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Abstract: We employ experimental economics techniques to gain insight into the factors that affect consumer susceptibility to fraudulent advertising. We asked participants to rate the credibility of a series of mock-ups of plausible and implausible print advertisements that we designed. We then measured a variety of economic, psychological, and demographic variables and examined their relationship with consumers' assessments of the credibility of plausible and implausible advertisements. Consumer literacy, impulsivity, numeracy, overconfidence, and skepticism were significantly associated with participants' credibility assessments of implausible ads.

1   INTRODUCTION

As part of its consumer protection mission, the FTC has brought hundreds of cases targeting fraud, and has committed significant resources to educational initiatives designed to protect consumers. The Commission hosted a Fraud Forum in 2009 to examine the extent of fraud in the economy, the methods that fraudulent actors employ, and the best practices to identify and prevent fraud.[1] The Commission has also conducted telephone surveys in 2003, 2005, and 2011 designed to measure the proportion of the U.S. adult population that has fallen victim to various consumer frauds.

This study is a preliminary and exploratory step toward a greater understanding of the determinants of susceptibility to fraud. Economic and psychological experiments have identified several decision-making biases that can cause systematically inaccurate assessments of the risks, costs, and benefits of various choices. In addition, other factors, such as consumer literacy or skepticism of advertising, may also contribute to consumers' assessments of an ad's credibility. In this study, we employ experimental economics techniques to gain insight into the factors that affect consumer susceptibility to fraudulent advertising.

In an artificial experimental setting, it is not plausible to identify participants who would actually fall victim to fraudulent offers. We therefore focused on what may be the first step in fraud victimization, whether an individual finds advertisements with implausible, "too good to be true" offers to be credible. Consumers who do not view implausible ads as credible may be unlikely to purchase the product and thereby fall victim to fraud. On the other hand, at least some of those who find implausible ads to be highly credible may be more likely to purchase fraudulent products. We asked study participants to rate a series of mock-ups of plausible and implausible print advertisements that we designed.

We designed four advertisements that typified the implausible claims found in fraudulent advertisements, inspired by examples from FTC casework. These advertisements involved product categories in which frauds and scams have previously occurred. We also designed versions of these implausible advertisements with plausible claims. For example, the implausible version of a weight loss advertisement touted a pill which delivered guaranteed weight loss of up to 2 pounds per day, whereas the plausible version simply advertised foods that "keep you feeling fuller longer" and made no specific weight loss claims. This research design enables us to examine whether subjects are skeptical of *any* weight loss ad, or skeptical solely of weight loss ads that promise guaranteed and significant weight loss. In addition, we designed four advertisements with plausible claims from typically non-fraudulent product categories. These four ads represent standard advertisements, and allow us to measure subjects' reactions to typical advertisements to determine if certain subjects are skeptical of all advertisements, regardless of product category.

At the beginning of the experiment, which involved a total of 254 subjects, participants viewed and rated the credibility of eight different advertisements: six ads with plausible claims and two ads with plausible claims. We next measured a variety of economic, psychological, and

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[1] Information on the Fraud Forum is available at: http://www.ftc.gov/bcp/workshops/fraudforum/index.shtm.

demographic variables and analyzed their relationship with subjects' credibility ratings of both plausible and implausible advertisements. We consider three research questions: (1) What characteristics are associated with subjects' credibility assessments of plausible advertisements? (2) What characteristics are associated with subjects' credibility assessments of implausible advertisements, and are these the same characteristics associated with credibility assessments of plausible ads? (3) What are the characteristics of subjects who rated the implausible advertisements as particularly credible, the group of individuals who are presumably the most likely to be actual fraud victims?

Previous work has examined the relationship of individual characteristics to fraud susceptibility. The FTC conducted nationally representative telephone surveys in 2003, 2005, and 2011 to determine the percentage of American adults that were victims of fraud. The 2011 survey (Anderson, 2013) asked 3,638 adults whether they were victims of each of seventeen different types of frauds. In 2011, an estimated 10.8% of Americans (25.6 million consumers) self-reported being victims of one or more of the frauds included in the survey. The survey also elicited demographic information from each participant. Individuals who reported themselves as being more willing to take risks and who had engaged in risky purchasing practices were more likely to be fraud victims. Those who had experienced a negative life event, such as divorce, death of a family member or close friend, a serious injury or illness in their family, or the loss of a job, in the last two years were also more likely to be fraud victims. Individuals who reported themselves as being more patient were statistically less likely to be fraud victims. Seniors (individuals aged 65 years and older) were statistically less likely to be fraud victims, with the exception of prize promotions for which individuals between 65 and 74 had the greatest likelihood of victimization. Hispanics and African-Americans were more likely to have been victims than non-Hispanic whites, though the difference between African-Americans and non-Hispanic whites is not significant after controlling for all other variables. Education, sex, income, and marital status were not statistically significant predictors of fraud victimization after controlling for all other explanatory variables.

The British Office of Fair Trading conducted a similar survey to measure the prevalence of fraud victimization in the U.K. (Office of Fair Trading, 2009). Ten percent of respondents self-reported victimization in the preceding 24 months. Further, the survey asked respondents how much they agreed with a variety of statements designed to measure psychological biases and judgment vulnerabilities. Fraud victims and non-victims displayed significant differences, based on univariate comparisons, for several of the survey measures. Fraud victims were more likely to think that the fraud was a scarce offer; that the fraudster liked the victim or was similar to the victim; that the fraud offered opportunities consistent with future life expectations; and that there was an authority behind the scam conferring trustworthiness. Fraud victims also responded that part of the reason they fell for the scam was that they responded to an initial offer and felt partially invested in the scam. Victims reported being drawn further into the scam because they felt committed to their previous investments. Correspondingly, victims reported spending *more* cognitive effort trying to understand scams than non-victims, as non-victims presumably dismissed scams based upon initial reactions and without further thought.

Shadel and Schweitzer-Pak (2007) examined the demographic and psychological characteristics of investment fraud victims and lottery fraud victims versus the general population. Univariate comparisons between the three groups reveal that investment fraud victims actually had greater financial literacy than the general population, who in turn had greater financial literacy than lottery fraud victims. Both investment and lottery fraud victims were more likely to have recently experienced a financial hardship, such as a decrease in income, job loss, or foreclosure, than general population members. Lottery fraud victims were more optimistic, impulsive, and distrusting of professionals than either investment fraud victims or the general population.

Our experiment builds upon previous work in several ways. One advantage of our study design is that all subjects viewed versions of ads for the same set of products, thereby ensuring that we are measuring subjects' reactions to an identical set of products. Further, previous work on individual characteristics and fraud susceptibility has been based upon retrospective self-reports. One limitation of retrospective surveys is that fraud victims may distort their memories about why they fell for a particular fraud in order to justify their previous actions. Alternatively, fraud victimization might alter an individual's beliefs or attitudes. Our experiment collects subjects' reactions in "real time," enabling us to measure the relationship between individuals' current characteristics and fraud susceptibility. Finally, our experiment delves deeper into some of the individual characteristics than previous studies. Previous studies frequently measured psychological characteristics with a single question, which may yield limited statistical power for detecting a relationship with fraud susceptibility. The greater time length of our experiment permits more in-depth questioning. We often used multiple questions to measure each psychological construct, yielding more precise estimates and greater statistical power. We frequently utilized measures drawn directly from the economic or psychology literature, permitting comparability with previous results.

2 DESCRIPTION OF EXPERIMENTAL METHODOLOGY

In this study, we measured individuals' characteristics and explore their association with susceptibility to implausible advertising. In this section, we describe our experimental setting and recruiting procedure. We next describe each component of the experiment and the rationale for its inclusion.

2.1 Experimental Setting and Recruitment Procedure

FTC Bureau of Economics staff designed the experiment instrument and contracted with George Mason University's Interdisciplinary Center for Economic Science (ICES) to conduct the experiment in their laboratory. All participants in the experiment were recruited via the ICES subject pool. The ICES subject pool consists of several thousand individuals who voluntarily joined the pool. Participants in experiments receive monetary compensation in the form of show-up fees and earnings in experiments. The ICES subject pool predominantly consists of current George Mason University students, along with a small percentage of alumni and non-university affiliated individuals. Student subject pools are typical for the economics and psychology literatures on the decision-making characteristics that we employ in this study.

The experiment was conducted over the course of 23 sessions from April through October, 2011. There were no eligibility restrictions other than excluding participants who had already participated. For each experiment session, an automated recruiting program randomly selected and e-mailed 75 individuals at a time, and accepted the first 25 who agreed to participate.[2] This procedure continued until at least 250 subjects had participated. In total, 254 subjects completed our experiment.

All participants completed the experiment at individual computer workstations in a common room in sessions with other participants for the same experiment. The experiment lasted up to 90 minutes. Participants earned an $8 show-up fee in addition to earnings based upon their decisions and performance in the experiment. Any individual finishing the experiment early was instructed not to leave, but to remain seated until all other participants in that session had finished.[3] The experiment design and instrument was approved by the Office of Management and Budget as well as George Mason University's Institutional Review Board.

2.2 Description of Experiment Components

The complete experiment instrument appears as Appendix A. Subjects completed each section in the order as it appears in the instrument.

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[2] Some individuals would agree to participate but then not show up for the experiment. The maximum number of individuals in one of our experiment sessions was 17.

[3] This instruction was necessary as one component of participants' compensation was based upon their performance relative to other individuals in the session, which could not be determined until everyone in the session had completed the experiment.

2.2.1 What We Seek to Explain: Ratings of Ad Credibility

The core task of the experiment was the elicitation of subjects' ratings of the credibility of various implausible and plausible advertisements. Each subject viewed simulations of eight print advertisements for eight different products on the computer screen in randomized order. Subjects rated each ad's believability, truthfulness, and deceptiveness separately on a seven-point scale. The average of subjects' ratings for these three questions serves as the main variable of focus throughout the study.[4] Subjects also rated how informative and appealing each ad was; these were merely filler questions to mask the focus on ad credibility. Subjects answered all five questions for each of the eight ads, and subjects completed each ad rating separately before viewing the subsequent ad.

We designed four advertisements with implausible, "too good to be true" claims as found in some fraudulent advertisements: an excessively lucrative work-from-home job, a memory-boosting drink, a "free" vacation offer requiring pre-payment of only "government taxes," and a pill guaranteed to result in weight loss.[5] Several of these implausible claims were ones that the FTC has previously warned consumers and the media are likely to be false or fraudulent. For example, the ad for the weight loss pill claimed that consumers would "lose up to 10 pounds per week" and that the product was "guaranteed to deliver permanent weight loss for everyone."[6] The ad for a Cancun vacation promised that consumers could "Enjoy a 4-Day, 3-Night Complimentary Luxury Resort Getaway FREE at Beautiful Regal Queen Resort" and

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[4] We reverse-coded participants' ratings for the deceptiveness of an advertisement before averaging these responses with the believability and truthfulness ratings.

[5] As part of the process of litigating allegations that an advertisement is deceptive under Section 5 of the FTC Act, either the Commission or a defendant may conduct a copy test to help determine the meaning that consumers take from the specific claims being challenged. In order to determine the meaning consumers take from the challenged claims, a copy test will often compare consumer interpretation of the ad that contains the claims with consumer interpretation of a control ad that is as much the same as possible, but does not contain the challenged claims. However, the task in this study was not to determine the meaning consumers take from specific claims. Rather, we were interested in examining how consumers' impressions of the overall credibility of ads varied by the consumers' characteristics. For this purpose, it was neither necessary nor particularly desirable to attempt to construct ads that differed only in the presence or absence of specific claims.

[6] See, *e.g.*, "Gut Check: A Reference Guide for Media on Spotting False Weight Loss Claims," Federal Trade Commission, available at http://www.ftc.gov/tips-advice/business-center/guidance/gut-check-reference-guide-media-spotting-false-weight-loss (visited 12 February 2015) ("To make it easier to spot false weight loss representations … the FTC has compiled a list of seven statements in ads that experts say simply can't be true." "1. causes weight loss of two pounds or more a week for a month or more without diet or exercise; 2. Causes substantial weight loss no matter what or how much the consumer eats; 3. Causes permanent weight loss even after the consumer stops using product …."). See also Direct Marketing Association, the Federal Trade Commission, U.S. Postal Inspection Service, "Screening Advertisements: A Guide for the Media" ("Screening Advertisements"), available at http://www.ftc.gov/tips-advice/business-center/guidance/screening-advertisements-guide-media (visited 11 February 2015), p. 7 ("Despite claims to the contrary, there are no magic bullets or effortless ways to burn off fat. The only way to lose weight is to lower caloric intake and increase physical activity. **Claims for diet products or programs that promise weight loss without sacrifice or effort are bogus. And some can even be dangerous.**" "The Buzz Words … "No Diet! No Exercise!, Lose 30 Pounds in 30 Days, "Eat Your Favorite Foods and Still Lose Weight," … "New Scientific / Medical Breakthrough").

repeats "Oh Yes! IT'S FREE."[7] The Commission has also brought numerous cases involving claims similar to the ones contained in these ads.[8]

Due to previous frauds, subjects may view any ad for one of these potentially fraudulent product categories with suspicion. For example, previous exposure to fraudulent ads touting miraculous weight loss might make an individual skeptical of any weight loss products, regardless of the claims made in the particular ad. In order to determine whether subjects are skeptical of the entire product category, or solely the "too good to be true" portion, for each of the four implausible advertisements above we also created a version of the ad that contained solely plausible claims. For example, the plausible version of the diet ad did not promise guaranteed weight loss but simply advertised foods that "help you feel fuller longer;" the plausible version of the vacation ad eliminated the "free" claim and instead stated a plausible room rate.

Finally, we also designed four advertisements representing typical advertisements for products not typically associated with fraudulent claims: a fleece blanket, a wireless mouse, an MP3 player, and pizza delivery. There are no matched implausible versions of these ads. We refer to these four ads as control ads, as they serve to measure subjects' baseline credibility judgments of advertising in general. Copies of all the ads used in the study are presented in Appendix B.

Each subject rated the credibility of eight different advertisements, chosen from among the twelve ads we developed: the four control ads, two ads with implausible claims, and two ads from the potentially fraudulent product category but with plausible claims. For each of the potentially fraudulent product categories, a given subject saw either the plausible or implausible version, but not both. The particular combination of plausible versus implausible ads was randomized between subjects.

Though we could have shown subjects solely the implausible ads and measured the association between credibility ratings and individual characteristics, such a design would prevent us from addressing several additional questions or critiques. One benefit of our experimental design is that it contains both plausible and implausible versions of ads for the

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[7] See, *e.g.*, consumer education in: "Tripping: Free Travel Offers to Anywhere Could Take You Nowhere Fast," Federal Trade Commission Consumer Information, available at www.consumer.ftc.gov/blog/tripping-free-travel-offers-anywhere-could-take-you-nowhere-fast-0 (visited 11 February 2015) and media advise in Screening Advertisements, p. 13 ("Fraudulent travel ads usually offer exciting opportunities at unrealistically low prices…. But ads for these 'free' or bargain-priced vacations often fail to disclose expensive 'catches' or restrictions that may render the deals worthless." Watch out for "A vacation offer accompanied by a certificate for free or very low cost travel.")

[8] Weight loss cases have included *FTC v. Genesis Today, Inc., et al.*, No. 1:15-cv-62 (W.D. Texas, Settlement January 2015), *FTC v. Kevin Wright, HCG Platinum, LLC, et al.*, No. 2:14-cv-00258-CS (D. Utah, Settlement December 2014), and *FTC v. SensaProducts, LLC, et al.*, No. 14-cv-00072 (E.D. Illinois, Settlement January 2014). Cases involving medical billing business opportunities have included *FTC v. Medical Billers Network, Inc., et al.*, No. 05 CV 2014 (S.D. New York, Settlement May 2009) and *FTC v. Mazzoni & Son, Inc., d/b/a EDI Healthclaims Network*, No. 06-15766 (E.D. Michigan, Settlement February 2008).

same product. The difference in average credibility ratings between the plausible and implausible versions of an ad yields the impact of implausible claims on credibility assessments. This design enables us to examine whether subjects are indeed responsive to implausible claims and are not simply displaying skepticism towards any ad in our artificial experimental setting. A further advantage of our experimental design is that each subject viewed both plausible and implausible advertisements. This design enables us to examine whether subjects who are disbelieving of implausible ads are simply displaying general skepticism towards any advertisements, or are significantly more skeptical of implausible advertisements.

We also explored one additional manipulation of the advertising claims. A substantial literature has documented the existence of framing effects (Tversky and Kahneman, 1981), whereby seemingly small manipulations in the way a question is phrased or presented may impact subsequent decisions. For example, Levin and Garth (1988) found that individuals rated ground beef more favorably when described as "75% lean" as opposed to "25% fat." To explore the impact of positive versus negative ad framings on credibility judgments, (and more importantly, any association between perceived credibility and individual characteristics) we created two different versions of both the implausible memory-boosting drink and its plausible energy-boosting counterpart. One version of each ad advertised the product as creating a positive benefit, and the other version advertised as reducing a detriment. For example, the "positive" version of the implausible memory-boosting drink advertised "boost your memory" and "increases memory retention," whereas the "negative" version advertised "eliminate memory problems" and "reduce forgetfulness." Half of the subjects viewed the positive version of the ad and the other half viewed the negative version, determined by random assignment.

2.2.2 Characteristics that May Affect Ad Interpretation

We examined whether the following individual characteristics are related to how individuals rated the credibility of the various ads in our experiment.

2.2.3 Optimism

Excessively optimistic consumers may be more susceptible to fraud because of unrealistic expectations about the performance of products that others would view skeptically. Puri and Robinson (2007) found that extreme optimists reported shorter financial planning horizons, were less likely to save, and held a greater portion of investments in individual stocks than did moderate optimists, even after controlling for demographics, risk tolerance, and health quality. Shadel and Schweitzer-Pak (2007) found that lottery fraud victims were more optimistic than the general population, though investment fraud victims were not.

We employed a measure of optimism from the psychology literature known as the Life Orientation Test – Revised (LOT-R), developed and validated by Scheier et al. (1994). The LOT-R consists of 10 questions: three measuring optimism (questions 1, 4, and 10); three measuring pessimism (questions 3, 7, and 9); and four filler statements (questions 2, 5, 6, and 8). Previous research (Herzberg et al., 2006; Glaesmer et al., 2012) has demonstrated that optimism and pessimism are actually two separate constructs, rather than two extremes of a single trait. The LOT-R thus permits measuring optimism by combining optimism and pessimism into a

single measure, or separately analyzing optimism and pessimism. Our combined measure of optimism is the average of responses to the optimism questions and reverse-coded pessimism questions, and our distinct measures for optimism and pessimism are the separate averages of each question set.

2.2.4 Consumer Literacy

Individuals with greater consumer knowledge should be able to filter out inappropriate products more effectively. We hypothesized that individuals with greater consumer literacy would deem implausible advertisements as less credible than would individuals with less consumer literacy. We devised four consumer literacy questions, and our measure of consumer literacy is the number of questions an individual answered correctly. In addition, we also examine the number of "Don't Know" responses to test whether individuals who are capable of admitting that they don't know an answer are less susceptible to fraud than those who incorrectly answer a question.

