How Emotions Affect Risk-Taking

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Abstract

Studies have suggested that emotions can have impacts on decision-making, especially risk-taking. We created an incentivized experiment, inducing three different emotions (happiness, sadness, and neutrality) and using lottery choices to elicit risk preferences to investigate the connection between emotions and risk aversion. We found evidence of sadness making individuals less willing to accept the complex lottery-payment scheme. Their behaviors could be the result of complexity aversion and we believe this is a new discovery on the effect of emotions.

***Keywords*:** complexity aversion, emotions, risk-taking

Introduction

People make decisions all the time. It can be something as simple as deciding what to eat for breakfast, or something important like choosing the kind of work to do when multiple choices are given. There are always risks involved in decision-making, some are small and have minimal impact, while others can have serious consequences. This applies to the field of economics too. Investors have to make decisions all the time, picking their investments, some of which are quite risky.

There are numerous factors that can affect risk-taking: context (Weber et al, 2002); previous experiences (Imas, 2016); and framing (Kahneman & Tversky, 1979). This leads us to think about whether emotion could affect risk-taking. A previous study proposed the risk-as-feelings hypothesis, which states that the mental image of an outcome at the moment of decision-making often evokes emotions, and these emotions will become the determinants of one's decision. This suggests that incidental emotions might affect risk-taking. (Hsee et al., 2001).

We want to focus on emotions. There are always times someone experiences positive or negative emotions, and these emotions certainly play a role in shaping their decisions, including risk-taking. There are studies that show emotions can have a lasting effect on economic decision making (Andrade et al., 2009).

Risk-aversiveness, the tendency of an individual to avoid taking risks, is often viewed as a preference arising from feelings about uncertainty. However, risk aversion can also result from complexity aversion, which is the tendency of an individual to avoid being caught up in complex and difficult situations or tasks. Studies have shown that people do tend to prefer simplicity under large cognitive loads and stick with the default option. Avoidance of complexity could also

be an important reason behind risk-taking anomalies. This model can be a potential explanation for unexpected behaviors of individuals that can't be explained with traditional models like the prospect theory or risk aversion. (Puri, 2018; Opera 2022)

There are already a number of published studies on this topic out there, but not all of them came to the same conclusion on how positive and negative emotions—happiness and sadness specifically—affect risk-taking behavior. Some found that both happiness and sadness lead to risk aversion (Colasante et al., 2017), while others suggested that happiness decreases risk aversion and induces gambling behaviors (Schlureich et al., 2014; Stanton et al., 2014).

In this paper, we sought to investigate the effect of emotions on risk-taking behavior and look for evidence of risk aversion or possibly complexity aversion through an incentivized-choice experimental design. Our hypothesis is that people with positive emotions (happiness) are more willing to take risks and face complexity than those with negative emotions (sadness). We found some evidence that could suggest an effect of sadness on the willingness to take risk or to encounter complexity.

Method

We used Prolific.co to recruit participants, aiming for a sample of 150 splits across three conditions. All of the participants in this study were recruited from that platform and were all at least 18 years old. Participants had to have a minimum of 10 previous submissions on Prolific with a minimum of 90% approval rate. We gave all participants an incentivized choice survey.

The first page of the survey asked for the subjects' consent to participate in this study and their Prolific ID (so they can be paid for their participation). We also told them briefly about what kind of tasks they will complete without revealing the actual purpose of the study.

After that, participants were split into three different groups: Group H (happy), Group S (sad), and Group N (neutral). Since participants could be in any mood when they take the survey, we attempted to manipulate their emotions. We followed Lerner and Keltner's method to induce emotions in their study: asking participants to write about something that makes them angry or afraid (Lerner & Keltner, 2001). Here, the instructions asked the participants to write about an experience that either makes them feel happy or sad, with as many details as possible. For the control group(Group N), they were asked to write about their daily routines, also with as many details as possible. Additionally, a picture was presented below the instructions to strengthen the emotion induction for all three groups:

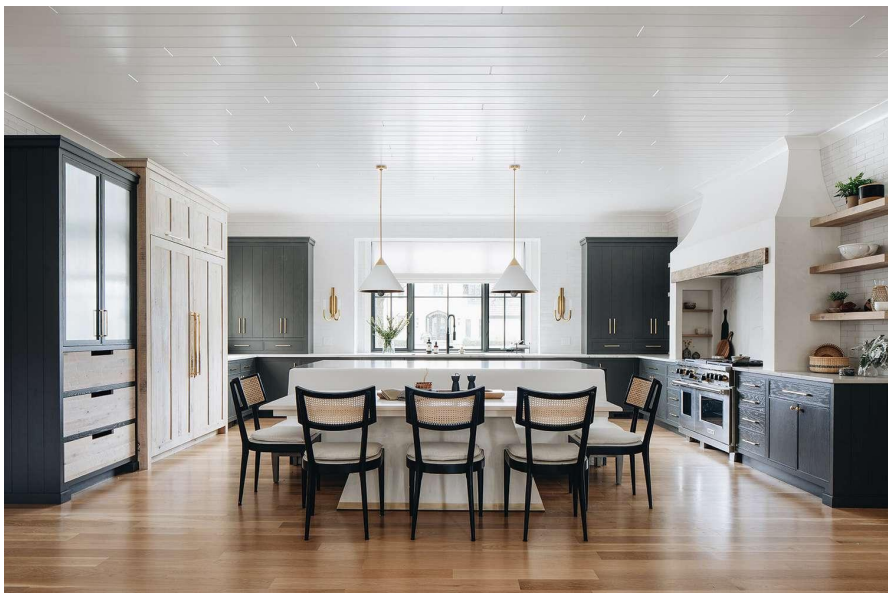
Figure 1. Picture seen by Group H

Note. Reprinted from "Don't be a word bore: alternative ways of saying 'happy'", by Wil, (2021, November 09). Retrieved from http://englishlive.ef.com/blog/language-lab/dont-word-bore-alternative-ways-saying-happy/.

Figure 2. Picture seen by Group S

Note. Reprinted from “Latest sad girl DP to express your emotions [best collection]”, (2023, April 30). Retrieved from http://gyanvaan.com/very-sad-girl-dp-with-images-and-pics/.

Figure 3. Picture seen by Group N



Note. Reprinted from “15 luxury kitchen for cooking and entertaining”, by Nawab, A., (2022, November 20). Retrieved from http://koloapp.in/magazine/luxury-kitchen-ideas-for-cooking.

We used the Holt and Laury risk elicitation to measure the participants' willingness to take risks (Holt & Laury, 2002). Participants were presented with a menu with ten rows of lottery choices. There is a safe option (option A) and a risky option (option B) on each row. Participants have to make ten choices in total, going from the top to the bottom. They were reminded twice in the instructions that only one of their ten choices will be played to determine their bonus payment.

Figure 4. the lottery menu presented in the survey

	Option A	Option B
1)	1/10 of $1.00, 9/10 of $0.50	1/10 of $1.80, 9/10 of $0.10
2)	2/10 of $1.00, 8/10 of $0.50	2/10 of $1.80, 8/10 of $0.10
3)	3/10 of $1.00, 7/10 of $0.50	3/10 of $1.80, 7/10 of $0.10
4)	4/10 of $1.00, 6/10 of $0.50	4/10 of $1.80, 6/10 of $0.10
5)	5/10 of $1.00, 5/10 of $0.50	5/10 of $1.80, 5/10 of $0.10
6)	6/10 of $1.00, 4/10 of $0.50	6/10 of $1.80, 4/10 of $0.10
7)	7/10 of $1.00, 3/10 of $0.50	7/10 of $1.80, 3/10 of $0.10
8)	8/10 of $1.00, 2/10 of $0.50	8/10 of $1.80, 2/10 of $0.10
9)	9/10 of $1.00, 1/10 of $0.50	9/10 of $1.80, 1/10 of $0.10
10)	10/10 of $1.00, 0/10 of $0.50	10/10 of $1.80, 0/10 of $0.10

Note. We modified the bonus amounts from those in Holt and Laury's study but kept the probabilities the same. In row one, option A, for example, gives participants a 1/10 chance to get 1 dollar, and a 9/10 chance to get 50 cents.

A slight twist was added to the risk elicitation. Participants were given the choice to not participate in the lottery choice menu, and instead be guaranteed to receive 50 cents. This is a dominant choice, as 50 cents is the lowest you could get if you participate and always choose A. This option was meant to be a measurement for a combination of complexity aversion and extreme risk aversion.

There was a manipulation check section at the end of the survey to see how well the emotion induction worked. Participants had to rate their feelings on a scale of 1(sad) to 5(happy) by recalling how they felt after the writing task.

