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Factors associated with food delivery app use in young adults

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by

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Abstract

Factors associated with food delivery app use in young adults

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Food delivery apps are highly popular among young adults and are often used to purchase calorie-dense foods, which are associated with a variety of health issues such as increased risk for obesity. Limited research exists on the use of food delivery apps and the research that has been conducted, focused on adults, suggests that food delivery app use differs by sociodemographic factors. Thus, the purpose of this study is 1) to describe food delivery app use among young adults, and 2) to examine the association between young adult food delivery app use and factors including age, race, ethnicity, sex, SES, food insecurity, living arrangement, financial responsibility, and full-time student status. Data are from the Promoting Young Adult Health Survey, a cross-sectional online survey with 1,038 young adults online from the Qualtrics panel January-February 2022. Poisson regression was used to examine the relationship between food delivery app use and the sociodemographic variables. Our results suggest that participants who reported being non-Hispanic Black and Hispanic had greater food delivery app use frequency as compared to participants who reported being white. Having higher perceived subjective social status, being food insecure, being financially responsible, and being a full-time student were all significantly associated with greater food delivery app use frequency. Living with someone else was significantly associated with lower food delivery app use frequency. Age, sex, and ‘Other’ Race/ethnicity were not associated with food delivery app use frequency. Overall, young adults

use food delivery apps approximately twice a week with vulnerable groups such as Black and Hispanic young adults and young adults reporting food insecurity having greater frequency of use. This study provides a first step in understanding the characteristics of young adults who use food delivery apps more frequently. Given that this new technology can both increase access to unhealthy food options as well as healthy food options, future research is needed to better understand the types of food purchased through food delivery apps and the differences by the sociodemographic factors explored in this study.

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1. Introduction

1.1 Food Delivery App Use and Health in Young Adults

Food delivery applications (apps) refer to the \$26.8 billion dollar industry of digital ordering services (i.e. Grubhub, DoorDash, UberEATS) found on mobile apps, the internet, and text messaging (Stephens et al., 2020a). In the United States, food delivery apps have risen dramatically in popularity and use within the last decade and are becoming a significant component of the food industry next to restaurants and fast-food businesses (Lee et al., 2019). Food delivery apps often target young adults by advertising on social media, with most advertising being for nutrient-poor food as opposed to more healthy options (Molenaar et al., 2021). This advertising to young adults is effective, data show that 18–25-year-olds report the highest use of food delivery apps in the past 90 days of any age group (Zion & Hollmann, 2019).

Prior studies have labeled food delivery apps as “junk food on demand” (Partridge et al., 2020), as they offer restaurant meals and fast food at a greater convenience by eliminating the need for transportation. Compared to meals made at home, food from restaurants is typically higher in calories from saturated fat and sodium and less nutritionally dense than meals prepared at home (Bowman & Vinyard, 2004; Kant & Graubard, 2018; Scourboutakos et al., 2013). In fact, over 70% of GrubHub users report using food delivery for fast food (*School Meal Trends & Stats*, 2019), and according GrubHub data, purchase calorie-dense unhealthy food options like pizza, fries, nachos, and cheesecake (*The Dish*, 2019). Regular consumption of these calorie-dense foods available could contribute to the risk of becoming overweight or obese (McCrorry et al., 2019; Stephens et al., 2020a). According to the Centers for Disease Control (CDC), the prevalence of obesity in the U.S. is 42.4%, with around \$147 billion spent annually on obesity-related health

issues (2021). Thus, it is important to understand how the emerging food delivery market may contribute to obesity risk among young adults.

While we know that 18–25-year olds use food delivery apps more frequently than older adults (Zion & Hollmann, 2019), we do not know whether young adults display different frequencies of food delivery app use across the ages of 18-25 years (or emerging adulthood), as these years are inclusive of multiple life stages such as transitions to college, work, partnered relationships or marriage, and parenthood (Arnett, 2000). Younger young adults who are still in college may use food delivery apps more frequently as an easy option during a busy school day (Fryar et al., 2019). While we have an idea of food delivery app use for U.S. adults (Lee et al., 2019; Stephens et al., 2020b; Zion & Hollmann, 2019), studies about the factors associated with food delivery app use are lacking, particularly among young adults in emerging adulthood.