2.2.5 Cognitive Impulsivity – Cognitive Reflection Test

Impulsive individuals may take insufficient time to evaluate whether an offer is too good to be true, and hence may be more vulnerable to fraud and deception in cases where further reflection would have revealed the offer to be suspect. One measure of impulsivity is the cognitive reflection test (CRT). The CRT consists of three questions, each with a seemingly obvious, intuitive, but incorrect answer (Frederick, 2005). Answering a CRT question correctly typically requires a moment's pause to recognize that the initial intuitive answer is incorrect. We use the number of CRT questions answered correctly as our measure of impulsivity, with fewer correct answers reflecting greater impulsivity.[9] As in some of the other experimental components, we offered payments for correct answers to provide an incentive for subjects to think carefully about the questions. Subjects received $3 for each CRT question answered correctly.

2.2.6 Numeracy

Basic math skills may aid consumers in various marketplace decisions, including assessing the plausibility of claims made in advertisements. Gerardi et al. (2010) survey mortgage borrowers' numerical skills and demonstrate that individuals with lower numerical skills are more likely to be delinquent or default on their mortgages. This negative correlation between numerical skills and mortgage delinquency persists even after controlling for socio-demographic variables and mortgage characteristics. Smith et al. (2010) measure several

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[9] One noteworthy point is that there is an extremely low correlation ($r = -0.03$) between the length of time that subjects spent on the CRT section and the number of correct CRT answers. However, the length of time that subjects spend on the CRT section is an imperfect measure of impulsivity, as it depends upon reading and comprehension speed. We use the term "impulsive" to refer to a tendency to act upon one's initial instincts without re-consideration and not one's reaction or response speed.

different types of cognitive skills and find that, among the different dimensions of cognitive skills, numeracy is by far the best predictor of household wealth.

We measured subjects' numerical skills to test whether more numerate subjects rated the implausible advertisements as less credible than did subjects with less numerical skills. We employed the same five-question numeracy measure used in Banks and Oldfield (2007) and Gerardi et al. (2010). Specifically, we constructed the same numerical skills index suggested by Banks and Oldfield (2007), which sorts individuals into four separate groups of increasing numerical skill based on their responses to these five questions. We also included two additional questions focusing on expected value calculations. The first question's calculation involved two positive numbers, and the second and more difficult question's calculation involved a positive and a negative number. Subjects received $3 for each numeracy question answered correctly.

2.2.7 Confirmation Bias – Wason Selection Task

Confirmation bias refers to the tendency to favor information that confirms one's prior beliefs. Confirmation bias manifests in several different forms, such as interpreting ambiguous evidence as support for one's position, discounting evidence which contradicts one's prior beliefs, or searching for evidence in a biased manner. Confirmation bias may lead "on the fence" individuals who greatly wish for an offer to be true to seek out or focus disproportionately on aspects of the offer that seem legitimate, rather than search for disconfirming evidence.

Our measure of confirmation bias is the Wason Selection Task (Wason, 1971). The original version of the test is a logic puzzle involving cards with colors on one side and letters on the opposite side. Individuals must determine which of four cards to turn over to test the veracity of a rule such as "if a card has a vowel on one side, then the color on the opposite side is red." Wason (1971) found that the vast majority of individuals answered incorrectly, as most individuals chose pieces of evidence that could solely confirm the proposed hypothesis, rather than searching for the diagnostically informative disconfirming evidence. Previous research has identified that the Wason Selection Task is highly context-dependent (Cosmides and Tooby, 1992). For our context, we modified the Wason Task from its original abstract setting to a specific context involving which pieces of evidence to seek out to determine if a particular claim about a product made by an unknown company is false. Our measure of confirmation bias is a binary variable denoting whether an individual correctly answered our modified Wason Selection Task, with an incorrect answer suggesting a greater degree of confirmation bias. Subjects received $3 for answering this question correctly.

2.2.8 Overconfidence

A large literature documents the existence of overconfidence bias, a general term denoting when an individual overestimates his ability. Moore and Healy (2008) distinguish between three different forms of overconfidence: overestimation, the belief that one's ability, performance, or knowledge is greater than it actually is; overplacement (also known as relative overconfidence or the "better-than-average" effect), the belief that one's position in the ability distribution is higher than one's actual position; and overprecision, the belief that one's forecasts or judgments are more accurate than actuality.

Each of the above forms of overconfidence may lead consumers to be overconfident in their ability to assess the legitimacy of advertising claims. Overestimation and overprecision may lead consumers to overestimate the certainty of their assessments, resulting in increased vulnerability to deceptive ads when consumers incorrectly perceive an implausible ad as credible.[10] Overplacement may cause a consumer to believe that he is better than others at spotting frauds, and think that falling for frauds is something that could only happen to other people.

We employed two measures of overconfidence.   First, after the block of CRT questions, and after each of the numeracy and confirmation bias questions, we asked individuals how likely it was that their answer to the previous question was correct. After subjects had completed all confidence estimations, we asked subjects to estimate how many of the eleven CRT, numeracy, and confirmation bias questions they thought they answered correctly. The computer program calculated and displayed how many correct answers were implied by the self-reported confidence judgments. Subjects then had a chance to agree with this implied estimate or provide a different answer. We use the difference between the number of questions a subject thinks he answered correctly minus the number he actually answered correctly as a measure of absolute overconfidence, a combination of overestimation and overprecision. For our second overconfidence measure, we asked subjects to estimate whether their score on the preceding eleven questions was in the top third, middle third, or bottom third of subjects' scores in the current experimental session. We use the difference between a subject's predicted tercile minus his actual tercile as the measure of relative confidence or overplacement. Subjects received $2 for accurately predicting their total score and $2 for a correct tercile prediction.

It is important to note that, though described above in the context of overconfidence, both measures also permit underconfident judgments as well, if a subject forecasts answering fewer questions correct or a lower tercile than actuality. A second caveat, inherent to the measurement of overconfidence, is that there is less potential for individuals with high ability to exhibit overconfidence. For example, a subject with perfect performance cannot be overconfident, and a subject who answered one question incorrectly can be overconfident by at most one question. As our overconfidence measure is derived from expected performance on the CRT, numeracy, and confirmation bias sections, there is by construction a negative correlation between the overconfidence measures and numeracy among the highly numerate individuals.[11]

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[10] Overestimation and overprecision may aid in fraud avoidance if consumers accurately perceive an implausible ad as not credible, as the increased certainty serves to strengthen this correct assessment. These biases also exacerbate excessive skepticism and may lead consumers into forgoing beneficial non-fraudulent products if the consumer incorrectly judges these products as not credible.

[11] Similarly, individuals with very low numeracy scores may have censored under-confidence. However, given the systematic tendency for individuals to err towards overconfidence rather than underconfidence, this does not pose an issue. For example, in our data we estimate that 7% of individuals were underconfident whereas we estimate that 80% of individuals were overconfident.

2.2.9 Risk Preferences: Risk and Loss Aversion

Risk-averse consumers may be less susceptible to fraud if they are less willing to take a chance on whether a product will work as promised. Conversely, risk-seeking consumers may be more willing to take chances on unknown products and therefore may be more likely to be fraud victims. Another psychological phenomenon related to decisions involving risk and uncertainty is loss aversion, the attachment of greater importance to a loss than of a similarly sized gain (Kahneman and Tversky, 1979). For example, losing $100 frequently carries a bigger emotional impact (in absolute value) than gaining $100. The impact of loss aversion yields ambiguous predictions for fraud susceptibility. Particularly loss-averse consumers may be less susceptible to fraud if they place great importance on the money lost from purchasing a product that fails to live up to expectations. On the other hand, loss-averse consumers may be more susceptible to certain types of frauds that promise protection from losses, such as fraudulent preventative health products or stolen credit card liability insurance.

We measured risk and loss aversion by presenting subjects with five series of choices. Each series consisted of choices between either receiving (or losing) a certain fixed amount of money versus a gamble between receiving (or losing) a smaller or larger amount of money (Holt and Laury, 2002). Typically subjects will choose the risky option for a portion of the choices and switch to the certain choice for the remainder. Switching between the risky option and the certain choice implies that the subject was indifferent at some point along the interval between the two rows, which defines a range of values for a risk aversion parameter. We assumed that subjects were indifferent between the risky and certain choice at the mid-point between the values at which a subject switched from certain to risky choices. For example, if a subject preferred a 50% chance of $20 to a certain $8, but preferred a certain $9 over a 50% chance of $20, we assumed that a subject was indifferent between $8.50 and a 50% chance of $20.[12]

Our choices involve several gambles containing both gains and losses, which permits separate measures of risk- and loss-aversion. We assumed each subject had constant relative risk aversion utility with loss aversion, such that utility for outcome x is given by:

$$u(x) = \begin{cases} x^\alpha & \text{if } x \geq 0 \\ -\lambda(-x^\alpha) & \text{if } x < 0 \end{cases}$$

The parameter α denotes risk tolerance and the parameter λ captures loss aversion. Values of α less than one imply risk aversion, and values of λ greater than one imply that a loss has a greater impact than a gain of identical magnitude. We used non-linear least squares to best-fit a

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[12] If a subject never switched between risky and certain options, but for example always chose the certain row, then we assumed that he was indifferent at the most extreme certain row. If a subject switched between risky and certain options multiple times (violating preference monotonicity), we utilized the mid-point between the final switching rows as our measure of indifference. For tables 1 and 2, 83% of subjects exhibited either zero or one switches between certain and risky choices, and 90% of subjects exhibited either zero or one switches for tables 3, 4, and 5. Seventy-three percent of subjects exhibited no monotonicity violation across any of the five series of choices. These magnitudes are closely consistent with other studies, such as Holt and Laury (2002); Lusk and Coble (2005); and Anderson and Mellor (2008). Our conclusions about the effect of risk preferences on fraud susceptibility are robust to either utilizing the first observed switch between risky and certain choices as our indifference measure or to excluding subjects who exhibited multiple switches on any of the five risky choice series.

subject's indifference points that were derived from the five series of choices to obtain a measure of risk- and loss-aversion for each subject. We use these parameters to explore the relationship between risk- and loss-aversion on fraud susceptibility. In addition, we test whether more loss-averse subjects are more responsive to the positive/negative framing effect described in the Ad Rating Task section.

Subjects were informed that, for each of the five choice series, we would randomly select one row and subjects would receive the monetary gain or loss indicated in their chosen option for the row. If a subject preferred the risky option for the selected row, then the computer program would randomly determine the outcome of the risky option.

Dohmen et al. (2010) demonstrated that risk attitudes are not universal across all domains, but are partially domain-specific. For example, an individual's risk tolerance for financial matters may differ from his risk tolerance for health-related matters. However, the authors found that a general, context-free risk question does a reasonable job of predicting risky behavior across all domains. Our methodology described above elicits risk preferences over monetary outcomes, but some of the advertisements used in the study pertain to non-monetary outcomes. As such, we also included the general risk question used in Dohmen et al. (2010) to explore the relationship of non-monetary risk preferences with fraud susceptibility. Our measure of general risk preference is a subject's response to the question "How willing are you to take risks in general?" measured on a 0 to 10 scale.

2.2.10 Time Preferences: Impatience and Present-Bias

When considering outcomes that occur in the future, many individuals exhibit impatience and prefer to receive positive outcomes earlier and negative outcomes later. Some individuals also exhibit a form of time-varying impatience known as present bias, placing a disproportionate weight on immediate costs and benefits compared to future outcomes. Since the immediate present is continually shifting, present-biased individuals may regret previous choices or fail to enact plans. Previous research has demonstrated that present-bias contributes to self-control problems such as procrastination (O'Donoghue and Rabin, 1999); over-eating (Courtemanche et al., 2015); excessive debt accumulation (Meier and Sprenger, 2010); and insufficient retirement savings (Hastings and Mitchell, 2011).

Impatient and present-biased individuals may be particularly vulnerable to certain types of frauds, such as get-rich-quick schemes or miracle weight loss plans, which emphasize immediate results with little effort. The 2011 Fraud Study (Anderson, 2013) found that individuals who described themselves as relatively patient were less likely to be fraud victims compared to impatient individuals.

We measured impatience and present-bias using a similar methodology to the risk preference elicitation method. Subjects viewed three series of choices; each series contained several choices between receiving a smaller amount of money at an earlier point in time versus a larger amount of money at a later point in time. We observed subjects' choices between

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receiving money today versus in two months; receiving money today versus in four months; and receiving money in two months versus in four months. Similar to the risk preference elicitation method, the typical pattern was for individuals to choose the smaller but sooner amount for a portion of each choice series and switch to the larger but delayed amount for the remainder. We assume an individual was indifferent at the mid-point between the row at which he switched from preferring a sooner to delayed payment.[13]

This method allows us to decompose a subject's choices into separate impatience and present-bias components. We assumed subjects evaluated future options according to a quasi-hyperbolic discount function, discounting delayed options occurring in τ months by $\beta\delta^{\tau}$. The parameter β denotes present-bias (also referred to as time-inconsistent impatience, or short-run impatience) and the parameter δ denotes traditional, time-consistent impatience (also referred to as long-run impatience.) If $\beta = 1$ then the quasi-hyperbolic discounting reduces to traditional, time-consistent discounting, whereas $\beta < 1$ reflects present bias. Smaller values of δ indicate greater discounting of future outcomes and greater impatience. For each subject, we calculate the present bias β and impatience δ which best-fit his indifference points for the three series of time preference questions.

We informed subjects that the computer program would randomly select one out of thirty subjects. For each of these chosen individuals, the computer program randomly selected one row among the three choice sets, and these subjects received their chosen option for the row. If a subject chose a delayed option, the subject received a post-dated check for that amount of money. In order to equalize transaction costs between immediate and delayed options and prevent subjects from choosing immediate options solely to avoid the hassle of cashing a check, subjects choosing an immediate option were told that they would receive a check for the appropriate amount that could be cashed immediately.

2.2.11 General Skepticism of Advertising

The majority of consumers approach advertising with skepticism (Calfee and Ringold, 1994). Consumers who are skeptical of all advertising may be less susceptible to fraud simply because they discount the claims made in any advertisement. We measured skepticism towards advertising in general with a series of nine questions developed and validated by Obermiller and Spangenberg (1998). We use the average of a subject's responses to all nine questions as our general skepticism measure.

2.2.12 Situational Skepticism

In contrast to a general skepticism of advertising, some consumers may be selectively skeptical and exhibit particular skepticism in situations where additional skepticism is warranted. Such situational skepticism might not pertain to traditional, non-fraudulent advertising but may

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[13] Similar to the risk preference elicitation, if a subject never switched between the smaller sooner option and larger delayed option, we assumed indifference at the most extreme displayed option. If a subject exhibited multiple switching points we utilized the final switching rows. Ninety-six percent of subjects satisfied preference monotonicity on all of the time preference choice series.

make consumers less susceptible to fraudulent and deceptive advertisements, which frequently contain cues that the product is too good to be true. We measured situational skepticism with a nine-question scale that we developed. Our situational skepticism scale elicits subjects' attitudes about scenarios with a higher potential for fraud, such as advertisements on late-night television, advertisements requiring urgent action, and advertisements by unknown companies. We use the average of a subject's responses to the nine questions, reverse-coded when appropriate, as our measure of situational skepticism.

2.2.13 Demographics and Educational Background

We asked subjects to report their age, sex, race, and ethnicity. This permits us to examine and control for any relationship of basic demographics to fraud susceptibility. In addition, this enables us to explore the diversity and representativeness of our sample.

We also asked subjects to report their college entrance exam scores and educational background. We converted subjects' raw SAT scores into its percentile ranks. In some specifications we include this SAT percentile rank as a measure of general cognitive ability, as previous research has demonstrated a strong correlation between SAT scores and general intelligence test scores (Frey and Detterman, 2004; Beaujean et al., 2006; Koenig et al., 2008). One limitation is that we are relying upon self-reported SAT scores, which may be biased due to memory or self-image effects. However, Mayer et al. (2007) compare individuals' self-reported SAT scores to their actual scores and find that, while over-reporting is more common than under-reporting, on net there is a strong overall correlation ($r = 0.82$), indicating a high validity of self-reported scores. A second and more serious limitation of our SAT score data is that only 40% of our subjects reported an SAT score. We thus imputed the SAT score, using all other covariates, for any subject with a missing score. Given that the imputed SAT scores are based upon a relatively small sample of the 104 individuals who reported their scores, any direct relationship between SAT percentile and fraud susceptibility should be interpreted with caution. Instead, the main advantage of including SAT percentile is to estimate more precisely our other variables of interest, by ensuring that the knowledge questions or psychological biases are not simply proxying for general cognitive skills.[14]

We also elicited subjects' education level and major. We used this information to construct a binary variable indicating if a subject was a graduate student. We also constructed two binary variables indicating whether a subject was an economics or business major, and whether a subject majored in a science, technology, engineering, or mathematics (STEM) field.[15]

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[14] Our conclusions are robust to omitting SAT percentile from the regressions.

[15] We also included four questions intended to serve as direct measures of self-control and procrastination. However, at least one question was not applicable for a large portion of subjects, rendering a self-control index based upon all four questions invalid. In unreported analyses we included the individual self-control responses as covariates, but none of these results were ever significant or meaningfully impacted other variables. We do not include these responses in any of the reported results.

3   ANALYSIS AND RESULTS

In this section we present the results of the experiment. We first present a summary of subjects' earnings and time spent on the experiment. We then discuss subjects' ratings of the ads that they viewed. Next, we summarize all explanatory variables used in the analysis. Finally, we address the three main questions of our experiment. First, what characteristics are related to individuals' credibility ratings of plausible advertisements? Second, what characteristics are related to individuals' ratings of implausible advertisements, and are these the same characteristics that predict assessments of plausible ads as well? Finally, what characteristics are most prevalent among the individuals with presumably the highest likelihood of fraud victimization, the individuals who judged the implausible advertisements as highly credible?

3.1 Earnings and Time Spent on the Experiment

A subject's earnings consists of the $8 participation fee, $3 for each correctly answered cognitive reflection test (CRT), numeracy, and confirmation bias question, $2 for each correct overconfidence prediction, and the value of the subject's choice from a randomly selected row for each of the five elected risk preference questions. In addition, one out of thirty subjects received either the smaller, sooner amount or the larger, delayed amount from a randomly selected time preference question, depending on the subject's choice for that question. Subjects earned a mean of $28.40 and a median of $26.00 for participating in the 90-minute experiment. Figure 1 presents a histogram of the total amount of time subjects spent on the experimental tasks.[16] On average, subjects spent 38 minutes on the experiment. Importantly, Figure 1 reveals that the time subjects spent on the experiment was roughly normally distributed, indicating that our results are not skewed by subjects who sped through the experiment as quickly as possible.

