The Social and Health Consequences of Relying on Food Delivery Applications

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By

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

At the surface, on demand service applications are all about optimization and efficiency. Customers use services like Uber to get fast, individualized transportation to their destination of choice. Amazon and Walmart allow retail purchases to be made directly online and shipped within days, if not hours, straight to the household. Over the last few years, food delivery applications such as Grubhub and Uber Eats have allowed consumers to order meals, snacks, and groceries straight from their networked computer devices and their food arrives within the hour. These services are popular due to the convenience of ordering food on demand, food variety, and ease of use. These apps are especially popular among millennials and food delivery applications are among the top 40 top downloaded apps on the app store (Dunn 2018).

Yet, constant reliance on these applications brings to light several notable negative social implications. Some argue that food delivery services are spoiling society and driving laziness (Campbell 2015; Srinivasan 2018). Others say that it promotes isolation and removes an individual from the social atmosphere of eating out (Hobson 2017). Food delivery applications are not only disrupting consumers daily routines, but also indirectly effect the restaurants. Restaurants can lose more than 20% of revenue on orders placed through delivery apps, since they pay for the third-party software (Dunn 2018). However, with the traction that food delivery apps are gaining in the market, many businesses have no choice but to adapt and keep up with the competition.

These claims illustrate the growing list of unintended consequences of food delivery apps from various stakeholders' perspectives. To dive deeper into this topic, I will be researching the different social and health consequences, positive and negative, which result from the rapid adoption of food delivery applications. In addition to the research I will be carrying out, I will be working as part of team to develop a revolutionary food delivery application. This application

will differ from those on the market by solely focusing on homecooked meals. Together this technical project and research will give me a comprehensive understanding of food delivery apps and the market that they cater to. This research will identify and analyze the health and social implications from the usage of food delivery applications.

Case Context

Food delivery apps are revolutionizing the dated restaurant industry. According to a study by the NPD Group, online restaurant orders has grown 23% annually since 2013, with 60% of those online orders coming through mobile apps (Klein 2019). Another report by Allied Market Research predicted the global food delivery mobile app market to be worth $16.6 billion by 2023 (Klein 2019). This drastic disruption has created many benefits, primarily the convenience of ordering groceries and food straight to one's location. Furthermore, apps allow variety, as consumers can compare deals from several restaurants, select their option and immediately pay and process the order within the same app. With increased competition, popular apps such as DoorDash, GrubHub, and Uber Eats are constantly competing to attract and retain users.

At the core, the technology behind food delivery apps is pretty standard with apps having five key features: search and menus, secure payment integrations, accurate food delivery times, GPS tracking, and a rating or review system. While this makes the food delivery app market have a low barrier to entry from a technological development perspective, these apps are unsuccessful without a lot of consumer traffic. This causes the primary focus of companies to center around consumer analytics such as increasing registration rate, user engagement, and retention rates (Klein 2019). With focus on customer engagement, there are several unintended social and health concerns of reliance on these applications that go unnoticed. Furthermore, food delivery apps tend to discourage consumers from preparing their own freshly cooked meals and

instead rely on lower quality takeout food. To combat this, our team will be developing a web application called HomeEats, which will serve as a food delivery service, similar to Uber Eats and GrubHub, but tailor made for home-cooked meals.

HomeEats will allow consumers to finally have the ability to access fresh, home-cooked meals without having to go buy ingredients or prepare the dish themselves. Unlike other food delivery platforms, this convenience does not come at a sacrifice of food quality or fresh ingredients. To use the platform, consumers create an account on the site, enter their location and instantly view a large selection of dishes being cooked by amateur cooks in the area. They can view all the ingredients in the dish, the type of cuisine it originates from, estimated preparation time, and background on the chef, including reviews from previous customers. Once they select the dish they want, customers purchase the dish directly online, at which point the chef will be notified that an order has been placed and begin cooking. Home chefs will be able to specify when they are online and available to cook, how many orders they can take at a time, and in the case of a bulk order being placed in advance, they will have a few hours to choose whether or not to accept the order.