Sex has also been examined as a factor related to decision-making and food purchasing decisions (Ajzen, 1985; Hwang & Kim, 2019). According to the Centers for Disease Control and Prevention (CDC), men and women have similar rates of fast food consumption, with 38% of men and 35.4% of women consuming fast food daily (CDC, 2021). While this similar consumption frequency may translate to similarities in food delivery app use by sex, some studies also point to conflicting evidence that young adult males eat outside the home more than young adult women (Naska et al., 2015). Since food delivery apps offer a unique context that allows individuals to order fast food or restaurant food and eat at home, rates of food delivery app use by sex may vary. For example, women tend to eat more fruits and vegetables, while men often prefer more calorie-dense food options (Kiefer et al., 2005). These differences may lead men to be more attracted to using food delivery apps where they can easily find calorie-dense foods that can be delivered

straight to their home or work. On the other hand, women, who tend to have greater role strain and time demands (Thiagarajan et al., 2009) may be more likely to use food delivery apps to save time.

Food access has been found to vary by the racial/ethnic composition of neighborhoods and an individual's racial or ethnic background has been associated with their likelihood of fast-food consumption. For example, one study found that compared to white neighborhoods, Black neighborhoods (i.e., 80% Black) had a greater number of fast-food restaurants per square mile (Block et al., 2004), thus increasing ease of access to unhealthy foods. However, access to grocery stores, a marker of healthy food access, is decreased in neighborhoods with greater percentages of residents of color (Raja et al., 2008). Difference in food access may be one factor in food consumption. For example, in a study comparing Black and white females, across all ages of adolescence, Black females consumed more fast food than white females (Schmidt et al., 2005). It is important to determine if these barriers in food access extend to food delivery app use. Acculturation in the U.S. may also drive differences in unhealthy fast food consumption when comparing Asian-Americans, Mexican Americans, and Hispanic to Non-Hispanic whites (Batis et al., 2011; Unger et al., 2004). Adapting to more "American" preferences for fast, easy eating and sedentary activities at home (e.g. video games, TV) is one suggested reason why acculturation may cause an increase in fast food consumption (Unger et al., 2004). Given that food delivery apps provide a quick and easy way to access food, determining if an individual's racial or ethnic background is associated with use can help to inform our understanding of food delivery app use.

While there are several studies on food store purchasing decisions focused on differences in socioeconomic status (SES) among adults (Appelhans et al., 2012; Turrell et al., 2009), there are little existing data on differences in food delivery app use by SES among young adults. Recent consumer data for food delivery apps shows that 51.6% of adults within the lowest income

category (\$0-9k) reported use in the past 90 days, while only 25.3% of those in the third-highest income category (\$150-175k) reported using food delivery apps (Zion & Hollmann, 2019). Another recent study in England focused on low SES neighborhoods and food delivery use found that use of food delivery apps and online food services were highest in the poorest neighborhoods (Keeble et al., 2021). These complex results related to food purchasing and SES require further investigation among young adults.

Food insecurity refers to the way which individuals cope with rising food costs by facing hunger or consuming cheaper nutrient-poor foods, which can put individuals at risk for malnutrition or obesity according to the CDC (2020). Young adults in the United States are at higher risk for developing food insecurity than other age groups because of common factors including limited income, high tuition, housing cost, reliance on student loans, and lack of food assistance access (Larson et al., 2020; Pryor et al., 2016; Raskind et al., 2019). Experiencing food insecurity may be associated with less frequent food delivery app use in young adults because of these existing financial burdens or lack of food access that prevent them from purchasing meals from the apps.

