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ORIGINAL PAPER

Factors Associated with Food Delivery App use Among Young Adults

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Abstract
Food delivery apps are popular among young adults and often used to purchase calorie-dense foods. Limited research exists on the use of food delivery apps among young adults. The purpose of this study was to describe food delivery app use among young adults and examine the correlates of food delivery app use. Data are from a panel of U.S. young adults aged 18–25 (n = 1,576) who completed an online survey between January-April 2022. Participants were 51.8% female and 39.3% identified as non-Hispanic white, 24.4% as Hispanic/Latinx, 29.6% as non-Hispanic Black, and 6.8% as another race/ethnicity. Poisson regression was used to examine the relationship between food delivery app use and age, race, ethnicity, sex, SES, food insecurity, living arrangement, financial responsibility, and full-time student status. Young adults used food delivery apps approximately twice a week. Participants who identified as non-Hispanic Black and Hispanic/Latinx used food delivery apps more frequently than participants who identified as white. Having higher perceived subjective social status, food insecurity, financial responsibility, and being a full-time student were significantly associated with using food delivery apps more frequently. Living with someone else was associated with using food delivery apps less frequently. This study provides a first step in understanding the characteristics of young adults who use food delivery apps. Given that food delivery apps are a new technology that can both increase access to unhealthy food options as well as healthy food options, further research is needed to better understand the types of food purchased through food delivery apps.

Keywords food delivery apps · food insecurity · young adults · food access · food purchasing

Introduction

Food delivery applications (apps) refer to the $26.8 billion-dollar industry of digital ordering services (e.g., Grubhub, DoorDash, UberEATS) found on mobile phones, the internet, and text messaging [1]. In the United States, food delivery apps have become a significant component of the food industry next to restaurants and fast-food businesses, often targeting young adults on social media advertising nutrient-poor food items [2, 3]. This advertising to young adults is effective, as data show that 18–25-year-olds report the highest use of food delivery apps in the past 90 days of any age group [4].

Prior studies have labeled food delivery apps as "junk food on demand" [5], as they offer restaurant meals and fast food at a greater convenience. A recent review found that food delivery apps increase access to unhealthy food as well as alcohol [6]. Compared to meals made at home, food from restaurants is typically higher in calories from saturated fat and sodium and less nutritionally dense [7–9]. In fact, over 70% of GrubHub users report using food delivery for calorie-dense fast food like pizza, fries, and nachos [10, 11]. Regular consumption of these calorie-dense foods could contribute to the risk of becoming overweight or obese [1, 12]. Thus, it is important to understand how the emerging food delivery market may contribute to obesity risk among young adults.

To date, most studies on food delivery apps focus only on U.S. adults [1, 2, 4] with little attention given to young adults, although they are among the highest users. For example, we know that young adults use food delivery apps

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more frequently than older adults [4]. However, we do not know whether food delivery app use varies across the ages of 18–25 years, the period considered to be emerging adulthood. Given that these years are inclusive of multiple life stages such as transitions to college, work, partnered relationships or marriage, and parenthood [13], it is likely that food delivery app use may vary across this period.

When considering emerging adulthood, there are unique experiences during this age that may influence use of food delivery apps. For example, 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 [14]. This dichotomy of financial responsibility likely has impacts on food delivery app use given the added delivery fees and per item charges when ordering through these apps as compared to in store food purchasing. Research also suggests that young adults in the United States are at higher risk for developing food insecurity than other age groups because of limited income and high tuition or housing cost [15–17]. Given that emerging adults are often juggling many financial obligations, use of delivery apps may be seen as either time saving and convenient or too costly [33, 34]. Living status (i.e., alone, with family, or with a roommate) is also likely to impact food delivery app use given that meal patterns vary between individuals living alone or with others [18].

Food delivery app use may also vary by demographic factors such as sex, race/ethnicity, and socioeconomic status (SES). Some studies suggest that young adult males eat outside the home more than young adult women [19], which may increase their likelihood to use food delivery apps if they prefer to cook at home less than women. Yet, other work suggests that men and women have similar rates of fast food consumption [20], the most ordered food type on food delivery apps. Food access has been found to also vary by the racial/ethnic composition of neighborhoods [21, 22], and an individual's racial or ethnic background has been associated with their likelihood of fast-food consumption [23]. Yet, little is known about how use of food delivery apps varies across racial/ethnic background. Recent consumer data for food delivery apps shows that 51.6% of adults within the lowest income category ($0-9k) reported using food delivery apps in the past 90 days, while only 25.3% of those in the third-highest income category ($150-175k) reported using food delivery apps [4]. Another study found that use of food delivery apps and online food services were highest in the poorest neighborhoods [24]. Food delivery apps provide a quick and easy way to access food, including unhealthy food but also healthy food options through grocery stores. As such food delivery apps may allow those who live in food deserts access to healthier foods. Therefore, determining if food delivery app use frequency varies by these sociodemographic characteristics is the first step in understanding the impact of food delivery apps on food access.

