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The Relationship between the Use of Food Delivery Applications and the Risk of Obesity among Collage Students in the Jabodetabek Area

Hubungan Penggunaan Aplikasi Pesan Antar Makanan terhadap Risiko Obesitas pada Mahasiswa di Daerah Jabodetabek

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ABSTRACT

Background: The trend of using food delivery applications is currently popular with students because it makes it easier for them to get food. However, this can cause negative impacts such as changes in the variety, frequency, and amount of food consumed, thereby risking increasing the prevalence of obesity.
Objectives: This research aims to analyze the relationship between the use of food delivery applications, consisting of the frequency of use and the type of food/drink purchased, and the risk of obesity among students in the Jabodetabek area.
Methods: The research used a cross-sectional design with a sample of 73 students in the Jabodetabek area. A purposive sampling technique was employed. Data was collected through an online questionnaire containing respondent characteristics, application use, Food Frequency Questionnaire (FFQ), and risk of obesity.
Results: The food delivery application most frequently used by students was GoFood (42.5%). The majority of students used food delivery applications 1 – 3 times/week (94.5%). Meanwhile, coffee (27.4%) was the type of food/drink most often purchased through the application by students. Tests of the relationship between types of food/drinks and the risk of obesity showed several significant results, including fried chicken (p=0.03), baso aci (p=0.036), ice cream (p=0.018), and coffee (p=0.004). However, the test of the relationship between domicile and pocket money and the type of application used showed that the results were not significant with p=0.399 and p=0.163 respectively. The frequency of use of food delivery applications on the risk of obesity also did not show significant results (p=0.206).
Conclusions: Several types of food/drinks were related to the risk of obesity. Student residence and pocket money were not related to the type of application used, and the frequency of use of food delivery applications was also not related to the risk of obesity.

INTRODUCTION

The development of digital technology that is currently widely felt and often used by the public is a smartphone. All activities can be done using a smartphone that is connected to the internet[1]. The increasing number of smartphone and internet users has led to the development of online business applications such as food delivery applications[2]. Users of this application can buy the selected food easily and quickly[3]. Based on research results, as many as 64% of food delivery service users in Indonesia have increased the frequency of ordering food compared to before the pandemic[4].

GoFood is the top choice in food delivery applications used every week, followed by ShopeeFood (52%) and finally GrabFood (47%)[5]. Food delivery applications are in high demand by students because they are considered to always follow trends and want convenience[6]. Similar research results show that 41% of students use food delivery applications with high intensity (9-14 times/week), 33% use applications with moderate intensity (5-7 times/week), and 27% use applications with low intensity (2-3 times/week)[7]. The use of food delivery services is done because it can save time and money because of the promos offered on the application. The use of food delivery applications can also have a negative impact.

The negative impact is the change in the variety of food dominated by fast food, dessert, and modern food. In addition, the frequency of eating and the amount of food also increased due to the ease of getting food[8]. This is in line with previous research that the most frequently ordered food is fast food[9]. The results of the study also stated that there was a relationship between

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fast food consumption and the incidence of obesity[10]. Even the fast food consumption pattern with the occasional category can affect the occurrence of central obesity[11].

The prevalence of obesity at the age of >18 years increased from 14.8% in 2013 to 21.8%[12]. There is a relationship between sedentary lifestyle and the risk of obesity in students[13]. This is related to the diet of students who tend to consume more snacks when spending a long time in front of the screen[14]. Students who do sedentary activities consume more types of food or beverages in the form of noodles, milk and its products, fast food, and fried foods, which can have an impact on overnutrition and increase the risk of obesity[15]. Therefore, this study aims to analyze the relationship between the use of food delivery applications which includes frequency of use and types of food/beverages purchased through the application and the risk of obesity among college students in the Jabodetabek area.

METHODS

This study was an analytic observational study with a cross-sectional approach. The research was conducted online from July to August 2023 to students in the Jabodetabek area who were selected as respondents. Jabodetabek is a big city in Indonesia with many food delivery application users. The sample was determined by calculating using the Lemeshow formula, which was 73 students. The inclusion criteria in this study was being active students in semesters 1 - 9, aged 19 - 24 years, domiciled in Jabodetabek, and using food delivery applications at least once in the last week. While the exclusion criteria were students who had graduated, and students who were on a special diet. This research has received approval from the Health Research Ethics Approval Commission of the Faculty of Health Sciences, Syarif Hidayatullah State Islamic University Jakarta, with number Un.01/F.10/KP.01.1/KE.SP/07.08.007/2023.

