Gender, Age, and Peer Influence in Food Incentive*

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First sentence. Second sentence. Third sentence. Fourth sentence.

1 Introduction

In this paper, we will provide a deeper analysis and reproduction of the paper, *Incentives and Unintended Consequences: Spillover Effects in Food Choice* (Angelucci et al. 2019). Replications of Table 1, Figure 2 and 3 were also completed from the raw data in which the original paper is based. The original study was conducted on 1631 students from various elementary schools in a low-income neighborhood in Chicago, IL, from kindergarten to grade 8. The purpose of the study was to determine whether there were spillover effects of students making decisions based on their peers' decisions as well as the incentives given to their peers. The study consisted of two stages. In the first stage (G1), each student was given a card from a deck which offered the choice of cookies or grapes, where the grapes sometimes came with a prize as an incentive to be chosen. In the second stage (G2), each student was given the opportunity to change their choice of food based on the initial decisions of their peers. Students were sat in tables of sizes up to 10 students, in which the proportion of cards in the deck that contained incentivized grapes were 0%, 50%, or 100%. Furthermore, some tables were designated as public treatment, in which students were able to see the incentive status of their peers, and some tables were designated as private treatment, in which students were unable to see the incentive status of their peers.

The remainder of this paper is structured as follows. In Section 2, we compile the subset of data that strictly includes the students that took part in the public treatment study and not the private treatment study. Students were offered more information to advise their final decisions by being able to see the incentive status of their peers. In Section 3, we dive deeper

*Code and data are available at: https://github.com/SamanthaBarfoot/food-incentive-analysis.git The Social Science Reproduction DOI is: https://doi.org/10.48152/ssrp-s4sw-c494

into analyzing possible factors that may influence a student's final food choice in stage G2. We leverage `ggplot2` by creating bar graphs to represent the grouped data for the various factors that were analyzed. Finally, in Section 4, we summarize our results and also identify other factors or biases that may have affected the results, on a qualitative or quantitative level.

The graphs and tables in this paper were created in R Studio using R (R Core Team 2023) and the analysis in a Quarto document. The analysis was conducted with the use of the `ggplot` (Wickham 2016), `tiddyverse` (Wickham et al. 2019), `knitr` (Xie 2021), `kableExtra` (Zhu, Travison, and Tsai 2024), and `dyplr` (Wickham et al. 2023) packages. The replications of the original graphs and tables were completed with the `semiPar` (Wand 2018), `janitor` (Firke 2023), `tiddyverse` (Wickham et al. 2019), `knitr` (Xie 2021), `tibble` (Müller and Wickham 2023), and `kableExtra` (Zhu, Travison, and Tsai 2024) packages.

2 Data

The original study data included 1631 students, in which the incentive status, public or private, table size, table incentive proportion, sex, race, eligibility for free lunches, and food choices for both stages G1 and G2 was compiled for each student. By filtering out the original data to only show students who participated in the public treatment, the sample size reduces from 1631 students to 883 students, representing roughly 54% of the original sample size. Table 1 summarizes all the students at public treatment tables, with a subset of columns displayed representing some of the factors to be analyzed in Section 3. Comments regarding data cleaning methods are mentioned in Section 4.

We separated each student into 4 subgroups, based on the following criteria:

- Public and 0% of the card deck is incentivized,
- Public and 50% of the card deck is incentivized where the student is not incentivized,
- Public and 50% of the card deck is incentivized where the student is incentivized, and
- Public and 100% of the card deck is incentivized.

In the Table 1, the results are generally consistent across the 4 subgroups, in which there is low variance among the values in the various columns. This more-or-less even distribution of the races, genders and grades of students across tables of varying incentive levels speaks to the efficacy of the randomness that was intended in the original study. In the next section, we will dive into analyzing the correlation of several individual factors and the choices made in stage G2.

Table 1: Summary statistics for the four different observation groups: public and 0% of the card deck is incentivized, public and 50% of the card deck is incentivized where the student is not incentivized, public and 50% of the card deck is incentivized where the student is incentivized, and public and 100% of the card deck is incentivized

Group	Observations	Table Size	Percent of boys	Grade	Black	Hispanic	Free Lunch
Public-0	268	6.51	0.47	4.07	0.34	0.58	0.87
Public-50-no incentive	238	6.42	0.47	3.68	0.39	0.48	0.83
Public-50-incentive	206	6.51	0.47	3.69	0.37	0.49	0.85
Public-100-incentive	171	5.98	0.49	3.83	0.39	0.56	0.89
Total	883	6.39	0.47	3.83	0.37	0.53	0.86

3 Results

To determine whether there is a certain characteristic in students that might influence the decision made in stage G2, particularly their grade, gender, or their eligibility for free lunches, bar graphs were created that group the public student's data based on each of the chosen factors.