Results

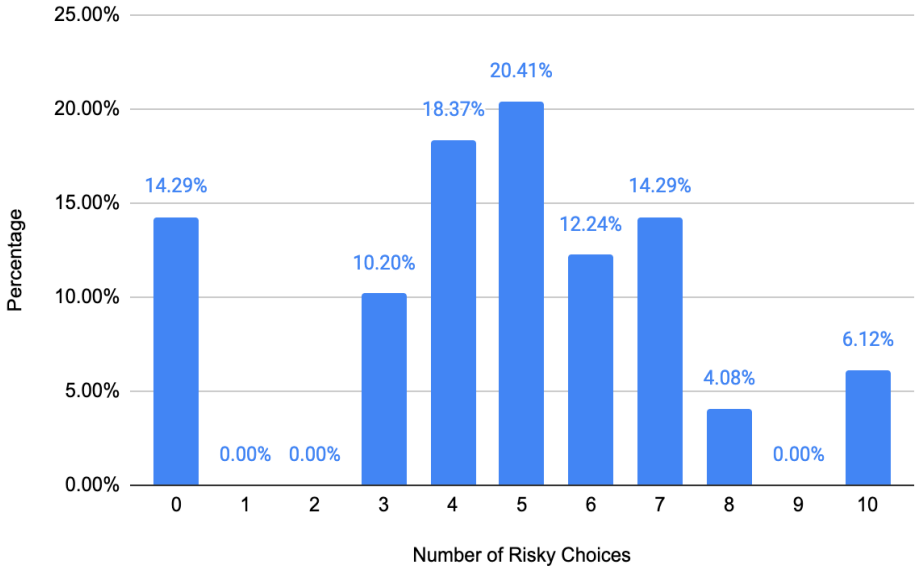
A total of 151 subjects actually took part in this study (one more than intended). We noticed that there were a lot of incoherent choices, which is when participants switch between options A and B more than once. There was a surprising amount of incoherent choices (39 out of the 151 participants). We decided to analyze the data with and without the incoherent choices separately.

According to the result of the manipulation check, the average happiness rating participants self-report is 4.45 in Group H; 4.02 in Group N; and 1.89 in Group S. This suggests that participants in Group S and N were generally in a good mood during the survey, and there were no 1s and only a few 2s in the entirety of these two groups. Participants in Group S, on the other hand, were apparently more sad, and the emotion induction worked.

I: Results with incoherent choices included

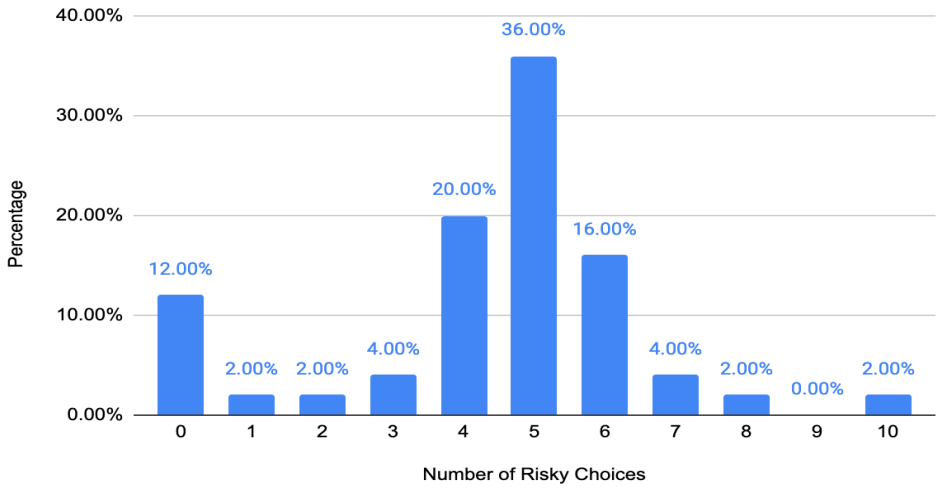
Group H. There are 49 participants in this group. Out of those, 7 of them chose the extreme risk-averse option. The average number of risky choices made in this group is 4.74, with a standard deviation of 2.61. Figure 5 shows the frequency of each specific number of risky choices ($0 \leq n \leq 10$) from Group H.

