SUSTech undergraduate students' dependency on online shopping

Group 1

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Abstract

With the pursuit of exploring SUSTech undergraduates' online shopping dependency, a sampling survey is conducted among SUSTech undergraduates. The questionnaire is issued via popular communication applications, and the online shopping dependency is defined from six aspects according to prior studies and the result of focus group interview. After quantification, the dependency scores are analyzed based on hypothesis tests and several types of plots. Therefore, some specific online shopping dependency trends and patterns are identified.

Keywords: online shopping, physical dependency, psychological dependency, mood modification, withdrawal, self-control.

Content

1. Introduction and research objectives

Online shopping has been a growing phenomenon in all four corners of the world, in particular amongst countries possessing highly developed infrastructure available for marketing activities through the internet.[1] Previous studies show that internet usage and online shopping are most common among university students even though they do not have sufficient funds for shopping. University students have great intention towards online shopping.[2] Some of them even have become dependent on online shopping.

Our group intend to investigate SUSTech undergraduate students' dependency on online shopping. In this research, we expect to

- Study the current situation of dependency on online shopping for undergraduate students from SUSTech.
- Find out the factors affecting the level of dependency on online shopping.
- Explore the potential effects of different levels of online shopping dependency.

2. Concepts and measurement

2.1. Concepts

In XU Ming-Xing's study[3], people with online shopping dependency enjoy the pleasant sensation of online shopping, spend excessive time and money on online shopping, have negative emotions when online shopping is restricted or just after shopping online, and cannot control themselves to stop shopping online.

According to the research[4] of WANG Chih-Chien and YANG Hui-Wen, online shopping dependency may occur when individuals use online shopping platforms habitually and continue to shop online.

XU Lang mentioned in his paper[5] that online shopping addiction can be described with four aspects: excessive time consumption and excessive money consumption, problems caused by online shopping, pleasant sensation when shopping online, and the reaction when online shopping is restricted.

In addition, participants in our focus group meeting thought that people who had online shopping dependency would shop online frequently, expend a lot of time on online shopping, feel uneasy and vapid if they stop shopping online for a long time, and cost considerable money to buy a lot of things online and cannot stop shopping online.

According to these references[3][4][5] and the result of focus group meeting, online shopping dependency in this project is defined as follows:

One person has online shopping dependency when he or she frequently uses online shopping applications to do shopping, spend much time and most of disposable money on online shopping, enjoys the pleasant sensation of online shopping, has negative emotions if online shopping is restricted and feels it difficult to control himself or herself to stop shopping online.

Although XU Lang's research is about online shopping addiction, we still use it because the symptoms of online shopping dependency and online shopping addiction are very similar. More details will be discussed in section 2.2: Comparison with online shopping addiction.

Based on the definition, online shopping dependency can be measured by several attributes: the frequency of online shopping, time and money spent on online shopping, and mood modification, withdrawal and self-control in terms of online shopping.[3][4][5] Mood modification, withdrawal and self-control are three psychological terms.

Mood modification refers to the subjective experiences that people report as a consequence of engaging in the particular activity.[6] People who have online shopping dependency usually feel happy, excited and a sense of relieving pressure when and after they shop online. The stronger the feelings, the higher level of dependency they are likely to have. In addition, they might feel guilty and remorse if they spend too much money on online shopping.[3][5]

In terms of online shopping, withdrawal means the reaction of people when online shopping is restricted. When one person is obstructed from shopping online, like when the access to internet is cut off, if he or she feels empty, uneasy or has other negative emotions and tries to get access to online shopping by all means, then this person are very likely to have online shopping dependency.[5]

As for self-control, it is hard for people with online shopping dependency to control themselves to stop shopping online. After buying what they intend to buy, they usually still use online shopping applications to shop and cannot stop, which might lead to excessive time consumption. They often buy things which they do not need and they cannot control themselves, which may cause excessive money consumption.[3][5]

2.2. Comparison with online shopping addiction

Online shopping dependency and online shopping addiction have similar symptoms. However, there are two differences between them. The first is that the symptoms of online shopping addiction are more severe than that of online shopping dependency. People with online shopping addiction must have high-level dependency while people with online shopping dependency might not be addicted to it. The second difference is that people with online shopping addiction suffer from mental health issues and their personal connections are usually affected, but online shopping dependency does not cause such serious problems.[3]

As a matter of fact, there is no strict distinction between online shopping dependency and online

shopping addiction. The existing distinction now in psychology is the level of intensity of symptoms and problems caused by online shopping.[3]

2.3. Measurement

Frequency, time and money are used to measure physical online shopping dependency. Mood modification, withdrawal and self-control are used to measure psychological dependency.

Mood modification (question 12 and question 15), withdrawal (question 16) and self-control (question 13 and question 14) are measured with scale questions which have five options: strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree and strongly disagree. Frequency (question 2), time (question 3) and money (question 10) are easy to measure since they are quantitative data. Each one is also measured by five options, except the option "Not sure".

All these eight questions are measured using a 5-point Likert-type scale[7][8]. WANG Chih-Chien and YANG Hui-Wen also used this method to measure the dependency.[4] More specifically, because the options corresponding to these eight questions are ordinal data, it is easy to give points to each option, so we can obtain a score of each question. For example, in question 12, five points are given to the option "Strongly agree" and one point is given to "Strongly disagree". If one person selects "Strongly agree", his or her score of this question is 5. According to the Likert-type scale, psychological dependency score can be obtained by adding up the scores of questions 12-16 and the higher score of one person, the higher-level psychological dependency he or she is likely to have.[7]

Similarly, physical dependency score is calculated. For example, in question 10 which is related to money, five points are given to the first option "≤ 500 CNY" and one point is given to the fifth option "≥ 2000 CNY". For the option "Not sure", when we did pilot study, some students said they could not determine to choose which option except "Not sure" because their online shopping expenses varies largely every month. So, the mean or the median is a good choice to represent their monthly online shopping expenses. The mean of the score is not an integer but the score of the question must be an integer. Therefore, we use median score of the question to substitute "Not sure". In addition, there are few students select the option "Not sure", so using the median to substitute it cannot make a big difference to the result. Frequency and time are measured similarly. Physical dependency score is the sum of the scores of questions 2,3 and 10.

