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EMOTION AND DECISION-MAKING  
A LOOK INTO LONELINESS AND BEHAVIORAL ECONOMICS

By

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A capstone project submitted for Graduation with University Honors

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## ABSTRACT

Behavioral economics studies the interdisciplinary phenomenon between economics and psychology. Whereas standard economics assumes that people are capable of optimizing decisions based on their own preferences in order to maximize subjected utility, simple observation suggests human behavior often falls short of this assumption. One important part of everyday decision making that economic models largely ignore is emotion. Our current investigation explores the relationship between loneliness and economic decision making. Loneliness is a complex emotion that describes the perceived social disconnectedness between a person and their surroundings. This study employed a correlational survey-based approach to investigate the relationship between this negative emotion and economic tasks designed to measure impulsivity, delay discounting, risk aversion, and loss aversion. We found that loneliness was seldom experienced by university students in our sample. However, to the extent that loneliness varied, it was negatively correlated with impulsivity, suggesting that lonely individuals tend to make less impulsive purchases, but not significantly related to any of the other decision-making measures. We also conducted a pre-post design in a follow-up study that examined any significant change in responses of the same participants over the course of the year amid the COVID-19 pandemic. Loneliness surprisingly did not see any change on average, but other negative emotions did. In addition, loss aversion significantly and risk aversion significantly decreased. That is, students became less averse to potential losses and were simultaneously more risk seeking for gains. Lastly, we found that all forms of internet usage were negatively correlated with loneliness. We conclude with some suggestions as to how the study could be improved and the next steps to take for exploratory research and explanatory investigation.

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## **Behavioral economics**

Behavioral economics gives insight into how economic participants respond to underlying forces in their decision-making. The effects of psychological, cognitive, emotional, and social factors perpetuate the judgment of these individuals in how they think and act. This discipline offers both normative and descriptive reasoning of human behavior. These two types of theories are embedded in research involving economic decision-making. While the former depicts the ideal decision in a given situation, it commonly consists of many assumptions not feasible in practical application. Normative theories are guided by underlying concepts of rationality and optimality (Einhorn & Hogarth, 1981). Rational choice by itself does not take into account any influence beyond the default. By simply weighing costs and benefits under preexisting preferential circumstances, it leaves no room for disruption of choice stability. An example of this is the expected utility theory, which is rooted in rational normative choice in decision-making. This is hardly reflected in practical applications because there are a variety of impacts that can influence the decision process. Furthermore, it is not adept to assume that each individual will make the same choice. Given the same alternatives, one will likely choose differently than another based off individual' value maximization. This describes the concept of utility where the theory is underscored by people's preferences; judgments on a number of things reflect each individual's reference point and evaluation of worth (Fishburn, 1968). Therefore, descriptive decision theory portrays the likely outcome of a scenario, given differing variables present in the decision process. It can be assumed that individuals likely make choices that reap the most benefits. This is a simple task when all outcomes are known; however, this is often not the case. Uncertainty has an immense impact in the evaluation of possible outcomes of a decision. Economic optimality is then skewed as decisions are not always framed optimally. In

developing the idea of Prospect Theory, Psychologists Daniel Kahneman and Amos Tversky doubted the assumptions adopted by previous rational choice theories. In their paper, *Advances in Prospect Theory: Cumulative Representation of Uncertainty*, the researchers identify various choice structures where preferences disagree with principles guided by the expected utility theory (Kahneman & Tversky, 1986). With no absolute guarantees, one's suspect of the resolution is justified. Responses are influenced by the way questions are framed. Since studies have shown that rationality can be violated, it is reasonable to assume that emotions can too, play a part in such economic decisions.

### **Emotions in decision-making**

Emotions have a profound, multiplicative effect in our everyday experiences. In many ways, it plays an integral role in the reasoning and rationalizing of past, present, and future decisions. The primary interest of this paper concerns itself with that of immediate emotion, or those that are present at the moment of decision-making. In a paper published in the *Handbook of Affective Sciences*, economist David Lowenstein and social psychologist Jennifer Lerner found that immediate emotions can somewhat be rationalized, but to a certain extent (Lowenstein & Lerner, 2003). Varying across individuals, those unexpected emotions may play a bigger role in the decision-making than intended or planned for. There is varying level of degrees to which affect influences different types of decisions; however, once the intensity levels surpass a certain threshold, emotions began to influence the cognitive processing of information relevant to the decision. The effect of incidental emotions can be beneficiary or aversive, yet in either case, they are unplanned, unwarranted, and made unconsciously (Lerner et al., 2015). It might be obvious to identify a specific emotion playing a role in the decision process when the individual outwardly precipitates it, an example being a moment of absolute rage or complete sadness.

While these examples are on the extreme end of the spectrum, it may be hard to recognize more subtle biological states. Acting as trigger stimuli, how one perceives information and behaves is heavily permeated by such feelings. In this paper, the primary focus in terms of emotions is loneliness, the perceived unpleasant feeling of isolation and societal disconnect.

## **Loneliness**

Human beings are inherently social species that have historically relied on each other for survival. This is even more evident with the digitalized and globalized society that is today. With the growing number of media outlets available, the opportunity to be an accepted member of a group has grown substantially. The feeling of social connectedness plays an important role in how individuals feel in-tune with their environment and themselves. When this social belongingness is challenged, people turn to a flight-or-fight mode of thinking. Although one might propose a solution of simply networking and finding a group, a variety of constraints exist that make this hard to do so. However, identifying reasons why social inclusion may be inhibited is beyond the scope of this paper. Rather, we are interested in the effects of this conclusion.

Continued symptoms of social ineptitude lead people who struggle to be socially included to experience loneliness, an aversive state that leaves people hopeless and helpless, further issuing the necessity for social contact. (Reichmann, 1959). This emotional state is derived from countless attempts at recontact with social surroundings, but to no prevail. It is developed in an individual who seemingly exhausted their efforts in feeling a social belonging. Although one may have others to talk to, this does not necessarily indicate that the individual feels attached to these people. Loneliness is thus initiated by the affected' perspective as the emotional distress creates a social discrepancy between subjective connections and what is perceived to be the apt level of contact. (Peplau & Perlman, 1979). This overwhelming concern to feel included may



dominate many of the thoughts associated with loneliness. The constant reminders and feelings to want to be included and accepted has affected individuals constantly spending time and thought to building relationships to repair their social belongingness (Baumeister & Leary, 1995). Because these individuals spend so much time thinking about social inclusion, their judgment might reflect this type of thinking when making decisions. While other emotions such as sadness and anger can be felt across a group of people, loneliness is more thought of as an individual, internal struggle. Because the conflict is with themselves, it makes the individual cognitive processes much more personally confined. With all this in mind, the research question then frames the potential implications loneliness has on individual decision-making. This paper looks to analyze any effects this aversive, emotional state has on behavioral economic decisions from a correlational approach. This aversive emotional state is somewhat synonymous to that of depression; however, it holds its own credence as a distinct feeling.