Figure 5. Percentage of the whole Group S that picked each number of risky choices



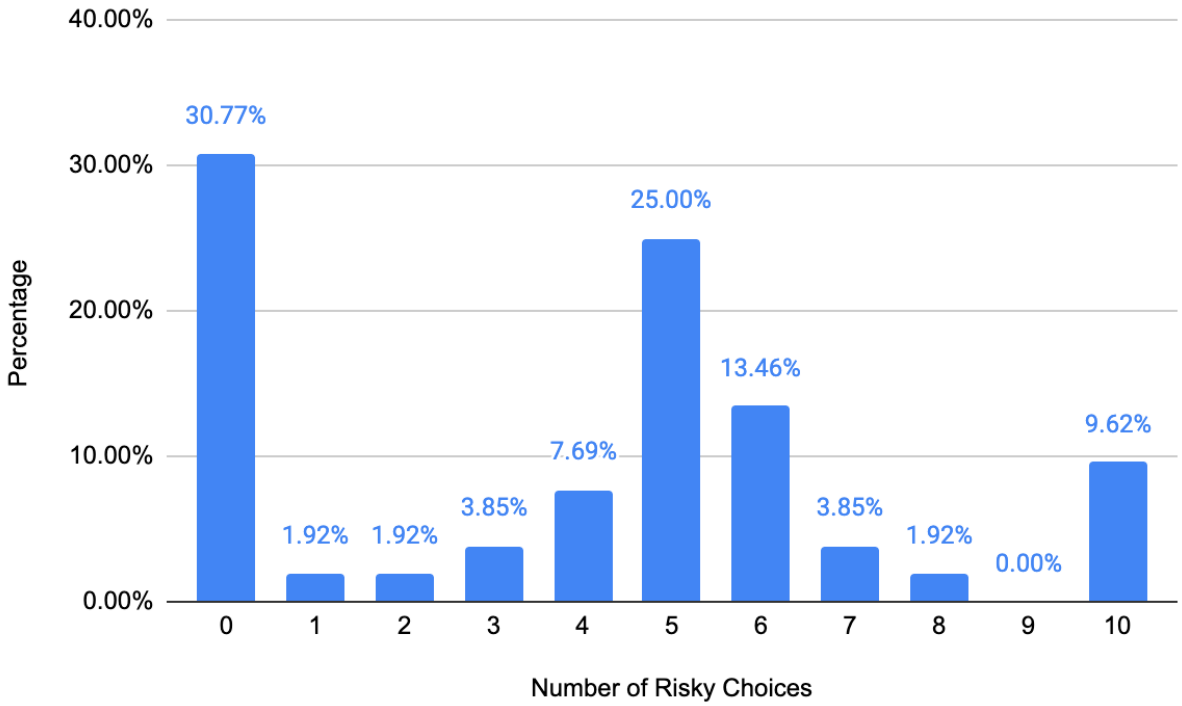
Group N. There are 50 participants in this group. Only three subjects chose the extreme risk-averse option, while there were also three that didn't choose the risky option at all. The average number of risky choices made in this group is 4.38, with a standard deviation of 2.14. Figure 6 shows the frequency of each specific number of risky choices ($0 \leq n \leq 10$)from Group N.

Figure 6. Percentage of the whole Group N that picked each number of risky choices.



Group S. This group consists of 52 participants. There are significantly more people choosing not to participate or not choosing the risky option at all, but the average number of risky choices, 3.92, isn't much lower compared to the other groups. The data from this group has a standard deviation of 3.21. Figure 7 shows the frequency of each specific number of risky choices ($0 \leq n \leq 10$) from Group S.

Figure 7. Percentage of the whole Group S that picked each number of risky choices.



II: Comparison Between Different Groups

We compared the average number of risky choices between groups (see Figure 8) to see if there was any evidence of correlation between each group using the t-test. The results are as follows: H&N—$p = 0.463$, S&N—$p = 0.377$, S&H—$p = 0.157$.

We also compared the proportion of subjects that chose to participate in the lottery choice task (# of subjects that participated/total # of subjects). We found that 85.71% of Group S participated, while this percentage is 94.00% in Group N and 71.15% in Group S (see Figure 9).

These percentages were compared with a z-test. Some of the differences were significant: H&N—p = 0.199, S&N—p = 0.00394***, S&H—p = 0.083*. This suggests that participants that were made to feel sad were less likely to participate in this task.

Figure 8. Average number of risky choices in each group.