The dependency score is the sum of scores of physical dependency and psychological dependency, that is, the sum of scores of these eight questions. For each question, the highest score is 5 and the lowest is 1. So, dependency score of each observation is between 8 and 40. The dependency score indicates the level of online shopping dependency of each individual. People with higher scores are more likely to have online shopping dependency, and the higher the scores, the higher-level dependency they are likely to have.[7]

3. Focus group meeting

Besides the definition presented in section 2.1, focus group meeting contributed to explore the current situation of SUSTech undergraduates' need and use of online shopping, identify key factors affecting the level of dependency on online shopping and find out the main influences of online shopping dependency.

Four interviewees participated our focus group meeting, including two males and two females. Both of females thought they had online shopping dependency while both of males thought they did not have online shopping dependency. All of them have used applications to shop online and online shopping is important to their daily life because it is convenient and there are many choices of goods.

Both of females said that they would open the online shopping applications, like Taobao, when they felt bored since the live broadcast for advertising was attractive and they enjoyed this experience. Both of males said that they just used applications to search products which they need and then buy them. These two different behaviors might affect the level of dependency on online shopping. There are also other factors, which might affect online shopping dependency level, detected in focus group interview, such as online loans.

When talking about the influences of online shopping, some participants mentioned that when they shopped online, they felt happy and online shopping helped to relieve the pressure of study and others thought that online shopping was one reason for staying up, which was harmful to health. In addition, one interviewee said she spent so much time on online shopping that she did not have enough time to do other things.

More details of focus group meeting are presented in the appendix.

4. Questionnaire design

According to research objectives, questionnaire, which is shown in the appendix, consists of four parts.

- Part 1 is used to calculate the dependency score, including question 2, 3, 10 and 12-16.
- Part 2 is used to find out the factors affecting the level of dependency on online shopping, such as living expenses, online loans and so on, including question 1, 4-9 and 11.
- Part 3 is used to explore the potential effects of online shopping dependency, including question 17 and 18. Question 17 is about positive effects and question 18 is about negative effects.
- Part 4 is basic information, such as gender and year of study, including question 19-21.

5. Sampling scheme

According to previous studies[9][10] and the result of focus group meeting, the difference between

males and females is significant in terms of online shopping. Therefore, it is reasonable to use stratified random sampling to select individuals.

The data of pilot study are used to estimate variances of two important questions (question 10 and 14). Take the middle value of each option in question 10 (for the option "≥ 2000 CNY", use 2250 CNY to substitute it) to calculate the variance σ_i^2. For question 14, use the point for each option of this question to estimate the variance. We choose proportional allocation to calculate the sample size, so the sample size is $n = \frac{\sum_{i=1}^{2} N_i^2 \sigma_i^2 / a_i}{N^2 D + \sum_{i=1}^{2} N_i \sigma_i^2}$, where $\mathrm{D} = \frac{B^2}{z_{\alpha/2}^2}$ and $a_i = \frac{n_i}{n} = \frac{N_i}{N}$.[11] There are about 4000 undergraduates in SUSTech with 3000 males and 1000 females, so $a_1 = \frac{3}{4}$ for male and $a_2 = \frac{1}{4}$ for female. After calculation, for question 10, $\sigma_1^2 = 69444$, $\sigma_2^2 = 141667$ and $\mathrm{B} = 45$, the result is $n = 160$, $n_1 = a_1 n = 120$, $n_2 = a_2 n = 40$ with $\alpha = 0.05$. For question 14, $\sigma_1^2 = 1.361$, $\sigma_2^2 = 1.467$ and $\mathrm{B} = 0.2$, the result is $n = 136$, $n_1 = 102$, $n_2 = 34$ with $\alpha = 0.05$. Therefore, we need 160 participants in total with 120 males and 40 females theoretically. Because we use the middle value of each option in question 10 to calculate the variance instead of the true value, the result is inaccurate.

In fact, WeChat and QQ groups are used to send out questionnaires. So, actually the sampling is more like a simple random sampling. Finally, 211 completed questionnaires are obtained and 208 of them are from SUSTech undergraduates. 126 are from males and 82 are from females.

6. Data analysis and major findings

6.1. Classification

- Classification by gender

There are 211 questionnaires collected and 208 are from SUSTech undergraduates. Delete the observations that never shop online or that are not undergraduate in SUSTech, the sample size is 206. The sample consists of 124 male students and 82 female students.

- Classification by grade

8 respondents that selected "Other" in question 19 (year of study) are deleted, so the sample size becomes 198. The sample consists of 24 first-year students, 28 second-year students, 85 third-year students, and 61 fourth-year students. Since the sample sizes of first-year group and second-year group are too small, and that the online shopping patterns of these two groups do not differ much, we combine first-year students and second-year students as a group "first-two-year". Therefore, the sample consists of 52 first-two-year students, 85 third-year students and 61 fourth-year students. Justifications are provided in section 6.2.3.

6.2. Current situation of online shopping dependency

In this part, the distribution of online shopping dependency score is identified. We also explore the difference of dependency score between males and females, and between different grades.

6.2.1. Dependency Score distribution

The lowest score is 10, and highest score is 32, and the average scores is 21.65. The distribution of score is shown in figure 1. The figure shows that the score approximately normally distributes and that most students get 19 to 25 points.