### **Loneliness versus depression**

Depression is a biological, psychological, and social sign of distress. While it shares similar symptoms with that of loneliness, they are both fundamentally different sources of problems. A major reason why the two are associated with each other is because of their implicit high correlations. Often times, loneliness will lead to a depressed state and vice versa; however, the two do not contractually cause one another (Weeks et al., 1980). In this study, the four researchers concluded that these two issues are indeed entirely two different constructs. It is possible to experience both at a time, yet it is also conceivable to experience one but not the other. Considering further implications, depression can be referred to as a mental health condition, a state beyond feelings. In a study of loneliness, sociologist Robert S. Weiss developed the underlying difference, yet commonality between loneliness and depression. In his

paper, *Loneliness: The experience of emotional and social isolation*, Weiss concluded that those who are lonely actively look to bridge this perceived social gap; however, those who are depressed have reached a state beyond return (Weiss, 1793). Individuals suffering from loneliness have continued motivation to seek social connectedness, whereas those who are depressed have essentially given up in doing so. This might imply that the latter no longer constantly thinks about their perceived social deficit.

### **Prevalence of loneliness**

Loneliness is increasingly becoming more prevalent in society today than ever before. With so many affected by perceived social discrepancies, this subset in emotion is has become popular in research. In a study published in the *Personality and Individual Differences* journal in 2021, researchers conducted a study known as the *BBC Loneliness Experiment*. The study reported over 46,000 participants aged 16-99 years across 237 different countries having experienced loneliness. This suggests that loneliness is not inhibited by diversity whatsoever. It also reveals that younger people may experience loneliness more than any other aged group (Barreto et al., 2021). In data collected by the Office for National Statistics, the recognized national statistical institute of the UK, the report showed “those aged 16 to 24 are the group most likely to report feeling lonely, with 10% feeling lonely “often or always”” (Ortiz-Ospina & Roser, 2020). This challenges the preconception that older individuals are thought to feel lonelier than their age-difference counterparts. Interestingly enough, there have been various studies debunking the loneliness pandemic notion with reported non-significance in their analysis regarding the trend of this emotion. While this is certain to be studied further in the future, it’s no surprise that more and more people are reporting their social disconnect. Not only has the

digitalized world allowed for anonymous confessions at a large scale, but it may have contributed to the increase in self-reported loneliness because of its wide availability.

### **Loneliness in university students**

With young age groups (16 - 24) having reported higher levels of loneliness than any other age group, a target susceptible to loneliness is college students. Research has indicated that this emotional state may be an underlying factor in the stress that these students feel, especially freshmen at such universities. The sense of increased independency and freedom leaves some vulnerable to feeling overwhelmed and anxious in making social connections. In a study conducted at a large midwestern state university, researchers found that the lack of social competence among freshman college students is derived from high levels of attachment anxiety (Wei et al., 2005). Social competence describes one's confidence to control their own motivation, behavior, and social environment. Because of this absent or wavering characteristic, these students will likely experience loneliness. While one may think a large student-body leaves more opportunity to connect, the magnitude of students at any given institute can be intimidating. This is partly the reason why students feel suppressed in their social activities. This may lead to continued loneliness, even beyond the first year at a university. Another study reported the absence of social-efficacy as being the main indicator of loneliness amongst college students where social-skills deficits augmented the causality between high-loneliness students against their counterparts (Jones et al., 1982). It is not surprising that lonely individuals tend to lack in this department; however, this emotion is not only subjected to individuals with these characteristics. Even those outspoken and trying college students may experience loneliness at some period during their stay at the university. In an unfortunate time, college campuses around the world were forced to shut down due to the emerging COVID-19 pandemic. With online

instruction becoming the primary method of teaching, many students returned home and a limited few selected to stay in campus apartments.

### **Impact of COVID-19 protocols**

With social distancing in place and “stay-at-home” orders mandated to control the coronavirus outbreak, many college students were subjected to the confines of their rooms while taking online classes. While certainly modern technological capabilities allow us to easily communicate with others, the virtual world leaves no room for physical interaction and connectedness. Research has already been published regarding the recent pandemic and loneliness. A study surmised that while holistically loneliness levels may not have increased significantly, this does not specifically translate to individual experiences (Luchetti et al., 2021). Having data span across the periods before and during the pandemic, the authors of this paper had the opportunity to identify any significant changes in loneliness across the participants. Although it seems that there was no significant change in the average of loneliness ratings, there were some noticeable spikes when looking at the individual responses. The sample size was not limited to college students; however, another study published recently identified the association between loneliness and rumination; here, increase in rumination led to increase in coronavirus anxiety (Arslan et al., 2020). This study included a sample of Turkish college students who took a web-based survey to answer the questions. This is particularly interesting with rumination being the dependent variable in this study. The constant thoughts of social discrepancy may have transferred to focused attention on the distress caused by the coronavirus. It is interesting to see if this has any impact on other decisions using cognitive resources, particularly when it comes to behavioral economics.

## **Current study**

The current study takes a deeper dive into emotional decision-making with respect to loneliness and other common emotions and how it impacts economic behavior. Aforementioned in the discussion of decision-making, rationality and optimality is assumed to be the focal point in the decision process, at least in normative theory lenses. Paired with the idea of utility maximization, an individual will likely choose the alternative that best suits their needs and or desires. Having said that, human rationale can easily be impaired by judgment in decision-making. Because loneliness is an aversive state, it can lead to increased emotional distress. That is, emotional impact is cognitively depleting. This takes up space in the processing of information and draws analyses and conclusions away from rational thinking, which can lead to loss of self-control (Baumeister, 2002). To assess this behavior, this study makes use of four economic tasks: temporal discounting, risk aversion, loss aversion, and impulsivity. Temporal discounting, also known as delay or time discounting, refers to the way people discount rewards as they approach a temporal horizon – in this case, in the future. Given a choice between immediate or delayed satisfaction, this method will be able to capture the individuals' time preference in their relative valuation of the alternatives. Both risk aversion and loss aversion are derived from the prospect theory aforementioned. The underlying differential factor between the two is uncertainty. In a given scenario, there might be risk involved in the decision to be made. Oftentimes, sure gains are framed at a lesser value compared to their riskier, but higher valued counterparts. Those risk-averse will likely opt in for sure gains while those risk seeking might choose to forego this benefit in hopes of achieving more. The certainty effect developed in the Prospect Theory describes risk aversion underscored in choices framed with sure gains, whereas risk seeking is activated for decisions involving sure losses (Kahneman & Tversky, 2013). This