3.2 Ratings of Advertisement Credibility

We utilize the average of an individual's believability, truthfulness, and reverse-coded deceptiveness ratings as our measure of an individual's credibility assessment for that ad.[17] Table 1 reports the average of the ad credibility ratings for each of the different ads, and Figure 2 depicts these average credibility ratings. Figures 3 and 4 depict the distribution of credibility ratings of each ad.[18] Subjects rated the ads' credibility on a seven-point scale. A rating of one indicates that a subject thought the ad was extremely incredible; that is, the ad was "completely unbelievable," "completely untruthful," and "completely deceptive." A rating of seven indicates the subject thought the ad was extremely credible; that is, the ad was "completely believable," "completely truthful," and "completely non-deceptive."

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[16] The computer program did not properly save the time data for 49 subjects. These figures are based on the time data for the remaining 205 subjects.

[17] A principle components analysis of the responses to these three questions reveals that 84 percent of the variation in the three questions is explained by a single factor and that this factor consists of the three responses weighted essentially equally.

[18] In Figures 3 and 4, ad ratings have been rounded to the nearest whole number.

In general, the ads worked as we had anticipated. There is significant variation within each of the three types of ads. Among the implausible ads, the average ratings range from 2.0 for the implausible drink ad to 2.8 for the implausible vacation ad.[19] Of the four implausible ads, only the vacation ad received the maximum credibility rating of seven from at least one subject.[20] In 23 percent of instances in which subjects viewed an implausible ad, the ad was rated a 1.0, extremely incredible.

For the four plausible versions of the ads for these same products, the average ratings ranged from 3.1 for the plausible diet ad to 5.5 for the plausible job ad.[21] With the exception of the plausible diet ad, at least one person viewing each of the plausible ads rated the ad a seven, completely credible. For both the plausible job and vacation ads, the lowest credibility rating was 1.67.

There were also significant differences across the average ratings of the four control ads. The average ratings for the control ads ranged from 4.7 for the MP3 player to 5.6 for the pizza ad.[22] Each of these ads was rated at credibility of seven by at least one subject. The lowest ratings given to the blanket and mouse ads were 1.33, and the lowest ratings given to the MP3 and pizza ads were 1.0.

Importantly, there are significant differences in the average credibility ratings between the three types of ads. Our manipulations to create plausible versions of the implausible ads worked as intended. For all products with both a plausible and implausible version of the ad, subjects rated the implausible versions of the ads as significantly less credible than their matched plausible versions.[23] The average credibility rating of the four implausible ads was 2.4, whereas the average credibility rating of the plausible versions of these ads was 4.4. Both the implausible ads and the plausible versions of these ads were rated as significantly less credible than the control ads, which had an average credibility rating of 5.1 across the four ads.

The range in average ratings across the four implausible ads, 0.8 points, is relatively narrow compared to the range across the four plausible ads for these same products, 2.4 points. Subjects rated the plausible versions of the job offer and the vacation ads to be roughly as credible as the four control ads, generating a large credibility gap between the implausible and plausible versions of these ads. By contrast, subjects rated the plausible versions of the energy drink and diet plan ads as less credible than the control ads, generating a relatively small gap between the plausible and implausible versions of these ads.

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[19] A test for differences (excluding any covariates) in the ratings of the implausible drink ad depending upon whether the ad was framed positively or negatively failed to reject the null hypothesis of no difference ($p = 0.39$). Similarly, we cannot reject the null hypothesis of no difference in ratings between the positively and negatively framed versions of the plausible drink ads ($p = 0.78$).

[20] We can reject the null hypothesis that the four implausible ads had identical ratings ($p < 0.0001$).

[21] We can reject the null hypothesis that the four plausible ads had identical ratings ($p < 0.0001$).

[22] We can reject the null hypothesis that the four control ads had identical ratings ($p < 0.0001$).

[23] A test for whether the credibility ratings of all implausible ads differed from the matched plausible versions was highly significant ($p < 0.0001$), and even the diet ad, the ad with the least dramatic difference in credibility ratings between its implausible and plausible versions, was significant with $p < 0.001$.

3.3 Summary Statistics for Explanatory Variables

Table 2 presents a description of all explanatory variables and their summary statistics. On average, subjects answered 2.1 of the four consumer literacy questions correctly. Subjects answered an average of 1.6 of the three CRT questions correctly, slightly greater than Frederick's (2005) sample average, though still well within his sample range. Our subjects were on average much more numerate than the representative sample of U.S. adults surveyed in the Commission's 2011 fraud survey; 51% of our subjects were in the highest numerical skill category and 18% were in the second highest group.[24] Eighty percent of subjects answered the simple expected value problem correctly, 36% answered the more difficult expected value problem correctly, and only 22% answered the confirmation bias problem correctly. Subjects were on average overconfident, overestimating their performance on the eleven CRT, numeracy, and confirmation bias questions by an average of 1.9 correct answers. Fifty-seven percent of subjects correctly guessed their relative performance tercile, which is notably higher than chance, but 34% over-estimated by one tercile and 6% over-estimated by two terciles.

Approximately 10% of our subjects revealed infinite loss aversion, requiring an extremely high loss aversion parameter to best-fit their risky choices. We employed a variety of strategies to account for these subjects, such as truncating their loss aversion parameter at five or ten, dropping these subjects, and fitting their responses using a univariate measure of risk tolerance. The presented summary statistics truncate loss aversion at a maximum value of ten, but we note that our regression results with respect to loss aversion were ultimately very sensitive to our method of accounting for these infinitely loss-averse subjects and are typically not robust across the various truncation methods. Somewhat surprisingly, subjects were on average perfectly time-consistent, with an average present-bias parameter β equal to 1.0. However, subjects exhibited extreme (albeit time-consistent) impatience, with an average monthly discount factor δ of 0.88, implying an almost 400% annual interest rate.

Our subjects were by no means nationally representative: 66% of our subjects were male and 44% were graduate students. Fifty-four percent of our subjects were Asian, 34% were non-Hispanic whites, 5% were black, 4% were Hispanic, and 3% reported multiple racial categories.[25] Ten percent of subjects were economics or business majors, and 33% were majors in one of the science, technology, engineering, or mathematics (STEM) fields. Though we can

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[24] In the 2011fraud survey, seven percent of U.S. adults were in the highest numerical skill group and fifteen percent were in the second highest group (Anderson, 2013). The numeracy of our sample also exceeds that of Banks and Oldfield's (2007) sample of English adults aged 50 and over. In their sample, 11% of respondents were in the highest numerical skill group and 26% were in the second highest group.

[25] Our sample is also not representative of the George Mason University "GMU" student body. While 66 percent of our sample was male, only 45 percent of the GMU student body is male. Only 36 percent of the student body are graduate students, compared to 44 percent of our sample. Finally, only 13 percent of the GMU student body is Asian-American, compared to 55 percent of our sample. (See "George Mason University, Fall 2011 Official Census Student Enrollment by Demographic," available at http://irr.gmu.edu/off_enrl/StuEnrl/EnrlSide1.cfm?term=cen2011F.)

control for these observable characteristics in our regression specifications, there is no guarantee that our results would generalize to a nationally representative sample.

3.4 Characteristics Related to the Credibility Assessments of Plausible Advertisements

Table 3 presents the results of an Ordinary Least Squares (OLS) regression pertaining to individuals' credibility assessments of the plausible advertisements. The dependent variable is an individual's credibility ratings for each of the four control advertisements and two plausible versions of implausible ads, yielding six observations per person. Because we utilize multiple observations per person, we cluster standard errors by individual in all analyses throughout the study. The coefficient on each regressor implies the effect of a one-unit change in that variable on the average credibility rating of plausible advertisements, after controlling for the effects of all other included regressors.

Specification (1) presents the results using solely the economic and psychological variables as regressors. Specification (2) includes a fixed effect for each ad to account for the heterogeneity in ratings across ads. Finally, specification (3) adds the demographic variables.[26]

We find a positive and statistically significant effect of cognitive reflection scores on credibility ratings of plausible advertisements, implying that less impulsive individuals rate plausible ads as more credible than impulsive individuals do. For example, specification (3) implies that answering an additional cognitive reflection question correctly is associated with rating the plausible advertisements 0.12 units more credible, relative to the 1-7 credibility scale. Individuals in higher numeracy skill categories rated the plausible ads as significantly more credible than did individuals in lower numeracy skill categories. Further, answering the more difficult expected value question and the confirmation bias question correctly were positively associated with credibility ratings at marginal significance levels.

We find a highly significant and positive effect of absolute overconfidence. Also, as expected, more skeptical individuals, as measured by the general skepticism scale, rated ads as significantly less credible. Somewhat surprisingly, even the situational skepticism measure is negatively related to plausible credibility ratings, though the result is only marginally statistically significant. One noteworthy finding is the robustness of the above relationships. Inclusion of ad fixed effects and demographics has very little impact on the coefficients across specifications.

We find no robust significant relationship of optimism, risk preferences, or time preferences with plausible ads' credibility ratings. Greater consumer literacy is associated with higher credibility ratings for the plausible ads at marginal statistical significance levels. Asian subjects rated the plausible ads as less credible than did non-Hispanic whites, but none of the

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[26] Seventeen subjects did not respond to the race or ethnicity demographics questions, and an additional nine subjects did not respond to the graduate student status question. As such, specifications that include demographic information are based upon the responses of 229 individuals rather than the full sample of 254 individuals. The distribution of subjects' ages was sufficiently compressed and correlated with graduate student status that we do not utilize age as a regressor.

other racial indicator variables is significant. There are no statistically significant effects of SAT percentile, graduate student status, or the college major variables.

One concern about the analysis of the plausible ads might be our inclusion of the plausible versions of implausible ads. Though the plausible versions of these ads do not contain implausible claims, participants still rated the plausible versions of the diet and drink ads as significantly less credible than the four control ads.   Pooling the plausible versions of the implausible ads together with the four control ads is problematic if different factors affect individuals' credibility assessments of each type of ad.

We address this concern by repeating the analysis but defining the plausible ads as solely the four control ads (blanket, mouse, MP3, and pizza ads). Specification (4) of Table 3 presents these results. The results are relatively unchanged: we still find positive and significant effects of cognitive reflection score, numerical skill category, and absolute overconfidence on the credibility ratings of the four control ads. The general skepticism index and situational skepticism, however, are no longer significantly correlated with the ratings of the four control ads although they retain their negative sign. We also find that greater consumer literacy rate and answering the confirmation bias question correctly is associated with higher credibility ratings for the four control ads.

3.5 Characteristics Related to Credibility Assessments of Implausible Advertisements

We now turn to the second question of this study: which characteristics are related to individuals' credibility assessments of implausible advertisements? Each subject viewed and rated two implausible advertisements, and Table 4 presents the results of an OLS regression using these credibility ratings with two observations per subject. Specification (1) includes solely the economic and psychological variables. Specification (2) adds fixed effects for each different ad that subjects viewed. Specification (3) adds demographic variables for subjects with non-missing demographic information. Specification (4) includes an individual's average rating of the four control ads as an additional regressor. This specification allows us to examine the relationship between an individual's rating of plausible ads and implausible ads, as well as to address the concern that some individuals may simply deem all ads, plausible or implausible, as unbelievable.

Individuals with greater consumer literacy rated the implausible ads as less credible. Across the various specifications, each additional consumer literacy question answered correctly implies a .15 to .17 unit decrease (relative to the 1-7 scale) in the implausible ads' credibility rating. Overconfidence was associated with assigning higher credibility ratings to the implausible ads. In contrast to the plausible ad ratings, which were associated with an individual's absolute overconfidence (i.e., overestimation), ratings of implausible ads were associated with an individual's relative overconfidence or overplacement. Our situational skepticism measure was strongly associated with an individual's rating of implausible ads. For example, specification (3) implies that each additional point on our situational skepticism

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measure was associated with rating the implausible ads as 0.53 units less credible. Interestingly, individuals' general skepticism was uncorrelated with ratings of implausible ads, regardless of whether or not we controlled for situational skepticism. We find no statistically significant relationship between the implausible ads' credibility ratings and optimism, risk preferences, or time preferences.[27] None of our demographic variables (sex, race and ethnicity, whether one was a graduate student, or college major) were significantly associated with the credibility ratings of the implausible ads. An individual's rating of the four control ads was not significantly associated with his rating of the implausible ads.

We also find two unexpected results: the coefficients for cognitive reflection score and a correct answer for the more difficult expected value question were both positive and statistically significant. Though we hypothesized that less impulsivity and more numeracy would be associated with lower credibility ratings for implausible ads, in fact, these traits were associated with higher credibility ratings.

The first three columns in Table 5 present the results of OLS regressions for the implausible ads analyzing the three credibility measures of believability, truthfulness, and (reverse-coded) deceptiveness as separate dependent variables, rather than averaging the three measures into a single index. The results of the separate credibility measures analysis comport well with the results based upon the averaged credibility measures. The effects of cognitive reflection score, answering the harder expected value question correctly, and situational skepticism are relatively uniform across the three separate credibility measures. Consumer literacy is most significantly related to the deceptiveness rating, and relative overconfidence is most significantly associated with the believability rating, though the coefficients for each of these explanatory variables retain the same sign across all credibility measures.

One concern that could be raised about our findings is that they may not be due to actual differences in subjects' credibility perceptions, but rather due to differences in their use of the numerical credibility rating scale. For example, if more numerate individuals are more willing to assign credibility ratings over the entire range of the rating scale, whereas less numerate individuals use solely the bottom half of the rating scale, then this heterogeneity could cause our finding that more numerate individuals rate implausible ads more highly than less numerate individuals. In assessing this concern, it is important to note that the deceptiveness rating was reverse-coded relative to the other credibility measures. The high degree of similarity between predictors of deceptiveness versus predictors of believability and truthfulness indicates that our results are not simply artifacts of the numerical rating scale. We further address this concern via falsification tests in which we analyze subjects' ratings to the two "filler" questions of how informative and how appealing each ad was. If our previous results are simply reflecting differences across subjects in their use of numerical rating scales (or any other unobserved factor), then the same regressors that are predictive of implausible ads' credibility ratings should also be significant for these ads' informativeness and appeal ratings. The last two columns of

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[27] Decomposing optimism into separate measures of optimism and pessimism also yielded insignificant results for both the plausible and implausible credibility ratings. Including solely the general risk measure, or solely the loss- and risk-aversion parameters, to avoid potential multicollinearity still yielded insignificant results for all risk measures.

Table 5 present these results. The falsification tests support the conclusion that our analysis of credibility ratings is capturing genuine differences in credibility assessments. Consumer literacy, cognitive reflection score, and correctly answering the harder expected value question are not significantly associated with an individual's rating for either how informative or appealing each ad was. Relative overconfidence and situational skepticism were significantly related to an ad's informativeness rating. This partial overlap between predictors of credibility and informativeness is not surprising, if individuals rate implausible advertising as less informative than plausible advertising. Relative overconfidence was not significantly related to the rating of an ad's appeal, and situational skepticism was marginally statistically significantly related to this rating.

3.5.1 Analyzing the Unexpected CRT and Numeracy Findings

We now address our unexpected finding that less impulsive and more numerate individuals rated the implausible ads more highly than did individuals with more impulsivity and less numeracy. One concern is that these unexpected results might be due to our non-representative subject pool. A high proportion of our subjects were graduate students. If, for example, graduate students are both more numerate and more trusting of all ads, then the impact of numeracy on credibility assessments will appear over-stated relative to studies based upon a nationally representative subject pool. Though we controlled for graduate student status in the specification that includes demographics and found no significant relationship between being a graduate student and ad credibility ratings, any omitted variable correlated with both numeracy and credibility might be driving the unexpected results. To address this concern, we ran separate regressions for the graduate students and undergraduate students, and tested the equality of the explanatory variables' coefficients between the two specifications. The effect of CRT on credibility ratings was positive and significant for graduate students, and positive though insignificant for the non-graduate student sample. However, we cannot reject the null hypothesis that the graduate versus non-graduate CRT coefficients were equal to each other ($p = 0.68$). The coefficient for correctly answering the harder expected value question was positive but insignificant for the undergraduate sub-sample, and positive and significant for the graduate sub-sample. The difference between the undergraduate's and graduate's numeracy coefficients was statistically significant ($p = 0.02$), suggesting that the high fraction of graduate students in our sample is over-stating the effect of numeracy on implausible ads' credibility ratings. Though we cannot conclude that our CRT result is due to subject pool composition, the surprising numeracy result may not remain significant with a more nationally representative sample.

Another concern is that our unexpected impulsivity and numeracy results might be due to the mechanical negative correlation between overconfidence and the CRT, numeracy, and confirmation bias scores. For example, if greater overconfidence is genuinely positively correlated with credibility ratings, and since in our set-up highly numerate individuals cannot express overconfidence about their numeracy, then these numeracy effects might simply be proxying for the inexpressible overconfidence of the individuals with high numeracy.

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We address this concern in two ways. First, we re-ran the analysis including solely individuals who got eight or fewer questions correct out of the eleven CRT, numeracy, and confirmation bias questions, as these individuals were relatively unconstrained on the overconfidence measure. These individuals' scores represent the 63rd percentile of our sample for these questions. The coefficients for the CRT and more difficult expected value question are relatively unchanged and still significant. Second, we repeated the analysis on all individuals, now omitting both the absolute and relative overconfidence measures. If the unexpected numeracy and impulsivity results are simply proxying for a lack of an overconfidence measure among highly numerate individuals, then we should expect these coefficients to lose significance when overconfidence is omitted. Both the CRT coefficient and the expected value coefficient exhibit a statistically significant decrease in magnitude after omitting overconfidence, relative to the specification that includes overconfidence. However, both the CRT and expected value coefficients remain positive and individually significant. As such, any effects of CRT score and numeracy do not appear to be driven solely by any correlation with our overconfidence measure.

We offer the following speculations as to why less impulsive and more numerate individuals would rate the implausible ads as more credible. The first conjecture is that, despite our demographic controls, these results still reflect an omitted variable associated with our non-representative subject pool. The second conjecture is that these results represent a distinction between different types of intelligence; some individuals may be particularly adept at numerical problems yet lack the common sense or sensitivity to language and visual cues required to spot obvious deception. A final possible explanation is that greater cognitive reflection skills may cause individuals to "talk themselves into" a fraud. Impulsive individuals may stick with their initial reaction that an offer is implausible and give it no further thought. By contrast, higher CRT scores imply a willingness to re-consider and not simply act upon an initial instinct. Even if non-impulsive individuals experience an initial judgment that an offer is implausible, they may ponder the offer further and compile sufficient justifications to over-rule their instincts, consistent with the Office of Fair Trading's (2009) finding that fraud victims reported spending more time trying to understand a fraud than non-victims.

3.5.2 Ad-by-ad Analysis

We also ran an OLS regression on ad credibility ratings for each of the four separate implausible ads to examine whether the estimated effects of particular variables are relatively constant across the four implausible ads. These results are presented in Table 6. Specification (1) repeats the pooled analysis of all implausible ads for comparison purposes (identical to specification (3) from Table 4), and specifications (2) through (5) present the results for the diet, drink, job, and vacation ads separately. Some caution is warranted in interpreting these results, as disaggregating by ad will necessarily cause some previously significant variables to become insignificant, as each variable is now identified by one-fourth of its previous sample size. Conversely, some previously insignificant variables may now appear significant by chance, due to the four-fold increase in the number of tests run.