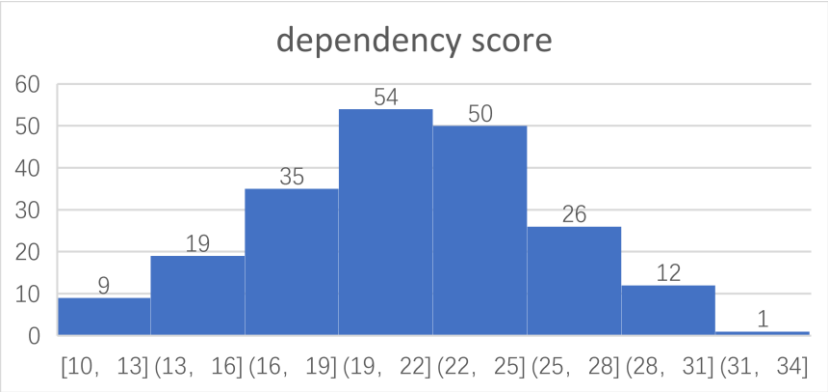

Figure 1 Distribution of dependency scores

6.2.2. Dependency and gender

Figure 2 shows the boxplot of scores of male student group (n = 124) and female student group (n = 82). As expected, female students have higher dependency scores than male students overall.

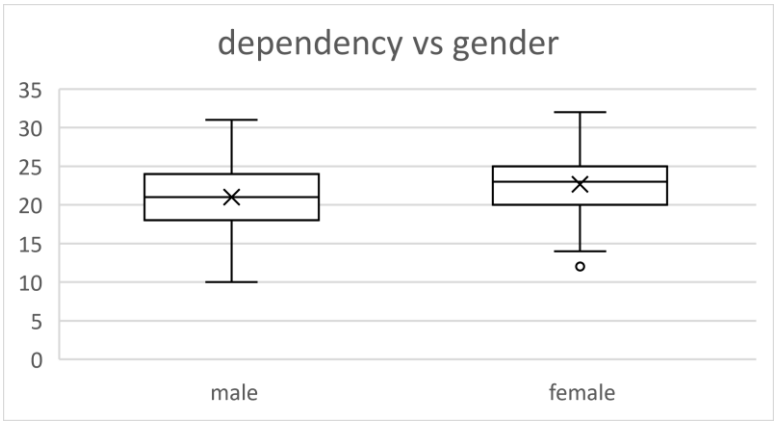

Figure 2 Dependency scores of different gender groups

We apply Welch two sample t test[12] to test the mean scores of two groups, and the results suggest that female students and male students are significantly different in dependency scores (t = 2.784, p-value = 0.005916). The average score in female student group is 22.65 and the average score in male student group is 20.98. This indicates that female students tend to spend more time and money on online shopping and are more dependent on online shopping mentally.

6.2.3. Dependency and grade

We are interested in the dependency difference between grades, so we illustrate the score distribution of four grades in figure 3. From this boxplot, we can see the groups “first-year”, “third-year” and “fourth-year” have the same lowest scores,12. Also, the highest score, 32, is in third-year student group, which appears as an outlier. The relatively large sample of third-year group may account for the existence of outlier.

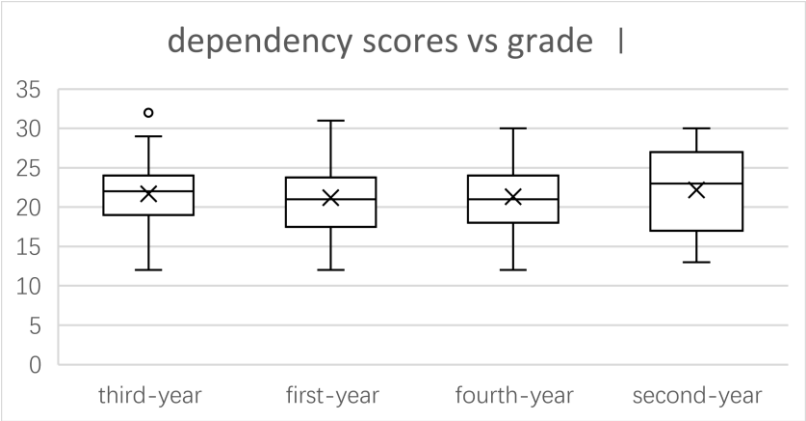

Figure 3 Dependency scores of four grades

Furtherly, we apply Welch two sample t-test to compare the mean scores of first-year student group and second-year student group, and the results suggest that two groups are not significantly different in dependency score (t = -0.69186, p-value = 0.4922). Since the sample size of first-year group (n = 24) and second-year group (n = 28) are much smaller than third-year group (n = 85) and fourth-year group (n = 61), we combine these two groups as a new group “first-two-year” (n = 52).

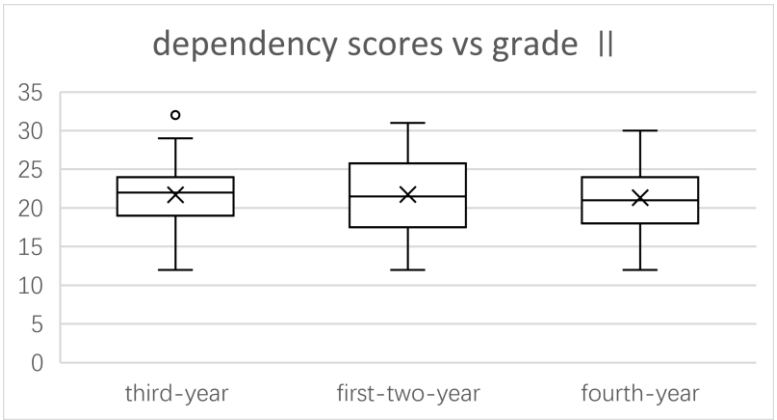

Figure 4 Dependency scores of three grades (After collapsing first-year and second-year as first-two-year)

Now, Figure 4 shows that the score distributions of three grades are very similar, all of them have the mean in the range (21,22). To check whether three groups have statistically different dependency scores, we compare scores of three groups using Kruskal-Wallis test[13]. The results suggest that there

is no significant different in online shopping dependency among grades (chi-squared = 0.53, p-value = 0.7674).