Young adults living alone may have less access to readily available meals made with a roommate or family member (Knol et al., 2019), and so may use food delivery apps more frequently. However, it may be that young adults living with a roommate may also use food delivery apps more frequently, to eat together or because they have greater financial stability due to living outside of their family's home (Knol et al., 2019). Therefore, it is important to understand how living arrangements impact the use of food delivery apps.

Financial responsibility is important to identify as a factor related to young adults' food delivery app usage. Many young adults are considered non-financially responsible, relying on their

parents, caregivers, or another form of income other than their own, while others are considered financially responsible and pay for their own purchases or bills (Fan et al., 2022). Thus, financial responsibility may lead young adults to scrutinize their food purchasing decisions and be less likely to order from food delivery apps than those who have access to their parent's income as a financial source. Alternately, financially responsible young adults may be more likely to live on their own (Xiao, 2014), and so use food delivery apps as an easier alternative to cooking.

Similarly, full-time student status may also impact their frequency of food delivery app use. For example, those who attend colleges or universities full time may have greater access to foods provided on campus, and so might have less of a need to order food delivery. However, given that food options on campus may be limited, food delivery apps may provide an opportunity for easy access to a larger variety of food options.

The literature on food delivery app use is limited. Beyond basic consumer demographic reports (US. Foods, 2019; Zion & Hollmann, 2019), there is a lack of studies that demonstrate who is using food delivery apps and what factors may influence an individual's frequency of using these apps. Further, although young adults are shown to be the highest users of food delivery apps, there is little work that focuses specifically on this age group to better understand their usage behavior (Stephens et al., 2020). Therefore, the purpose of this study is 1) to describe food delivery app use, and 2) to examine the association between food delivery apps in young adults and factors including age, race, ethnicity, sex, SES, food insecurity, living arrangement, financial responsibility, and full-time student status.

2. Methods

2.1 Study design and participants

Data were from the Promoting Young Adult Health Survey. We recruited 1,038 young adults aged 18-25 years old through the Qualtrics panel. The sample was recruited to be approximately 50% female and nationally representative by race and ethnicity (e.g. 62.04% Non-Hispanic White, 11.75% Non-Hispanic Black, 11.75% Hispanic, and 8.67% Other). The cross-sectional survey was administered online using Qualtrics. Data were collected in January and February 2022.

3. Measures

3.1. Food delivery app use. Participants' frequency of food delivery app use was assessed by the question, "In the last month, how many times per week on average did you use a delivery app (e.g., DoorDash, Grubhub, UberEATS, Postmates, etc.) for restaurant/prepared food delivery?" Response options were included on a scale of 0-6 from (0) "0 days/not at all" to (5) "Multiple times a day", or (6) "delivery apps are not available in my area". Data were recoded on a scale which included 0 times per week, 1.5 times per week, 3.5 times per week, 5.5 times per week, 7 (every day in the last week), and 8 (multiple times a day).

3.2. Sociodemographic factors. The survey included questions about the sociodemographic characteristics of young adult participants such as age, sex, race/ethnicity, and SES. Age was measured by one item that asked, "How old are you?", on a scale from 18-25 years old and was coded as continuous. Sex at birth was coded as male (0) and female (1). Race/ethnicity was coded as Non-Hispanic White (0), Hispanic (1), Non-Hispanic Black (2), and Other (3). Full-time student status was measured with one item that asked, "What is your current employment/student status?". Responses were coded as (0) other and (1) full-time student. Socioeconomic status was measured by the MacArthur Scale of Subjective Social Status (SSS) (Adult Version), a reliable measure of SSS which asked, "Where would you place yourself on this ladder? Please place a large "X" on

the rung where you think you stand at this time in your life relative to other people in the United States” (Adler et al., 2000). Each rung in the ladder was numbered from 1 (bottom) being the lowest compared to others to 10 (top) being the highest compared to others in the U.S.

3.2.a. Living Arrangement. Participants were asked, “What are your current living arrangements?”. Response options included, “living with parents/caregivers, living with partner and/or children, living with one or more roommates, or living independently alone”. For the analysis, data were coded as (1) living with someone and (0) living alone.