speaks volume to the idea of loss aversion. People are naturally loss-averse and so they will want to mitigate any possibilities of losing their possessions. Because losses loom larger than equivalent gains, individuals will assign greater weight to alternatives that look to minimize any potential loss (Tversky & Kahneman, 1991). Individuals have a tendency to prefer avoiding losses to acquiring equivalent gains. Lastly, impulsivity is a trait that is often associated with low self-control. With the absence of forethought and impending consequences, individuals displaying impulsive behavior in their decision-making have lower self-control and cognitive ability to rationalize their choice behavior at sudden moments in time (Franken et al., 2008). This is suggestive of impaired cognitive rational thinking, which is to be investigated in tandem with loneliness and its cognitively depleting consequence.

This study is designed to assess the hypothesis that college students are susceptible to feelings of loneliness, drawn from both sources of trait characteristics and state conditions. In doing so, this exploratory research is concerned with the impact of this emotion and how it may lead to implications of intervention in specific decision-making tasks under a behavioral economics framework. It is hypothesized that college students are susceptible to feelings of loneliness and this negative impact leads to impulsive behavior, discounting of future rewards, increased loss aversion, and more risk-averse behavior under the behavioral economic framework. As an aside, in an attempt to better understand this asynchronous transient and chronic emotion in our investigation, we used a correlational approach as our means of statistical analysis to portray the relationships between loneliness and common emotions. With this, we considered personality traits and social desirability in our study. These are presented in the results section. Study 2 takes a pre-post design and considers within-subject analyses to determine any impact the implications of COVID-19 has had on any of the measures used in the

original study. It is hypothesized that reported levels of loneliness increased over the course of the year following COVID-19 safety protocols and that this measure reflected in the four economic tasks. Moreover, we hypothesize that loneliness correlates with social uses of the internet, an added measure for the recontact study.

## **Study 1 Design**

### **Method**

To conduct our study, we partnered with a university in Southern California. For one week of the quarter term, students taking a marketing and distributions class were required to sign up for one session where they will partake in various studies designed and administered by professors and graduate PhD candidates. Participant recruitment heavily relied on course credit being given to those who participated in the survey studies. To encourage honesty and accuracy, we implemented a randomized lottery system where a few of the students would have an actual chance to play their specific decision answered in the survey for real money. This was done in hopes to increase attention and involvement of the participants partaking in the study.

### **Participants**

The majority of the participants are undergraduate students taking this marketing class in their 3<sup>rd</sup> or 4<sup>th</sup> year, with occasional sophomores and rare 5<sup>th</sup> and beyond year seniors. Overall, the study had 281 responses with only 274 of those having completed the survey. Of the completed responses, 147 identified as male (53.65%), 126 as female (45.99%), and 1 as other (not specified). The distribution of ethnicity are as follows: Asian – 155 (56.57%), Black or African American – 11 (4.01%), Hispanic or Latino – 74 (27%), Native Hawaiian or Pacific Islander - 10 (3.65%), White – 50 (18.25%), and Other – 17 (6.2%). Note, some participants selected more than one race; however, the percentages are averaged using the total number of

responses. The age range of these participants had the youngest of 14 years and the oldest of 56 years. It's no surprise that there was an overwhelming majority of Asian participants as California's student demographic reflects this sample population.

## **Materials**

To distribute the surveys, we used Qualtrics, an experience management software designed to develop and distribute web-based surveys. Data is collected through the program's cloud-based platform, allowing for ease and timely access of the recorded responses. While the platform is priced on a subscription-based model for the general public, we had access to its license through the university, which made it free for faculty, staff, and students. There were many types of questions used in the study. Likert scale questions were used primarily to model scales used in other studies, as well as for its ease and convenience. Matrix tables, sliders, and common multiple choice were also used throughout the study for more general questions. Although the survey was web-based, the participants were required to complete the study at the research center. The participants took the survey in an enclosed lab room filled with computers provided by the school.

## **Procedure**

To earn course credit, students were tasked with participating in two rounds research studies. Our study was administered in the 1<sup>st</sup> round of studies in week 3 of the Fall 2019 term. One of the PhD candidates sent out an email to each student to sign up for a time slot to participate in the study. The days and times available were Monday through Friday from 12:30 pm to 5:30 pm. Each participant sat one seat away from one another to avoid any cheating or copying of answers and talking during the studies. Because students were required to sit at least one seat away from one another and there were only a certain number of desktops available, only



a limited number of students could participate at a time. Each session lasted for an hour where the participants had to complete all the studies involved in that session's time. Individuals were able to leave once they completed all the required studies. To provide the research subjects with sufficient information of the proposed research and the nature of the participation with added anonymity, each participant was handed a consent form to fill out before partaking in the studies. For those students who did not want to partake in the studies for whatever reason, they simply had to complete a writing task instead to earn the same course credit as the participants received.

## **Measures**

### ***Loneliness***

Participants completed the 9-item reverse-scored University of California, Los Angeles Loneliness Scale. These include the 9 positively worded (non-lonely) items in the new version of the UCLA Loneliness Scale (Russell, 1996). This scale has provided a reliable and valid measure of loneliness over the years. In an attempt to quantify such an emotion, it has given weight to assess the loneliness level of individuals. Because the items in the scale are positively worded, they are reverse scored to keep consistent with the original score direction with 1 = Never scored as 4 = Always and vice versa for 4 = Always as 1 = Never. Across the 4-point Likert scale ranging from 1 to 4, a participant could potentially receive a low score of 9 and a high score of 36. The higher the score, the greater degrees of loneliness a person has.

### ***Emotions***

In exploring emotions and decision-making, the participants were tasked with one single scale across 19 different emotion-type questions. These were scored on a 9-point Likert scale with 0 indicating no feeling of the emotion/state and 8 feeling it more strongly than ever. Across the 19 different emotions, 6 distinct constructs were created using specific emotions. These are: sad,

happy, angry, fearful, disgust, and neutral. These 6 emotions were also part of the original 19 items. To be consistent, the 6 coded emotions will be reserved for the regression analysis, but their original counterparts will be used in every other statistical data. A driving behavioral force in our everyday decisions, this will help map any significant correlations between any one of these 19 emotions to that of loneliness and the economic decision tasks.