6.2.4. Time spending and gender/grade

We already know that the time spending on online shopping platform closely relates to the dependency. To investigate the difference of time spending between genders and between grades, we sum up the score of question 2 (frequency) and question 3 (time) for respondents.

Figure 5 shows that although the student with the highest score is a male, female students spend more time on online shopping platform than male students on average.

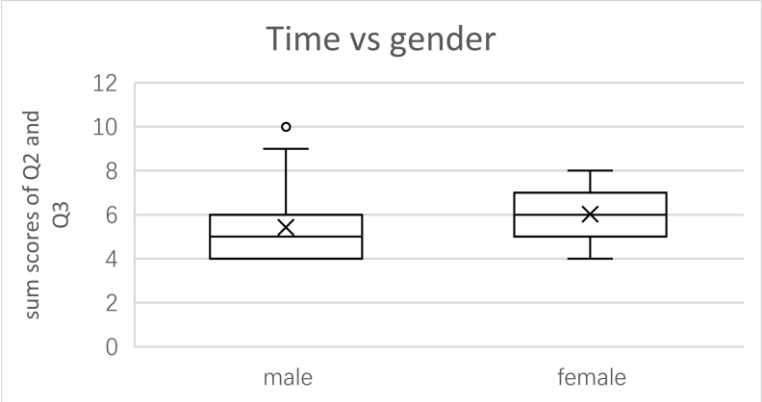

Figure 5 Sum scores of Q2 and Q3 in two gender groups

Once again, three grade groups show similar patterns in time spending: all of them have the mean scores in the range (5,6). The lowest scores of three groups are 4, and the highest scores of "first-two-year" and "third year" are 9, and the highest score of "fourth-year" is 10. There is no significant difference of time spent on online shopping between grades.

6.3. Factors affecting dependency level

There are several factors which might affect online shopping dependency level, including living expenses, online loans, watching advertisements and comments on commodities, interests and types of goods. In this part, we study the impact of these factors on dependency scores.

6.3.1. Living expenses

We are interested whether one's living expense would influences their online shopping behavior. Thus, we survey the living expenses per month (in CNY) in the questionnaire (question 9). Delete the respondents that selected "Not sure" in question 9, and we get 189 valid responses for this part. Table 1 summary the living expense per month and online shopping expenses per month. About 60% of respondents spend less than 500 CNY on online shopping each month, about 93% of respondents spend less than 1500 CNY on online shopping each month. Only about 2% of respondents spend more than 1500 CNY on online shopping per month and none of them spend more than 2000 CNY on online shopping per month. The results indicate that most of students are moderate on online

shopping expenses and spend less than one-third of their living expenses on online shopping expenses. Also, for those students with living expenses less than 3500 CNY, there is no significant difference on their consumption pattern of online shopping, but for students with living expenses more than 3500 CNY per month, they tend to spend more on online shopping. A possible explanation is that, higher expenses on online shopping result in higher living expenses.

		Living expenses per month (CNY)				
		<1500	1500-2500	2500-3500	≥3500	Total
Online shopping Expenses per month (CNY)	< 500	35	62	16	1	114
	500-1000	4	45	10	2	61
	1000-1500	0	4	4	2	10
	≥1500	0	1	2	1	4
	Total	39	112	32	6	189

Table 1 Living expenses per month (in CNY) and online shopping expenses per month (in CNY)

We also examine the relationship between the living expenses and dependency score. Figure 6 exhibits the scores of four living expense groups. On average, the group "1500-2500" has highest dependency score (22.5) and the group "2500-3500" has the lowest dependency score (18.8). Therefore, the living expenses do not necessarily relate to the dependency on online shopping.

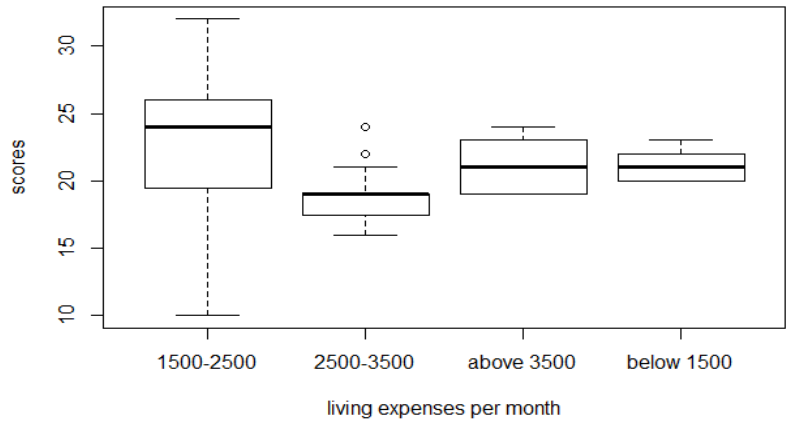

Figure 6 Dependency scores in groups with different living expenses (per month)

However, the sample sizes of four groups differ much, and the large variance in group "1500-2500" (Var = 24.41) might be due to the relatively large sample (n = 112). The differences of variances between groups and the large variance in in group "1500-2500" might explain why no specific patterns are recognized.

6.3.2. Online loans

During the focus group meeting, a participant expressed his concerns about online loans popular among undergraduates, such as Huabei and Baitiao. That is, some undergraduates might use online loans when they do not have enough money to purchase, but most of them fail to pay the loans due to the high interest. Therefore, we survey the online loans amount per month in questionnaire (question 11) and wonder if there is relationship between online loans and dependency. After excluding the respondents that selected "Not sure" in question 11, 204 responses are valid.

The results show that many students do not use online loans (n = 85, 41.6%) or borrow small amount of money. About 70% of students do not use online loans or loan less than 500 CNY. Only 22 students (10.7%) admit that they borrow over 1500 CNY on online loans per month.