Human and Social Implications of Adopting Food Delivery Applications

Food delivery applications have been created to further optimize the consumer's life (Stern 2016). Ordering meals and groceries online is a convenience, that allows for more efficient allocation of time without worrying about transportation or preparation. On the other hand, eating out is often a social experience and can be a time of relaxation, whether as a break from work or time to spend with friends and family. Physically leaving the house to do a simple task of buying groceries can be a mental break and a chance to interact with people. In the age of social media and mobile phones, face to face social interaction has decreased. Loneliness and

isolation are growing trends among the millennial and Z generations (Hobson 2017), and food delivery services may unintentionally worsen these issues.

The connection between the technical and social aspects revolves around the value that specifically homecooked meals provide. Not only is HomeEats another food delivery application, but homecooked meals are a relatively new segment of the market that adds a completely new health perspective. There are services, such as Blue Apron which provide the exact ingredients, portions, and instructions needed to prepare a healthy meal. These services allow customers to get only what they need, try new foods, and utilize time saved on other activities or exercise. HomeEats would go a step further and save more time by having amateur chefs cook the dishes directly. Health professionals insist that homecooked meals are often healthier and more cost effective as oppose to eating out (Thomson 2016). It will be interesting to dive deeper on how that could alter the perception of food delivery services. If people become reliant on these meals on a daily basis, are they avoiding the social interactions of going out? Does it even matter that people can capitalize on the benefits of eating homecooked meals without having to make these meals or physically leave the house to go grocery shopping? Will isolation worsen or will overall health improve?

To dive deeper into these issues, I will draw upon the socio-technical integration framework introduced in Michael Harrison's, "Unintended Consequences of Information Technologies in Health Care - An Interactive Sociotechnical Analysis". In the article, Harrison stresses that there are always unintended consequences of developing technology, both in terms of technical infrastructure and the social systems that revolve around the implementation of the technology. He builds his argument by following the Interactive Sociotechnical Analysis (ISTA) process with a case study Healthcare Information technologies (HIT). The ISTA process

comprises of five types of HIT interactions and their associated unintended consequences (Figure A). A couple of them relate to the way HIT and HIT-in-use changes the social system around them (Boxes 1 & 4 in Figure 1 respectively). The associated unintended consequence of the former is a decline in vital interactions between clinicians, care providers, and patients. In the latter case, HIT-in-use leads to a shift in the balance of power requiring physicians to comply with IT based directives.

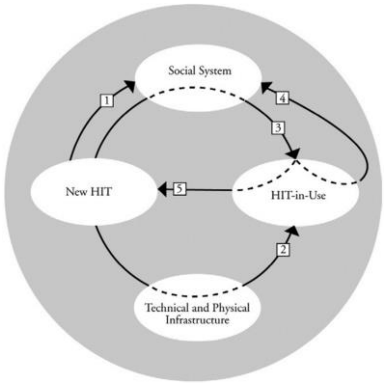

Figure 1: Interactive Sociotechnical Systems (Created by Harrison et al, 2007)

At a high-level, these interactions progress from how HIT alters the functionality of the existing social system and physical infrastructure, to how the systems already in place actually mediate HIT use, and concluding with how HIT can be redesigned and modified to better fit the systems in place. This highlights Harrison's key takeaway that it is important to not only develop a system for its technical capabilities but to see how it fits into the already present environment surrounding it. To draw the parallel, food delivery apps may have unintended consequences for society as a whole but also from the perspective of each user. For example, restaurants may reduce food preparation time for dine-in guests when online orders start funneling in. Furthermore, customers at home may become more isolated from the lack of social interaction when dining out. These perspectives must be considered when doing a complete analysis because it will ultimately effect both the enhancements made to the systems and the long-term ability of the platforms to stick in the market.

Research Question and Methods

What health and social implications are resulting from the rapid growth and mainstream use of food delivery systems for the restaurant industry?