### ***Big Five Inventory***

Many emotions are influenced by specific personality traits one possesses. There is research suggesting that some of these personality traits induce certain reactionary emotions when differing stimuli is applied in a given situation. In helping us better understand the causality of the participants decision-making, we used the Big Five Inventory-2 Short Form scale to find any significant correlations between the domain and facet scales of the personality trait spectrum (Soto & John, 2017). Here, participants answered questions scored on a Likert scale from 1- 5 with 1 = Disagree strongly and 5 = Agree strongly.

### ***Social desirability***

Oftentimes, those who are lonely express adaptive behavior that appears to be more socially acceptable than what they might have answered if given absolute anonymity. This social desirability then portrays the tendency of individuals to present themselves amongst popular opinion to avoid any negative reactions from others. As social creatures, people want to be liked. To evaluate the social desirability of the participants, we used the Reynolds Short Forms of the Marlowe-Crowne Social Desirability Scale (Ballard, 1992). In the findings section, it will be interesting to see any correlations between the scores of the participants with any of the scales aforementioned in this correlational study.

### ***Delay discounting***

To measure temporal or time discounting, Participants answered 27 different questions each framed with two options: the immediate reward or the delayed awards of higher value. We used an updated delay discounting scale developed by psychologist Kris Kirby (Kirby et al., 1999). Choosing the reward to obtain tonight versus a higher value in (x) amounts of days would indicate that the individual had a higher discount rate, at least for that particular question. As mentioned before, this was one of the tasks where randomly selected participants would actually get their decisions played out for real money.

### ***Risk aversion***

Similar to the delay discounting tasks mentioned previously, participants were tasked with selecting between two options for the questions in both the risk aversion and loss aversion scales. In the set of questions for risk aversion, individuals were given a choice between 6 different coin-flip gambles of varying risks (Dave et al., 2010). The risk-averse option indicated the baseline of a sure, equal gain of a certain amount, regardless of whether or not the coin landed on heads or tails. This was a \$28 reward for landing on either heads or Tails. The alternatives increased in risk from this reference point, with each gamble increasingly becoming more risk, but with a higher potential payout. The riskiest alternative was framed as Heads = \$2 and Tails = \$70. The more risk-averse a participant is, the more likely they would choose an alternative with a higher guaranteed gain. If the individual was risk-seeking, then they might choose the gamble with the highest potential payout. This gamble was too played out with real money by randomly selecting participants.

### ***Loss aversion***

This task also used the coin flip gamble, but with different decision mechanics. Here, participants were given 6 decisions, each with an option to accept or reject. The different underlying factor here is that participants were at risk of losing their own money as part of the gamble. In all of the alternatives, only landing on Tails would give the win to the participant. The coin landing on tails always paid out \$6; however, each gamble's cost to enter increased incrementally by \$1 to play, starting from \$2 and ending at \$7. Those who chose the last option were less impacted by the sense of loss aversion. With the potential for loss, participants who were randomly selected to have their decisions played out were given an option to decline to play if they did not wish to carry out their chosen decisions.

### ***Impulsivity***

To measure the impulsivity of each participant we used The Impulse Buying Tendency Scale (Jones & Beatty, 1998). Participants were presented with 5 different impulsive-buying questions separated into two blocks (2 and 3, respectively). Each item was scored on a Likert scale with the first two questions scored from 1 (Very Rarely) to 7 (Very Often) and the last three questions scored from 1 (Strongly Disagree) to 7 (Strongly Agree). Using this scale, we can better see any associations between the various emotions and this particular abrupt decision-making process.

## **Results**

Descriptive findings – On average, the student participants had low levels of loneliness ( $M = 15.87$ ,  $SD = 4.15$ ). A histogram of the frequency of loneliness scores can be found in Figure 1 of Appendix B. The synonymous emotions in sad and depressed also revealed low levels averaged across the sample population with means of 2.43 and 3.08, respectively. Not surprisingly, a counterpart of these 3 emotions in happy had an average score of 4.86, which was above the

possible median score. Generally, the students were in a more positive mood when completing this survey; however, the only emotion to have an average score above 5 was neutral at 5.93. Cronbach's alpha, a measure of internal consistency for scale reliability, for loneliness was 0.83. The original, full 20-item UCLA Loneliness Scale measured 0.96 in scale reliability (Russel et al., 1980). The mean and standard deviation measures for the entire emotions considered can be found in Table 1 of Appendix A.

The Big Five Inventory yields five primary scales, which are calculated as the sum of the respective items, and then average by the number of items. Note, the number of items varies in each scale. In each of the Big Five personality traits (extraversion, agreeableness, conscientiousness, neuroticism, and openness), participants on average had slightly higher than median scores. The entire mean and standard deviation for the personality traits can be found in Table 2 of Appendix A.

The four economic tasks: Impulsivity, Discounting, Risk Aversion, and Loss Aversion are all scored on different scales as aforementioned. On average, participants scored 3 (SD = 0.90) for impulsivity, 11.95 (SD = 5.69) for discounting, 3.28 (SD = 1.77) for risk aversion, and 3.20 (SD = 1.64) for loss aversion. The mean and standard deviation table for the four economic tasks can be found in Table 3 of Appendix A.

Correlational analyses were performed to examine the relationship between loneliness and the 19 different emotions participants scored in the emotion ratings task. The results of the Pearson correlation analysis revealed that there was a low, positive correlation between peoples' loneliness and their sad, depressed, fearful, disgust, neutral, afraid, bored, furious, gloomy, indifferent, mad, nauseated, nervous, repulsed, and unemotional levels. The low, negative correlations with

loneliness included levels of happy, angry, amused, and cheerful variables. The correlation table between loneliness and these 19 emotions is shown in Table 4 of Appendix A.

Much like the emotions, correlational analyses were performed to examine the relationship between loneliness and the Big Five personality traits scored in the Big Five Inventory. There were four traits negatively correlated with loneliness, those being extraversion, agreeableness, conscientiousness, and openness. Out of these four, extraversion had a moderate correlation with Pearson's correlation being -0.456. The only trait positively correlated with loneliness was neuroticism with a relatively low-level relationship of 0.237. The full loneliness and the Big Five personality traits correlation table can be found in Appendix A (see Table 5).

In investigating the relationship between loneliness and the four different economic tasks, we found that three of the four were negatively correlated, that being Impulsivity, Discounting, and Risk Aversion with Pearson's correlational value of -0.131, -0.050, and -0.006, respectively. Loss aversion was positively correlated with Loneliness with a correlation coefficient of 0.068. The only task with a significant p-value in these correlation tests was impulsivity with a p-value of 0.0303. The full loneliness and economic tasks correlation table can be found in Appendix A (see Table 6).