Loans (CNY)	Do not use	<500	500-1000	1000-1500	≥1500	≥1000	Total
Count	85	56	31	10	22	32	204
Average scores	20.91	21.36	22.52	23.6	23.45	23.5	21.68

Table 2 Average dependency score of online loans expenses groups

Table 2 exhibits the number of respondents in each group and their average dependency scores. We collapse the groups "1000-1500" and "Above 1500" as the group "Above 1000", because two groups have relatively small sample sizes and similar distributions of dependency scores. From Table 2, we find that the groups with higher amounts of online loans tend to show higher dependency on online shopping. Specifically, the group with loans above 1000 CNY has the highest average dependency scores, 23.5, while the group never use online loan has the lowest dependency scores, 20.91. Therefore, there is relationship between online loans and dependency, and larger amount of loans relate to higher dependency on online shopping. One explanation is that, although students get similar living expenses from parents, their dependency on online shopping varies much. The dependency would lead to spending, when some students cannot afford the spending, they tend to borrow money. Apparently, the online loan is a way for them to borrow money, since it is accessible for students.

6.3.3. Advertisements and comments on commodities

Since the e-commerce livestreaming has got much attention, we would like to determine if watching or reading advertisements and comments on commodities (Ads) influences the dependency on online shopping.

Most of respondents never browse Ads (n = 54, 26.2%) or have browsed them for less than one day per week (n = 90, 43.7%). 40 respondents would spend 1 to 2 days per week and 17 respondents would spend 3 to 5 days per week browsing Ads. Only 5 respondents (2.4%) admit that they browse

Ads for at least 6 days per week. Figure 7 shows that the students who browse Ads more frequently tend to have higher dependency level. Specifically, the group "Never" has the lowest average dependency scores, 19.91, and the group "At least 6 days" has the highest average dependency scores, 28.20. The result of Kruskal-Wallis test presents that the dependency scores of students grouped by Ads browsing frequency are significantly different (chi-squared = 24.809, p-value = 5.497e-05).

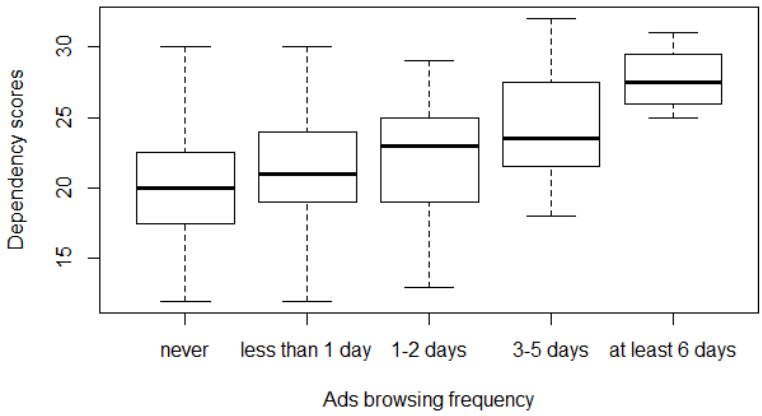

Figure 7 Dependency scores in groups with different ads browsing frequency (per week)

Furthermore, there are significant differences of browsing Ads between gender. 19.5% of female respondents never browse Ads while 30.6% of male respondents never browse that. Also, 3.8% of female respondents would spend at least six days browsing Ads while only 1.6% of male respondents spend at least six days watching Ads. The result of Welch two sample t test shows that the difference of Ads browsing frequency between males and females is significant under 0.1 level (t = 1.7323, p-value = 0.08493). Therefore, female students tend to spend more time on browsing Ads than male students.

6.3.4. Interests and types of goods

We use question 1 and question 5 to investigate students' interests and types of goods which they usually buy online. For each question, each individual can select five options at most.

	Makeup	Cartoon	Sport	Delicious food	Movie and TV show	Photography
Count	49	61	73	126	81	32
Average scores	23.39	21.61	21.52	21.85	22.23	22.41
	Computer game	Art	Handicraft	Keeping pets	Other	
Count	96	55	14	21	17	
Average scores	20.77	21.58	22.93	22.76	22.35	

Table 3 Average dependency score for students with different interests

Table 3 shows the average scores for students with different interests. The table shows that students who are interested in makeup have the highest dependency level on average while students

who are interested in computer games have the lowest. Since females are usually interested in makeup and males are usually interested in computer games, this result is consistent with the result of average dependency scores of different genders.

	Food	Electronic products	Books and CDs	Daily necessities	Clothes
Count	131	94	100	133	130
Average scores	21.69	22.19	20.97	21.71	22.28
	Cosmetics	Stationeries	Jewelries	Toys	Other
Count	59	73	8	34	3
Average scores	23.64	20.93	25.13	21.15	26.33

Table 4 Average scores for students grouped by types of goods which they usually buy online

Table 4 presents the average scores for students grouped by types of goods which they usually buy online. Except those choosing the option "Other", students who usually buy jewelries have the highest dependency level on average, followed by students who usually buy cosmetics. Those who usually buy books and stationeries have the lowest dependency score on average. This result is also consistent with the result of dependency score for different genders because it is females who usually buy cosmetics and jewelries.

6.3.5. Reasons for shopping online instead of offline

We also investigate the reasons for shopping online instead of offline (question 6). Each person can select at most three options in question 6.

	Online shopping offers discounts	Some products can only be bought online	Save time	Offline salesmen are overly enthusiastic	Shy to buy some specific goods offline	Other
Count	148	89	185	42	16	2
Average scores	21.68	21.74	21.66	23.71	24.69	28

Table 5 Reasons for shopping online instead of offline

In table 5, the average scores of "Online shopping offers discounts", "Some products can only be bought online" and "Online shopping can save time" are very similar, and average scores of "Offline salesmen are overly enthusiastic" and "Shy to buy some specific goods offline" are significantly higher, relatively.