The consumer literacy coefficient is negative and statistically significant for the implausible diet and drink ads. The coefficient for consumer literacy on the implausible vacation ad is insignificant though still negative, and the coefficient is positive but insignificant

for the job ad. We cannot reject that the consumer literacy coefficients are jointly equal across products ($p = 0.22$). Similarly, the coefficients on the variable denoting whether subjects correctly answered the more difficult expected value question are positive and relatively consistent across the four ads, and we cannot reject that the coefficients are jointly equal ($p = 0.26$). The coefficient for situational skepticism is negative for all ads and relatively consistent for three of the four ads, though the job ad's coefficient does imply that the set of skepticism coefficients differs between ads ($p = 0.05$).

The ad-by-ad analysis reveals that our aggregate cognitive reflection result is driven mainly by the large and significant effect from the vacation ad. We can reject the equality of coefficients for cognitive reflection scores ($p = 0.05$). The CRT coefficient is positive for all four ads, though only significant for the vacation ad. Further, the finding that relatively overconfident individuals rated implausible ads as more credible stems primarily from the vacation ad. Relative overconfidence is positive and significant for the vacation ad, positive but insignificant for the diet and job ads, and negative with marginal significance for the drink ad. We can reject the equality of overconfidence coefficients across the four ads ($p = 0.005$). We cannot offer a plausible reason for the heterogeneous effects of cognitive reflection and overconfidence across the different implausible ads.

3.6 Comparison of Characteristics Related to Credibility Assessments of Plausible Versus Implausible Advertisements

In Table 7 we summarize whether each explanatory variable was positively, negatively, or insignificantly associated with the credibility assessments of plausible and implausible advertisements. In summary, we find positive impacts of numeracy (as measured by Banks and Oldfield's (2007) numerical skill category) and absolute overconfidence on the credibility ratings of plausible ads, and negative impacts of impulsivity, general skepticism, and situational skepticism. We find positive effects of numeracy (as measured by correctly answering the more difficult expected value question) and relative overconfidence, and negative effects of impulsivity, consumer literacy, and situational skepticism on the credibility ratings of implausible ads. There is a large degree of overlap between these two sets; impulsivity, numeracy, overconfidence (broadly defined) and situational skepticism are commonly associated with the credibility assessments of both plausible and implausible ads.

However, this overlap is somewhat surprising, as specification (4) in Table 4 reveals that an individual's rating of the four control ads has virtually no predictive power for how the individual rated the implausible ads.[28] Further, controlling for an individual's rating of the control ads does not alter the estimated impact of the other explanatory variables. The lack of correlation between assessments of plausible and implausible ads suggests that any overlap in significant explanatory variables is not simply capturing a general tendency to rate all advertisements as dubious. Though assessments of plausible versus implausible ads appear to be

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[28] The control ads' lack of predictive power is not due to correlation with other regressors, as the correlation between the implausible ad ratings and control ad ratings is only 0.035.

two separate and uncorrelated constructs, common economic and psychological factors are associated with both assessments.

It is also worth highlighting that, as shown in Table 4, each of the statistically significant predictors of credibility assessments is remarkably consistent across specifications. The addition of ad fixed effects, demographics, and an individual's average rating for the control ads has extremely little impact on each significant variable's coefficient. This robustness enhances our confidence that our measured effects are not simply capturing spurious correlations resulting from the large number of included individual characteristics.

One concern is that the large overlap of variables affecting plausible and implausible assessments might be due to the inclusion of the plausible versions of implausible ads among the plausible ad analysis. However, as previously demonstrated in Specification (4) of Table 3, restricting the plausible analysis to solely the four control ads still yields significant relationships of consumer literacy, impulsivity, numeracy, and overconfidence with credibility ratings of plausible ads. With the exception of skepticism, the large overlap between the significant predictors of plausible and implausible advertisements is not attributable to the inclusion of plausible versions of implausible ads among the plausible ads.

3.7 Characteristics Related to Rating the Implausible Ads as Highly Credible

Though our study did not measure actual fraud victimization (and doing so in an experimental setting for significant stakes raises ethical issues), we presume that the individuals who rated the implausible ads as particularly credible would be the individuals most willing to actually purchase the product. We now turn to the third question of the study: which individual characteristics are related to rating an implausible ad as highly credible?

Subjects rated the ads on three credibility scales (believable, truthful, and reverse-coded deceptive) with values from one to seven, with four defined as a neutral mid-point. We construct a binary variable denoting whether the average credibility rating across these three scales was 4.3 or higher, and another binary variable denoting whether the average credibility rating was 5.0 or higher.[29] A rating of 4.3 represents the 88th percentile of credibility ratings across all implausible ads, and a rating of 5.0 represents the 94th percentile, identifying the highest 12% and 6% of the credibility ratings, respectively. Specifications (1) and (2) of Table 8 present the marginal effects from a probit regression of all previous economic, psychological, and demographic variables on these 4.3 and 5.0 credibility indicator variables.

We also employ quantile regressions to examine the effects of the individual characteristics across different levels of credibility assessments. The coefficient in a standard linear regression represents the increase in the average value of the dependent variable produced by a one unit increase in the explanatory variable. The coefficient in a quantile regression estimates the change in a specified quantile of the dependent variable produced by a one unit

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[29] As our credibility rating variable takes on the values {1.0, 1.33, 1.67, ... , 6.67, 7.0}, focusing on ratings strictly greater than 4.0 is equivalent to ratings at or above 4.3. We focus on these values as they are strictly greater than the neutral midpoint of 4.0 and are thus definitively on the "credible" half of the rating scale.

change in the explanatory variable. We perform quantile regressions at the 90th and 95th percentile of average credibility ratings for the implausible ads to examine the relationships of the explanatory variables and ad credibility ratings among the subjects who rated the implausible ads the most highly and are, presumably, the most at-risk for fraud victimization. Specifications (3) and (4) of Table 8 present these results.

In contrast to its significant negative effect on the average credibility rating, the coefficient of consumer literacy is smaller and is no longer significantly predictive of rating an implausible ad as particularly credible. Cognitive reflection scores remain positive and significant across three of the four specifications, and positive and marginally significant for the remaining specification. Individuals with higher cognitive reflection scores (and thus less impulsivity) were more likely to rate implausible ads at or above 5.0. Further, as with the average credibility rating, answering more of the cognitive reflection questions correctly is correlated with a higher value in the 90th and 95th percentile regressions. Individuals who answered the more difficult expected value question correctly were also more likely to rate the implausible ads as particularly credible, and we even find positive and significant effects for the relatively simple expected value question in the probit specifications. In addition, the coefficient for answering the confirmation bias question correctly was positive and significant across all specifications as well. Taken together, these results confirm the previous (and unexpected) finding that individuals with greater numerical skills rate implausible ads as more credible than those without such numeracy. We also find positive effects of relative overconfidence and negative effects of situational skepticism, further enhancing confidence in our previous findings.

The distribution of particularly high credibility ratings was not uniform across the four implausible ads. Of the 63 observations for implausible ads with credibility ratings at or exceeding 4.3, 31 were from the vacation ad, 15 from the job ad, 12 from the diet ad, and only five from the implausible drink ads. As such, the above probit specifications are disproportionately comprised of vacation ad observations. As previously discussed, cognitive reflection scores and overconfidence had particularly large effects for the vacation ad, so the disproportionate number of vacation ad observations may be swaying our probit analyses. In unreported regressions, we repeat the probit and quantile regressions omitting the vacation ad. Cognitive reflection score is no longer significant but remains positive, and overconfidence remains positive and statistically significant.

It is worth noting that, of subjects who rated an implausible ad as particularly credible, the large majority of these subjects only rated one of the two implausible ads they viewed as particularly credible, not both ads. This suggests that we are not capturing a general tendency of some subjects to rate all ads as particularly credible; rather, subjects display heterogeneity in their credibility assessments across the various implausible ads.

As an additional robustness check, we created a binary variable denoting whether an observation represented the top 10% of credibility ratings for that particular ad, yielding an equal number of observations for each implausible ad. This methodology requires unequal cutoffs for

deeming each particularly credible ad; for example, a rating of 5.0 and greater represents the top 10% of observations for the implausible vacation ad, whereas a rating of 4.3 and greater represents the top 10% of observations for the implausible diet ad. A probit regression of individual characteristics on the binary variable for the top 10% of credibility ratings yields similar conclusions as before: we find positive and significant effects of cognitive reflection, answering the more difficult expected value question correctly, relative overconfidence, and a negative and significant effect of situational skepticism. In addition, we find positive and significant effects of answering the less difficult expected value question correctly, answering the confirmation question correctly, and absolute overconfidence, further reinforcing the previous findings of numeracy and overconfidence with credibility assessments.

3.8 Testing the Relationship Between Loss Aversion and Susceptibility to Framing

We tested the effect of our framing manipulation, whereby half of the drink ads were "positively framed," describing the product as creating benefits, and the other half of drink ads were "negatively framed" and described a reduction in detrimental outcomes. We ran separate OLS regressions for the plausible and implausible drink ads, now including an indicator variable for whether the ad version was negatively framed. The negative frame lowered credibility assessments of the plausible drink ad by an average of 0.26 units, but the effect was not significant ($p = 0.36$). For the implausible drink ad, the negative frame lowered subjects' credibility rating by 0.31 units, and the effect was not significant ($p = 0.15$).[30]

Additionally, we tested whether individuals with greater loss-aversion reacted more strongly to the framing manipulation. Particularly loss averse consumers should find products that alleviate harms as more desirable than do individuals without loss aversion. If increased desirability translates into a greater propensity to rate an ad as credible, then loss-averse individuals should rate the negatively framed ads as more credible than do individuals without loss-aversion.

We repeat the above analyses, now including an interaction effect between an individual's loss aversion parameter and the negative framing indicator. For the implausible ad, more loss-averse subjects rated the negatively framed ad as more credible than did less loss-averse subjects ($p = 0.02$). This result was robust to truncating the infinitely loss-averse subjects at a loss aversion parameter equal to five ($p = 0.005$) and was marginally significant if we simply dropped the infinitely loss-averse subjects ($p = 0.08$). For the plausible ad, there was no statistically significant interaction effect between loss-aversion and the negative ad frame for any of the loss aversion truncation methods. We can reject that the coefficients on the loss-aversion and negative ad frame interaction effect were identical between the plausible and implausible ads for any of the loss aversion truncation methods. In summary, we do find evidence that individuals with greater loss-aversion respond more strongly to the negative ad frames, but solely for the implausible ad. We can think of no satisfying explanation as to why more loss-averse individuals should only respond strongly to negatively framed implausible ads but not negatively framed plausible ads. As such, there does not appear to be evidence for a general

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[30] We cannot reject the null hypothesis that the effect of the negative framing was identical between the plausible and implausible ads ($p = 0.88$).

effect of heterogeneity to framing effects by loss-aversion, at least not detectable with this sample.

4   CONCLUSION

We conducted a controlled experiment to examine which characteristics of individuals are associated with fraud susceptibility. We examined the role of optimism, consumer literacy, cognitive impulsivity, numeracy, confirmation bias, overconfidence, risk aversion, loss aversion, present-bias, impatience, skepticism towards advertising, and demographics on credibility assessments of plausible and implausible advertisements. We found a positive relationship of numeracy and overconfidence with the credibility ratings of plausible ads, and a negative relationship of impulsivity and skepticism. Consumer literacy and skepticism were negatively associated with the credibility ratings of implausible ads, and more overconfident individuals rated implausible ads as more credible. We also found unexpected relationships of numeracy and impulsivity; more numerate individuals and less impulsive individuals rated the implausible ads as more credible.

Though several of the variables that are associated with an individual's rating of plausible ads are also associated with his rating of implausible ads, an individual's rating of plausible ads was not predictive of his rating of implausible ads, suggesting that assessments of plausible versus implausible ads represent two distinct processes.

We conducted a series of robustness tests and alternative specifications. The effects of consumer literacy, impulsivity, numeracy, overconfidence, and skepticism were very consistent across several specifications, indicating that the significant relationships to ad credibility assessments are not attributable solely to chance.

There are several important limitations to our study. The first limitation, inherent to most experiments, is the artificiality of our environment. Subjects viewed print advertisements in the absence of any other contextual or environmental cues. By removing these outside factors, our experiment ensures that any observed difference in subjects' reactions is attributable to the different claims made between the different versions of the ads. In the real world, though, multiple factors contribute to a consumer's reaction to an advertisement. There may be other signals that an ad is fraudulent in addition to the content of the claims, and our study is necessarily silent on these factors. A second limitation is that our subject pool was a convenience sample drawn from a university population, and was not nationally representative. The final limitation of our study is that we measured subjects' assessments of ad credibility and not willingness to pay or actual purchase decisions. Our experiment thus measures one of the initial stages along the path towards fraud victimization, not actual victimization decisions.

Our experiment is also silent on welfare implications as to whether individuals are displaying an appropriate amount of skepticism. Though one way to avoid fraud is to be incredulous of all advertisements and never purchase any unknown product, such a strategy forgoes beneficial consumption opportunities. We have demonstrated individual characteristics that are correlated with the credibility ratings of implausible ads, but we cannot determine if these assessments represent an optimal level of wariness.

The experimental techniques and methodology used in this study could also be applied to different samples or different settings to inform and improve consumer protection policy. Our differing versions of advertisements worked as intended; subjects rated the implausible versions of our advertisements as significantly less credible than the matched plausible versions. Moreover, there was significant variation in subjects' credibility assessments of the different advertisements. Though most subjects rated the implausible advertisements as unbelievable, a small portion of subjects did view the implausible claims as believable. Importantly, these relatively high credibility ratings for implausible ads were associated with measurable individual characteristics. We found that consumer literacy, impulsivity, numeracy, overconfidence, and skepticism are associated with credibility assessments of implausible ads. We found no statistically significant effect of optimism, risk preferences, or impatience on the credibility ratings of implausible advertisements. Though some of these insignificant effects may be partly attributable to our sample's small size, it is worth noting that with this same sample we found significant and robust relationships for some of the economic and psychological variables. As such, our study has suggested fruitful avenues for future research on fraud victimization.

REFERENCES

Anderson, Keith B., "Consumer Fraud in the United States: The Third FTC Survey," Staff Report of the Bureau of Economics, Federal Trade Commission, April 2013. [available at: http://www.ftc.gov/os/2013/04/130419fraudsurvey.pdf]

Anderson, Lisa R. and Jennifer M. Mellor. "Predicting Health Behaviors with an Experimental Measure of Risk Preference," *Journal of Health Economics*, 27 (2008), pp. 1260–1274.

Banks, James and Zoë Oldfield. "Understanding Pensions: Cognitive Function, Numerical Ability and Retirement Saving," *Fiscal Studies*, 28, June 2007, pp. 143-170.

Beaujean, Alexander, Michael W. Firmin, Andrew J. Knoop, Jared D. Michonski, Theodore P. Berry, and Ruth E. Lowrie. "Validation of the Frey and Detterman (2004) IQ Prediction Equations Using the Reynolds Intellectual Assessment Scales," *Personality and Individual Differences*, 41, Issue 2, July 2006, pp. 353-357.

Calfee, John E. and Debra J. Ringold. "The 70% Majority: Enduring Consumer Beliefs about Advertising," *Journal of Public Policy & Marketing* 13 (2), 1994, pp. 228–238.

Cosmides, Leda and John Tooby. "Cognitive Adaptations for Social Exchange," in J. Barkow, L. Cosmides, & J. Tooby (Eds.). *The Adapted Mind*, New York: Oxford University Press, 1992.

Courtemanche, Charles, Garth Heutel, and Patrick McAlvanah. "Impatience, Incentives, and Obesity," *Economic Journal*, Volume 125, Issue 582, pages 1-31, February 2015.

Dohmen, Thomas, Armin Falk, David Huffman, Uwe Sunde, Jürgen Schupp, and Gert G. Wagner. "Individual Risk Attitudes: New Evidence from a Large, Representative, Experimentally-Validated Survey," *Journal of the European Economic Association*, 9, 2010, pp. 522-550.

Frederick, Shane. "Cognitive Reflection and Decision Making," *Journal of Economic Perspectives*, 19, Fall 2005, pp. 25–42.

Frey, Meredith C. and Douglas K. Detterman. "Scholastic Assessment or g? The Relationship Between the Scholastic Assessment Test and General Cognitive Ability," *Psychological Science,* June 2004, 15 no. 6, pp. 373-378.

Gerardi, Kristopher, Lorenz Goette, and Stephan Meier. "Financial Literacy and Subprime Mortgage Delinquency: Evidence from a Survey Matched to Administrative Data," Federal Reserve Bank of Atlanta Working Paper (2010).

Glaesmer, Heidi, Winfried Rief, Alexandra Martin, Ricarda Mewes, Elmar Brähler, Markus Zenger, and Andreas Hinz. "Psychometric Properties and Population-based Norms of the Life Orientation Test Revised (LOT-R)," *British Journal of Health Psychology*, 2012 May 17(2), pp. 432-45.

Hastings, Justine and Olivia Mitchell. "How Financial Literacy and Impatience Shape Retirement Wealth and Investment Behaviors," National Bureau of Economic Research Working Paper 16740, January 2011.

Herzberg, Philipp Y., Heidi Glaesmer, Jürgen Hoyer. "Separating Optimism and Pessimism: A Robust Psychometric Analysis of the Revised Life Orientation Test (LOT-R)," *Psychological Assessment*, 2006 Dec 18(4), pp. 433-8.

Holt, Charles A. and Susan K. Laury. "Risk Aversion and Incentive Effects," *American Economic Review*, 92 (December 2002), pp. 1644-1655.

Kahneman, Daniel and Amos Tversky. "Prospect Theory: An Analysis of Decision Under Risk," *Econometrica*, 47 (March 1979), pp. 263-291.

Koenig, Katherine A., Meredith C. Frey, and Douglas K. Detterman. "ACT and General Cognitive Ability," *Intelligence*, 36, Issue 2, March–April 2008, pp. 153-160.

Levin, Irwin P. and Gary J. Gaeth. "How Consumers are Affected by the Framing of Attribute Information," *Journal of Consumer Research*, 15 (December 1988), pp. 374-378.

Lusk, Jayson L. and Keith H. Coble. "Risk Perceptions, Risk Preference, and Acceptance of Risky Food," *American Journal of Agricultural Economics* 87 (2), 2005, pp. 393–405.

Mayer, Richard. E., Andrew Stull, Julie Campbell, Kevin Almeroth, Bruce Bimber, Dorothy Chun, and Allan Knight. "Overestimation Bias in Self-reported SAT Scores," *Educational Psychology Review*, *19*, 2007, pp. 443-454.

Meier, Stephan, and Charles Sprenger. "Present-Biased Preferences and Credit Card Borrowing," *American Economic Journal*, 2, no. 1 (2010), pp. 193-210.