On average, the participants had a negative Social desirability score with a mean of -1.51 and a standard deviation of 2.36. Correlational analysis was performed to examine the relationship between loneliness and Social Desirability. There was a low, positive correlation with Pearson's correlation being 0.194.

After conducting multiple regression analysis in estimating the relationships between loneliness (the dependent variable) and the 6 coded emotions from the emotion ratings task (independent variables), we found that the best fitted model included the following independent

variables: sad, happy, fearful, and neutral. The adjusted R-squared value was 0.1321 with a residual standard error of 3.869. The full regression model output (refer to Figure 2 of Appendix B) better presents the significance of each independent variable in predicting loneliness.

Instead of using emotions as predicting variables, we conducted a multiple regression analysis to estimate the relationships between loneliness and the Big Five personality traits. We found that the best fitted model included the following independent variables: Extraversion and Agreeableness. The adjusted R-squared value was 0.2889 with a residual standard error of 0.3502. The full multiple regression model output is shown in Figure 3 of Appendix B to better presenting the significance of each independent variable in predicting loneliness.

In exploring which variables best fitted the multiple linear regression models for the four economic tasks, we constructed a model that included the 6 coded emotions and loneliness. As was done in the previous models, we used the stepwise method to procure the best fitting model with the independent variables most significant in predicting each of the economic tasks. For impulsivity, delay discounting, risk aversion, and loss aversion, the adjusted R-squares were 0.0680, 0.0084, 0.0221, and 0.0087 with a residual standard error of 0.8711, 5.67, 1.754, and 1.629, respectively. The stepwise method output showed loneliness, sad, angry, and disgust as being the best predictor variables for the impulsivity task. For delay discounting, it was sad and fearful. Risk aversion was best predicted with sad and neutral. Lastly, loss aversion only included one predictor variable in neutral. The full multiple regression model outputs are show in Figures 4 - 7 of Appendix B to better present the significance of each independent variable in predicting the respective economic task.

## **Discussion**

Overall, the loneliness levels across the 274 students were quite low with a mean of 15.87. The sum of each individual score ranged from 9 to 36. The result of the study did not support our first hypothesis in that loneliness is prevalent across college students. This may be partly explained by the fact that the majority of participants were students in their 3<sup>rd</sup> or 4<sup>th</sup> year at the university. Because the overwhelming majority of participants were upperclassmen, they conceivably had ample amount of time to make new connections while enrolled in the school. The university we partnered with also has a known reputation of having high numbers of commuter students. This partially mitigates any feelings of social disconnect as some of these students were only on campus for class instruction. The high level of neutral feeling is probable to be dependent on the nature of survey completion. Because no manipulation effect was in place as the design of the study was a correlational approach, students likely did not feel strong emotions when partaking in the study.

The correlation between loneliness and impulsivity displayed a significant negative trend with a p-value of 0.0303 and a Pearson's correlation coefficient of -0.1309. This fails to support our second hypothesis that increase in loneliness suggest impulsive behavior. The results indicate that lonely people are more cognizant of potential immediate gratifications and may display reactionary judgement and control over the hypothetical situations given by the impulsivity scale. Because loneliness tends to dominate the thoughts of individual, it can lead to perspective-taking as individuals try to bridge this gap of social connectedness. The ability to perceive an alternative viewpoint is an important aspect in building relationships. Engaging in this behavior is a tool to create opportunities for social connection (King, 2018). As individuals consider alternative behaviors, they might reason with themselves that others would be more mindful of impulsive purchases. This then influences their judgement in this economic behavior.



The remaining economic tasks did not show a significant correlation with loneliness in either direction. For this, we cannot comment any further regarding our remaining original hypotheses (3 – 5). We do not have sufficient evidence to conclude any relationship exists between loneliness and delay discounting, risk aversion, or loss aversion.

Despite the shortcomings of our hypothesis, it is still interesting to see the average scores for the delay discounting, risk aversion, and loss aversion tasks. The results show that the participants on average greatly discounted future rewards. The majority of individuals then opted for a greater reward in the future, regardless of the magnitude or size discrepancy from the higher, but temporally further away reward. This further confirms the hyperbolic value decline with delay (Kirby, 1999). Although objectively the rewards can be framed equivalent in present value, subjectivity prefers immediate, smaller rewards as time delay become intolerable.

On average, the participants mean score for risk aversion was 3.28. This indicates that the students generally preferred a high opportunity for gains until a certain extent, before settling for what they perceived to be the right amount of riskiness in playing the gamble. Despite the 50-50 chance involved with the coin toss, it still remains of high uncertainty whether or not one would win the gamble. A risk premium is present as individuals were willing to play a riskier gamble, but even then, this premium had its ceiling.

Similarly, the loss aversion task had a mean score of 3.20, settling around the median of the 6 decisions to accept or reject the gamble. In assessing the psychological pain of losing money, the participants on average were willing to bet upwards of \$4 for a chance to win \$6, as suggested by the mean score. For a gamble involving 50% chance of winning, this seems to be more than fair for many individuals. Although losses loom larger than equivalent gains, the opportunity for loss can still be accepted if the chance for gain is relatively higher in value. This

was the only economic task to be positively correlated with loneliness, albeit it a very low correlation with Pearson's correlation value being 0.068. This may suggest that increased level of loneliness leads to increase in loss aversion; however, this cannot be concluded as the test did not produce any significant results.

### **Study 2 Design**

Although the average level of loneliness across study 1 was on the lower end of the spectrum, we still thought it would be interesting to pursue a pre-post design to further explore the underlying significance of loneliness in individual's decision-making as it pertains to their economic behavior. Although not having introduced our own manipulation in the studies, we decided to take a quasi-experimental pseudo dynamic approach by using the recent events associated with the COVID-19 pandemic. As discussed towards the beginning of this paper, the onset of mandated quarantines and stay-at-home orders have necessarily nudged, if not forced people into the confines of their own living spaces. With a physical element of isolation in place, this provided an interesting opportunity to test whether or not loneliness levels increased in individuals over this period of time and whether or not any changes can be seen in the four economic tasks. Because our 1<sup>st</sup> study was conducted pre-COVID-19 times, we were able to perform within-subject analysis to identify any significant changes to the same response variables.

### **Method**

As part of a recontact study, we contacted the same participants from study 1. Because completing this next survey was no longer associated with the marketing & distribution management course, participant recruitment heavily relied on bonus incentives through the same

randomized lottery system used in study 1. As in the previous study, this was implemented in hopes to increase attention and participation in this study.