6.4. Effects of online shopping dependency

To determine whether the effects of online shopping relate to online shopping dependency level, we compute the average dependency scores of the respondents that are influenced by online shopping in different ways. A respondent may select more than one option (3 options at most), so the total count exceeds 206. If a respondent selects no positive influence or no negative influence, he or she would

not select other options. Table 6 and Table 7 summarize the positive influences and negative influences of online shopping on respondents respectively, and the average dependency scores in groups with different influences.

Only 5 respondents thought online shopping brings no positive influence on them, and 4 out of 5 are males. Therefore, most of students (97.6%) believe that online shopping has positive influence from different aspects. “Make life more convenient” is the most common influence of online shopping in table 6, and students who believe online shopping can bring a convenient life do not show high dependency. On the other hand, the students who believe online shopping can help them release pressure and bring them a good mood have higher dependency on online shopping.

	Shopping convenience	Release pressure	Bring a good mood	Save money	No positive influence
Count	189	65	80	79	5
Average scores	21.4	23.29	23.85	21.57	21

Table 6 Average dependency score of students with different positive effects

Furthermore, there are 48 respondents (18.5%) found online shopping has no negative influences on them, and these students have low dependency scores on average (17.52) in table 7.

	Affect health	Waste money	Waste time	Impulse buying	No negative influence
Count	30	95	63	111	48
Average scores	23.43	23.92	23.14	22.99	17.52

Table 7 Average dependency score of students with different negative effects

On the other hand, the respondents that think online shopping affects health, for instance, makes them stay up late, wastes money or wastes time, show relatively high dependency. Particularly, the average dependency scores of these students exceed 23. The results indicate that online shopping is a double-edged sword, using it moderately can bring many positive influences, while being dependent on it too much leads to many negative influences.

6.5. Interaction analysis

In this part, our group intend to investigate the relationship between psychological dependency and physical dependency, how the psychological and physical dependency level were affected by different motivations for online shopping, how the psychological dependency level and physical

dependency level are affected by viewing advertisements and comments and how psychological dependency level and physical dependency level affect people's negative perspectives on online shopping,.

6.5.1. Quantification method

Before seeking answers for the above questions, we quantify physical dependency levels and psychological dependency levels, respectively.

- Psychological dependency level

Same grading rules for 5 questions in terms of mood modification, withdrawal and self-control were employed. After getting scores for each question, we calculate the average of the 5 scores, then rounded the average to the nearest integer. Then, we got 5 levels for psychological dependency level, namely 1,2,3,4 and 5. 1 represents the lowest level and 5 represents the highest level.

- Physical dependency level

We take the frequency they sign in shopping websites or applications, the time they spend once on shopping online in general, and money they spent on online shopping into consideration. We take the same measurement as we introduced before for the questions related to attributes mentioned above, then calculate the average for the 3 questions and round the average to the nearest integer. Finally, we get 4 levels for physical dependency. Since physical dependency level is calculated using time and money spent on online shopping, it is closely related to time consumption and money consumption,

6.5.2. Psychological and physical dependency

We employ boxplot (Figure 8) to visualize the relationship between psychological dependency level and physical dependency level. Y-axis represents psychological dependency level and x-axis represents physical dependency level. It seems that there are two outliers which are denoted by circles in figure 8. No other information show that they are outliers, so we do not remove them.

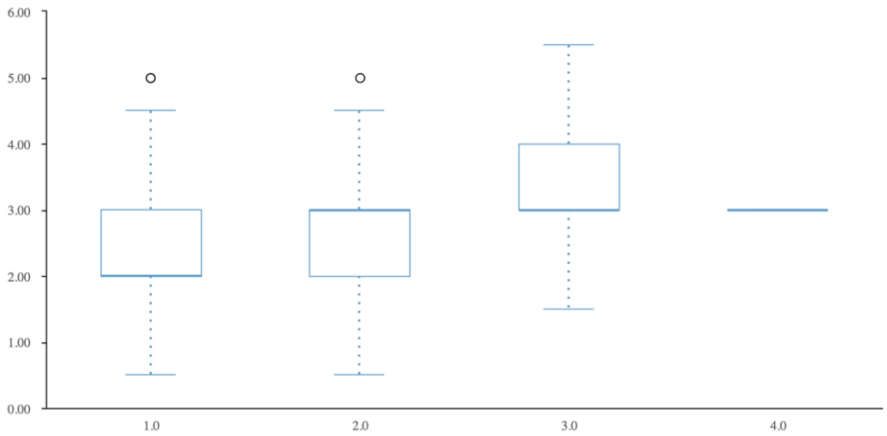

Figure 8 Psychological dependency levels and physical dependency level

According to the boxplot, in general people who are in a higher physical dependency level tend to rate themselves in a higher psychological dependency level. However, for those people who are in

the highest physical level, they did not regard their online shopping habit as a highly dependent behavior. One reason is that the sample size of physical dependency level 4 (the highest level) is very small. Another possible explanation could be that people will not restrict their consumption on online shopping if they do not think they have high dependency on online shopping psychologically, then they tend to cost more than average person.

6.5.3. Dependency levels and motivations

To investigate how different motivations affect dependency level physically and psychologically, we first classified students' motivations for online shopping. We identified from focus group meeting that we can divide the motivations for online shopping into two categories: commitment to goal and commitment to entertainment. Similarly, Mary Wolfinbarger and Mary C. Gilly's research suggests that there are two orientations of online shopping: goal-oriented and entertainment-oriented.[14] For users who employ online shopping techniques for particular goals, they will simply search for particular goods when they sign in online shopping websites. However, for those who shop online for entertainment and experience, they tend to do more things besides searching for what they need to buy. According to the result for question 4, "What did you do on online shopping websites or applications?", almost every student use online shopping applications or websites to search for what they need, which means they purchase online out of particular goals. Further, we regard those students who choose any other options as having an intention of entertainment and experience when they shop online. Then we apply clustered bar chart to display the difference caused by different motivations in terms of psychological dependency attributes (Figure 9) and physical dependency attributes (Figure 10), respectively. As for y-axis, 0 represents commitment to goal and 1 represents commitment to entertainment.