Moore, Don A. and Paul J. Healy. (2008). "The Trouble with Overconfidence," *Psychological Review*, 115(2), pp. 502–517.

Obermiller, Carl and Eric R. Spangenberg. "Development of a Scale to Measure Consumer Skepticism towards Advertising," *Journal of Consumer Psychology*, 7 (1998), pp. 159-186.

Office of Fair Trading. "The Psychology of Scams: Provoking and Committing Errors of Judgement," April 2009. Prepared for the Office of Fair Trading by the University of Exeter School of Psychology. [available at http://www.oft.gov.uk/shared_oft/reports/consumer_protection/oft1070.pdf]

Puri, Manju and David T. Robinson. "Optimism and Economic Choice," *Journal of Financial Economics*, 86 (October 2007), pp. 71-99.

Scheier, Michael F., Charles S. Carver, and Michael W. Bridges. "Distinguishing Optimism from Neuroticism (and Trait Anxiety, Self-Mastery, and Self-Esteem): A Re-evaluation of the Life Orientation Test," *Journal of Personality and Social Psychology*, 67, 1994, pp. 1063-1078.

Shadel, Douglas P. and Karla. B Schweitzer-Pak. "The Psychology of Consumer Fraud," Inaugural Dissertation, University of Tilburg, 2007.

Smith, James P., John McArdle, and Robert Willis. "Financial Decision Making and Cognition in a Family Context," *Economic Journal*, 120, 2010, pp. 363–380.

Tversky, Amos and Daniel Kahneman. "The Framing of Decisions and the Psychology of Choice," *Science*, 211 (January 30, 1981), pp. 453-458.

Wason, Peter and Diana Shapiro. "Natural and Contrived Experience in a Reasoning Problem," *Quarterly Journal of Experimental Psychology*, 23, 1971, pp. 63–71.

Table 1: Summary Statistics of Ad Credibility Ratings

Variable	Mean	S.D.	Min	Max
Blanket Ad n= 254	5.02	1.22	1.33	7.00
Mouse Ad n= 254	5.12	1.14	1.33	7.00
MP3 Ad n= 254	4.74	1.28	1.00	7.00
Pizza Ad n= 254	5.60	1.09	1.00	7.00
Plausible Diet Ad n= 130	3.11	1.27	1.00	6.00
Implausible Diet Ad n= 124	2.24	1.19	1.00	5.00
Positive Plausible Drink Ad n= 62	3.84	1.45	1.00	6.00
Positive Implausible Drink Ad n= 63	2.12	1.14	1.00	6.00
Negative Plausible Drink Ad n= 64	3.78	1.34	1.67	7.00
Negative Implausible Drink Ad n= 65	1.95	0.98	1.00	5.00
Plausible Job Ad n= 127	5.54	1.12	1.67	7.00
Implausible Job Ad n= 127	2.45	1.15	1.00	5.33
Plausible Vacation Ad n= 129	5.06	1.19	1.67	7.00
Implausible Vacation Ad n= 129	2.83	1.59	1.00	7.00

Table 2: Summary Statistics of Explanatory Variables

Variable Name	Mean	S.D.	Min	Max
Optimism Average of all responses on optimism scale	3.66	0.78	1.00	5.00
Consumer Literacy Number of consumer literacy questions answered correctly	2.08	0.96	0.00	4.00
Consumer Literacy DK's Number of consumer literacy questions answered with "Don't Know"	0.66	0.81	0.00	4.00
CRT (Impulsivity) Number of Cognitive Reflection Test questions answered correctly	1.63	1.14	0.00	3.00
BO Numeracy Numerical skill group using Banks and Oldfield categories	3.20	0.89	1.00	4.00
Simpler EV Correct Binary variable indicating a subject answered the simpler Expected Value question correctly	0.80	0.40	0.00	1.00
Harder EV Correct Binary variable indicating a subject answered the harder Expected Value question correctly	0.36	0.48	0.00	1.00
Wason (Confirmation Bias) Binary variable indicating a subject answered the Wason question correctly	0.22	0.41	0.00	1.00
Absolute Overconfidence Predicted number of numeracy, CRT, and Wason correct minus actual number correct	1.91	1.93	-3.00	8.00
Relative Overconfidence Predicted tercile for numeracy, CRT, and Wason correct minus actual tercile	0.44	0.65	-1.00	2.00
Loss Aversion Parameter (λ) computed using CRRA utility function fit to the risk responses	2.03	2.53	0.26	10.00
Risk Tolerance Parameter (α) computed using CRRA utility function from the risk responses	0.75	0.22	0.00	1.33
Present Bias Parameter (β) computed using quasi-hyperbolic discounting specification	1.00	0.20	0.52	1.94
Impatience Parameter (δ) computed using quasi-hyperbolic discounting specification	0.88	0.10	0.71	0.98
General Ad Skepticism Average of all responses on the general ad skepticism scale	3.42	0.75	1.22	5.00
Situational Ad Skepticism Average of all responses on the situational ad skepticism scale	3.50	0.52	1.89	4.89

Table Continued

Table 2: Summary Statistics of Explanatory Variables (Continued)

Variable Name	Mean	S.D.	Min	Max
SAT Percentile on the SAT	76.40	22.29	7.00	99.00
General Risk Response to the general risk question	6.30	1.77	0.00	10.00
Male Binary variable indicating subject is male	0.66	0.47	0.00	1.00
Graduate Student Binary variable indicating a subject is a graduate student	0.44	0.50	0.00	1.00
Asian Binary variable indicating a subject is Asian	0.54	0.50	0.00	1.00
Black Binary variable indicating a subject is black	0.05	0.23	0.00	1.00
Hispanic Binary variable indicating a subject is Latino or Hispanic	0.04	0.19	0.00	1.00
Mixed Race or Other Binary variable indicating a subject is mixed race or other	0.03	0.18	0.00	1.00
Non-Hispanic White Binary variable indicating a subject is non-Hispanic white	0.34	0.47	0.00	1.00
Economics or Business Major Binary variable indicating a subject is an economics or business major	0.10	0.30	0.00	1.00
STEM Major Binary variable indicating a subject is a Science, Technology, Engineering, or Math major	0.33	0.47	0.00	1.00

Table 3: Credibility Ratings of Plausible Advertisements

OLS Dependent Variable: Ad Credibility Index

Variable	Specification (1)	Specification (2)	Specification (3)	Specification (4)
Optimism	0.0186	-0.00303	-0.0421	-0.00881
	(0.0462)	(0.0481)	(0.0502)	(0.0529)
Consumer Literacy	0.0830*	0.109**	0.0859*	0.138**
	(0.0482)	(0.0493)	(0.0500)	(0.0557)
Consumer Literacy DKs	0.0233	0.0417	0.0295	0.0764
	(0.0545)	(0.0526)	(0.0536)	(0.0605)
CRT (Impulsitivity)	0.110**	0.112**	0.121**	0.127**
	(0.0451)	(0.0451)	(0.0507)	(0.0622)
BO Numeracy	0.102**	0.0976*	0.109**	0.124**
	(0.0501)	(0.0509)	(0.0551)	(0.0604)
Simple EV Correct	0.00276	-0.0585	-0.0706	-0.212*
	(0.108)	(0.111)	(0.114)	(0.126)
Harder EV Correct	0.147	0.167*	0.184*	0.239**
	(0.0934)	(0.0930)	(0.0981)	(0.110)
Wason (Confirmation Bias)	0.212**	0.169*	0.195*	0.285**
	(0.0981)	(0.0971)	(0.110)	(0.127)
Absolute Overconfidence	0.0913***	0.0904***	0.105***	0.101***
	(0.0258)	(0.0262)	(0.0289)	(0.0323)
Relative Overconfidence	0.0291	0.0548	0.0323	0.0497
	(0.0796)	(0.0807)	(0.0854)	(0.102)
Loss Aversion (λ)	0.0432**	0.0387**	0.0286	0.0397*
	(0.0177)	(0.0179)	(0.0189)	(0.0211)
Risk Tolerance (α)	-0.144	-0.105	-0.143	-0.0481
	(0.223)	(0.224)	(0.222)	(0.277)
Present Bias (β)	0.164	0.102	0.157	0.123
	(0.234)	(0.239)	(0.260)	(0.304)
Patience (δ)	-0.00307	-0.0423	-0.0946	-0.181
	(0.440)	(0.439)	(0.481)	(0.589)
General Skepticism	-0.111**	-0.134**	-0.131**	-0.0561
	(0.0560)	(0.0552)	(0.0574)	(0.0678)
Situational Skepticism	-0.160*	-0.155*	-0.168*	-0.124
	(0.0843)	(0.0827)	(0.0888)	(0.0997)
General Risk	0.0282	0.0267	0.0557**	0.0478
	(0.0240)	(0.0246)	(0.0264)	(0.0290)
SAT			0.00304	0.000368
	---	---	(0.00202)	(0.00262)

Table Continued

Table 3: Credibility Ratings of Plausible Advertisements (Continued)

OLS Dependent Variable: Ad Credibility Index

Variable	Specification (1)	Specification (2)	Specification (3)	Specification (4)
Male	---	---	-0.176* (0.106)	-0.160 (0.127)
Graduate Student	---	---	0.0494 (0.127)	0.130 (0.145)
Asian	---	---	-0.236** (0.118)	-0.300** (0.131)
Black	---	---	-0.213 (0.212)	-0.355 (0.265)
Hispanic	---	---	0.0885 (0.171)	-0.121 (0.159)
Mixed Race or Other	---	---	-0.213 (0.224)	-0.266 (0.162)
Economics or Business Major	---	---	-0.0458 (0.167)	-0.0410 (0.184)
STEM Major	---	---	0.0228 (0.0900)	0.0456 (0.102)
Ad Fixed Effects				
Negative Plausible Drink Ad	---	0.617*** (0.189)	0.584*** (0.201)	---
Positive Plausible Drink Ad	---	0.792*** (0.200)	0.693*** (0.217)	---
Blanket Ad	---	1.916*** (0.131)	1.926*** (0.139)	-0.541*** (0.106)
Plausible Job Ad	---	2.442*** (0.145)	2.428*** (0.154)	---
Mouse Ad	---	2.011*** (0.131)	2.031*** (0.140)	-0.437*** (0.0978)
MP3 Ad	---	1.637*** (0.139)	1.658*** (0.150)	-0.809*** (0.107)
Pizza Ad	---	2.494*** (0.130)	2.467*** (0.141)	---
Plausible Vacation Ad	---	1.955*** (0.151)	2.035*** (0.158)	---
Constant	4.442*** (0.661)	2.891*** (0.647)	2.922*** (0.734)	4.997*** (0.873)
Plausible Ads	All	All	All	Control
Observations	1,524	1,524	1,374	916
R-squared	0.029	0.288	0.296	0.111

Standard errors are in parentheses and are clustered by subject. *** $p<0.01$, ** $p<0.05$, * $p<0.1$ Ad fixed effects in (1)-(3) are relative to the omitted category of Plausible Diet ad and in (4) are relative to the Pizza ad.

Table 4: Credibility Ratings of Implausible Advertisements

OLS Dependent Variable: Ad Credibility Index

Variable	Specification (1)	Specification (2)	Specification (3)	Specification (4)
Optimism	-0.00151	0.0146	0.0410	0.0409
	(0.0803)	(0.0783)	(0.0839)	(0.0840)
Consumer Literacy	-0.145**	-0.155**	-0.169**	-0.168**
	(0.0681)	(0.0669)	(0.0683)	(0.0692)
Consumer Literacy DKs	0.0509	0.0276	-0.0675	-0.0667
	(0.0945)	(0.0919)	(0.0937)	(0.0937)
CRT (Impulsivity)	0.249***	0.258***	0.231***	0.232***
	(0.0676)	(0.0671)	(0.0762)	(0.0768)
BO Numeracy	0.0459	0.0284	-0.00853	-0.00718
	(0.0733)	(0.0742)	(0.0782)	(0.0790)
Simpler EV Correct	0.0296	0.0499	0.245	0.242
	(0.147)	(0.150)	(0.176)	(0.177)
Harder EV Correct	0.426***	0.438***	0.518***	0.521***
	(0.155)	(0.152)	(0.158)	(0.159)
Wason (Confirmation Bias)	0.200	0.224	0.317*	0.320*
	(0.171)	(0.166)	(0.175)	(0.176)
Absolute Overconfidence	0.0566	0.0634	0.0657	0.0668
	(0.0463)	(0.0451)	(0.0457)	(0.0467)
Relative Overconfidence	0.294***	0.279**	0.301**	0.301**
	(0.111)	(0.113)	(0.124)	(0.124)
Loss Aversion (λ)	0.00168	0.00009	-0.00300	-0.00256
	(0.0268)	(0.0264)	(0.0287)	(0.0292)
Risk Tolerance (α)	0.000331	-0.0600	-0.0507	-0.0512
	(0.316)	(0.313)	(0.313)	(0.314)
Present Bias (β)	0.0624	0.157	0.329	0.330
	(0.382)	(0.367)	(0.418)	(0.418)
Patience (δ)	0.0552	0.178	0.608	0.606
	(0.710)	(0.696)	(0.743)	(0.746)
General Ad Skepticism	-0.0155	0.00283	0.0455	0.0449
	(0.0893)	(0.0880)	(0.0925)	(0.0920)
Situational Ad Skepticism	-0.514***	-0.527***	-0.533***	-0.534***
	(0.125)	(0.124)	(0.129)	(0.130)
General Risk	-0.00344	0.00458	-0.0125	-0.0120
	(0.0361)	(0.0358)	(0.0399)	(0.0404)
SAT	---	---	0.00281	0.00281
			(0.00318)	(0.00320)

Table Continued

Table 4: Credibility Ratings of Implausible Advertisements (Continued)

OLS Dependent Variable: Ad Credibility Index

Variable	Specification (1)	Specification (2)	Specification (3)	Specification (4)
Male	---	---	0.0415 (0.134)	0.0400 (0.137)
Graduate Student	---	---	-0.0773 (0.166)	-0.0760 (0.168)
Asian	---	---	0.0951 (0.155)	0.0919 (0.160)
Black	---	---	0.0632 (0.270)	0.0595 (0.272)
Hispanic	---	---	0.0660 (0.315)	0.0644 (0.316)
Mixed Race or Other	---	---	0.334 (0.452)	0.331 (0.453)
Economics or Business Major	---	---	-0.303 (0.207)	-0.303 (0.208)
STEM Major	---	---	-0.0999 (0.151)	-0.0994 (0.151)
Control Ad Average	---	---	---	-0.0107 (0.0873)
Ad Fixed Effects				
Negative Implausible Drink Ad	---	-0.323** (0.158)	-0.314* (0.166)	-0.313* (0.166)
Positive Implausible Drink Ad	---	-0.132 (0.173)	-0.0877 (0.191)	-0.0884 (0.191)
Implausible Job Ad	---	0.211 (0.144)	0.252 (0.156)	0.254 (0.157)
Implausible Vacation Ad	---	0.603*** (0.157)	0.637*** (0.167)	0.638*** (0.168)
Constant	3.414*** (1.124)	3.031*** (1.096)	2.178* (1.174)	2.226* (1.265)
Observations	508	508	458	458
R-squared	0.123	0.180	0.200	0.200

Standard errors in parentheses. Standard errors are clustered by subject. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Ad fixed effects are relative to the omitted category of Implausible Diet Ad.

Table 5: Separate Credibility Variables and Falsification Tests for Implausible Ads

Analysis Method: OLS

Variable	Dependent Variable:				
	Believable	Truthful	Deceptive	Informative	Appealing
Optimism	0.115	0.117	-0.109	0.0938	-0.0442
	(0.104)	(0.0952)	(0.108)	(0.120)	(0.122)
Consumer Literacy	-0.147	-0.0923	-0.268***	-0.126	0.118
	(0.0899)	(0.0795)	(0.100)	(0.101)	(0.109)
Consumer Literacy DKs	-0.0791	-0.0444	-0.0789	-0.117	-0.0959
	(0.125)	(0.111)	(0.105)	(0.120)	(0.125)
CRT (Impulsivity)	0.224**	0.203**	0.266***	0.134	0.108
	(0.0882)	(0.0910)	(0.0895)	(0.110)	(0.121)
BO Numeracy	0.0551	0.0495	-0.130	0.177	0.159
	(0.0957)	(0.0898)	(0.108)	(0.111)	(0.124)
Simpler EV Correct	0.281	0.275	0.178	0.498*	-0.107
	(0.205)	(0.208)	(0.214)	(0.254)	(0.276)
Harder EV Correct	0.581***	0.436**	0.537***	0.355	-0.141
	(0.184)	(0.192)	(0.182)	(0.218)	(0.238)
Wason (Confirmation Bias)	0.418*	0.321	0.212	0.371	0.386
	(0.215)	(0.195)	(0.213)	(0.243)	(0.263)
Absolute Overconfidence	0.0730	0.0853	0.0389	0.0195	0.0270
	(0.0552)	(0.0534)	(0.0557)	(0.0721)	(0.0765)
Relative Overconfidence	0.433***	0.240	0.229*	0.409**	0.178
	(0.155)	(0.151)	(0.132)	(0.181)	(0.182)
Loss Aversion (λ)	0.0119	-0.00888	-0.0121	-0.0566	-0.104***
	(0.0352)	(0.0321)	(0.0349)	(0.0400)	(0.0366)
Risk Tolerance (α)	0.00398	0.0800	-0.236	-0.339	-0.959*
	(0.376)	(0.351)	(0.380)	(0.434)	(0.494)
Present Bias (β)	0.767	0.873*	-0.654	0.734	0.498
	(0.526)	(0.478)	(0.490)	(0.489)	(0.471)
Patience (δ)	1.363	1.238	-0.778	1.068	0.425
	(0.900)	(0.837)	(0.951)	(1.062)	(1.179)
General Ad Skepticism	0.0624	-0.0262	0.100	-0.439***	0.0885
	(0.108)	(0.106)	(0.133)	(0.135)	(0.141)
Situational Ad Skepticism	-0.620***	-0.477***	-0.502***	-0.451**	-0.410*
	(0.154)	(0.160)	(0.145)	(0.189)	(0.219)
General Risk	-0.0385	-0.0316	0.0325	-0.000659	0.0202
	(0.0451)	(0.0497)	(0.0456)	(0.0535)	(0.0623)
SAT	0.00307	0.00235	0.00300	0.00618	-0.00112
	(0.00415)	(0.00414)	(0.00321)	(0.00482)	(0.00522)

Table Continued

Table 5: Separate Credibility Variables and Falsification Tests for Implausible Ads (Continued)

Analysis Method: OLS

Variable	Dependent Variable:				
	Believable	Truthful	Deceptive	Informative	Appealing
Male	0.223	-0.0560	-0.0420	-0.308	-0.140
	(0.154)	(0.167)	(0.161)	(0.211)	(0.202)
Graduate Student	-0.0124	-0.0707	-0.149	0.0488	0.231
	(0.204)	(0.200)	(0.225)	(0.242)	(0.271)
Asian	0.115	0.00580	0.165	0.0491	0.0514
	(0.192)	(0.198)	(0.195)	(0.248)	(0.273)
Black	0.259	-0.127	0.0579	0.233	0.901**
	(0.325)	(0.331)	(0.310)	(0.543)	(0.454)
Hispanic	0.369	0.0606	-0.232	-0.511	0.0512
	(0.423)	(0.367)	(0.318)	(0.488)	(0.380)
Mixed Race or Other	0.786	0.479	-0.262	1.064**	0.212
	(0.563)	(0.545)	(0.323)	(0.506)	(0.473)
Economics or Business Major	-0.243	-0.472*	-0.194	-0.737**	0.166
	(0.253)	(0.249)	(0.317)	(0.297)	(0.374)
STEM Major	-0.0642	-0.0885	-0.147	-0.0885	0.000438
	(0.186)	(0.178)	(0.174)	(0.211)	(0.228)
Ad Fixed Effects					
Negative Implausible Drink Ad	-0.574***	-0.400**	0.0340	-0.770***	-1.039***
	(0.195)	(0.200)	(0.220)	(0.242)	(0.284)
Positive Implausible Drink Ad	-0.273	-0.163	0.173	-0.0858	0.271
	(0.225)	(0.219)	(0.235)	(0.280)	(0.291)
Implausible Job Ad	0.100	0.319*	0.338*	0.0894	0.473**
	(0.198)	(0.190)	(0.176)	(0.224)	(0.230)
Implausible Vacation Ad	0.656***	0.868***	0.386**	1.023***	1.519***
	(0.205)	(0.203)	(0.178)	(0.217)	(0.214)
Constant	0.555	0.687	5.292***	3.244*	3.915**
	(1.451)	(1.410)	(1.369)	(1.696)	(1.799)
Observations	458	458	458	458	458
R-squared	0.204	0.175	0.154	0.245	0.237

Standard errors in parentheses. Standard errors are clustered by subject. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Ad fixed effects are relative to the omitted category of Implausible Diet Ad. The deceptiveness rating is reverse-coded to facilitate easier comparisons to the other credibility measures.