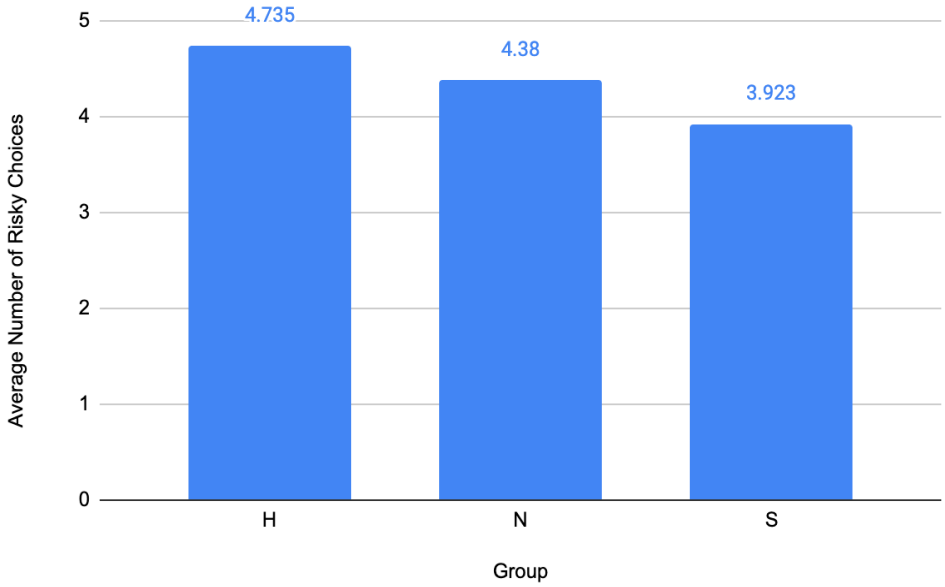
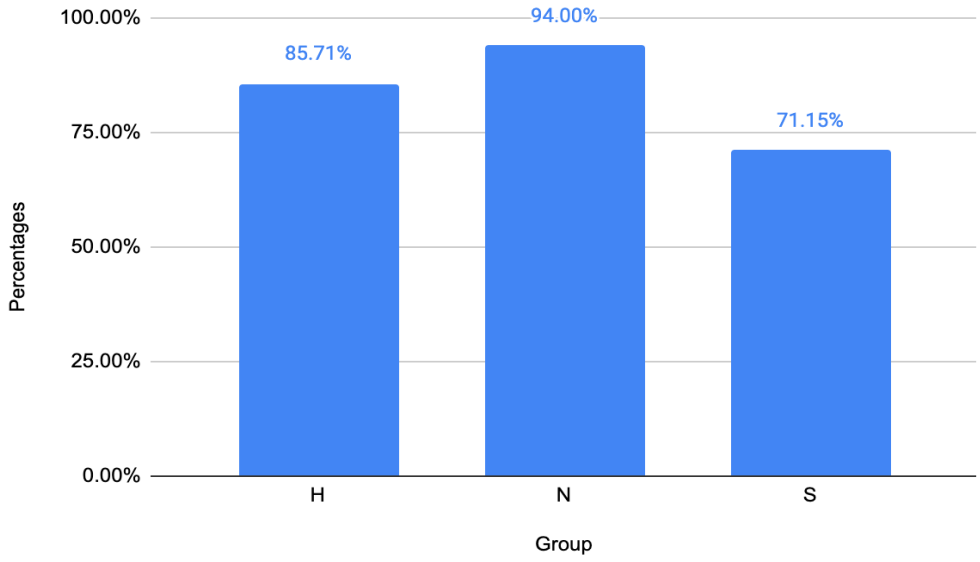


Figure 9. Percentages of participants from each group that participated in the lottery choice task.