3.2.b. Food insecurity. To assess participants’ food insecurity, two items were used: 1) “Within the past 12 months I worried whether my food would run out before I got money to buy more”, and 2) “Within the past 12 months, the food I bought just didn’t last and I didn’t have money to get more”. From these items, participants were asked to indicate on a scale from 1-4 ((1) often true, (2) sometimes true, (3) never true, or (4) don’t know) their agreement with those statements (Hager et al., 2010). Participants were considered food insecure if they responded often true or sometimes true to either item (food insecure (1) or not food insecure (0)).

3.2.c. Financial Responsibility. Financial responsibility was measured with one item that asked, “Are you personally responsible for your credit card bill?” and was coded as Yes (1) or No (0).

4. Coding and Statistical Analyses

The data were collected in Qualtrics and exported to Stata Version 19 for all data analyses. Descriptive statistics were calculated. Poisson regression was used to examine the relationship between food delivery app use and age, sex, race/ethnicity, perceived SSS, living arrangement, food insecurity, financial responsibility, and full-time student status.

5. Results

Descriptive statistics for each of the variables are shown in Table 1. In the last month, on average, young adults used food delivery apps approximately 1.9 times per week. The average age was 27.8 years. The sample was approximately half female (51.8%) and 62% of the participants were non-Hispanic white, 11.8% non-Hispanic Black, 17.5% Hispanic, and 8.7% Other. Average perceived SSS was 5.8 on the ladder (on a scale from 1-10). Most participants lived with someone (79.3%), were food insecure (55.8%), were financially responsible for their own credit card bills (61.1%) and were full-time students (71.8%).

Table 1. Descriptive statistics for sociodemographic factors of young adults (N= 1,038).

| Factors | Freq. (%) |
|-------------------------------------------|--------------|
| Weekly Food delivery app use, mean (SD) | 1.85 (1.89) |
| Age, mean (SD) | 21.78 (2.22) |
| Sex | |
| Male | 48.17% |
| Female | 51.83% |
| Race/Ethnicity | |
| Non-Hispanic White | 62.04% |
| Non-Hispanic Black | 11.75% |
| Hispanic | 17.53% |
| Other | 8.67% |
| Subjective Social Status (SSS), mean (SD) | 5.76 (2.29) |
| Living arrangement | |
| Living alone | 20.33% |
| Living w/ someone | 79.67% |
| Food insecure | |
| Yes | 55.78% |
| No | 44.22% |
| Financial responsibility | |
| Responsible for credit card bill | 61.08% |
| Not responsible | 38.92% |
| Full-time student status | |
| Full-time student | 71.77% |
| Other | 28.23% |

Age, sex, and ‘Other’ Race/ethnicity were not associated with food delivery app use frequency (See Table 2). Participants who were non-Hispanic Black and Hispanic had greater food delivery app use frequency as compared to participants who were white. Having higher perceived SSS, being food insecure, living with someone else, being financially responsible, and being a full-time student were all significantly associated with greater food delivery app use frequency.

Table 2: Poisson regression models predicting times per week use of food delivery apps among young adults (N=1,038)

| | <i>Coefficient (β)</i> | <i>St. Error</i> | <i>p</i> |
|-----------------------------------------|-----------------------------------------|------------------|-----------------|
| Age | 0.02 | 0.01 | >.05 |
| Female sex (vs. male) | 0.06 | 0.05 | >.05 |
| Race/Ethnicity (vs. Non-Hispanic White) | | | |
| Non-Hispanic Black | 0.38 | 0.06 | <.001 |
| Hispanic | 0.25 | 0.06 | <.001 |
| Other | 0.06 | 0.08 | >.05 |
| Subjective Social Status (SSS) | 0.10 | 0.01 | <.001 |
| Food insecurity | 0.27 | 0.05 | <.001 |
| Living arrangement (Living w/ someone) | -0.16 | 0.05 | <.01 |
| Financial responsibility | 0.21 | 0.05 | <.001 |
| Full-time college student | 0.16 | 0.05 | <.01 |

Discussion

This study is the first to examine how sociodemographic factors are associated with the frequency of ordering from food delivery apps among young adults, a group with the highest rates of use. Findings suggest that several sociodemographic factors are associated with young adults' use of food delivery apps including being non-Hispanic Black or Hispanic, having higher SSS, experiencing food insecurity, living alone, being financially responsible, and being a full-time college student. We did not find differences by age, sex, or 'Other' race/ethnicity once all these other factors were considered.