In order to gather data for this research project my plan utilized surveys and case studies. I built a survey through Google Forms and sent it out electronically to my fellow peers at UVA who use food delivery apps to capture the consumer perspective of the stakeholders driving the industry today – gen Z consumers. The purpose of the survey was to understand what changes, both positive and negative, consumers have seen in their lives from using these apps. I wanted to understand how consumers are making use of the time saved by ordering food via the app, the healthiness of the food being ordered, and whether these services were in fact contributing to an overall healthy, or unhealthy lifestyle. I was able to gather 66 college student responders, a majority of whom attend the University of Virginia.

To capture additional information on user experiences of food delivery apps and access a wider audience, I analyzed a case study and supplemental articles. The study, titled, "Comparing Popular Food Delivery Services," was written by Customer Impact, a third-party national merchandizing company. This case study included a survey on food delivery apps sent to over 1800 people, as well as a situational interview portion where a few interviewees would order pre-selected meals and critique their delivery and dining experience. The supplemental articles were individual User Research Studies written by Max Chung and Sachin Mittal on Medium, a popular blogging platform. Both these user research studies were targeted at finding pain points with customers using the existing applications on the market. They both include designs for new applications to meet those consumer needs. These articles were particularly useful as I wanted to understand what consumer problems app designers were focusing on, and whether they were addressing social and health implications in future iterations of the technology.

Once all this data was collected, I utilized thematic analysis to identify trends in the data. I chose thematic analysis because I wanted to explore various themes and sub-categories such as

food quality, the restaurant industry, consumer isolation, physical activity, social interactions, and body health. The socio-technical integration framework described earlier was also used to incorporate the data captured into how food delivery apps have disrupted the current restaurant and food delivery system. The ISTA framework Harrison et al (2007) uses details how Healthcare Information Technologies have disrupted the social system and the technical/physical infrastructure around it. Similarly, I looked at how food delivery applications have disrupted the restaurant and food delivery system (technical and physical infrastructure) as well as the social system of ordering food.

Results

There are several health and social implications that were revealed through my research. The first health concern is that users are not ordering and consuming healthy food, which falls on both the user's individual choices as well as on the food delivery applications for not providing healthy selections. The second concern is that users are not making the most out of the saved time gained by using food delivery apps. On the other hand, a social consequence that was revealed, was that poor delivery experiences contribute to negative views of restaurants. Finally, there are possible mental health concerns with food delivery apps indirectly promoting isolation and reducing social interactions in society. However, my research showed that this may not be an immediate concern among the younger generation.

Unfortunately, unhealthy food consumption is an emerging trend with food delivery applications. Surveyed college users claimed that not only were their individual orders unhealthy (average score of 4.65/10), but the available options on the food delivery apps are not healthy to begin with (average score 4.88/10) (Figures 2, 3). Furthermore, while food delivery apps are extremely convenient and save customers the hassle of shopping, cleaning, and preparation, the

majority of that saved time is not being allocated to useful activities. Only approximately 40% of survey responders are working or doing homework during that saved time, with almost 60% doing nothing or watching TV (Figure 4). Combined, this is a lose-lose situation as students are not only eating unhealthily, but also developing poor time management habits.