### **Participants**

Overall, the study had 52 responses with only 45 having completed the survey. The high attrition rate of 81.02% was expected as participation in the study was no longer a course requirement for the students. Of the completed responses, 23 identified as male (51.11%), 21 as female (46.67%), and 1 as other (not specified). The distribution of ethnicity are as follows: Asian – 26 (57.77%), Black or African American – 1 (2.22%), Hispanic or Latino – 13 (28.88%), Native Hawaiian or Pacific Islander - 1 (2.22%), White – 8 (17.77%), and Other – 3 (6.66%). Note, some participants selected more than one race; however, the percentages are averaged using the total number of responses. Of the 45 responses, 32 students were still attending the university.

### **Procedure**

The survey created for study 2 followed the same exact questions as in study 1, but with a few added questions to determine internet usage and general inquiries about the participant's life in the year 2020. These two sets of questions were added at the end of the survey so as to not influence any answers of the scales used in study 1. Because our survey was created and distributed with the web-based experience management software, Qualtrics, we were able to again distribute the recontact survey to the same sample population. Of course, the only difference was that the students now took the surveys at their preferred location rather than at the school's research lab.

### **Measures**

All measures used in study 1 are replicated in study 2. The only difference between the two surveys was that in the recontact study, we measured the participant's average internet usage per day. This was rated on a sliding scale from 0 to 24 internet hours. In addition, we also asked how often the students used social media sites, networking sites, and entertainment sites. These three measures were rated on a Likert scale consisting of 4 choices from 1 (Never) to 4 (Always). There are studies that have suggested that the using the internet may mediate the effects of loneliness, and in some ways, help reduce this perceived discrepancy of social connectedness. Social uses of the internet were found to enhance the social behavior of lonely individuals and even encourage them to network with others (Martin & Schumacher, 2003). These added measures will help see any correlation between loneliness and the uses of the internet.

## **Results**

Descriptive findings - To determine whether there were any significant differences in the means across the various tasks from study 1 to study 2, we conducted paired sample t-tests with the paired observations of individuals. This test was used throughout the different scales used identically in both studies. (Note: For the loneliness question, emotions ratings task, and impulsivity questions, about ~ 33% of total survey responses are missing one of these three data due to error in study design). With this statistical procedure, we could not conclude that the difference in the mean levels of loneliness across the 21 participants was significantly different than 0 ( $\alpha = 0.05$ ). Across the 19 emotions in the emotion ratings, those that had a significant change of mean scores were: sad, angry, fearful, disgusted, afraid, furious, mad, nervous, and repulsed. Testing for the direction of these significant changes, all 9 emotions indicated an increase in levels. That is, participants on average rated these emotions higher in the second study compared to the first study. Regarding the 6 coded emotions, angry, fearful, and disgust

indicated an increased trend. Similar to the 9 individual emotions, these 3 scores also showed the true difference in means was greater than 0. The Big Five personality traits and social desirability did not show any significant changes in mean scores between the two studies. The full table for the means and standard deviations of emotions that showed a significant change can be found in table 1 of Appendix C.

In terms of the four economic tasks, both the loss aversion risk aversion gambles indicated significant changes in the mean scores of the paired observations (see table 2 of Appendix C). The direction of the paired t-test indicated a significant decrease in the mean scores of loss aversion with a p-value of 0.0166. Participants chose more gambles they were willing to play in the study 2 relative to study 1. The tests for the risk aversion gamble had a p-value of 0.0216. The paired t-test showed that the students on average chose a higher gamble in the second study with the true difference in means being greater than 0.

In exploring the participants' internet use, the mean general usage of the internet yielded 10 hours per day (SD = 3.99). Narrowing the activities into the three categories of social media sites/apps, networking sites/apps, and entertainment sites/apps, the mean scores were 3.36 (SD = 0.86), 2.78 (SD = 0.85), and 3.62 (SD = 0.72), respectively (see table 3 of Appendix C). All four categories were negatively correlated with loneliness. Of the four, only the social media sites/apps usage displayed a moderate, negative correlation with loneliness with Pearson's Correlation coefficient being -0.45 (see table 4 of Appendix C).

## **Discussion**

Results of this study indicated that the student's feelings of loneliness did not significantly change over the course of the year, despite the abrupt quarantine for the last three quarters of 2020. This suggests that the physical confinement encouraged by "stay-at-home"

orders did not greatly impact the students' level of loneliness over this period of time. Similarly, social desirability did not see any significant changes. Although face-to-face interactions with strangers was conceivably much lower, at least in terms proximity with other students and having to be on campus, this did not seem to play a part in how the students wanted to present themselves to others. However, those items in the emotion ratings that displayed a significant change, on average, were consistent with the overall assumption of increased negative attitudes over the period of intense quarantine. The situation was not ideal for many students and this reflected in the overall average increase in items such as sad, angry, and nervous.

People were generally less risk averse as they opted for the gamble with a higher payout, but smaller probability of winning. Also, the participants displayed a decrease in loss aversion, on average. Of the 6 total decisions, each increasing in the amount of potential loss, students significantly accepted more gambles to play than they did in study 1. These two behavioral patterns coincide with each other. With the average decrease in feelings of loss aversion, students were willing to play a riskier gamble in the risk aversion task. Between the two time points of when the studies were conducted, the effects of quarantine associated with COVID-19 reveals an increase in risk-taking economic behaviors and a decrease in effect of loss aversion as a guiding force in the individual's behavior.

The number of hours spent using the internet across the 45 participants was quite high, averaging 10 hours per day. With the ongoing pandemic, it wasn't surprising to see that many students spending hours using internet devices. However, it's important to note that this general usage could include the portion of time spent on online classes too with both synchronous and asynchronous instruction. The average amount of hours spent on social media and entertainment sites/apps were relatively close, and the mean of networking sites/app wasn't too far behind.

Despite the conceived notion of social uses of the internet, correlation tests showed negative trends between these three specific sources of internet use and loneliness. This can be partly explained by the general overall low levels of loneliness across the participants. Even so, an increase in loneliness suggests reduced use of internet usage. Of the three sources, the social media category displayed the highest negative correlation. Although loneliness stems from perceived dissonance in relationships, a lonely individual also tends to actually have a smaller circle of social connections. Perhaps this smaller sized circle partly explains the reason for less amount of time spent on social media. There's simply less feed or activity displayed in a given app.