The significant association of race/ethnicity, specifically that non-Hispanic Black and Hispanic young adults used food delivery apps more than their non-Hispanic white peers, may further our understanding of sociodemographic differences in consumption. For example, we know there are more fast-food restaurants in Black neighborhoods which has been associated with increased fast food consumption among Black populations (Block et al., 2004; Raja et al., 2008). This increased prevalence of fast food in neighborhoods may also be associated with the increased availability of unhealthy options in food delivery apps. However, food delivery apps may also

provide communities that do not have access to healthier options within their neighborhoods an opportunity to purchase fresh fruits and vegetables or other foods. Future research is needed to better understand the types of foods purchased through food delivery apps, to help elucidate the implications of greater food delivery app use.

Although previous consumer data had suggested those from the lowest SES and highest SES had the greatest food delivery app use (Zion & Hollman, 2019), our results indicate that young adults of higher perceived SSS use food delivery apps more frequently than those who report lower perceived SSS. Since prior studies have included older adults in their analysis, these findings may indicate that young adults use food delivery apps differently than older adults when considering SSS. Young adults who report lower SSS may not be able to afford to purchase from food delivery apps, which are usually more expensive than buying from a food outlet. Thus, young adults who report low SSS may want to maximize their budgets by traveling to purchase food from the outlets themselves, while those who report high perceived SSS may find it more convenient to pay the extra fee to have their food delivered. In future research, it would be beneficial to further explore benefits and barriers to using food delivery apps with a specific focus on perceived SSS.

One key finding was that young adults who reported food insecurity within the last 12 months used food delivery apps more often in the last month. Young adults who are food insecure may use food delivery apps as a quick solution to gain access to a broader range of food options or a less stressful purchasing experience. Young adults experiencing food insecurity may view food delivery apps as a quick solution to their worries about not having enough food on hand as they begin to navigate life on their own (Arnett, 2000; Hagedorn & Olfert, 2018). Future research would benefit from exploring this association between food insecurity and food delivery app use more thoroughly through a qualitative lens to understand this relationship more fully.

This study also found that living alone was associated with greater food delivery app use. Many young adults who live alone lack self-perceived cooking skills and therefore have lower motivation to cook meals for themselves (Andrade, 2020). Food delivery apps may provide an easy and convenient alternative to cooking at home, and this may be particularly appealing for young adults who live alone. Further, young adults who live with someone may have a parent, caregiver, or roommate to cook with or who cooks for them. Studies that explore the impact of more specific living arrangements, such as living in a parent's home versus living with roommates are needed.

Young adults who are financially independent and living on their own may use food delivery apps as a way of obtaining quick meals to avoid cooking (Xiao, 2014). Further, young adults with greater financial responsibility may also display greater food delivery app use as they have more time constraints such as full-time jobs, or balancing work and school that prevent them having time to cook healthy meals themselves (Pelletier & Laska, 2012). Further investigation is needed to determine whether financially responsible young adults use food delivery apps because of their greater financial stability or rather because of their lack of time to cook.

Finally, the association between full-time student status and greater food delivery app use is informative as it may be indicative of food access issues on college campuses. For example, because of the lack of perceived healthy or affordable meal options on college campuses, many students view their campuses as a food desert (i.e. a lack of healthy food options in proximity) (Dhillon et al., 2019). Thus, food desert campuses with fast-food restaurants as the only perceived source of affordable food may drive students to use food delivery apps more frequently to get their meals. Further, many full-time students who live on campuses may not own their own vehicle, and so are unable to regularly grocery shop or go to restaurants themselves, and so rely on food delivery

apps. Future studies should identify the types of food outlets full-time college students are purchasing from on food delivery apps to determine whether food desert issues on campuses extend to food delivery app use.