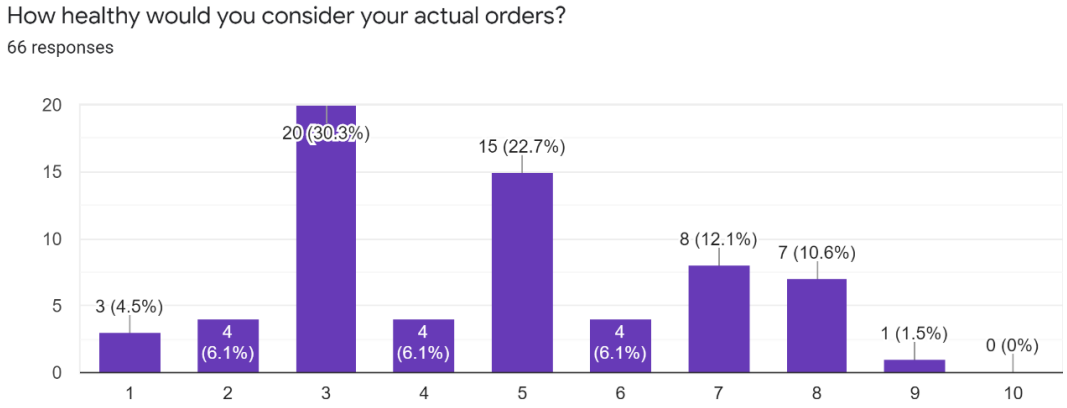

Figure 2: How healthy would you consider your actual orders? (Created by Karaky, 2020)

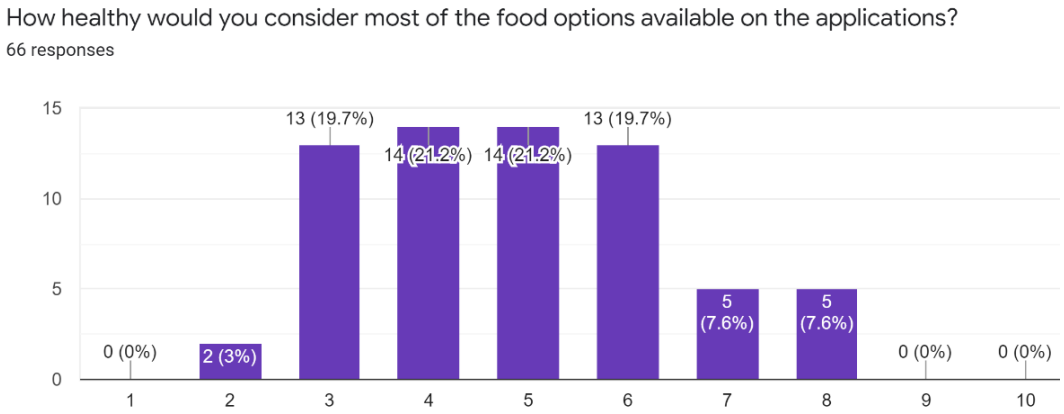

Figure 3: How healthy would you consider most of the food options available on the applications? (Created by Karaky, 2020)

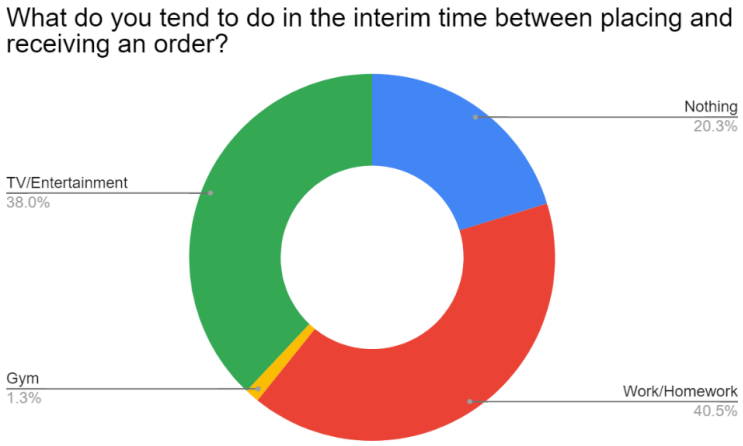

Figure 4: What do you tend to do in the interim time between placing and receiving an order (Created by Karaky, 2020)

One of the other points I wanted to dive deeper into was self-isolation and whether or not food delivery apps were contributing to eating alone and reduced social interactions. Based on my survey, college students do not appear to be feeling the potential isolation that food delivery apps may cause. When asked if food delivery apps reduced the amount of times they went out or prepared food (Figure 5), surveyed students remained neutral with an average response of 3/5, with 1/5 being strongly disagreeing and 5/5 being strongly agreeing. When taken a step further and asked if they thought food delivery applications indirectly encouraged eating alone, students actually slightly disagreed, with an average response of 2.7/5 (Figure 6).