In sum, the literature on food delivery app use is limited. Further, very little research of limited work has focused on young adults, even though young adults are shown to be the highest users of food delivery apps. Therefore, the purpose of this study is to (1) describe food delivery app use among young adults, and (2) examine the association between food delivery app use and factors including age, race, ethnicity, sex, perceived SES, food insecurity, living arrangement, financial responsibility, and full-time student status.

Methods

Study Design and Participants

Data were from the Promoting Young Adult Health Survey, a cross-sectional, online survey administered from January-April 2022. We recruited young adults aged 18–25 years old using the Qualtrics survey panel [25]. A total of 1,630 young adults completed the survey. We oversampled by race and ethnicity to ensure 30% of the participants identified as Hispanic/Latinx or of Spanish origin and 30% identified as Black or African American. For the present study, 1,576 participants (96.7% of full sample) had data available on items included in the analysis. The institutional review board at the University of Texas at Austin approved this study.

Measures

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).

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 to 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 another race (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. Perceived SES 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" [26]. 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.

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).

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" [27]. From these items, participants were asked to indicate on a scale from 1 to 4 ((1) often true, (2) sometimes true, (3) never true, or (4) don't know) their agreement with those statements. Participants were considered food insecure if they responded often true or sometimes true to either item (food insecure (1) or not food insecure (0)).

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.

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.

Table 1 Descriptive statistics for sociodemographic factors of young adults (N = 1,576)

Factors	*Freq. (%)*
Weekly Food delivery app use, mean (SD)	1.8 (1.46)
Age, mean (SD)	21.75 (2.22)
Sex	
Male	48.22%
Female	51.78%
Race/Ethnicity	
Non-Hispanic White	39.33%
Non-Hispanic Black	29.57%
Hispanic	24.36%
Other	6.75%
Perceived SSS, mean (SD)	5.86 (2.30)
Living arrangement	
Living alone	21.90%
Living w/ someone	78.10%
Food insecure	
Yes	68.40%
No	31.41%
Financial responsibility	
Responsible for credit card bill	63.07%
Not responsible	23.68%
Full-time student status	
Full-time student	71.60%
Other	28.40%

Results

Descriptive statistics for each of the variables are shown in Table 1. In the last month, young adults used food delivery apps approximately 1.8 times per week. The average age was 21.8 years. The sample was approximately half female (51.8%) and 39.3% of the participants identified as non-Hispanic white, 29.6% as non-Hispanic Black, 24.4% as Hispanic/Latinx, and 6.8% as another race/ethnicity. Average perceived SSS was 5.9 on the ladder (on a scale from 1 to 10). Most participants lived with someone (78.1%), were food insecure (68.4%), were financially responsible for their own credit card bills (63.1%) and were full-time students (71.6%).

Sex and identifying as another race/ethnicity were not associated with food delivery app use frequency (See Table 2). Participants who identified as non-Hispanic Black and Hispanic/Latinx had greater food delivery app use frequency as compared to participants who identified as white. Being older, 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 = 1,576)

	Coefficient (β)	*St. Error*	*p*
Age	**0.02**	**0.01**	**< 0.05**
Female sex (vs. male)	-0.04	0.04	> 0.05
Race/Ethnicity (vs. Non-Hispanic White)			
Non-Hispanic Black	**0.21**	**0.05**	**< 0.001**
Hispanic	**0.35**	**0.05**	**< 0.001**
Other	0.12	0.08	> 0.05
Perceived SSS	**0.08**	**0.01**	**< 0.001**
Food insecurity	**0.32**	**0.04**	**< 0.001**
Living arrangement (Living w/ someone)	**-0.09**	**0.04**	**< 0.05**
Financial responsibility	**0.21**	**0.04**	**< 0.001**
Full-time college student	**0.11**	**0.04**	**< 0.01**

Discussion

The use of food delivery apps has increased in recent years [6]. In our sample of young adults, food delivery apps were used approximately two times per week. Several sociodemographic factors were associated with the use of food delivery apps including identifying as non-Hispanic Black or Hispanic/Latinx, having higher perceived SSS, experiencing food insecurity, living alone, being financially responsible, being a full-time college student, and being an older young adult. No differences in food delivery app use were found by sex once all other factors were considered. These findings suggest that food delivery app use varies across young adults who use these apps more than once per week, thus possibly increasing the number of times they consume foods prepared outside of the home.