The sampling technique used purposive sampling by distributing Informed Consent questionnaires through social media such as WhatsApp, Instagram, Telegram, Twitter, and others. Respondents who had filled out the Informed Consent questionnaire were then be selected according to the inclusion criteria. The selected respondents were invited to the WhatsApp group to facilitate the determination of the discussion schedule for explaining the procedures for filling out the research questionnaire through the Zoom Meeting. After explaining the procedures for filling out the research questionnaire, the researcher sent an online questionnaire link in the form of a Google form to be filled in by the respondent. The research questionnaire included the use of food delivery applications, FFQ, and a validated obesity risk questionnaire16. The FFQ contains food/beverage types that had been customized based on the food delivery application. The FFQ results were divided into 3 categories: Rarely (1 - 3 times/week), Sometimes (5 - 7 times/week), and Often (9 - 14 times/week), according to the use of food delivery applications.

The data obtained were then subjected to univariate analysis, with the variables tested being the characteristics of respondents consisting of gender, age, domicile, nutritional status, and pocket money, as well as the type of application most frequently used, the frequency of application use, and the type of food/beverage purchased through the application obtained by selecting food/beverage based on the score results ≥ the average frequency of the amount of food/beverage on the food delivery application. Meanwhile, the bivariate analysis used the chi-square test to determine the relationship between variables. The variables tested were domicile to the type of application most often used, pocket money to the type of application most often used, frequency of application use to the risk of obesity, and the type of food/beverage purchased to the risk of obesity.

RESULTS AND DISCUSSION

Characteristics of respondents

The characteristics of the respondents observed included gender, age, domicile, and nutritional status. The results seen in Table 1 based on gender characteristics show that 94.5% of respondents are female. The age characteristics of the respondents were divided into 2 groups, 34 respondents aged 19-21 years (46.6%) and 22-24 years (39 people (53.4%). When viewed based on domicile, most students live in the city of Jakarta, with a percentage of 34.2%. In the characteristics of nutritional status, most respondents had a normal nutritional status of 61.6%. Meanwhile, based on pocket money, students with pocket money of IDR 1,000,000 - 5,000,000 dominated by 56.1%.

Table 1. Frequency distribution of student characteristics of food delivery app users in the Jabodetabek area

Characteristics	(n)	(%)
Gender		
Male	4	5.5
Female	69	94.5
Age		
19 – 21 years	34	46.6
22 – 24 years	39	53.4
Domicile		
Jakarta	25	34.2
Bogor	18	24.7
Depok	7	9.6
Tangerang	9	12.3
Bekasi	14	19.2
Nutritional status		

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Characteristics	(n)	(%)
Severe thinness	3	4.1
Thinness	7	9.6
Normal	45	61.6
Overweight	6	8.2
Obesity	12	16.4
Pocket money (Monthly)		
<Rp 500.000	8	11.0
Rp 500.000 – 1.000.000	24	32.9
Rp 1.000.000 – 5.000.000	41	56.1

Source: Primary data

Nutritional status is related to all the food a person consumes. The food consumed has nutrients that are useful for metabolic processes in the body to benefit health, growth, organ function, body tissues, and energy production[17]. Thus, nutritional status reflects the food consumed. The purpose of food consumption is to fulfill nutritional needs, psychological needs, and social needs. Food consumption to meet psychological needs is usually carried out based on taste and ability in the selection of food to be consumed[17]. Good food selection is necessary to maintain normal nutritional status.

Use of food delivery apps

The type of application observed is the type of application most frequently used by students. Table 2 shows that GoFood was the most frequently used choice by food delivery application users at 42.5%, which was followed by ShopeeFood at 37%. This is in line with research conducted on Siliwangi University students that the majority of students use GoFood because the available features are quite attractive such as various discount offers and more affordable prices[18]. Research conducted on students in DKI Jakarta province also shows that GoFood is an application that has a higher level of customer satisfaction with 77.58% compared to GrabFood and ShopeeFood[19].