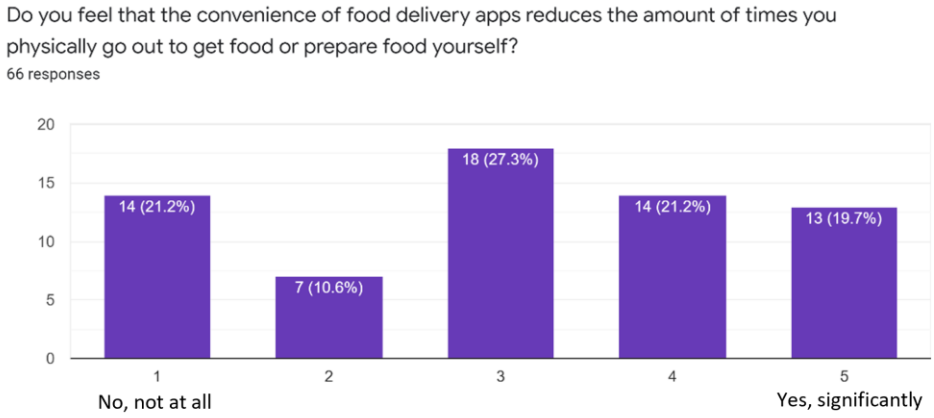

Figure 5: Do you feel that the convenience of food delivery apps reduces the amount of times you physically go out to get food or prepare food yourself? (Created by Karaky, 2020)

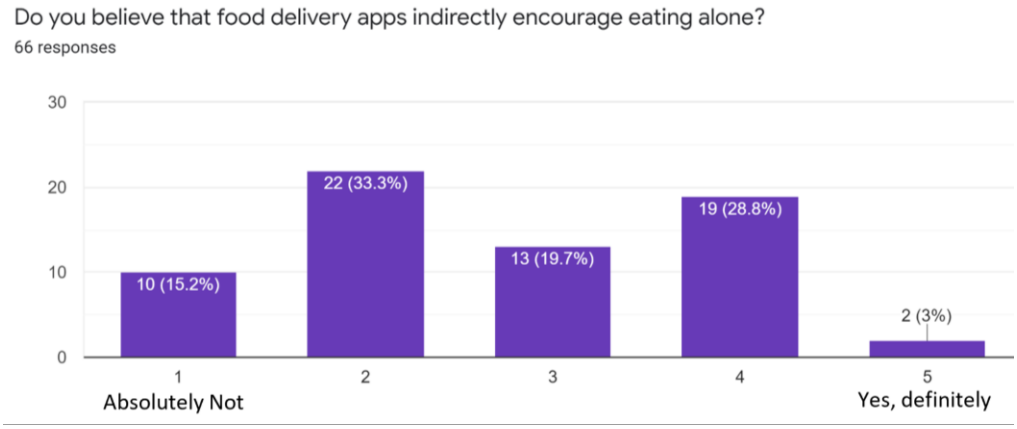

Figure 6: Do you believe that food delivery apps indirectly encourage eating alone? (Created by Karaky, 2020)

With all this data, in addition to the averages, I also calculated the standard deviations to see how spread out the responses were (Figure 7). While the deviations were around 1 for nearly all of the questions, indicating little variability, the largest scores of 2 and 1.57 related to the healthiness of personal orders and healthiness of available selection, respectively. I found this particularly noteworthy as it indicates that some students are motivated to locate and order healthy food options on the application, while others settle for the quick access to unhealthy food. This also may tie back to the primary reasons for ordering food in the first place, as those who are satisfying late-night cravings, 33.3% of survey responders, are probably not focused on making healthy choices (Figure 8).