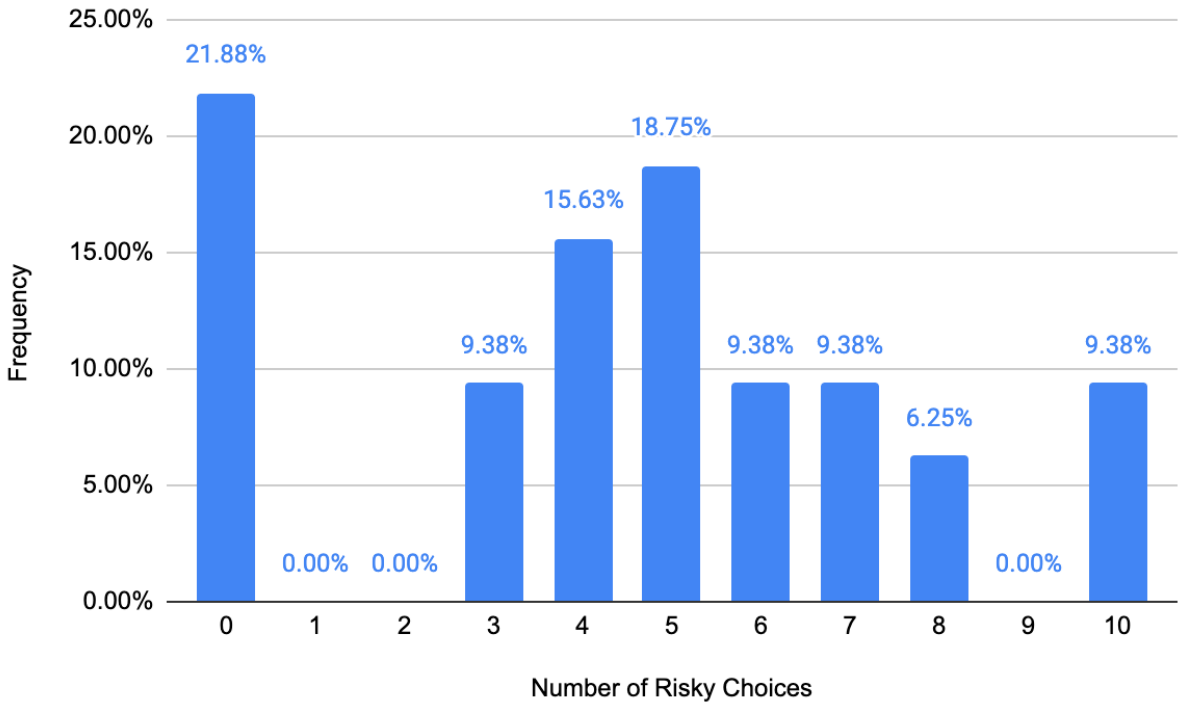


III: Results Excluding Incoherent Choices

In this section, we analyzed the data the same way as the previous two sections, except all the incoherent choices are excluded.

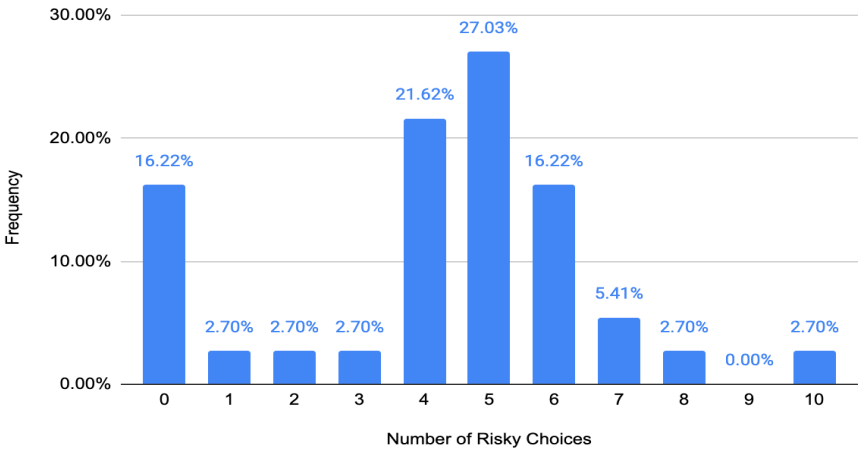
Group H. There are 32 subjects in this group now. The number of people who didn't take any risk at all remained the same, as it will be in all of the groups that follow. The average number of risky choices now is 4.50, and a standard deviation of 3.07.

Figure 10. Percentage of the whole Group S that picked each number of risky choices (excluding incoherent choices).