Young adults who identified as non-Hispanic Black or Hispanic/Latinx used food delivery apps more than their peers who identified as non-Hispanic white. This finding may further our understanding of sociodemographic differences in consumption. For example, research has documented more fast-food restaurants in neighborhoods with a greater proportion of residents who identify as Black, and this has been associated with increased fast food consumption among populations that identify as Black [21, 22]. This increased prevalence of fast food may also be associated with increased availability of unhealthy options on food delivery apps in those areas, thus furthering unhealthy food access.

Although previous consumer data suggested those from the lowest SES and highest SES had the greatest food delivery app use [4], we found that young adults who reported higher perceived SSS use food delivery apps more frequently. Since prior studies have included older adults and measured SES using income, these findings may indicate that either young adults use food delivery apps differently than older adults, or, that differences in use may be observed depending on how SES is measured. Additionally, young adults who report lower perceived SSS may not be able to afford to purchase from food delivery apps, which are usually more expensive than buying from a food outlet. Work that explores how measures of SES may be differentially related to food delivery app use and the reasons for use and types of purchases by socioeconomic status is needed.

A key finding was that young adults who reported experiencing food insecurity in 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 [28]. Further, food delivery apps may serve as a quick solution to not having enough food on hand at home. Compared to other studies, the percentage of young adults in our sample who reported experiencing food insecurity was very high. Typically, other studies have found that about 11% in a U.S. sample (n = 14,786) are food insecure [29]. A recent study with young adults in the U.S. found that 23.3% of 1,568 participants experienced food insecurity in the past year [15]. One reason our sample displayed high food insecurity could be related to the timing of our data collection following the COVID-19 pandemic which increased the intensity of food insecurity in the U.S due to economic challenges and a decrease in food access globally [30]. Further, oversampling for racially/ethnically minoritized young adults may also have influenced our food insecurity findings, given that individuals who identify as Hispanic/Latinx and non-Hispanic Black experience food insecurity at greater percentages than individuals who identify as non-Hispanic white [31]. Given that food delivery apps have the potential to increase food access for those who are food insecure, additional research is warranted to better understand food delivery app use among those experiencing food insecurity.

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 [32]. 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 and obtain healthier food options.

Another aspect that may be related to age or increasing financial independence is living status and 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 [35]. 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. Conversely, young adults who live with someone may have a parent, caregiver, or roommate to cook with or who cooks for them, which may explain their lower food delivery app use.

While this study is one of the first to examine food delivery app use among young adults, it is not without limitations. First, because our survey was cross-sectional, we are unable to determine if the factors examined predicted food delivery app use. As such, future longitudinal studies are needed to better understand the temporality of these relationships. Another limitation to the study is that data were collected during the COVID-19 pandemic, specifically, between January and April 2022, when the omicron COVID-19 variant was at its peak of cases in the U.S. [36]. However, all data were collected at the same time, so all participants were experiencing the omicron peak to some degree. Continued research is needed that examines food delivery app use over time. Despite these limitations, our findings still reflect valuable insight into how young adults use food delivery apps.

This study has several implications for future research. First, while this study examined food delivery app use by sociodemographic and social factors, it does not explain food purchasing decisions or motivations for purchases. Thus, future research may benefit from examining decision-making and reasons for purchases. Additionally, a better understanding of the nutritional quality of foods purchased through food delivery apps would help determine if these 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 [37], 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 [37]. Thus, understanding the types of foods purchased through food delivery apps is essential. Finally, 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 from food delivery apps replace trips 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.

Food delivery apps introduce a new mode of food access for young adults that raises concern for potential easy access to unhealthy foods. 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. A better understanding of food delivery app use is the first step in understanding this new technology and the possible impacts it may have on public health.

Author Contributions Sarah Buettner and Keryn Pasch contributed to the study conception and design. Material preparation, data collection and analysis were performed by Sarah Buettner and Keryn Pasch. Natalie Poulos contributed to the interpretation of the findings and revision of the manuscript. The first draft of the manuscript was written by Sarah Buettner and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Data Availability The data that support the findings of this study are available from the corresponding author upon request.

Declarations

Conflict of Interest The authors have no conflicts of interest to report.

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