To begin our analysis, we created a graph, Figure 1, of the frequency of students that either switched their final food choice or kept the same food choice, grouped by the grade of the student. Grade 0 represents students in kindergarten. Figure 1 gives an overview of the public data across all levels of table incentivises, in which students were able to make their final choice based on their peers' initial choices and incentive statuses.

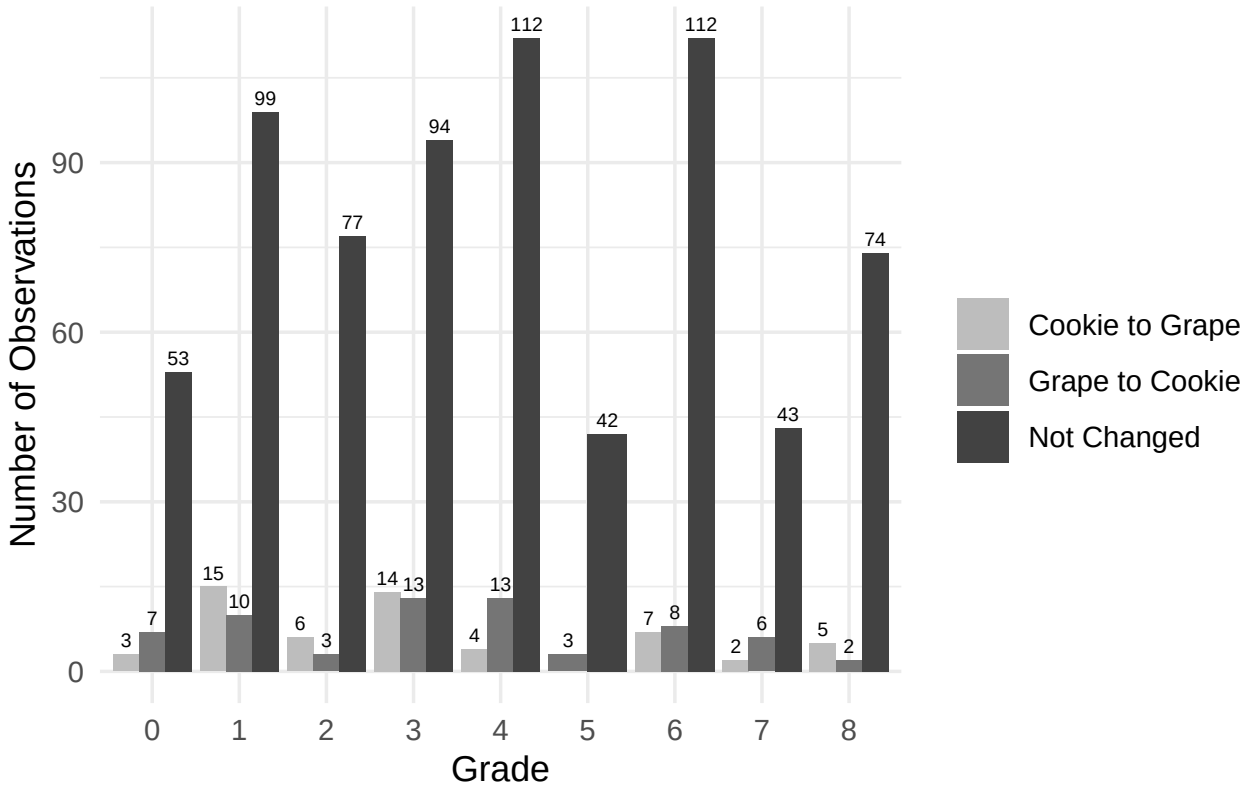

Figure 1: Students food choices from stage G1 to G2 comparing grape to cookie, cookie to grape, or no change.

It is evident that when aggregating all the public tables, including the incentivized and non-incentivized students, that the majority of students across each grade kept their initial food choice as their final food choice. Additionally, the number of students that switched from one food to the other was approximately even for both scenarios (56 switched from Cookie to Grape, 66 switched from Grape to Cookie).

To analyze the individual factors and observe their effect on incentivized students choosing grapes or cookies as their final choice, we compared all incentivized students who kept grapes as their final choice with whether or not the students were eligible for free lunches. This can be seen in Figure 2.

We can see in Figure 2 that the proportion of students choosing the incentivized grapes that are eligible for free lunches is roughly 94% (15/16). We can compare this to the expected value of 87% since the proportion of all students in public tables whom are eligible for free lunches is 0.87 as shown in Table 1.