OLS Dependent Variable: Ad Credibility Index

Variable	All Ads	Diet Ad	Drink Ad	Job Ad	Vacation Ad
Optimism	0.0410	0.0994	0.149	-0.178	0.177
	(0.0839)	(0.103)	(0.142)	(0.143)	(0.167)
Consumer Literacy	-0.169**	-0.312***	-0.252***	0.00210	-0.0872
	(0.0683)	(0.116)	(0.0935)	(0.119)	(0.192)
Consumer Literacy DKs	-0.0675	-0.157	-0.199	-0.0313	0.0172
	(0.0937)	(0.157)	(0.171)	(0.136)	(0.183)
CRT (Impulsivity)	0.231***	0.112	0.108	0.0621	0.543***
	(0.0762)	(0.157)	(0.0918)	(0.167)	(0.144)
BO Numeracy	-0.00853	0.0110	-0.312***	0.149	0.116
	(0.0782)	(0.134)	(0.116)	(0.128)	(0.183)
Simpler EV Correct	0.245	0.456	0.285	0.0420	0.174
	(0.176)	(0.369)	(0.218)	(0.319)	(0.342)
Harder EV Correct	0.518***	0.730**	0.243	0.859***	0.583**
	(0.158)	(0.284)	(0.234)	(0.224)	(0.278)
Wason (Confirmation Bias)	0.317*	0.559*	-0.367	0.451	0.397
	(0.175)	(0.325)	(0.243)	(0.300)	(0.326)
Absolute Overconfidence	0.0657	0.141	0.00762	0.0338	-0.0356
	(0.0457)	(0.0889)	(0.0562)	(0.0823)	(0.0986)
Relative Overconfidence	0.301**	0.267	-0.231*	0.250	0.821***
	(0.124)	(0.179)	(0.139)	(0.226)	(0.263)
Loss Aversion (λ)	-0.00300	-0.0953**	0.0755**	-0.0945*	0.0638
	(0.0287)	(0.0402)	(0.0351)	(0.0572)	(0.0637)
Risk Tolerance (α)	-0.0507	0.131	0.0148	-0.500	-0.208
	(0.313)	(0.441)	(0.422)	(0.532)	(0.642)
Present Bias (β)	0.329	0.0394	-0.776	-0.207	1.723**
	(0.418)	(0.554)	(0.635)	(0.656)	(0.686)
Patience (δ)	0.608	0.468	1.979*	0.0597	0.853
	(0.743)	(1.138)	(1.083)	(1.252)	(1.702)
General Ad Skepticism	0.0455	0.196	0.162	-0.0762	-0.00649
	(0.0925)	(0.152)	(0.140)	(0.147)	(0.194)
Situational Ad Skepticism	-0.533***	-0.606***	-0.730***	-0.0450	-0.876***
	(0.129)	(0.230)	(0.191)	(0.232)	(0.248)
General Risk	-0.0125	-0.110*	0.132**	0.00327	-0.117
	(0.0399)	(0.0628)	(0.0570)	(0.0736)	(0.0912)
SAT	0.00281	0.0107*	-0.00274	0.00259	-0.00398
	(0.00318)	(0.00613)	(0.00481)	(0.00467)	(0.00596)

Table Continued

Table 6: Credibility Ratings of Implausible Advertisements - Ad by Ad (Continued)

OLS Dependent Variable: Ad Credibility Index

Variable	All Ads	Diet Ad	Drink Ad	Job Ad	Vacation Ad
Male	0.0415	-0.132	0.324*	-0.438*	0.499*
	(0.134)	(0.213)	(0.183)	(0.255)	(0.294)
Graduate Student	-0.0773	-0.0818	0.0452	0.396	-0.789**
	(0.166)	(0.313)	(0.226)	(0.290)	(0.358)
Asian	0.0951	0.0164	0.254	-0.350	0.436
	(0.155)	(0.312)	(0.220)	(0.271)	(0.354)
Black	0.0632	0.694*	0.451	-0.0222	-0.651
	(0.270)	(0.414)	(0.361)	(0.588)	(0.551)
Hispanic	0.0660	-0.401	0.183	-0.114	-0.279
	(0.315)	(0.587)	(0.309)	(0.443)	(0.578)
Mixed Race or Other	0.334	0.464	0.108	0.270	-0.551
	(0.452)	(0.649)	(0.282)	(0.601)	(0.797)
Economics or Business Major	-0.303	-0.255	0.321	-0.720***	-1.227***
	(0.207)	(0.491)	(0.281)	(0.265)	(0.426)
STEM Major	-0.0999	0.169	0.00382	-0.191	-0.701**
	(0.151)	(0.225)	(0.218)	(0.252)	(0.279)
Ad Fixed Effects					
Negative Implausible Drink Ad	-0.314*	---	---	---	---
	(0.166)				
Positive Implausible Drink Ad	-0.0877	---	---	---	---
	(0.191)				
Implausible Job Ad	0.252	---	---	---	---
	(0.156)				
Implausible Vacation Ad	0.637***	---	---	---	---
	(0.167)				
Constant	2.178*	2.294	2.603	3.311*	2.305
	(1.174)	(1.936)	(1.702)	(1.754)	(2.657)
Observations	458	113	117	111	117
R-squared	0.200	0.275	0.402	0.227	0.369

Standard errors in parentheses. Standard errors are clustered by subject. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Ad fixed effects are relative to the omitted category of Implausible Diet Ad.

Table 7: Comparison of Results for Plausible versus Implausible Credibility Ratings

Variable Name	Plausible	Implausible
Optimism	N.S.	N.S.
Consumer Literacy	N.S.	-
Consumer Literacy DK's	N.S.	N.S.
CRT (Impulsivity)	+	+
BO Numeracy	+	N.S.
Simple EV Correct	N.S.	N.S.
Harder EV Correct	N.S.	+
Wason (Confirmation Bias)	N.S.	N.S.
Absolute Overconfidence	+	N.S.
Relative Overconfidence	N.S.	+
Loss Aversion (λ)	N.S.	N.S.
Risk Tolerance (α)	N.S.	N.S.
Present Bias (β)	N.S.	N.S.
Patience (δ)	N.S.	N.S.
General Skepticism	-	N.S.
Situational Skepticism	N.S.	-
General Risk	+	N.S.
SAT	N.S.	N.S.
Male	N.S.	N.S.
Graduate Student	N.S.	N.S.
Asian	N.S.	N.S.
Black	N.S.	N.S.
Hispanic	N.S.	N.S.
Mixed Race or Other	N.S.	N.S.
Economics or Business Major	N.S.	N.S.
STEM Major	N.S.	N.S.

N.S. denotes not significant at the 5% level, + or - denotes the sign of the coefficient for a statistically significant variable. The Plausible column is based upon Specification (3) of Table 3, and the Implausible column is based upon Specification (3) of Table 4.

Table 8: Particularly High Credibility Ratings

Dependent Variable: Ad Credibility Index

Variable	Analysis Method			
	Probit ≥ 4.3	Probit ≥ 5.0	90th quantile	95th quantile
Optimism	0.00189	-0.0101	0.00742	-0.0222
	(0.0195)	(0.0108)	(0.165)	(0.142)
Consumer Literacy	-0.0044	-0.0002	0.0242	-0.0760
	(0.0166)	(0.0109)	(0.158)	(0.136)
Consumer Literacy DKs	0.00369	0.0004	-0.0736	-0.0446
	(0.0196)	(0.0137)	(0.179)	(0.155)
CRT (Impulsivity)	0.0330*	0.0273**	0.359**	0.289**
	(0.0193)	(0.0135)	(0.161)	(0.139)
BO Numeracy	0.0126	0.0266**	0.198	0.143
	(0.0180)	(0.0114)	(0.165)	(0.142)
Simpler EV Correct	0.0958**	0.0829***	0.0601	0.346
	(0.0390)	(0.0266)	(0.378)	(0.326)
Harder EV Correct	0.0785**	0.0462**	0.756**	0.596**
	(0.0356)	(0.0235)	(0.308)	(0.266)
Wason (Confirmation Bias)	0.1318***	0.1096***	1.219***	0.991***
	(0.0354)	(0.0236)	(0.339)	(0.293)
Absolute Overconfidence	0.0334***	0.0329***	0.241**	0.185**
	(0.0105)	(0.0078)	(0.0995)	(0.0859)
Relative Overconfidence	0.0666**	0.0395**	0.528**	0.617***
	(0.0289)	(0.0171)	(0.244)	(0.211)
Loss Aversion (λ)	-0.0002	0.0083**	0.0382	0.0251
	(0.0056)	(0.0034)	(0.0518)	(0.0448)
Risk Tolerance (α)	-0.0637	0.0488	-0.313	-0.144
	(0.06465)	(0.0463)	(0.599)	(0.517)
Present Bias (β)	0.05794	0.1172**	0.124	0.255
	(0.0827)	(0.0475)	(0.730)	(0.631)
Patience (δ)	0.0576	-0.0045	1.116	1.148
	(0.1682)	(0.1181)	(1.467)	(1.267)
General Ad Skepticism	0.0354*	0.0196	0.105	0.0828
	(0.0204)	(0.0125)	(0.179)	(0.154)
Situational Ad Skepticism	-0.0974***	-0.0474**	-0.742***	-0.426*
	(0.0345)	(0.0193)	(0.276)	(0.239)
General Risk	-0.0065	0.0068	-0.0678	-0.00608
	(0.0099)	(0.0069)	(0.0763)	(0.0659)
SAT	0.00091	0.0016*	0.00709	0.0150**
	(0.00088)	(0.0008)	(0.00696)	(0.00601)

Table Continued

Table 8: Particularly High Credibility Ratings (Continued)

Dependent Variable: Ad Credibility Index

Variable	Analysis Method			
	Probit ≥ 4.3	Probit ≥ 5.0	90th quantile	95th quantile
Male	0.0222	-0.0063	-0.0668	-0.147
	(0.0314)	(0.0239)	(0.287)	(0.248)
Graduate Student	0.0278	0.0455*	0.195	0.490
	(0.0366)	(0.0265)	(0.345)	(0.298)
Asian	0.0040	0.0517*	-0.0757	-0.322
	(0.0356)	(0.0277)	(0.352)	(0.304)
Black	-0.0436	---	0.645	0.496
	(0.0841)		(0.611)	(0.527)
Hispanic	0.0150	0.0929**	0.227	-0.204
	(0.0583)	(0.0428)	(0.677)	(0.585)
Mixed Race or Other	0.1278	0.1274***	0.354	1.502**
	(0.0863)	(0.0427)	(0.723)	(0.625)
Economics or Business Major	-0.0438	0.0212	-0.176	-0.162
	(0.0521)	(0.0358)	(0.458)	(0.395)
STEM Major	-0.0539	-0.0247	-0.326	-0.602**
	(0.0334)	(0.0233)	(0.292)	(0.252)
Ad Fixed Effects				
Negative Implausible Drink Ad	-0.0923*	-0.0306	-0.808*	-0.856**
	(0.0548)	(0.0477)	(0.414)	(0.357)
Positive Implausible Drink Ad	-0.0285	0.0587	0.455	0.361
	(0.054)	(0.0395)	(0.429)	(0.370)
Implausible Job Ad	0.0182	0.011	0.192	0.0479
	(0.0409)	(0.0339)	(0.348)	(0.301)
Implausible Vacation Ad	0.1242***	0.1003***	1.283***	1.287***
	(0.0378)	(0.0307)	(0.344)	(0.297)
Constant	---	---	2.556	1.363
			(2.400)	(2.072)
Observations	458	432	458	458
Pseudo R-squared	0.203	0.314	0.209	0.258

Standard errors in parentheses. Standard errors are clustered by subject. *** p<0.01, ** p<0.05, * p<0.1. Ad fixed effects are relative to the omitted category of Implausible Diet Ad. Probit specifications report the marginal effects.
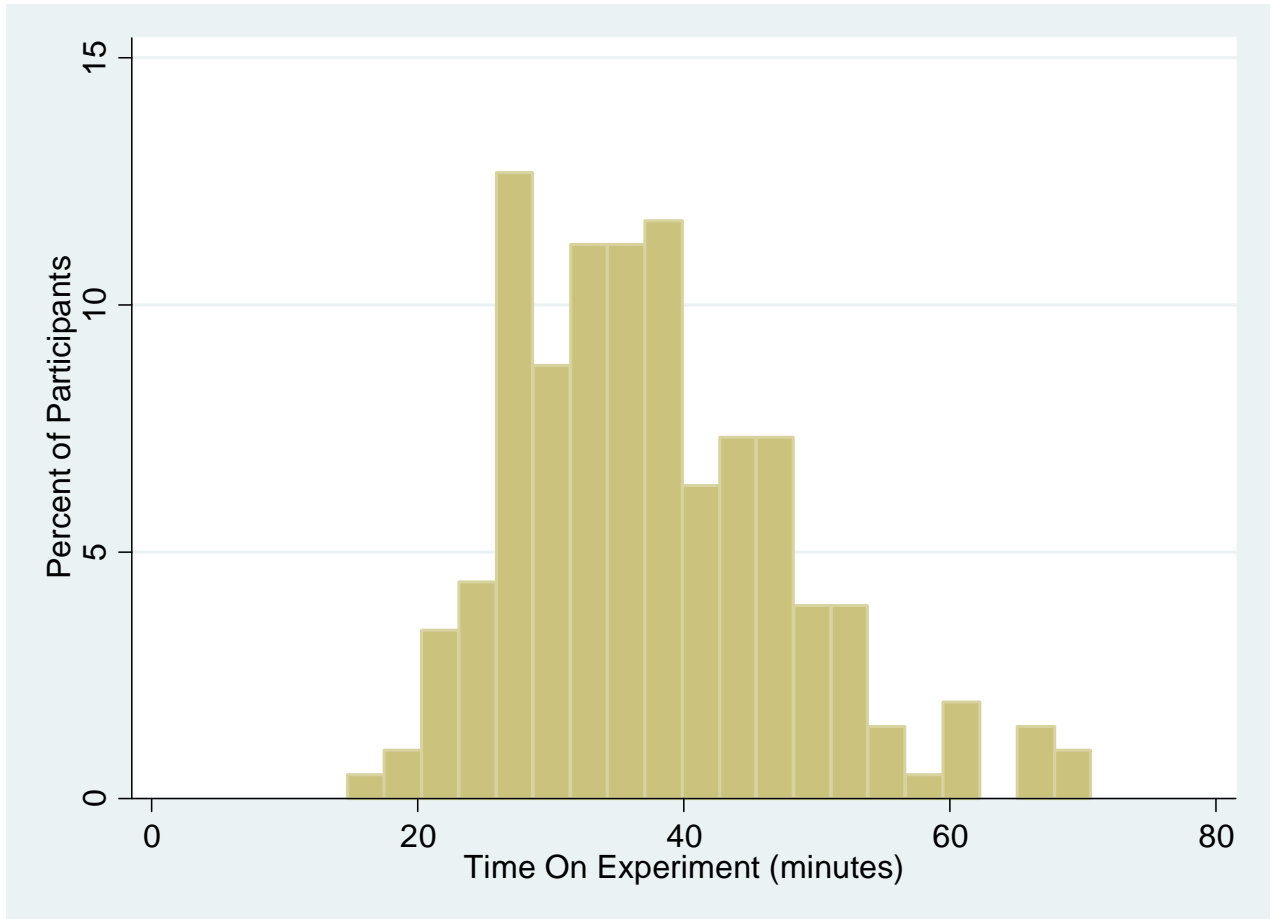
Figure 1: Histogram of Time Spent on the Experiment
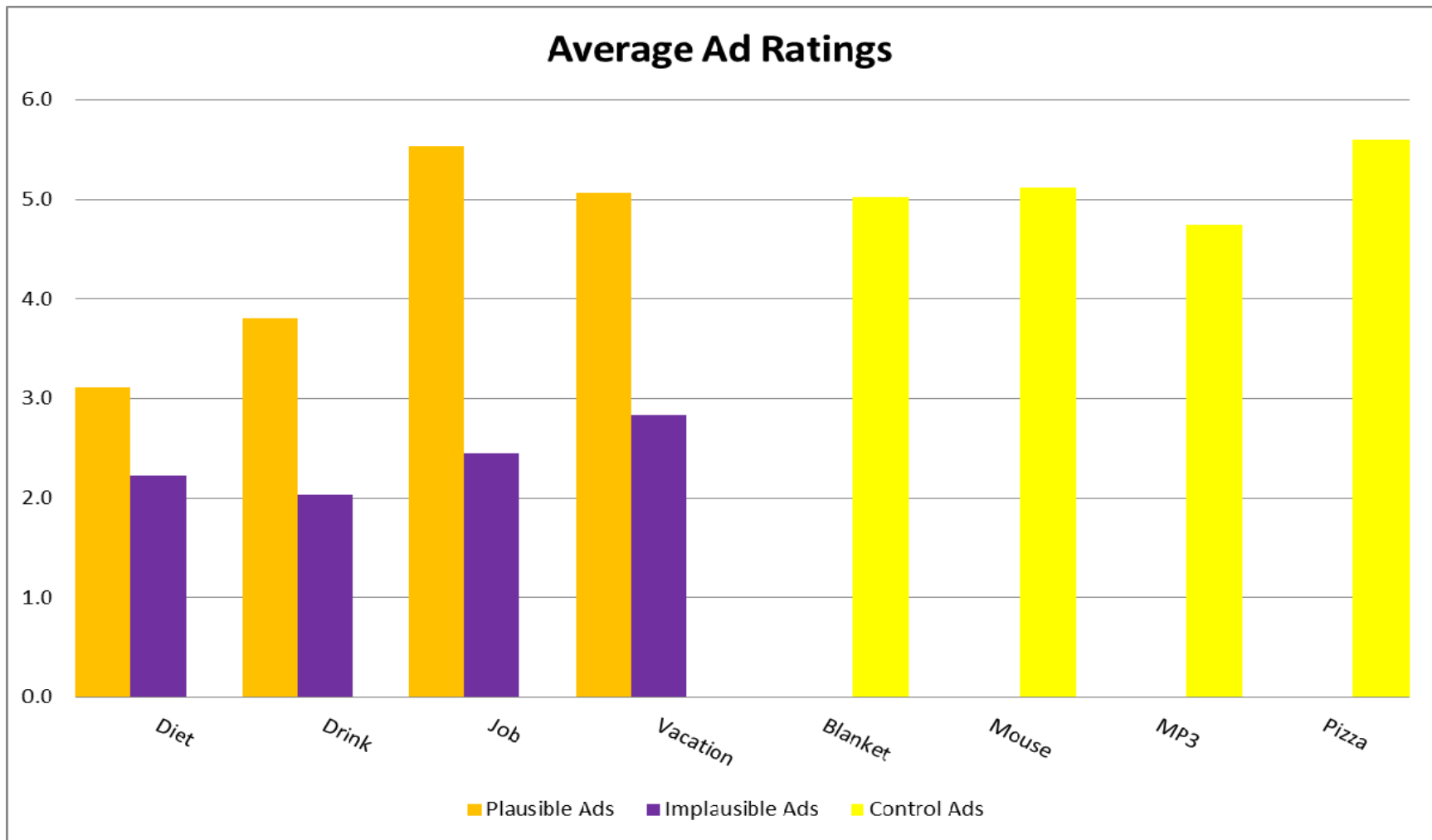
Figure 2: Average Ad Credibility Ratings, by Product and Ad Type