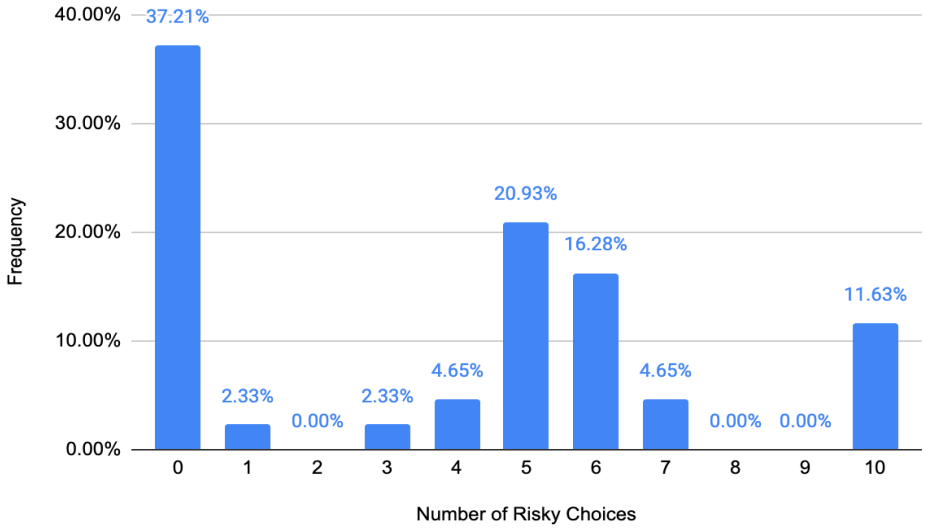
Group N. There are now 37 subjects in this group. The average number of risky choices is 4.22, and a standard deviation of 2.43.

Figure 11. Percentage of the whole Group N that picked each number of risky choices (excluding incoherent choices).



Group S. 43 subjects remained in this group. The average number of risky choices is 3.79, with a standard deviation of 3.45.

Figure 12. Percentage of the whole Group S that picked each number of risky choices (excluding incoherent choices).



IV: Comparison Between Different Groups (without incoherent choices)

We compared the new groups using the same methods as in section II. We first looked at the average of risky choices in each group and compared these averages with the t-test to see if there are possible correlations between each group: H&N—p = 0.676, S&N—p = 0.524, S&H—p = 0.355.

We again compared the proportion of subjects that chose to participate in the lottery choice task (# of subjects that participated/total # of subjects). We found that 78.13% of Group S participated, while it's 91.89% in Group N and 65.12% in Group S (see Figure 14). These percentages were also compared with a z-test, and there was one significant difference: H&N—p = 0.114, S&N—p = 0.00703***, S&H—p = 0.23. The observation that sad participants are less likely to participate in section II also appears in the group S&N comparison here.

Figure 13. Average number of risky choices in each group without incoherent choices.

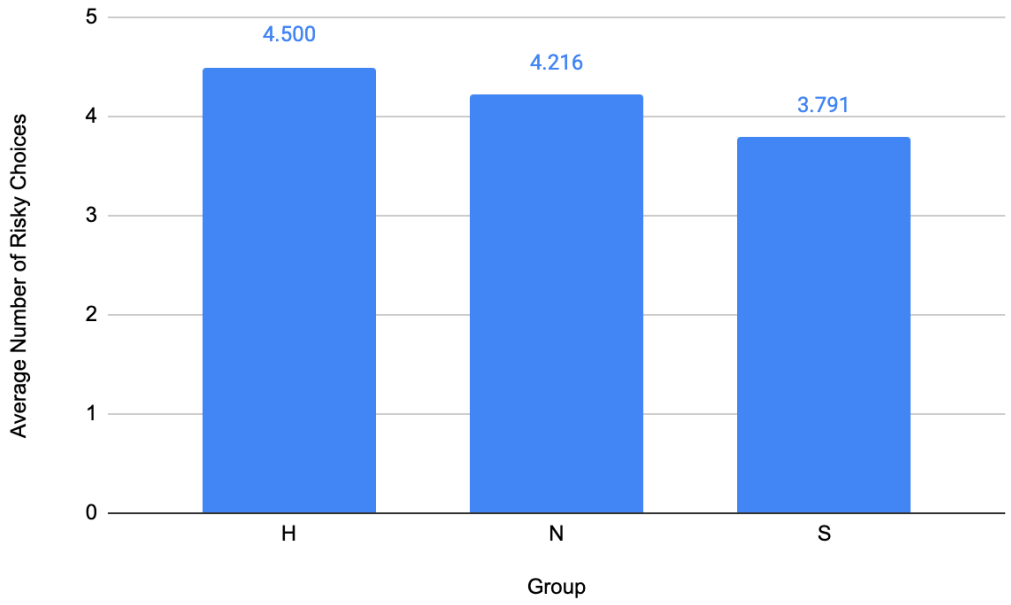
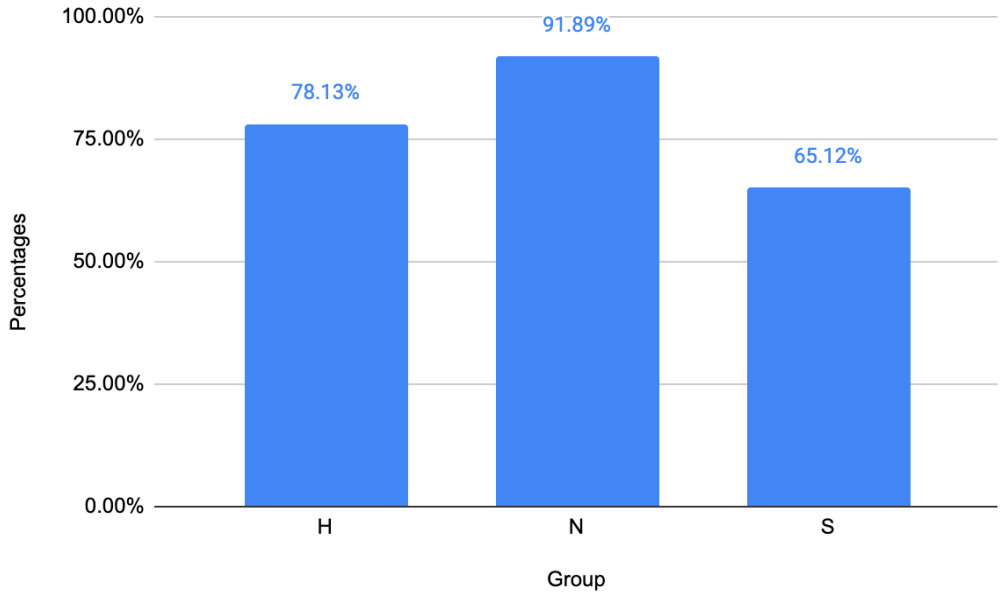