Table 2 also shows that the frequency of use of food delivery applications was dominated by low-intensity use (1-3 times/week) at 94.5%. Previous research states that more students make online food purchases 1-2 times/week[20]. Research conducted on office workers aged 18-35 years in DKI Jakarta shows that the majority of office workers have low intensity (<4 times/week) in using food delivery applications at 55.3%[21]. The reason for using low intensity is because it is only needed when hanging out with friends, and there is a shipping fee that must be paid by the user[22].

Table 2. Frequency distribution of food delivery application usage among college students in the Jabodetabek area

Use of the app	(n)	(%)
Type of apps		
GrabFood	15	20.5
GoFood	31	42.5
ShopeeFood	27	37
Total	73	100
Frequency of use		
1-3 times/week	69	94.5
5-7 times/week	4	5.5
9-14 times/week	0	0
Total	73	100.0

Source: Primary data

Types of food/drink purchased through food delivery applications

The list of food/beverage types in Table 3 is the result of the selection of food/beverage most ordered by students based on the results of the FFQ score. Table 3 shows that the types of food/beverages ordered by students were dominated by the rare category. Coffee was the type of drink with the category sometimes the most, which was 27.4% compared to other types of food/beverages. The type of food ordered in the occasional category was fried chicken at 21.9%.

Table 3. Frequency distribution of types of food/drink purchased through food delivery apps by college students in the Jabodetabek area

Type of food/beverage	Rarely		Sometimes		Often	
	n	%	n	%	n	%
Fried chicken	54	74	16	21.9	3	4.1
Coffee	52	71.2	20	27.4	1	1.4
Fried rice	61	83.6	11	15.1	1	1.4
Ayam geprek/penyet	62	84.9	10	13.7	1	1.4
French fries	62	84.9	8	11.0	3	4.1

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Type of food/beverage	Rarely		Sometimes		Often	
	n	%	n	%	n	%
Seblak	64	87.7	6	8.2	3	4.1
Sushi	62	84.9	9	12.3	2	2.7
Chicken noodles	62	84.9	9	12.3	2	2.7
Bakso	64	87.7	7	9.6	2	2.7
Pizza	66	90.4	5	6.8	2	2.7
Baso aci	63	86.3	8	11.0	2	2.7
Ice cream	65	89.0	7	9.6	1	1.4
Nasi padang	64	87.7	9	12.3	0	0.0

Source: Primary data

Coffee is one of the most commonly ordered beverages through food delivery apps[23]. For students, coffee can contribute energy, as well as be a sleepy remover when approaching exams. This makes the reason for students to consume the most coffee when approaching exams or when completing assignments by 55.2%[24]. The caffeine contained in coffee works as an antagonist on adenosine receptors. Inhibited A1 receptors cause norepinephrine release and inhibited A2a receptors cause an increase in dopaminergic activity thus providing a stimulant effect characterized by difficulty sleeping[25]. Coffee consumption is currently a trend among students. Research conducted in 2019 found that as many as 79.8% of students often consume coffee[26]. In line with the results of research conducted on students, 70.4% of students have the habit of consuming coffee[27].

Fried chicken, which is classified as fast food, is also a food choice that is often purchased by students. Students who tend to choose fast food as the chosen food have various reasons such as being lazy to wait a long time, easier to get, cheaper, considered tastier, and carried away by the influence of friends[28]. Research conducted in 2022 also shows that fried chicken is the most frequently ordered food through food delivery applications[29]. The relationship between strong influence from friends can be related to the frequency of fast food consumption[30].

Relationship between domicile and type of application

Table 4 shows the results obtained are students who lived in Jakarta dominated by GoFood which was the most frequently used application at 48%. This is also seen in students with Bogor and Bekasi domiciles, who find GoFood to be the most frequently used application choice. Meanwhile, students who lived in Tangerang mostly choose GrabFood to be the most frequently used application with a percentage of 44.4%. In contrast to other cities, students with Depok domicile mostly chose ShopeeFood to be the most frequently used application with a percentage of 57.1%.