This study is one of the first to examine food delivery app use among young adults, however, it is not without its limitations. First, because our survey was cross-sectional and not longitudinal, we are unable to determine how these factors examined the impact of food delivery app use. For example, although we found food insecurity was associated with greater food delivery app use, food delivery app use may also influence food insecurity by increasing access to food. As such, future longitudinal studies are needed to better understand the temporality of these relationships. However, since our study is one of the first to study food delivery app use among young adults, our findings still reflect valuable insight into how young adults use food delivery apps. A second limitation to our study is that data were collected online. While online survey administration allowed us to gain a more diverse sample of participants, it may mean that some participants could have been distracted or in different environments while responding to the survey. However, the survey data was checked for complete responses and “attention check” questions were included throughout the survey to ensure that participants were not randomly responding. Another limitation to the study is that data were collected during the COVID-19 pandemic. Specifically, our data was collected between January and February 2022, when the omicron COVID-19 variant was at its peak of cases in the United States (CDC, 2022). Thus, COVID-19 could be an important variable that may be related to both the independent variables as well as food delivery app use. However, all data were collected at the same time, so all participants were experiencing the omicron peak to some degree.

This study has several implications for future research. First, because our study was conducted with 18–25-year old's, future studies should replicate this study with additional populations to understand food delivery app use in the United States more fully. Second, while this study examined food delivery app use by sociodemographic and social factors, it does not explain food purchasing decisions based on these factors. This includes factors such as food delivery app use by nutritional content or for unique motivations. Thus, future research on food delivery app use may benefit from examining decision-making on the apps. For example, when surveying food delivery app users on intention to use, one study found that hedonic motivation (e.g. consumption behavior for the result of experiencing emotions of happiness or enjoyment) and price point were the most reported influences for intention to purchase (Prasetyo et al., 2021; To et al., 2007). However, another study found that habit resulted as the greatest influence on intention to continue using food delivery apps (Christino et al., 2021). These mixed findings indicate the need for further research into what motivations may impact continuing to use food delivery apps among certain individuals. Another recommendation is to incorporate the use of a Food Environment Score (FES) to determine the nutritional quality of each most popular food outlet (Partridge et al., 2020). A better understanding of the nutritional quality of foods purchased would help determine if food delivery apps are increasing access to unhealthy foods or opening access to healthy foods. Further, while we know that healthy food is available on food delivery apps for some individuals (Leone et al., 2020), there may be disparities in this food access across similar factors. Since COVID-19, dietary behaviors like food insecurity or overconsumption of fast food have been worsened for those already vulnerable to obesity based on risk factors such as race, ethnicity, perceived SSS, and environment (Leone et al., 2020). Thus, understanding the types of foods purchased through food delivery apps is essential.

Future work should also examine how food delivery app use may displace either home-prepared meals or dining out. It may be that meals consumed through the use of food delivery apps replace trips out to restaurants or it may be that food delivery app meals replace home-prepared meals. There are important distinctions between these two for the impact on overall health.

In sum, food delivery apps introduce a new mode of food access for young adults that raises concern for potential easy access to unhealthy foods. Results indicate that being Non-Hispanic Black, Hispanic, higher perceived SSS, food insecure, living alone, financially responsible, and enrolled as a full-time college student are associated with increased frequency of food delivery app use among young adults. A better understanding of the factors related to food delivery app use is the first step in understanding this new technology and the possible impacts it may have on public health. For example, food delivery apps may provide readily available, easily accessible, unhealthy food options delivered right to the doorstep increasing concerns for obesity and other chronic diseases such as diabetes. Conversely, food delivery apps may open access to healthier food options to communities living in food deserts or food swamps and positively impact health. We need continued research to help determine if food delivery apps are friends or foes.

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