Figure 14. Percentages of participants from each group that participated in the lottery choice task (without incoherent choices).



Discussion

None of the comparisons of the average number of risky choices were significantly different from each other. However, there were significant differences in the proportions who wanted to participate when comparing Group S to the other groups. This could be an indication of the effect of sadness on risk aversion, but we believe this is more about complexity aversion due to the unexpected number of people that chose to quit the lottery task.

A reason for this could be the success of emotion induction for Group S. Its average rating during the manipulation check on a scale of 1(sad) to 5(happy) was 1.885, a lot lower than Group N's 4.020 and Group H's 4.449. This is evidence that shows sadness induction did make participants sadder in general. Moreover, this suggests a potential reason why the data from Group N and H aren't significantly different from each other: that most participants were already in a somewhat happy mood when they took the survey. Although emotion induction might contribute to their happiness a little bit, it becomes no surprise that there aren't many differences in risk-taking behavior between Group N and H, which explains the results from the z and t-test of those two groups.

Incoherent Choices

There are quite a few subjects who had incoherent choices in their response across all sections, and we suspect that, for the most part, this is more likely to be a mistake or a misunderstanding of the instructions than that it's done subjectively.

There are 6 subjects that chose the risky option on their first pick(an indication of extreme risk-seeking behavior) in Group H, while there are 9 who did the same in Group S. This observation doesn't support the correlation suggested between sadness and risk-averseness from the z-tests between Group N and S, which makes us believe that this behavior is either due to

misclicks(there's one subject in Group S that chose B for their first pick, then switch to A for the rest of the picks) or misunderstanding.

Studies done in the past have proposed many different theories on the effects of sadness on human behavior: reduced attention and alertness (Finucane et al., 2009), impatience and present bias (Lerner, et al., 2012), and risk aversion (Colasante et al, 2017). Few have related sadness with complexity aversion, and we speculate that sadness can cause people to become more averse to complex situations or tasks. When people are sad, they are less motivated to put effort into their decisions because all of their effort has gone to dealing with or recovering from that emotion. Thus, they would want to avoid being in situations that require their cognitive efforts. They need time to recover from sadness or any other negative emotions similar to it, and they would want to avoid dealing with things that might distract this process. This explains why there was a much higher portion of people that chose to quit the lottery task in Group S than in any other group.

This set of results doesn't mean that there's no correlation between feeling happy and risk-seeking, or even risk aversion. The evidence from this sample size in the study is not sufficient enough to come to any real conclusion. The one we made earlier about risk-averseness and sadness shouldn't be taken as a definite statement. New patterns may emerge if the sample size is enlarged. The data from this survey does support the claim that sadness could contribute to risk-averseness, but more data will be needed to come to a stronger conclusion on the impacts of emotions on risk-taking.

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