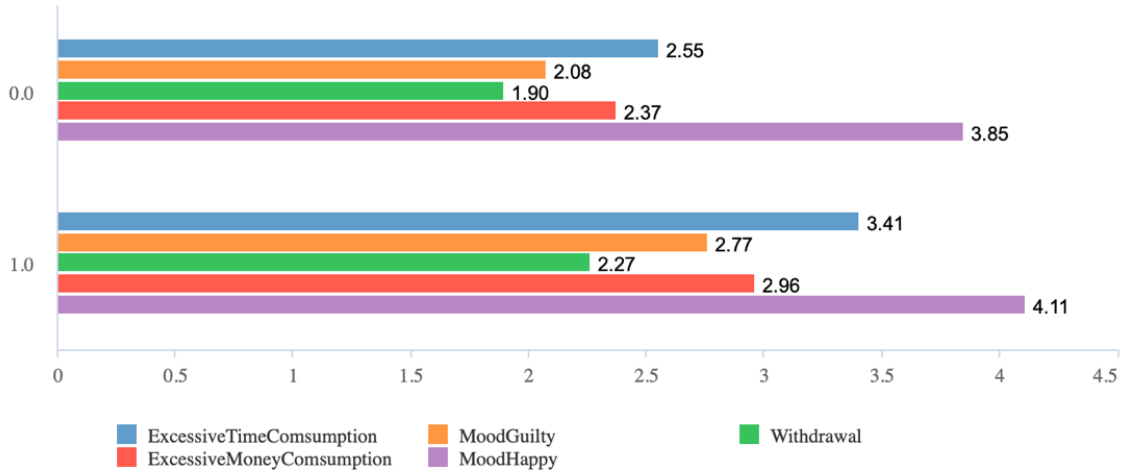

Figure 9 Average psychological dependency attributes levels for different motivations

According to our visualization, students with an intention of entertainment and experience when they are shopping online tend to have higher psychological dependency level than those who shops online just for particular goals.

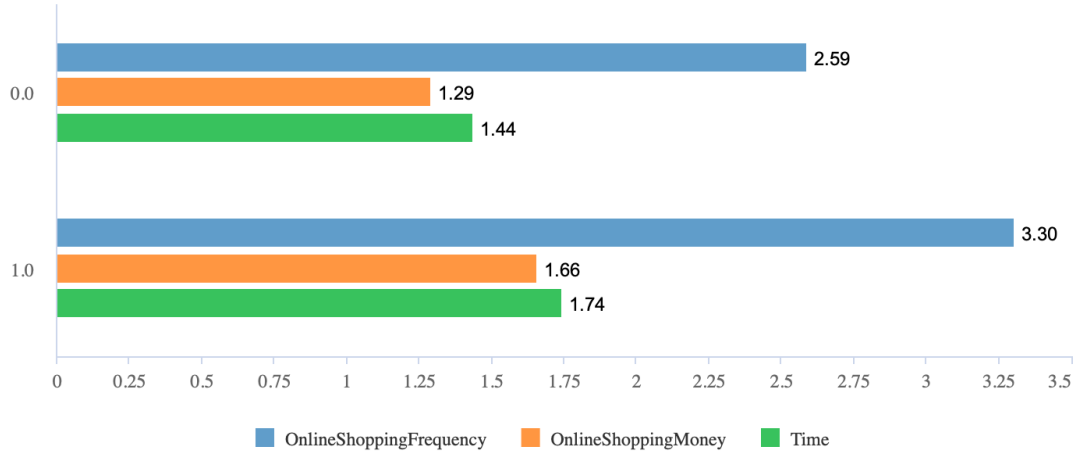

Figure 10 Average physical dependency attributes levels for different motivations

It is demonstrated that seeking for entertainment and experience through online shopping motivates people to cost more money and time.

6.5.4. Dependency level and advertisement

With the exploding of internet information, endless advertisements and comments on various of commodities are accessible to users. According to our discussion in focus group meeting, students might spend time on viewing advertisements and comments on commodities before ordering. We are curious about whether the investigation on watching ads and comments will affect physical and psychological dependency level of consumers on online shopping. Thus, we would like to explore the relationship between investigation on viewing advertisements and the dependency levels. We plot the relationship between viewing advertisements and the psychological dependency levels (Figure 11). We use different colors to represent different levels of frequency people watch ads and comments, integers in the y-axis to represent the level of time people spent on watching advertisements and comments, and numbers in the x-axis to represent the average number of psychological dependency level for different group of people.

Figure11 Psychological levels affected by time and frequency of viewing advertisements and comments

Here we notice that, in general, the more time users spend on watching advertisements and

comments, the more likely they rate themselves in a high psychological dependency level. Also, people who frequently watch advertisements and comments on commodities might be more dependent on online shopping psychologically. However, there are some exceptions that violates the trend we mentioned above. For example, for those who most frequently view advertisements and comments, spending more time in each viewing reduces their dependency level on online shopping psychologically instead. Also, for those who spend lots of time on viewing advertisements and comments but are moderate in the frequency of watching ads, increasing their frequency of watching ads might protect them from being dependent on even addicted in online shopping.