### **Limitations**

A possible limitation resides in how the participants were selected. Sampling error may have occurred because probability random sampling was absent from our studies. There is a strong selection bias here as all participants were undergraduates enrolled in the marketing & distribution management class at the university. This systematic tendency primarily includes students who specialized in business as part of their degree. Although the sampling procedure was fair for all students taking this course, it does not provide a representative cross section of the public; the studies didn't involve a planned use of chance. With that being said, it is hard to make inferences from the sample to the general population. It's also important to note that research aforementioned involving college students concluded findings involving freshmen. This population may be more susceptible to feelings of loneliness as students are just entering or are in their first year of undergraduate programs. The nature of the study designs with the university we partnered with only sampled students having already been a part of the school for at least a year.

With the high 81% attrition rate in the recontact study, the research suffers from non-response bias. The large number of participants who did not respond to study 2 impacts any possible inferential statistics. Non-respondents can be very different from respondents in a multitude of ways. It is possible that those who participated in both studies share some common characteristic amongst one another and vice versa for those who only participated in the first study. Such influencing factors contribute to the lack of response in the recontact study.

Emotions are subjective feelings often dictated by various events throughout the day, therefore, the subjects may have self-reported differently if they had participated in some other given circumstances. There are theoretically infinite amounts of influencing variables that may have altered the student's self-reported measures. Using scales, it is impossible to validate any responses due to the nature of the survey. Similarly, the self-serving bias may have also played a role in how the students rated themselves in the loneliness, emotion ratings, Big Five personality traits, and social desirability tasks. As hard as it is to accurately reflect one's experienced emotions in their perceived and recounted feelings, answers may have been distorted in order to maintain and enhance self-esteem. Put simply, students may have rated themselves in a more favorable manner to make themselves feel better.

There were also operational shortcomings with the design and distribution of the second study. To randomize the presentation of the loneliness, emotion ratings, and impulsivity tasks, we used a randomizer function in Qualtrics to randomly present the blocks of questions. This was done for study 1 to further discourage any copying of answers between students. However, the logic of the randomizer was not checked in study 2 and so participants were only presented with two of these three elements. Therefore, every student of the 45 total participants



did not get a chance to answer one of these three blocks of questions. About ~33% of the loneliness, emotions, and impulsivity scores contained missing values in the dataset.

### **Future Directions**

Loneliness is a complex emotion that can be interesting to investigate in relation to behavioral economics. There may be some underlying significance with further research to add to this discussion of emotions and decision-making. To more accurately present inferential statistics, a fair, impartial, and effective sampling procedure needs to take place so that the results can better generalize the general public. In our case, this should include college students ranging from backgrounds and interests of arts to sciences. In an attempt to understand the relationship between loneliness and decision-making, more exploratory research can be done. However, to further move this topic into better understanding of all moving parts, explanatory research needs to be conducted to emphasize any causality in contributing to empirical evidence. All of the questions asked in this study were based on scales. Although this works for correlation analyses, the use of scales has its limitations. Some suggestions would be to invoke loneliness in experimentation. Although we inadvertently did this by using the COVID-19 pandemic in our pre-post design for the second study, it was not a direct manipulation of loneliness. A direction forward would be to create concrete situations in where students may feel lonelier based on a given stimuli. An example of this can use bogus feedback as means to better insinuate this negative emotion. In doing so, we can gain a better understanding of the complexity of this emotion with regards to behavioral economics and further add to the discussion of emotions and decision-making.

## Appendix A

### Tables of Raw Data and Tests: Study 1

Emotion	Mean	SD
Loneliness	15.87	4.15
Sad	2.43	2.12
Depressed	3.08	2.35
Happy	4.86	2.10
Angry	2.00	1.79
Fearful	2.12	1.83
Disgust	1.83	1.75
Neutral	5.93	2.34
Afraid	2.24	1.97
Amused	3.47	2.15
Bored	4.48	2.40
Cheerful	4.22	2.21
Furious	1.72	1.54
Gloomy	3.08	2.33
Indifferent	4.85	2.58
Mad	1.80	1.57
Nauseated	1.78	1.53
Nervous	2.49	2.06
Repulsed	1.89	1.59
Unemotional	3.70	2.49

Table 1: Emotions means and standard deviations.

Trait	Mean	SD
Extraversion	3.15	0.76
Agreeableness	3.75	0.59
Conscientiousness	3.42	0.58
Neuroticism	3.03	0.73
Openness	3.49	0.58

Table 2: Big Five personality traits means and standard deviations.

Task	Mean	SD
Impulsivity	3.00	0.90
Discounting	11.95	5.69
Risk Aversion	3.28	1.77
Loss Aversion	3.20	1.64

Table 3: Economic tasks means and standard deviations.

Emotion	Pearson's Correlation	Significance
Sad	0.241	***
Depressed	0.274	***
Happy	-0.246	***
Angry	0.175	**
Fearful	0.166	**
Disgust	0.242	***
Neutral	-0.067	
Afraid	0.195	**
Amused	-0.059	
Bored	0.216	***
Cheerful	-0.197	**
Furious	0.233	***
Gloomy	0.236	***
Indifferent	0.121	*
Mad	0.147	*
Nauseated	0.169	**
Nervous	0.158	**
Repulsed	0.164	**
Unemotional	0.197	**

\*. Correlation is significant at the 0.05 level (2-tailed) where  $*p < 0.05$ .

\*\*. Correlation is significant at the 0.01 level (2-tailed) where  $**p < 0.01$ .

\*\*\*. Correlation is significant at the 0.001 level (2-tailed) where  $***p < 0.001$ .

Table 4: Correlations between loneliness and emotion levels.

Trait	Pearson's Correlation	Significance
Extraversion	-0.456	***
Agreeableness	-0.313	***
Conscientiousness	-0.198	***
Neuroticism	0.237	***
Openness	-0.199	***

\*. Correlation is significant at the 0.05 level (2-tailed) where  $*p < 0.05$ .

\*\*. Correlation is significant at the 0.01 level (2-tailed) where  $**p < 0.01$ .

\*\*\*. Correlation is significant at the 0.001 level (2-tailed) where  $***p < 0.001$ .

Table 5: Correlations between loneliness and Big Five Personality Traits.

Task	Pearson's Correlation	Significance
Impulsivity	-0.131	*
Discounting	-0.050	
Risk Aversion	-0.006	
Loss Aversion	0.068	

\*. Correlation is significant at the 0.05 level (2-tailed) where  $*p < 0.05$ .

\*\*. Correlation is significant at the 0.01 level (2-tailed) where  $**p < 0.01$ .

\*\*\*. Correlation is significant at the 0.001 level (2-tailed) where  $***p < 0.001$ .

Table 6. Correlations between loneliness and the economic tasks.