We can also examine the proportion of incentivized students that chose grapes compared to cookies, grouped by grade in Figure 3.

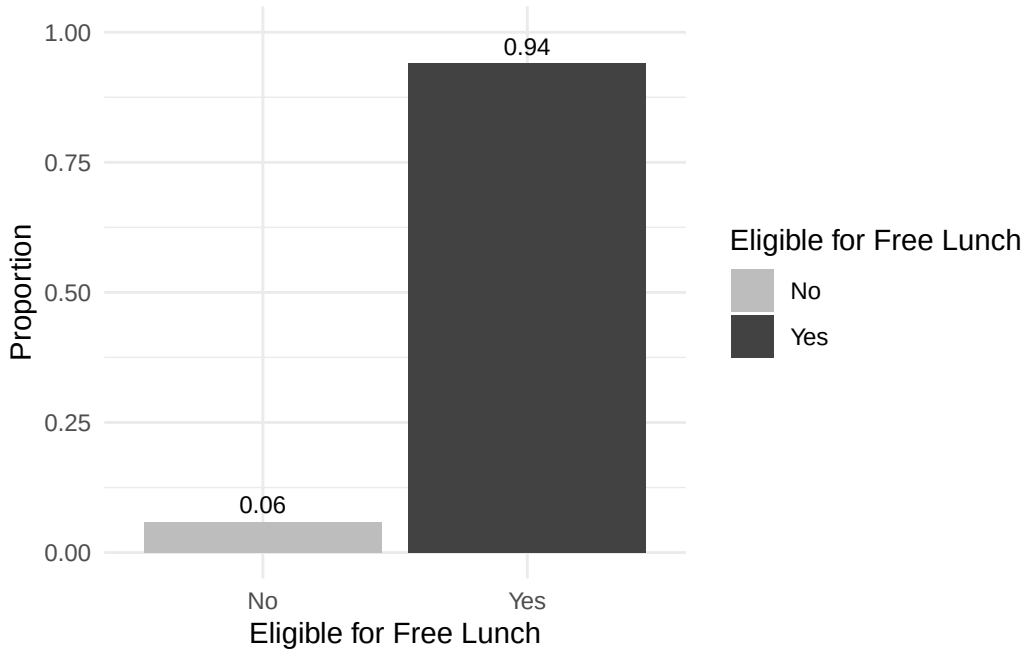

Figure 2: Comparing incentivized students choosing grapes if they are eligible or not eligable for the free lunch program

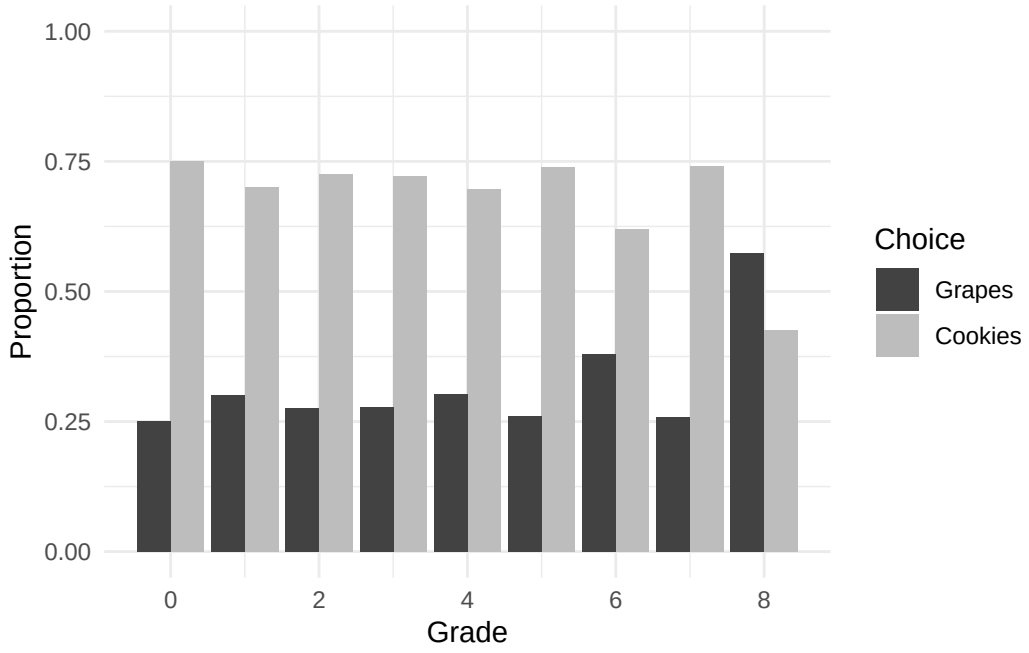

Figure 3: Comparing incentivized students choosing grapes or cookies by the students grade