Table 4. Relationship between domicile and the type of food delivery application used by students in the Jabodetabek area

Domiciles	Type of apps						Total		*p-value*
	GoFood		GrabFood		ShopeeFood				
	n	%	n	%	n	%	n	%	
Jakarta	12	48.0	4	16.0	9	36.0	25	100.0	0.399
Bogor	9	50.0	4	22.2	5	27.8	18	100.0	
Depok	1	14.3	2	28.6	4	57.1	7	100.0	
Tangerang	2	22.2	4	44.4	3	33.3	9	100.0	
Bekasi	7	50.0	1	7.1	6	42.9	14	100.0	
Total	31	42.5	15	20.5	27	37.0	73	100.0	

Source: Primary data
*Use the Chi-square test

The p-value obtained was 0.399. If the p-value > 0.05, the null hypothesis (H_0) was accepted, which means that there was no relationship between domicile and the type of application most often used by students in the Jabodetabek area. The type of application that is often used is not influenced by domicile but is related to service quality attributes. One of them is the price. Consumers will choose the type of application that has a lower price. In addition, the quality of service also affects the decision to choose the type of food delivery application[31]. The ease of use of the application also influences the decision to choose the type of application. Even though ShopeeFood promotions cut prices more, its use is quite complicated because it requires consumers to first claim the promo voucher so that consumers can then use it so consumers prefer other applications[32].

Relationship between pocket money and type of application

Table 5 shows that students who had an allowance of <Rp500,000 mostly chose ShopeeFood as the most frequently used application with a percentage of 62.5%. Students with an allowance of Rp500,000 - 1,000,000 also chose ShopeeFood as the most frequently used application with a percentage of 45.8%. Meanwhile, students with pocket money Rp1,000,000 - 5,000,000 chose GoFood as the most frequently used application with a percentage of 53.7%. Based on the results of the relationship test between pocket money and the type of

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application most often used, it turned out that it did not have a significant relationship characterized by a p-value > 0.05 was 0.163.

ShopeeFood is an application that has the most attractive discounts because it can reduce prices more[32]. The price offered by ShopeeFood is an advantage of this application. Apart from ShopeeFood, the GoFood application is also in great demand[19]. GoFood has a larger selection of restaurants that work with GoFood compared to other applications[33]. This is supported by the UMKM GoFoodieland feature which further expands GoFood's network of cooperation with surrounding Usaha Mikro, Kecil, dan Menengah (UMKM) so that there are more product choices[32]. In addition, orders that come according to what was ordered[34]. GoFood can be favored in terms of food quality and hygiene as well as the quality of information displayed so that users are quite satisfied with the features[19].

Table 5. Relationship between pocket money and the type of food delivery application used by students in the Jabodetabek area

Pocket money	Type of apps						Total		*p-value*
	GoFood		GrabFood		ShopeeFood				
	n	%	n	%	n	%	n	%	
<Rp 500.000	1	12.5	2	25.0	5	62.5	8	100.0	0.163
Rp 500.000 – 1.000.000	8	33.3	5	20.8	11	45.8	24	100.0	
Rp 1.000.000 – 5.000.000	22	53.7	8	19.5	11	26.8	41	100.0	
Total	31	42.5	15	20.5	27	37.0	73	100.0	

Source: Primary data
*Use the Chi-square test

Relationship between frequency of app use and obesity risk

Table 6 shows the relationship between the frequency of use of food delivery applications and the risk of obesity. The risk of obesity was obtained from the scoring results of the obesity risk questionnaire where a score of 0 means no risk and a score > 0 means risk. The results showed that 69 students had a frequency of use with low intensity, of which 66 (95.7%) students were at risk of obesity, and 3 (4.3%) students were not at risk of obesity. Students who used food delivery applications with moderate intensity were 4 people, with 3 (75%) of them were at risk of obesity and 1 (25%) student was not at risk of obesity.

Table 6. The relationship between the frequency of use of food delivery applications and the risk of obesity in students in the Jabodetabek area.