Question on Food Delivery Apps	Average Score	Out of	Standard Deviation
Variety of Selection?	4.02	5	0.75
Healthiness of Available Options?	4.88	10	1.57
Healthiness of Your Personal Orders?	4.65	10	2.06
Reduces Going Out or Preparing Food?	3.08	5	1.41
Encourages Eating Alone?	2.71	5	1.13

Figure 7: Summary Statistics (Created by Karaky, 2020)

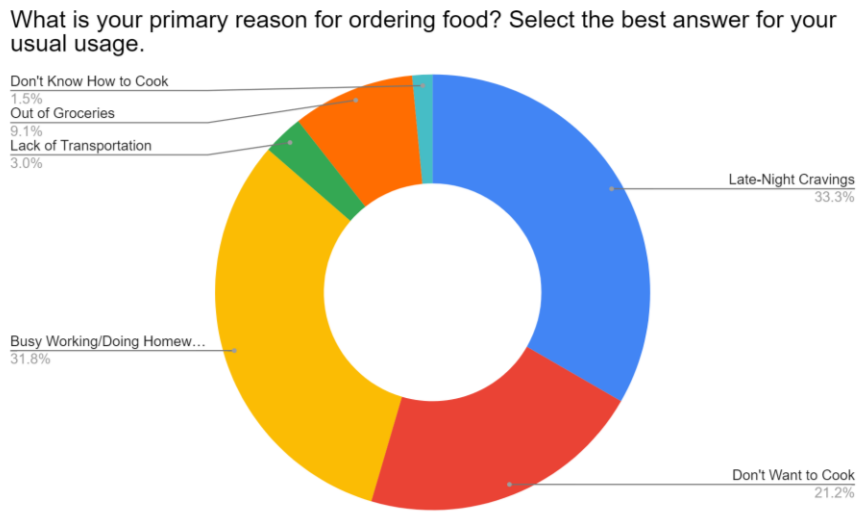

Figure 8: What is your primary reason for ordering food? (Created by Karaky, 2020)

Online Evidence

A common theme that I found while analyzing the Customer Impact case study is delivery food quality and its effect on a restaurant's image. One interviewee from the study ordered takeout food from a well-known Thai restaurant. When he received his delivery, the containers were "soaked in sauce, dented, melted, or leaking" (Customer Impact 2019). Furthermore, the actual delivery time was fifteen minutes past the initial estimated time, and there was not enough plasticware for the entire order. As a result of the poor experience, the interviewee claimed that it worsened his/her view of the restaurant. A different interviewee had a completely opposite experience ordering Mexican food. The food was packaged properly and the actual delivery time was ahead of schedule. Though the customer had heard mixed reviews about this restaurant, the smoothness of the delivery process and the quality of the food greatly increased his favorability of the restaurant. Furthermore, in the survey portion of the same case study, when asked who do users blame for a poor delivery experience, 41% blamed the restaurant, rather than the delivery app (Customer Impact 2019). In all these situations, assigning any blame of a poor delivery experience to a restaurant, tends to mask the role of the driver. The

driver, who is an employee for the food delivery app, has a huge effect on the consumer's perception of the restaurant. Any mistake in the delivery process can negatively affect a restaurant's business, customer retention, and potential revenue.

As for the two user research case studies on Medium, both verified the claims I made earlier in the introduction that the focus of improving food delivery apps is solely on the technical side with increasing user engagement. The only concern that either study addressed that was remotely connected to health concerns was the ability to filter search results by dietary restrictions. Aside from that, the problems that the new app designs were tackling included: cluttered interfaces, lack of personalization, order status, complicated search techniques, and simplified payment (Chung 2019, Mittal 2020). While technology is always evolving and becoming more efficient, this small sample size shows how engineers and designers can get so meticulous with the technical improvements of the software that they ignore the health and well-being of their customers and the impact their software is having on society.