We observe that from kindergarten to grade 8, the proportion of students choosing cookies in the final stage is around 60-75%, with the majority of grades being closer to 75%. However, for students in grade 8, the proportion of students choosing cookies was less than the proportion of students choosing the incentivized grapes, as only roughly 40% of students chose the cookies. This is a considerable drop compared to all of the lower grades. This may indicate that the older students are more inclined to choose the food option which also gives them the opportunity to win a prize, and that they are less influenced by the food option itself.

Finally, Figure 4 compares the food choices of boys and girls students who were incentivized to choose between grapes and cookies. It appears that there is not much difference between boys and girls when it comes to their choices between grapes and cookies. Both genders have a slight preference for grapes and the percentage of students who choose grapes or cookies is almost the same for both genders. From our Figure 4 analysis, summary statistics were calculated, which indicate that, on average, around 31% of boys and 35% of girls chose grapes as their final food option, while approximately 69% of boys and 65% of girls chose cookies. These statistics highlight the balanced distribution of food choices among genders within the incentivized students, suggesting that there is limited gender-based influence on decision-making in this context. In conclusion, it appears that isolating based on gender has the least variance or impact on the final food choice among incentivized students compared to the other factors analyzed.

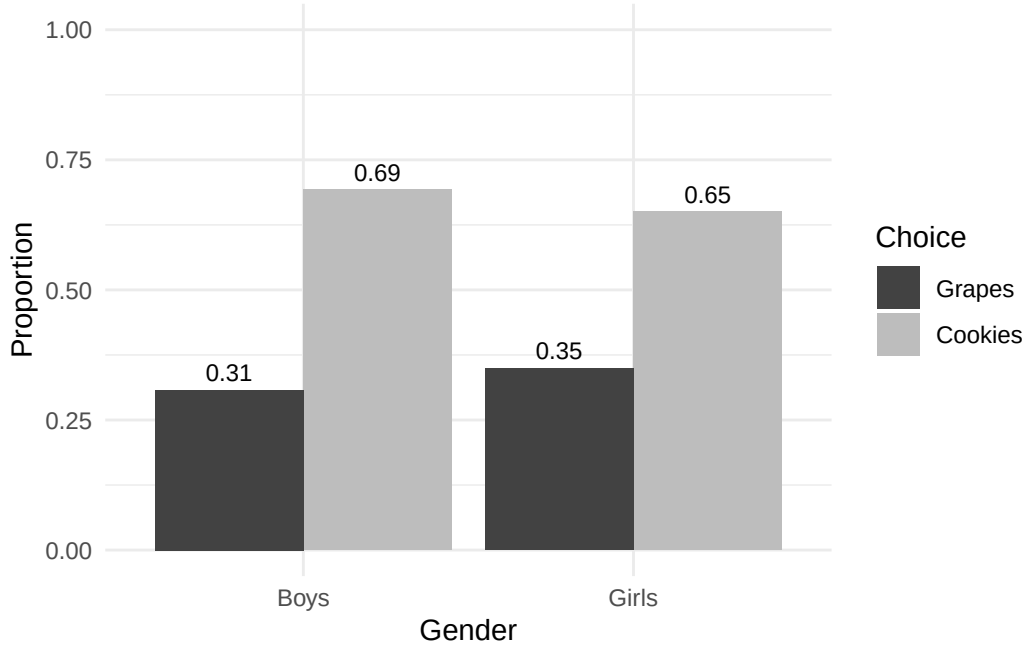

Figure 4: Comparing incentivized students choosing grapes or cookies by the students gender