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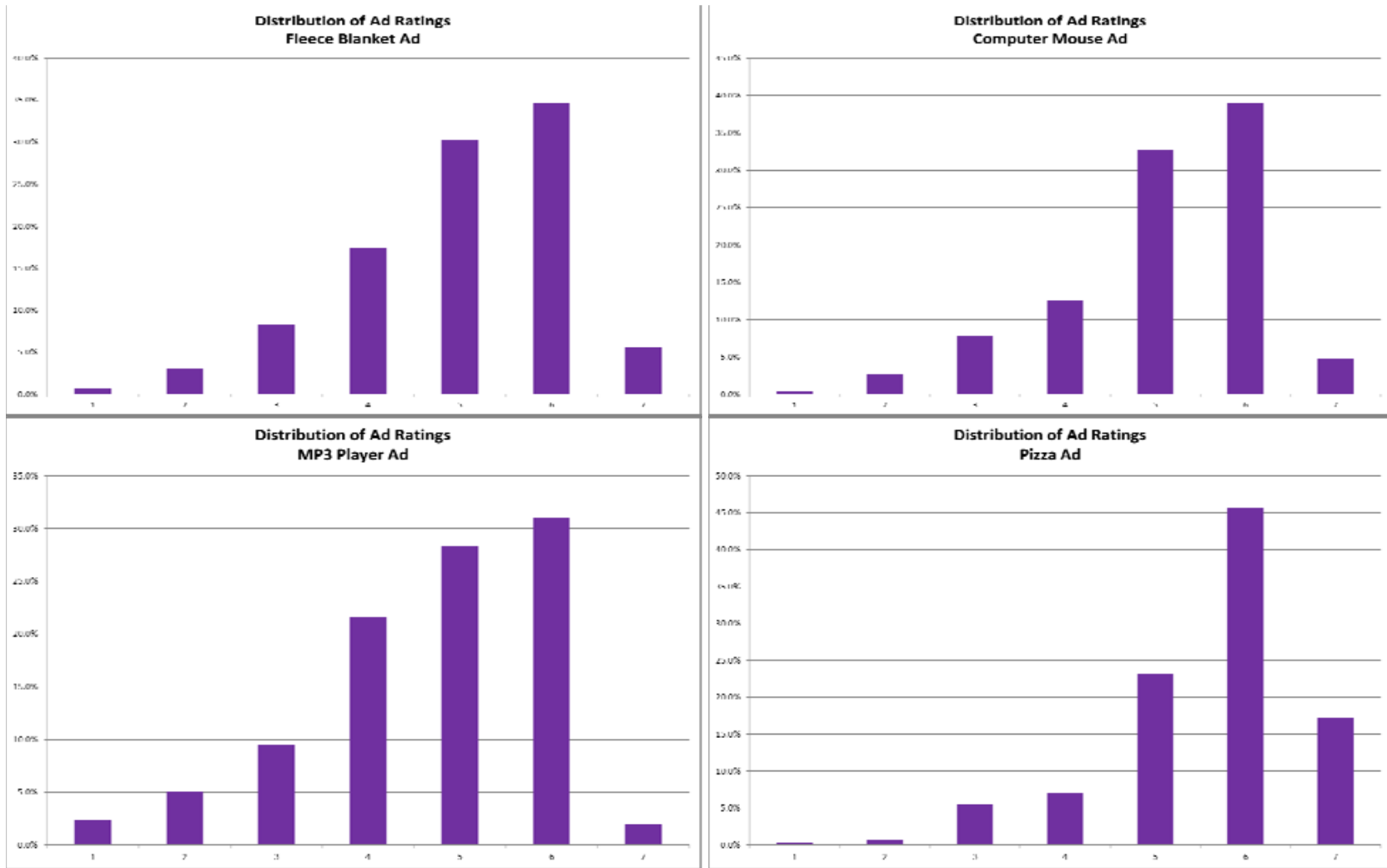
Figure 3: Distribution of Control Ad Ratings

55
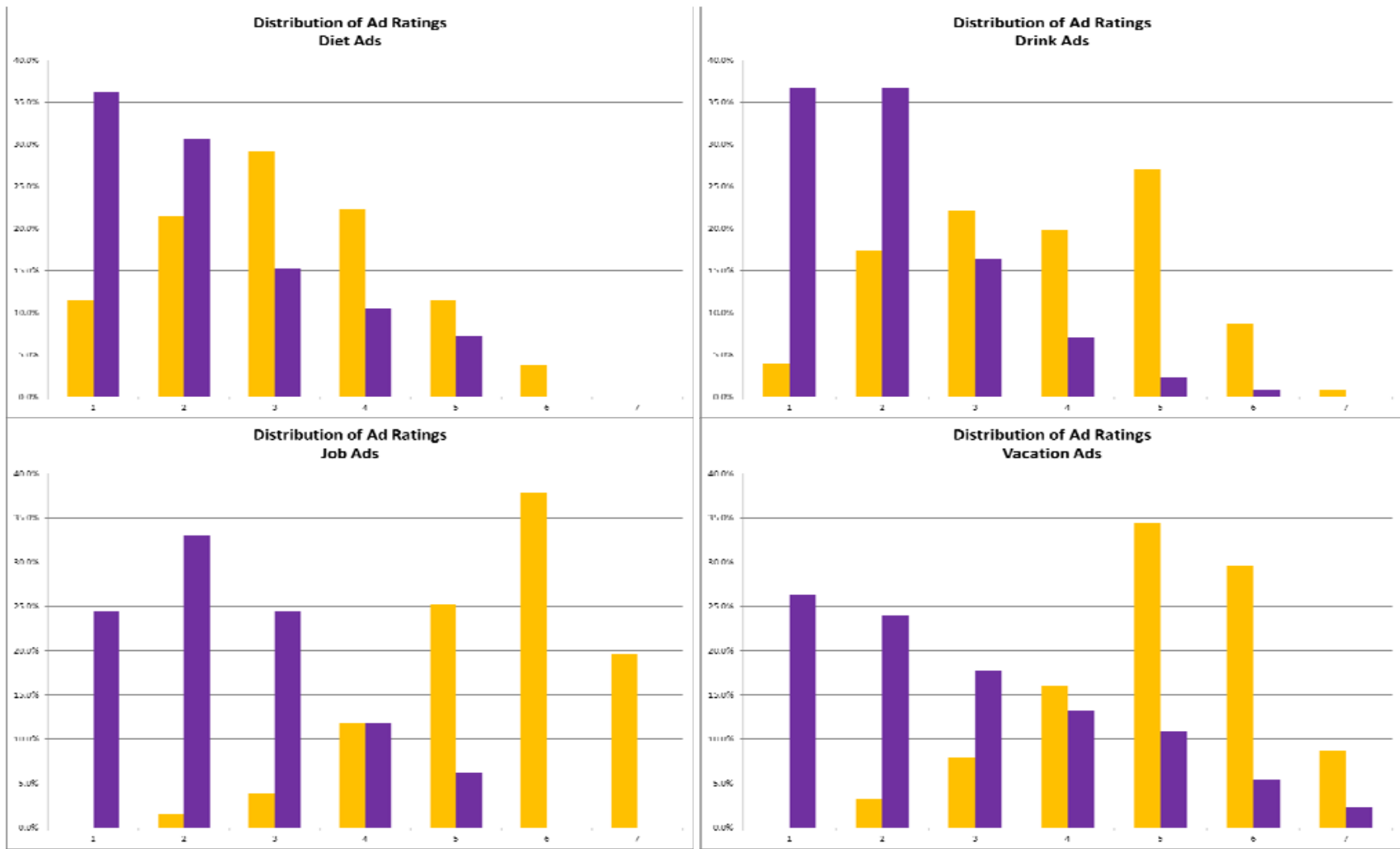
Figure 4: Distribution of Plausible/Implausible Ad Ratings   Plausible ■ Implausible ■

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APPENDIX A: EXPERIMENT INSTRUMENT

[Information in italics in [brackets] and question numbers in (parentheses) are for ease of reference and were not shown to subjects.]

Thank you for participating in today's experiment. You have already earned $8 for showing up. You have an opportunity to earn additional money based on your response to some of the questions.

You will be paid privately by check at the end of the experiment. Depending on your choices in this experiment, you may also receive a check that can only be cashed at a later date. All of the questions that may lead to payments at a later date are clearly marked.

If you have any questions, please raise your hand and an experimenter will assist you. During the experiment you are not allowed to talk to other participants. You may not use electronic devices such as cell phones, Blackberries, or calculators.

[Ad Credibility]

In the first part of this experiment, you will see a series of mock-ups of print advertisements like you might see in a magazine or newspaper or might see posted around campus. None of the ads are for actual brands or sellers. Rather, while you may have seen offers like some of these, these offers are being made by hypothetical sellers.

Please examine each ad as you would an actual ad and answer the questions that follow.

These questions are asking for your opinions about the ads. There are no right or wrong answers. Please give the response to each question that best describes your opinion about the ad.

Please examine the ad. When you are ready, click on "continue" to proceed to the questions.

(Ad_1)   How believable do you find this ad?
- Extremely unbelievable
- Generally unbelievable
- Slightly unbelievable
- Neither believable nor unbelievable
- Slightly believable
- Generally believable
- Extremely believable

(Ad_2)   How informative do you find this ad?
- Extremely uninformative
- Generally uninformative
- Slightly uninformative
- Neither informative nor uninformative
- Slightly informative
- Generally informative
- Extremely informative

(Ad_3)   How truthful do you find this ad?
- Extremely untruthful
- Generally untruthful
- Slightly untruthful
- Neither truthful nor untruthful
- Slightly truthful
- Generally truthful
- Extremely truthful

(Ad_4)   How appealing do you find this ad?
- Extremely unappealing
- Generally unappealing
- Slightly unappealing
- Neither appealing nor unappealing
- Slightly appealing
- Generally appealing
- Extremely appealing

(Ad_5)   How deceptive do you find this ad?
- Extremely non-deceptive
- Generally non-deceptive
- Slightly non-deceptive
- Neither deceptive nor non-deceptive
- Slightly deceptive
- Generally deceptive
- Extremely deceptive

[Subjects answered questions 1 through 5 for each of the eight ads.]

[Optimism]

That concludes the section requesting your opinions on ads.

Please answer the following questions about yourself by indicating whether you "Strongly disagree," "Somewhat disagree," "Neither agree nor disagree," "Somewhat agree," or "Strongly agree" with each of the statements.

(Optimism_1)   In uncertain times, I usually expect the best.
(Optimism_2)   It's easy for me to relax.
(Optimism_3)   If something can go wrong for me, it will.
(Optimism_4)   I'm always optimistic about my future.
(Optimism_5)   I enjoy my friends a lot.
(Optimism_6)   It's important for me to keep busy.
(Optimism_7)   I hardly ever expect things to go my way.
(Optimism_8)   I don't get upset too easily.
(Optimism_9)   I rarely count on good things happening to me.
(Optimism_10)   Overall, I expect more good things to happen to me than bad.

[Consumer Literacy]

In this section, please choose the best answer to each of the questions.

(Literacy_1)   Please choose the most accurate statement about television advertising:

    a. Television advertising is not regulated because of the US Constitution's guarantee of the freedom of speech.
    b. The Federal Government reviews television ads before they are aired to ensure that they are truthful.
    c. The Federal Government sometimes sues companies to stop deceptive advertising after the ads have been on the air.
    d. Television advertising is entirely self-regulated.
    e. Do not know.

[Answer: C]

(Literacy_2)   If someone steals your credit card and charges $1,000 of purchases to your account before you realize the card is missing and you report it to your credit card company, how much of the $1,000 will you be responsible for paying?

    a. All of it ($1,000).
    b. All of it ($1,000), unless you purchased credit card insurance, in which case you would owe zero.
    c. Half of it ($500).
    d. $50 or less.
    e. Do not know.

[Answer: D]

(Literacy_3)   You received a gift card as a present for your birthday. Before you can use the card, the store goes bankrupt and shuts down. The value of your gift card will most likely be:

    a. Refunded to you.
    b. Refunded to the initial purchaser of the gift card.
    c. Transferred to a gift card from another store selling similar products.
    d. Zero, no one will be able to use the card.
    e. Do not know.

[Answer: D]

(Literacy_4)   If a consumer applying for a loan missed several payments on another loan three years earlier, which of the following statements best describes the impact of these missed payments on the consumer's ability to get a new loan today?

    a. Lenders will know about the missed payments on the old loan and use that information in deciding whether to approve a new loan and what interest rate to charge.
    b. Privacy policies for financial transactions will prevent lenders from finding out about the missed payments on the old loan.
    c. Federal law prohibits lenders from considering any missed payments that occurred more than two years earlier.
    d. Lenders do not care about a consumer's past experience with other lenders as long as the consumer is currently employed and earns enough money to make the new loan payments.
    e. Do not know.

[Answer: A]

[Cognitive Reflection]

Your responses to the following questions will affect your earnings. If you read the instructions and choose carefully, you have the potential to earn additional money.

We will pay you $3.00 for each question that you answer correctly.

Please answer each question by typing in a number. Do not use any symbols ($ % ,) – numbers only.

(CRT_1)   A bat and a ball cost $1.10 in total. The bat costs $1 more than the ball. How much (in cents) does the ball cost? Your answer (in whole cents) is _____

[Answer: 5 cents. Also accept .05]

(CRT_2)   If it takes five machines five minutes to make five widgets, how long would it take 100 machines to make 100 widgets? Your answer (in minutes) is _____

[Answer: 5 minutes]

(CRT_3)   In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half the lake? Your answer (in days) is _____

[Answer: 47 days]

[Confidence (Cognitive Reflection Questions)]

We would like to know how well you think you did on the three questions you just answered. For each question, we will ask you to estimate how likely that you think it is your answer was correct. If you are absolutely certain you have the correct answer, that is a 100% chance your answer is correct. If you are absolutely certain you have the wrong answer, that is a 0% chance your answer is correct. Please feel free to use any number between 0 and 100 to indicate what you think the chance is that your answer is right.

At the end of the next section, we will use these probabilities to help you estimate the number of questions that you answered correctly. We will pay you if you correctly predict how many questions you have answered correctly.

We will now show you the last three questions again and the answers that you gave. For each, we will ask you to estimate how likely you think it is that your answer is correct.

(CConfidence_1)   We asked: A bat and a ball cost $1.10 in total. The bat costs $1 more than the ball. How much does the ball cost?

        Your answer was: *[Programming note: Fill-in the subject's answer from prior section]* cents

How likely is your answer to be correct? Please enter a value between 0 and 100%.

(CConfidence_2)   We asked: If it takes five machines five minutes to make five widgets, how long would it take 100 machines to make 100 widgets?

        Your answer was: *[Programming note: Fill-in the subject's answer from prior section]* minutes

How likely is your answer to be correct? Please enter a value between 0 and 100%.

(CConfidence_3)   We asked: In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half the lake?

        Your answer was: *[Programming note: Fill-in the subject's answer from prior section]* days

How likely is your answer to be correct? Please enter a value between 0 and 100%.

[Numeracy]

Your responses to the following questions also will affect your earnings. We will pay you $3.00 for each question that you answer correctly.

Please answer the following questions by typing in a number, unless instructed otherwise.

(Numeracy_1)   Suppose that each time a gambling game is played a person has a 50% chance of winning $2 and a 50% chance of winning $10. If a large number of people play the game, what would be their average winnings per person?

[Answer: $6]

(NConfidence_1)   How likely is your answer to be correct? Please enter a value between 0 and 100%.

(Numeracy_2)   Suppose that each time a gambling game is played a person has a 25% chance of winning $20 and a 75% chance of losing $4. If a large number of people play the game, what would be their average winnings or losses per person?

 [Answer: $2]

(NConfidence_2)   How likely is your answer to be correct? Please enter a value between 0 and 100%.

(Numeracy_3)   In a sale, a shop is selling all items at half price. Before the sale, a sofa costs $300. How much will it cost in the sale?

[Answer: $150]

(NConfidence_3)   How likely is your answer to be correct? Please enter a value between 0 and 100%.

(Numeracy_4)   If the chance of getting a disease is 10 per cent, how many people out of 1,000 would be expected to get the disease?

[Answer: 100]

(NConfidence_4)   How likely is your answer to be correct? Please enter a value between 0 and 100%.

(Numeracy_5)   A second hand car dealer is selling a car for $6,000. This is two-thirds of what it cost new. How much did the car cost new?

[Answer: $9,000]

(NConfidence_5)   How likely is your answer to be correct? Please enter a value between 0 and 100%.

(Numeracy_6)   If 5 people all have the winning numbers in the lottery and the prize is $2 million, how much will each of them get?