Discussion

Many restaurants are being forced to use food delivery apps to keep up with demand and access wider customer-bases. However, in addition to reduced margins and fewer in-store diners, food presentation becomes another major concern. Large restaurants provide food that is meant to be eaten in store, usually on a plate. Chefs spend time and effort on food presentation making sure a customer has a pleasant dining experience. To-go boxes are usually used for consuming any leftovers at home. By ordering online via food delivery apps, customers are still paying the same cost, but are not receiving the same in store dining experience or food presentation. Not only could the food look less appealing in to-go containers, but the temperature of the food will undoubtedly be colder when you are no longer enjoying the meal straight out of the kitchen. Fast

food restaurants, on the other hand, are designed for delivery and are much cheaper, so customers know exactly what to expect. In this context, referring back to Harrison's sociotechnical framework, unintended consequences of food delivery apps-in-use include foregoing the positive experience of in-house dining, and sacrificing food quality for convenience. Both the social and physical aspects of traditional restaurant experience are disrupted by the use of this technology. If customers stop physically going out to stores to eat, that will eliminate the need for an elaborate in-store dining area, as restaurant owners will have to shift resources to improving the delivery experience. Furthermore, if the customer has a poor delivery experience, he/she may not even come into the store to give the full dine-in experience a chance.

The lose-lose situation discussed earlier of poor eating habits and time management among college students is another example of a possible unintended consequence using the socio-technical framework. The ideal way the technology is meant to supplement the current infrastructure for consuming food is to serve as a way to conveniently get food when one is busy working. This allows for consumers to still eat properly while completing their work. The small sacrifice in food healthiness is made up for in work productivity. However, at least among college students, this is not how the technology is being adopted in society. Instead, students are sacrificing food quality and not being productive, as they could have had the time to cook a better meal or finish their work while the food is being delivered. This is an example of reciprocal effect of the social system on the technology-in-use (ISTA Framework Figure 1).

A limitation on my research is the sample size and demographic of those interviewed. I had 66 college student responders, a majority of whom attend the University of Virginia. As a result, the claims I am making and the evidence I am using to support those claims is based upon

that small sample size. Another limitation is that there were few heavy users surveyed, with 80% of surveyed users using it no more often than monthly. Especially with trends relating to self-isolation and reduced social interaction, there is most likely a certain reliance on the applications that must be established before any noticeable lifestyle differences are apparent. However, the case study showed that 74.4% of responders plan to use food delivery apps more frequently so there will soon be more data from heavy users to support or deny this claim (Customer Impact 2019). If in fact, food delivery applications are found to reduce eating out, this would be a major change in the social infrastructure of consuming food from predominately eating out to now ordering in.

In the future, I would like to understand the strategies of executives behind these food delivery companies. Today, almost all of these companies are still startups, so representatives were unwilling to share much about the business due to potential conflicts of interest and a lack of intellectual property. There is very little proprietary technology with food delivery applications, so corporate strategy is kept rather secretive and many employees must sign non-disclosure agreements. As a result, it was difficult for me to capture this opinion at this point in time. Furthermore, in the future I would like to capture the perspectives of different working professionals as opposed to students. Are working parents utilizing the apps in a different way, especially when ordering for their children? How are young professionals using these apps when they are working for long hours in the office?

I do not plan on using this research to directly advance my engineering practice, it was more so done out of my personal interest on the topic. However, as an aspiring product manager, I will be thinking more in-depth about the social and health implications of the technologies that I help create. To that point, there are some key lessons from this study that I have applied to the

final stages of development in HomeEats. One of the last features we added in this semester was bulk ordering. This allows customers to place larger orders in advance. We put in this feature not only to bring in the revenue from larger orders, but to allows groups of friends to enjoy freshly prepared meals together. This reduces the likelihood of isolating and eating alone, without forcing people to physically eat out. In addition, to account for any allergies, we have all the ingredients listed on each dish, and customers can message chefs any special requests. This can include preferences on cooking meat (medium vs well-done) or simply a customer asking if the dish can be prepared without an ingredient they are allergic to. Back and forth messaging allows chefs to personalize dishes for customers and further helps distinguish our app from others on the market. Furthermore, should our team commercialize the platform in the future, we will require consistent packaging. All chefs must use pre-approved packaging for the food they prepare. This will help us ensure that each customer is having a clean dining experience and increase retention rates.