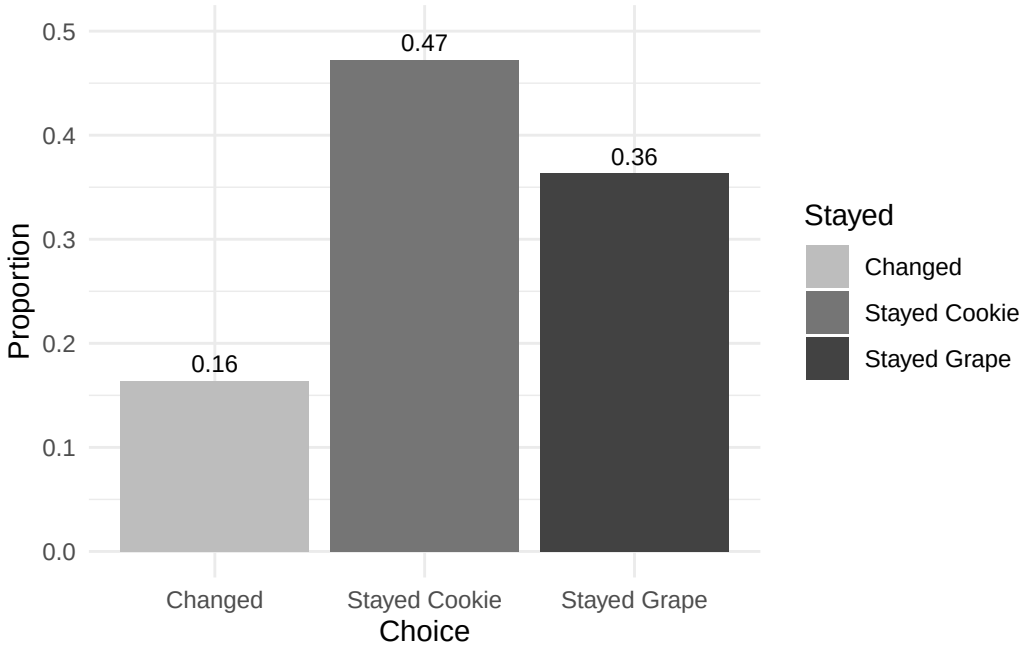

Figure 5: Comparing the proportion of students in the public group who recieved no incentive and whether or not they stayed with their initil choice of cookie or grape or if they switched.

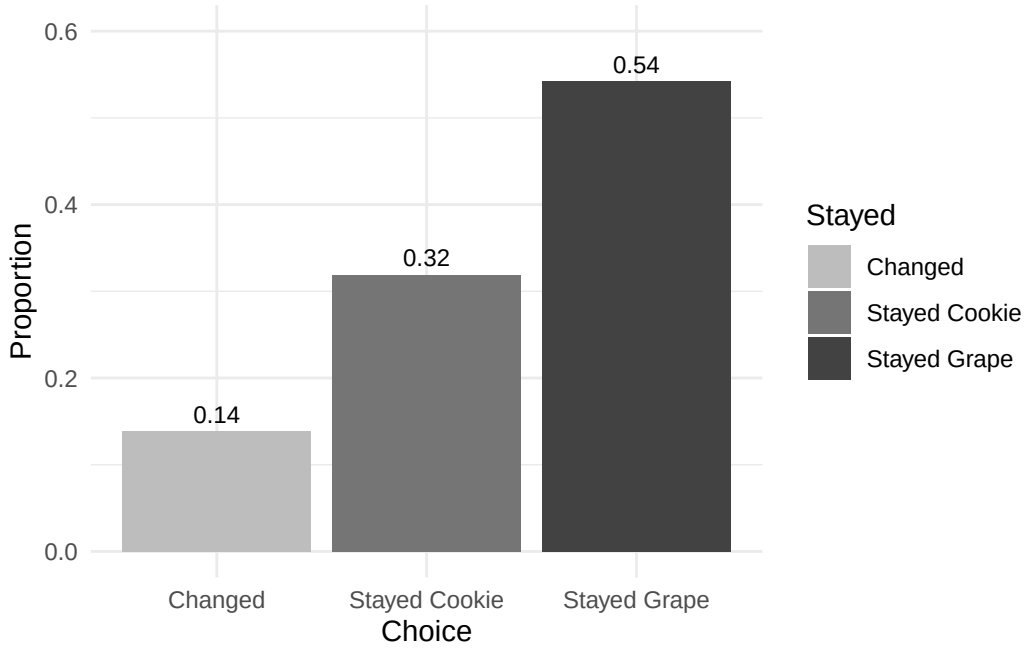

Figure 6: Comparing the proportion of students in the public group who recieved an incentive and whether or not they stayed with their initil choice of cookie or grape or if they switched.

4 Discussion

4.1 First discussion point

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4.2 Second discussion point

4.3 Third discussion point

4.4 Weaknesses and next steps

Speak about any holes in our analysis or perhaps the original study. One point worth mentioning may be the fact that the study was undertaken in a low-income neighborhood in Chicago. When introducing the incentive factor in the public treatment, the spillover effect may be magnified as these elementary students may be more influenced to alter their final food choice and choose the incentivized grapes, compared to students surveyed in more affluent neighborhoods who may not be as swayed by the option of a prize.

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