[Answer: $400,000]

(NConfidence_6)   How likely is your answer to be correct? Please enter a value between 0 and 100%.

(Numeracy_7)   Let's say you have $200 in a savings account. The account earns ten per cent interest per year. The account compounds interest once a year. How much will you have in the account at the end of two years?

[Answer: $242]

(NConfidence_7)   How likely is your answer to be correct? Please enter a value between 0 and 100%.

[Wason Confirmation Bias]

You see an advertisement that claims if you take the drug Sanatron, you will not get colds. However, Sanatron is made by a drug company you have never heard of, and when you Google the product, you find that there are complaints that it does not work.

You want to determine whether the claim is false.

You know the following information about four of your friends:

I.   Ann takes Sanatron.

II.   Betty does not take Sanatron.

III.   Carla does not catch colds.

IV.   Debbie catches colds.

To help you determine whether the claim is false, you can ask your friends for additional information.

You can obtain the following additional pieces of information from your friends. Check the boxes next to all of the piece(s) of information that would help you determine whether the claim is false. Do not click on pieces of information that would not help you determine whether the claim is false.

   A.   Whether Ann catches colds.

   B.   Whether Betty catches colds.

   C.   Whether Carla takes Sanatron.

   D.   Whether Debbie takes Sanatron.

   E.   None of these would help determine whether the claim is false.

 [answer: exactly A and D must be checked]

(WConfidence)   How likely is your answer to be correct? Please enter a value between 0 and 100%.

[Overconfidence]

Please answer the following questions that ask you to estimate how many questions you answered correctly.

(Total Confidence)   Your answers indicate that you think you are most likely to have gotten *[Programming note: Display Y, the average of the subject's responses to the (NConfidence_), (CConfidence_), and (WConfidence) questions here.]*% of 11 questions right, or *[Programming note: display X=(Y/100)*11 rounded to the nearest integer here]* questions total, but we will let you adjust this estimate if you would like.

We will pay you $2 if you correctly predict the number of questions you got right.

Do you think you got:

a. *[Programming note: display X here]* questions right.
b. Some other number of questions right. How many questions (out of 11) do you think you got right? ___

(Relative Confidence)   How do you think you did on these 11 questions compared to the other participants in this experimental session? We will pay you $2 if your prediction is correct. Do you think that your score was in the:

a. top third of scores from this session?
b. middle third of scores from this session?
c. bottom third of scores from this session?

[Risk and Loss aversion]

This section presents 5 tables, each with 9-12 rows. In every choice, Option A will be a definite outcome in which you will receive or lose a fixed amount of money. In Option B, there will be two possible outcomes, with the actual outcome determined by the flip of an electronic coin. There are no right or wrong answers. Simply choose whichever option that you would prefer.

At the end of the experiment, we will randomly select one row from each table to count for real money, and you will receive or lose the amount of money for the option you chose in those rows. If you chose the definite Option A, then you will receive or lose the specified amount. If you chose Option B, we will (electronically) flip a coin to determine the outcome. If you earn money, the money will be added to your earnings. If you lose money, the money will be deducted from your earnings

Table 1

For each row of this table, you must choose one of the following options:

Option A: You will **receive** a fixed amount of money, ranging between **$1 and $12**, depending on the row.

Option B: There will be a 50% chance you will **receive $20** and a 50% chance you will **receive nothing ($0)**.

	Option A: Definitely Receive		Option B: 50 % Chance of Receiving	50 % Chance of Receiving
(risk_A_1)	$1		$0	$20
(risk_A_2)	$2		$0	$20
(risk_A_3)	$3		$0	$20
(risk_A_4)	$4		$0	$20
(risk_A_5)	$5		$0	$20
(risk_A_6)	$6		$0	$20
(risk_A_7)	$7		$0	$20
(risk_A_8)	$8		$0	$20
(risk_A_9)	$9		$0	$20
(risk_A_10)	$10		$0	$20
(risk_A_11)	$11		$0	$20
(risk_A_12)	$12		$0	$20

Table 2

For each row of this table, you must choose one of the following options:

Option A: You will **receive $2.**

Option B: There will be a 50% chance you will **receive $12** and a 50% chance you will **lose** an amount **between $0 and $11** depending on the row.

	Option A: Definitely Receive		Option B: 50 % Chance of Receiving	50 % Chance of Losing
(risk_B_0)	$2		$12	**$0**
(risk_B_1)	$2		$12	**-$1**
(risk_B_2)	$2		$12	**-$2**
(risk_B_3)	$2		$12	**-$3**
(risk_B_4)	$2		$12	**-$4**
(risk_B_5)	$2		$12	**-$5**
(risk_B_6)	$2		$12	**-$6**
(risk_B_7)	$2		$12	**-$7**
(risk_B_8)	$2		$12	**-$8**
(risk_B_9)	$2		$12	**-$9**
(risk_B_10)	$2		$12	**-$10**
(risk_B_11)	$2		$12	**-$11**

Table 3

For each row of this table, you must choose one of the following options:

Option A: You will **lose** a fixed amount of money, ranging **between $7 and $15**, depending on the row.

Option B: There will be a 50% chance you will **lose $6** and a 50% chance you will **lose $15**.

	Option A:		Option B:	
	Definitely Lose		**50 % Chance of Losing**	**50 % Chance of Losing**
(risk_C_7)	**-$7**		-$6	-$15
(risk_C_8)	**-$8**		-$6	-$15
(risk_C_9)	**-$9**		-$6	-$15
(risk_C_10)	**-$10**		-$6	-$15
(risk_C_11)	**-$11**		-$6	-$15
(risk_C_12)	**-$12**		-$6	-$15
(risk_C_13)	**-$13**		-$6	-$15
(risk_C_14)	**-$14**		-$6	-$15
(risk_C_15)	**-$15**		-$6	-$15

Table 4

For each row of this table, you must choose one of the following options:

Option A: You will **lose $3.**

Option B: There will be a 50% chance you will **receive $2** and a 50% chance you will **lose** an amount **between $7 and $16** depending on the row.

	Option A:			Option B:	
				50 % Chance of	50 % Chance of
	Definitely Lose			**Receiving**	**Losing**
(risk_D_7)	-$3			$2	-$7
(risk_D_8)	-$3			$2	-$8
(risk_D_9)	-$3			$2	-$9
(risk_D_10)	-$3			$2	-$10
(risk_D_11)	-$3			$2	-$11
(risk_D_12)	-$3			$2	-$12
(risk_D_13)	-$3			$2	-$13
(risk_D_14)	-$3			$2	-$14
(risk_D_15)	-$3			$2	-$15
(risk_D_16)	-$3			$2	-$16

Table 5

For each row of this table, you must choose one of the following options:

Option A: You will **lose $6.**

Option B: There will be a 50% chance you will **lose $3** and a 50% chance you will **lose** an amount **between $7 and $16** depending on the row.

		Option A:			Option B:	
		Definitely Lose			**50 % Chance of Losing**	**50 % Chance of Losing**
(risk_E_7)		-$6			-$3	**-$7**
(risk_E_8)		-$6			-$3	**-$8**
(risk_E_9)		-$6			-$3	**-$9**
(risk_E_10)		-$6			-$3	**-$10**
(risk_E_11)		-$6			-$3	**-$11**
(risk_E_12)		-$6			-$3	**-$12**
(risk_E_13)		-$6			-$3	**-$13**
(risk_E_14)		-$6			-$3	**-$14**
(risk_E_15)		-$6			-$3	**-$15**
(risk_E_16)		-$6			-$3	**-$16**

[Impatience and Present Bias]

This section presents 3 tables each with 8 rows. In each row, you can choose to receive either a smaller amount of money sooner or a larger amount of money later. Please indicate for each row whether you would prefer the smaller, sooner amount or the larger, later amount. There are no right or wrong answers. Simply choose whichever option that you prefer.

This portion of the experiment involves the possibility of earning real money. We will randomly select 1 out of 30 participants. For each of these participants, we will then randomly select one row from one of the three tables. Each of the chosen participants will receive the amount of money indicated in their choice in that row.

If we select you and you have chosen to receive money today, we will give you a check for this amount of money in addition to what you may have earned on other sections of the experiment. If we select you and you have chosen to receive money in the future, you will receive a check which cannot be cashed until after the appropriate amount of time has passed.

Table 1

For each row of this table, you must choose either Option A or Option B.

	Option A: Sooner Amount		Option B: Later Amount
(Time_A_1)	$ 77.50 today		$ 80.00 in 2 months
(Time_A_2)	$ 75.00 today		$ 80.00 in 2 months
(Time_A_3)	$ 72.50 today		$ 80.00 in 2 months
(Time_A_4)	$ 70.00 today		$ 80.00 in 2 months
(Time_A_5)	$ 65.00 today		$ 80.00 in 2 months
(Time_A_6)	$ 60.00 today		$ 80.00 in 2 months
(Time_A_7)	$ 50.00 today		$ 80.00 in 2 months
(Time_A_8)	$ 40.00 today		$ 80.00 in 2 months

Table 2

For each row of this table, you must choose either Option A or Option B.

	Option A: Sooner Amount		Option B: Later Amount
(Time_B_1)	$ 77.50 today		$ 80.00 in 4 months
(Time_B_2)	$ 75.00 today		$ 80.00 in 4 months
(Time_B_3)	$ 72.50 today		$ 80.00 in 4 months
(Time_B_4)	$ 70.00 today		$ 80.00 in 4 months
(Time_B_5)	$ 65.00 today		$ 80.00 in 4 months
(Time_B_6)	$ 60.00 today		$ 80.00 in 4 months
(Time_B_7)	$ 50.00 today		$ 80.00 in 4 months
(Time_B_8)	$ 40.00 today		$ 80.00 in 4 months

Table 3

For each row of this table, you must choose either Option A or Option B.

		Option A: Sooner Amount		Option B: Later Amount
(Time_C_1)		$ 77.50 in 2 months		$ 80.00 in 4 months
(Time_C_2)		$ 75.00 in 2 months		$ 80.00 in 4 months
(Time_C_3)		$ 72.50 in 2 months		$ 80.00 in 4 months
(Time_C_4)		$ 70.00 in 2 months		$ 80.00 in 4 months
(Time_C_5)		$ 65.00 in 2 months		$ 80.00 in 4 months
(Time_C_6)		$ 60.00 in 2 months		$ 80.00 in 4 months
(Time_C_7)		$ 50.00 in 2 months		$ 80.00 in 4 months
(Time_C_8)		$ 40.00 in 2 months		$ 80.00 in 4 months

[General Ad Skepticism]

This section asks for your opinions. Please indicate whether you "Strongly disagree," "Somewhat disagree," "Neither disagree nor agree," "Somewhat agree," or "Strongly agree" with each of the statements. There are no right or wrong answers. This section does not affect your earnings.

(Skep_1)   We can depend on getting the truth in most advertising.
(Skep_2)   Advertising's aim is to inform the consumer.
(Skep_3)   I believe advertising is informative.
(Skep_4)   Advertising is generally truthful.
(Skep_5)   Advertising is a reliable source of information about the quality and performance of products.
(Skep_6)   Advertising is truth well told.
(Skep_7)   In general, advertising presents a true picture of the product being advertised.
(Skep_8)   I feel I've been accurately informed after viewing most advertisements.
(Skep_9)   Most advertising provides consumers with essential information.

[Situational Skepticism]

This section asks for your opinions. Please indicate whether you "Strongly disagree," "Somewhat disagree," "Neither disagree nor agree," "Somewhat agree," or "Strongly agree" with each of the statements. There are no right or wrong answers. This section does not affect your earnings.

(Specific_Skep_1)   Limited time offers and other promotions that emphasize the need to act quickly are usually outstanding values.

(Specific_Skep_2)   Advertisements about product characteristics that consumers can verify before purchase – like a shirt's satin soft fabric – are more likely to be true than advertisements about product characteristics that consumers can only verify by purchasing and using the product – like a shirt's durability.

(Specific_Skep_3)   Advertisements from unknown companies are as likely to be true as advertisements from well-known brands.

(Specific_Skep_4)   There are many valuable products and business opportunities presented in 30-minute advertisements on late-night television.

(Specific_Skep_5)   Favorable quotes from satisfied customers in advertisements mean the product will work for you.

(Specific_Skep_6)   There are effective treatments for many diseases that the big drug companies do not want people to know about.

(Specific_Skep_7)   There is no reason to think that a product endorsed by a famous athlete or movie star will outperform products that have no celebrity endorsements.

(Specific_Skep_8)   It is easy to find effective alternative medical approaches that are safer than conventional treatments from mainstream doctors and pharmacies and just as effective.

(Specific_Skep_9)   Scientists will soon discover safe treatments that let you lose 20 pounds a month without diet or exercise and keep that weight off after you end treatment.

[General Risk-Taking]

(GeneralRisk)   How willing are you to take risks in general? In answering this question please use a scale from 0 to 10 where 0 indicates that you are not at all willing to take risks and 10 indicates that you are fully willing to take risks.

[Demographics and Background]

Please respond to the following questions. If you prefer not to respond to any of these questions, just click the "Continue" button.

(Demog_1)   Are you now (or were you during the last academic year) enrolled at George Mason or any other college or university?

a. Yes *[Continue]*
b. No *[Skip to (Demog_3)]*

(Demog_2)   Are you (or were you most recently):

a. An undergraduate student *[Skip to (Demog_4)]*
b. A graduate student *[Skip to (Demog_6)]*
c. A non-degree student *[Continue]*

(Demog_3)   What is the highest level of education that you have completed?

a. Less than high school
b. High school degree or GED
c. Technical / trade school
d. Some college
e. Associate's degree
f. Bachelor's degree
g. Graduate or professional degree

[Skip to (Demog_8)]

(Demog_4)   What year were you in school during the last academic year?

a. Freshman
b. Sophomore
c. Junior
d. Senior

(Demog_5)   Did you complete a college degree or trade school before you enrolled in your current program?

a. Yes *[Continue]*
b. No *[Skip to (Demog_7)]*

(Demog_6)   What is the most advanced degree you finished before enrolling in this program?

a. Technical / trade school
b. Associate's degree
c. Bachelor's degree
d   Graduate or professional degree

(Demog_7)   What is your major? If you have more than one major, list all that apply.

(Demog_8)   Are you currently employed?

a. Yes *[Continue]*
b. No *[Skip to (Demog_11)]*

(Demog_9)   Do you have a paid job working for George Mason University?

a. Yes
b. No

(Demog_10)   How many hours a week do you work for your employer(s)?

[If the answer is less than 20 hours, continue. If the answer is 20 or more hours, skip to (Demog_12)]

(Demog_11)   Have you ever worked an average of 20 or more hours a week for a full year?

a. Yes *[Continue]*
b. No *[Skip to (Demog_13)]*

(Demog_12)   How many years have you worked an average of at least 20 hours a week year round?

(Demog_13)   Do you have a credit card?

a. Yes *[Continue]*
b. No *[Skip to (Demog_15)]*

(Demog_14)   Do you pay your credit card bill yourself or does someone else, such as a spouse or other family member, pay it?

a.   I pay it myself
b.   Someone else pays it

(Demog_15)   What is your age?

a. 18-19
b. 20-21
c. 22-25
d. 26-30
e. 31-35
f. 36-45
g. 46-60
h. 60+

(Demog_16)   Have you taken the SAT?

a. Yes *[Continue]*
b. No *[Skip to* (Demog_22)*]*

(Demog_17)   Did you take the SAT before or after the 2005 changes?

a. Before (maximum score was 1600, the test included analogies)
[Skip to (Demog_18)]
b. After (maximum score was 2400, the test included an essay)
[Skip to (Demog_19)]
c. Both before and after *[Skip to (Demog_20)]*

(Demog_18)   What was your total SAT score?
        a.   400-790
        b.   800-890
        c.   900-990
        d.   1000-1090
        e.   1100-1190
        f.   1200-1290
        g.   1300-1390
        h.   1400-1490
        i.   1500-1600
        j.   Can't remember

[Skip to (Demog_21).]
(Demog_19)   What was your total SAT score?
        a.   600 - 1190
        b.   1200 – 1340
        c.   1350 – 1490
        d.   1500 – 1640
        e.   1650 – 1790
        f.   1800 – 1940
        g.   1950 – 2090
        h.   2100 – 2240
        i.   2250 – 2400
        j.   Can't remember

[Skip to (Demog_21).]
 (Demog_20)   What was your total SAT score on the **new SAT**?
        a.   600 - 1190
        b.   1200 – 1340
        c.   1350 – 1490
        d.   1500 – 1640
        e.   1650 – 1790
        f.   1800 – 1940
        g.   1950 – 2090
        h.   2100 – 2240
        i.   2250 – 2400
        j.   Can't remember

(Demog_21)   What was your SAT math score?
  a. 200-290
  b. 300-390
  c. 400-490
  d. 500-590
  e. 600-690
  f. 700-800
  g. Can't remember

(Demog_22)   Have you taken the ACT?

a. Yes *[Continue]*
b. No *[Skip to (Demog_24)]*

(Demog_23)   What was your ACT score?
  a. 11-15
  b. 16-20
  c. 21-24
  d. 25-27
  e. 28-30
  f. 31-33
  g. 34-36
  h. Can't remember

 (Demog_24)   Are you Hispanic or Latino?

a. Yes
b. No

(Demog_25)   Which of these categories best describes your race? You may choose more than one race if applicable. Click the "Continue" button when you are done choosing answers.

  a. American Indian or Alaska native
  b. Asian
  c. Black or African American
  d. Native Hawaiian or other Pacific Islander
  e. White

(Demog_26)   Are you:

a. Male
b. Female

[Procrastination and Self-Control Behavior]

 (SelfControl_1)   Are you currently taking classes (or have you done so in the past year)?
a. Yes   *[Continue]*
b. No   *[Skip to (SelfControl_4)]*

The following sentences could describe how you handle certain situations. Please indicate how frequently your actions are consistent with each statement: *(Response options: Almost always, Usually, Sometimes, Seldom, Almost Never)*

(SelfControl_2)   I postpone doing work for my classes until the last minute.

(SelfControl_3)   I often promise myself I will do some of my course work, then put it off anyway.

(SelfControl_4)   I spend more money than I should, considering my income and savings.

(SelfControl_5)   I pay my bills on time.

        [(SelfControl_5) offers another option: "Not applicable: I am rarely the person responsible for paying bills"]

[Concluding Instructions]

Please wait quietly. As soon as everyone has finished the experiment, you will be able to see a summary of your payments.

Click "Continue" to see a summary of your payments.

This concludes the experiment. Please wait quietly until we call you to the payment desk.

APPENDIX B: COPY OF ADS USED

Blanket Ad

B-2

X-LABS X8

DIGITAL MEDIA PLAYER

Proprietary digital sound processor reduces distortion to put big stereo sound in your pocket

Smaller than a credit card & thinner than a pen

WWW.X-LABS.COM

- MP3 Player
- FM Radio
- Video Playback
- Photo Albums
- Color Screen
- 30 hour battery life
- 8 GB

Pizza Ad

Implausible Job Ad

B-14