## Appendix B

### Figures of Statistical Analyses: Study 1

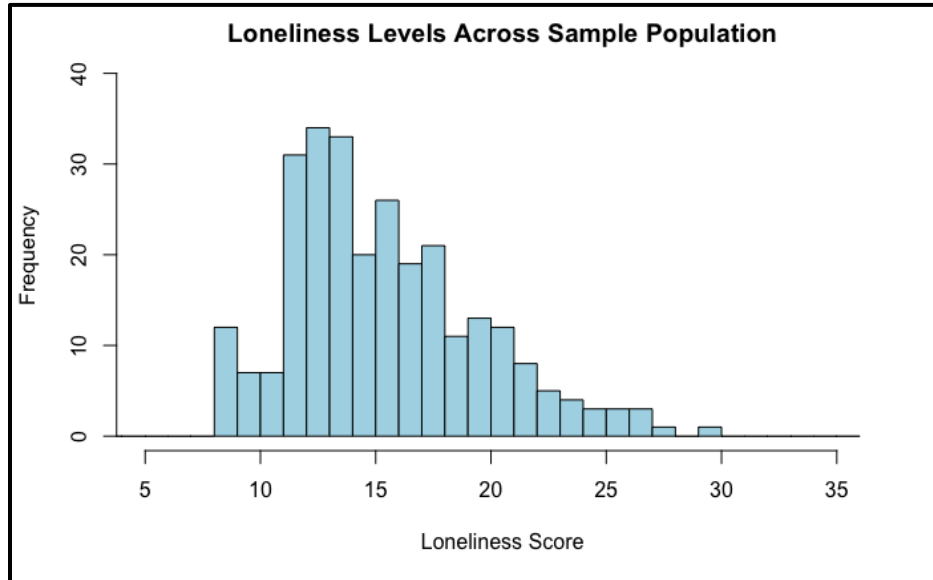


Figure 1: Loneliness levels histogram

Coefficients:				
	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	14.6900	0.9549	15.384	< 2e-16 ***
sad	0.3361	0.1445	2.325	0.020794 *
happy	-0.5221	0.1380	-3.782	0.000192 ***
fearful	0.3770	0.1753	2.151	0.032385 *
neutral	0.3251	0.1453	2.238	0.026068 *
---				
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Residual standard error: 3.869 on 269 degrees of freedom				
Multiple R-squared: 0.1448, Adjusted R-squared: 0.1321				
F-statistic: 11.39 on 4 and 269 DF, p-value: 1.495e-08				

Figure 2: Multiple regression for loneliness and emotions.

```

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   31.2452    1.5898  19.654 < 2e-16 ***
BF_extraversion -2.4232    0.2794  -8.673 3.95e-16 ***
BF_agreeableness -2.0697    0.3594  -5.759 2.29e-08 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3.502 on 271 degrees of freedom
Multiple R-squared:  0.2941,    Adjusted R-squared:  0.2889
F-statistic: 56.46 on 2 and 271 DF,  p-value: < 2.2e-16

```

Figure 3: Multiple regression for loneliness and Big Five personality traits.

```

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   3.36927    0.21015  16.032 <2e-16 ***
loneliness   -0.04349    0.01328  -3.274 0.0012 **
sad           0.07443    0.03561   2.090 0.0375 *
angry        -0.09622    0.05093  -1.889 0.0599 .
disgust       0.15633    0.06028   2.593 0.0100 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.8711 on 269 degrees of freedom
Multiple R-squared:  0.08164,    Adjusted R-squared:  0.06799
F-statistic: 5.978 on 4 and 269 DF,  p-value: 0.000127

```

Figure 4: Multiple regression for impulsivity.

```

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  12.2048    0.6385  19.115 <2e-16 ***
sad           0.3057    0.2043   1.496 0.1357
fearful      -0.4969    0.2449  -2.029 0.0435 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 5.67 on 271 degrees of freedom
Multiple R-squared:  0.01566,    Adjusted R-squared:  0.008391
F-statistic: 2.155 on 2 and 271 DF,  p-value: 0.1179

```

Figure 5: Multiple regression for delay discounting.

```

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  3.22349    0.33837   9.526 < 2e-16 ***
sad          -0.14233    0.05334  -2.668  0.00808 **
neutral      0.09734    0.06571   1.481  0.13964
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.754 on 271 degrees of freedom
Multiple R-squared:  0.02924, Adjusted R-squared:  0.02207
F-statistic: 4.081 on 2 and 271 DF, p-value: 0.01794

```

Figure 6: Multiple regression for risk aversion.

```

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  2.68064    0.30101   8.906 <2e-16 ***
neutral      0.11052    0.06003   1.841  0.0667 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.629 on 272 degrees of freedom
Multiple R-squared:  0.01231, Adjusted R-squared:  0.008677
F-statistic: 3.39 on 1 and 272 DF, p-value: 0.0667

```

Figure 7: Multiple regression for loss aversion.



## Appendix C

### Tables of Raw Data and Tests: Study 2

Emotion	Mean	SD
Sad	3.27	2.18
Angry	2.61	2.54
Fearful	3.52	2.72
Disgust	2.97	2.43
Afraid	3.27	2.83
Furious	2.33	2.29
Mad	2.55	2.24
Nervous	3.85	2.77
Repulsed	2.33	1.96

Table 1: Emotions means and standard deviations.

Task	Study 1	Study 2	Paired t-test
Risk aversion	M = 3.28 (SD = 1.77)	M = 4.02 (SD = 1.79)	Mean of the differences = 0.56 P-value = 0.0216
Loss aversion	M = 3.20 (SD = 1.64)	M = 2.78 (SD = 1.69)	Mean of the differences = -0.62 P-value = 0.0166

Table 2: Paired t-test of economic tasks with significant difference between the population means.

Internet Usage	Mean	SD
General usage	10	3.99
Social Media sites/apps	3.36	0.86
Networking sites/apps	2.78	0.85
Entertainment sites/apps	3.62	0.72

Table 3: Internet usage means and standard deviations.

Internet Usage	Pearson's Correlation	Significance
General usage	-0.183	
Social Media sites/apps	-0.167	
Networking sites/apps	-0.45	*
Entertainment sites/apps	-0.28	

\*. Correlation is significant at the 0.05 level (2-tailed) where  $*p < 0.05$ .

\*\*. Correlation is significant at the 0.01 level (2-tailed) where  $**p < 0.01$ .

\*\*\*. Correlation is significant at the 0.001 level (2-tailed) where  $***p < 0.001$ .

Table 4: Correlations between loneliness and internet usage.

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