Conclusion

The significance of this research is that it highlights not only a lot of social and health concerns that arise with food delivery apps, but also the scary potential such simple apps have to completely alter the restaurant industry and consumer's well-being. While it is understandable that companies are competing to perfect the technical side of the applications, appealing to the health concerns of the users may be a smarter way to capture market share. Engineers are often laser focused on improving efficiency, adding features, improving designs, and increasing engagement. It is important to take a step back and think about how these applications will be adopted in society. What are the risks, what are the benefits, how are they impacting users and the existing infrastructures of the industries they are a part of? These are all valid questions that

need to be considered. As for users, it is important to make sure that convenience is not negatively impacting your quality of life. These apps should be aiding you when you are busy and cannot prepare food yourself. It is not healthy, nor financially responsible, to overuse these apps for fast-food deliveries.

Immediate next steps for people with regards to food delivery apps is looking how they can be used during times of need. We are currently experiencing massive life changes with reduced social interaction and forced isolation due to the global coronavirus pandemic. Instead of criticizing food delivery apps for possibly promoting isolation and reducing the social experiences of going out, it is quite ironic that they should now be marketed heavily as avenues for safely receiving food at home. It would be interesting to see if food delivery apps could actually help reduce the need for people to leave home while still providing restaurants a consistent stream of revenue. If so, should governments be encouraging people to download them?

Appendix (Graphs)

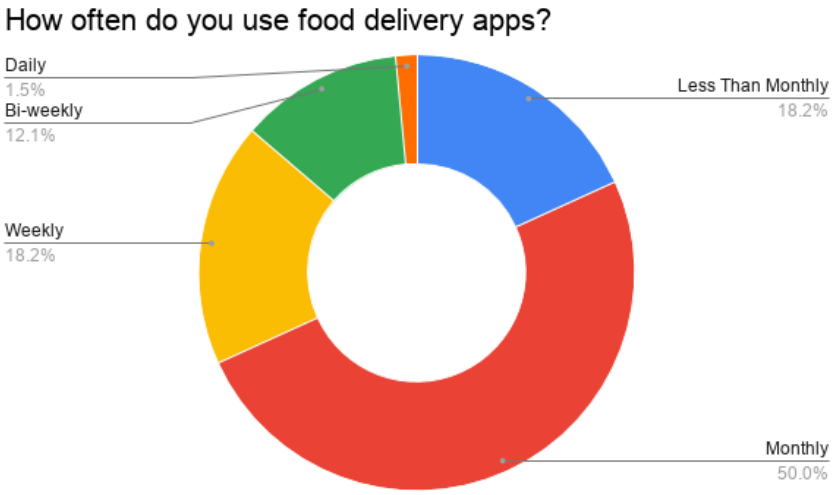

Figure 9: How often do you use food delivery apps? (Created by Karaky, 2020)

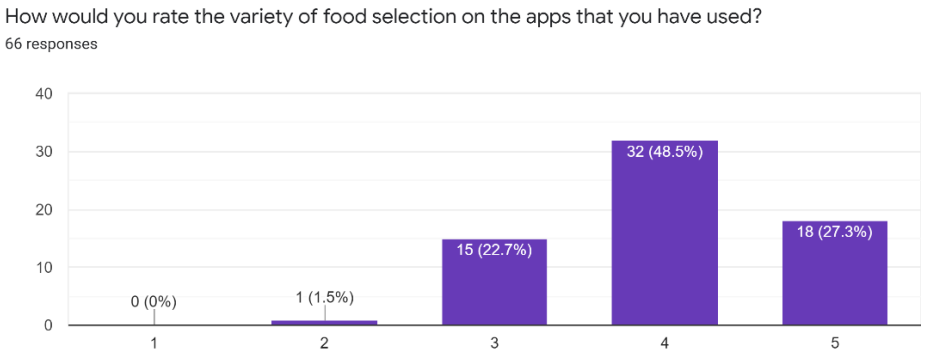

Figure 10: How would you rate the variety of food selection on the apps you have used? (Created by Karaky, 2020)

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