Frequency of use	Risk of Obesity				Total		*p-value*
	At risk		Not at risk				
	n	%	n	%	n	%	
Low intensity	66	95.7	3	4.3	69	100.0	0.206
Medium intensity	3	75.0	1	25.0	4	100.0	
Total	69	94.5	4	5.5	73	100.0	

Source: Primary data
*Use the Chi-square test

The test results obtained a p-value of 0.206, which means the p-value was > 0.05. So, it can be concluded that there was no relationship between the frequency of use of food delivery applications on the risk of obesity in students in the Jabodetabek area. This is because the use of food delivery applications is not the only factor that affects obesity. Factors that can increase the risk of obesity include genetics, diet, drugs, hormonal, and physical activity[35]. The results of a similar study stated that the frequency of ordering through food delivery applications ≥ 3 times a week was not a risk factor for central obesity[29]. The results of research conducted on Siliwangi University students stated that energy and protein intake, as well as physical activity, are risk factors for obesity[36]. Students with high energy intake have a 7.5 times greater risk of obesity than students with low intake. High protein intake in students is 7.6 times more at risk of obesity than low protein intake, and students with low physical activity will have a risk of obesity of 6.8 times greater than students who have sufficient physical activity[36].

Relationship of type of food/beverage purchased to obesity risk

Table 7 shows the relationship between food types to the risk of obesity among students in the Jabodetabek area. Based on the results of the chi-square test carried out, 4 types of food/beverage had a p-value <0.05, which means H_0 was rejected or in other words, there was an association between the type of food/beverage with the risk of obesity. The type of food in the form of fried chicken had an association with the risk of obesity, with a p-value of 0.03. Besides fried chicken, baso aci also had a relationship with the risk of obesity with a p-value of 0.036. The types of drinks associated with the risk of obesity were ice cream and coffee with a p-value of 0.018 and 0.004 respectively.

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Table 7. Relationship of food/beverage type to obesity risk in college students in Jabodetabek area

Type of food/beverage	Risk of Obesity				Total		*p-value*
	At risk		Not at risk				
	n	%	n	%	n	%	
Fried chicken							
Rarely	53	98.1	1	1.9	54	100.0	
Sometimes	13	81.3	3	18.8	16	100.0	0.030*
Often	3	100.0	0	0.0	3	100.0	
Total	69	94.5	4	5.5	73	100.0	
Coffee							
Rarely	52	100.0	0	0.0	52	100.0	
Sometimes	16	80.0	4	20.0	20	100.0	0.004*
Often	1	100.0	0	0.0	1	100.0	
Total	69	94.5	4	5.5	73	100.0	
Fried rice							
Rarely	58	95.1	3	4.9	61	100.0	
Sometimes	10	90.9	1	9.1	11	100.0	0.830
Often	1	100.0	0	0.0	1	100.0	
Total	69	94.5	4	5.5	73	100.0	
Ayam geprek/penyet							
Rarely	60	96.8	2	3.2	62	100.0	
Sometimes	8	80.0	2	20.0	10	100.0	0.094
Often	1	100.0	0	0.0	1	100.0	
Total	69	94.5	4	5.5	73	100.0	
French fries							
Rarely	58	93.5	4	6.5	62	100.0	
Sometimes	8	100.0	0	0.0	8	100.0	0.687
Often	3	100.0	0	0.0	3	100.0	
Total	69	94.5	4	5.5	73	100.0	
Seblak							
Rarely	60	93.8	4	6.3	64	100.0	
Sometimes	6	100.0	0	0.0	6	100.0	0.743
Often	3	100.0	0	0.0	3	100.0	
Total	69	94.5	4	5.5	73	100.0	
Sushi							
Rarely	58	93.5	4	6.5	62	100.0	
Sometimes	9	100.0	0	0.0	9	100.0	0.687
Often	2	100.0	0	0.0	2	100.0	
Total	69	94.5	4	5.5	73	100.0	
Chicken noodles							
Rarely	59	95.2	3	4.8	62	100.0	
Sometimes	8	88.9	1	11.1	9	100.0	0.699
Often	2	100.0	0	0.0	2	100.0	
Total	69	94.5	4	5.5	73	100.0	
Bakso							
Rarely	61	95.3	3	4.7	64	100.0	
Sometimes	6	85.7	1	14.3	7	100.0	0.538
Often	2	100.0	0	0.0	2	100.0	
Total	69	94.5	4	5.5	73	100.0	
Pizza							
Rarely	63	95.5	3	4.5	66	100.0	
Sometimes	4	80.0	1	20.0	5	100.0	0.323
Often	2	100.0	0	0.0	2	100.0	
Total	69	94.5	4	5.5	73	100.0	
Baso aci							
Rarely	61	96.8	2	3.2	63	100.0	
Sometimes	6	75.0	2	25.0	8	100.0	0.036*
Often	2	100.0	0	0.0	2	100.0	
Total	69	94.5	4	5.5	73	100.0	
Ice cream							

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Type of food/beverage	Risk of Obesity				Total		*p-value*
	At risk		Not at risk				
	n	%	n	%	n	%	
Rarely	63	96.9	2	3.1	65	100.0	
Sometimes	5	71.4	2	28.6	7	100.0	0.018*
Often	1	100.0	0	0.0	1	100.0	
Total	69	94.5	4	5.5	73	100.0	
Nasi padang							
Rarely	60	93.8	4	6.3	64	100.0	
Sometimes	9	100.0	0	0.0	9	100.0	1.00
Often	0	0.0	0	0.0	0	0.0	
Total	69	94.5	4	5.5	73	100.0	

Source: Primary data
*significant results with Chi-square test

Fried chicken and ice cream are foods that are high in fat, so they can cause fat accumulation if consumed too much. In previous research conducted on Malikussaleh University students, the type of Western fast food that is very often consumed is fried chicken with 78 (74.3%) respondents[37]. Consumption of fried chicken is associated with triglyceride levels[37]. Triglycerides are a type of fat that is found in many animal and vegetable foods. Triglycerides are formed due to excess carbohydrates in the liver, mostly composed of adipose tissue[17]. So, if triglyceride levels in the blood are high, it will cause an increase in adipose tissue which will increase the risk of obesity. Meanwhile, fried chicken and aci meatballs are foods that contain high sodium. Consumption of high-sodium foods that are usually found in high-energy foods causes energy intake to increase[38]. High energy intake will have an impact on increasing body weight. The results of related studies state that there is a relationship between sodium intake and the risk of obesity[39].

Coffee was also a type of beverage associated with the risk of obesity with a p-value of 0.004. Coffee consumption with added sugar and creamer has a risk of overweight and obesity[40]. Simple sugar intake that exceeds the daily consumption limit can affect obesity[41]. The recommended daily consumption of sugar is 50 grams or the equivalent of 4 tablespoons[42]. In espresso-based coffee drinks, the sugar contained is usually 30-40 grams per cup, and the sugar usually used by coffee shops is liquid sugar and palm sugar[43]. The added sugar usually consists of fructose and glucose. Long-term consumption of fructose as added sugar causes leptin resistance, which plays a role in regulating satiety. This results in a loss of satiety, leading to excess energy consumption and overweight[44]. The use of creamer in coffee also contributes to the risk of overweight and obesity. Creamers added to coffee are made from fat, either vegetable fat or animal fat. The fat contained in creamer usually ranges from 20-40%[45]. Fat stores in the body can be used as energy reserves. However, fat accumulation can increase the risk of obesity if there is no balanced energy expenditure. Energy expenditure can be done with sufficient physical activity.

CONCLUSIONS

GoFood was the most frequently used application by students to order food/drinks, followed by ShopeeFood and GrabFood. The frequency of application use in students was dominated by low intensity (1 - 3 times/week). Meanwhile, the types of food/beverages that were most purchased on food delivery applications included fried chicken, pizza, sushi, nasi padang, ice cream, coffee, and others. In the relationship test, several variables were significantly related to other variables. There was a relationship between the type of food in the form of fried chicken and baso aci and the type of beverage in the form of ice cream and coffee to the risk of obesity. The unrelated variables were domicile to the type of application most often used, pocket money to the type of application most often used, and the variable frequency of application use to the risk of obesity.

Suggestions that can be made for further research are that testing can be done on the amount of food consumed because obesity can be influenced by consumption patterns, one of which is the amount of consumption. In addition, an analysis can be made of the reasons for purchasing through food delivery applications related to the frequency of application use.

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