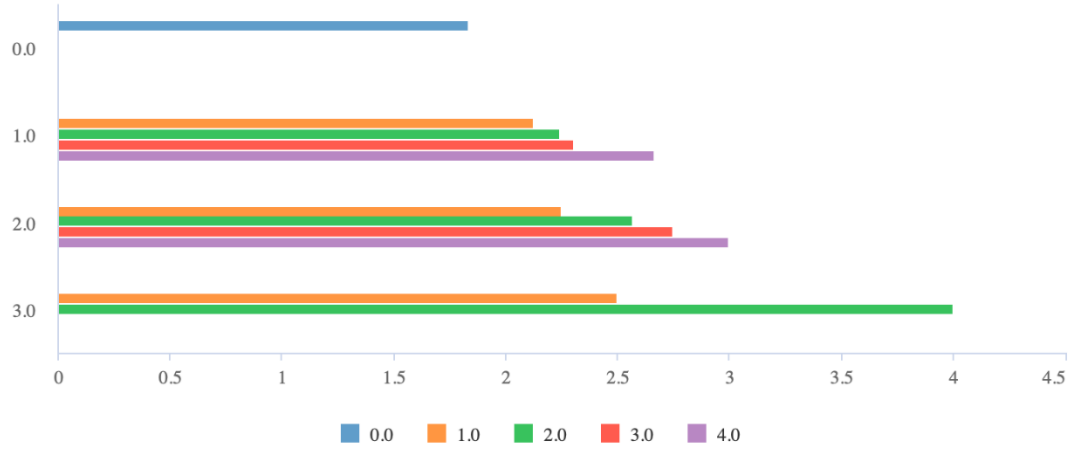

Figure 12 Physical levels affected by time and frequency of viewing advertisements and comments

To illustrate the relationship between physical dependency level and viewing advertisements and comments, we apply the same visualize procedure as above but now x-axis represents the average number of physical dependency level for different group of people. According to figure 12, we have similar conclusion as the psychological dependency level that watching more advertisements and comments might motivate people to consume more in online shopping.

6.5.5. Dependency levels and possible influences

According to the feedbacks in the questionnaire, most of students (97.6%) believe that online shopping has positive influences from different aspects. However, when it comes to the negative effects that online shopping brings to our life, different students might hold different perspectives. We visualize how students in different physical and psychological dependency levels view the impact of online shopping negatively. For a single individual, we count the number of all options he or she chose for negative effects in the questionnaire, which is represented by y-axis, and then we plot the scores for people in different dependency levels (Figure 13). In the clustered line chart, 5 different colors represent 5 different psychological dependency levels and x-axis represents different physical dependency levels.

According to the line chart, in general, the more people feel themselves dependent on online shopping and the more they cost in online shopping, then the more negative effects they will find of

online shopping.

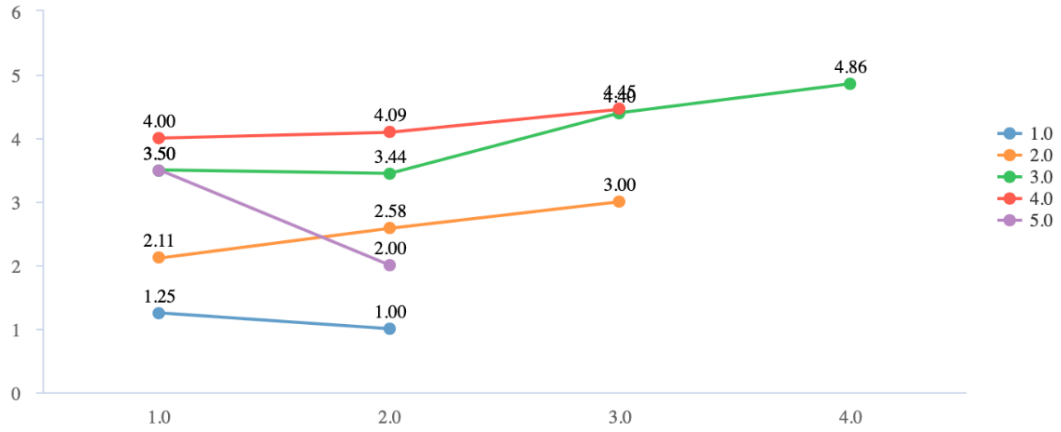

Figure 13 Negative effects faced by students in different physical and psychological dependency levels

However, there are two exceptions in the extremely high and extremely low psychological dependency level groups. It is reasonable that those who rated themselves much lower in the psychological dependency level tends to cost less in online shopping and their consumption, which can be represented by physical dependency level, is acceptable for most people. Now, even they increased their consumptions a little more, it won't bring more negative effects to their life. On the country, they think that online shopping causes less negative effect while spending a little bit more on online shopping.

Interestingly, students who get the highest score in online shopping also tends to cost less. In addition to the small sample size, a reasonable explanation can be that those who thought themselves are highly dependent on online shopping will try to restrict their consumption on it.

7. Conclusion

Firstly, the overall online shopping dependency situation in SUSTech is investigated in the questionnaire. Reasonably, female students show higher online shopping dependency than male students. They tend to spend more time and money on online shopping. However, there is no significant dependency difference among grades. First-year students and second-year students obtain similar dependency score with third-year students and fourth-year students. Generally, SUSTech students are moderate in costing money on online shopping, and most of them show various degree of online shopping dependency but they are still cautious in consumption. Majority of students agree with the positive effect of online shopping, they enjoy it because of its convenience and pleasure.

Secondly, we analyze the factors that contribute to different level of dependency. Consumers shop online with different orientations, which can be classified as goal-oriented and entertainment-oriented. We found that students with pursuit of entertainment and experience are possibly to have

higher dependency level. Nowadays, live advertisement and comments influence the shopping experience more and more. Students who spend more time watching them frequently depend on online shopping more psychologically. Although there is no difference between males and females, for the most frequent watching group, females take up more percentage than males. With the popularity of online loans, we find that students who are dependent on online loans a lot, such as borrowing more than 1000 CNY from some online applications, tend to have higher dependency level.

Lastly, the influence of different online shopping dependency levels is discussed. Interestingly, the convenience of online shopping is not the main reason for dependency. It is the pleasure that students experience while shopping contributes to high dependency level. Although most of students enjoy online shopping, they find some negative effects of it. Students whose dependency level exceed a certain threshold tend to be influenced by those negative effects such as disrupting routine, distraction more and over consumption.

8. Limitation and suggestion

Our sample survey still needs to be improved. The internet questionnaire automatically selects samples who are interested or well use mobile phones, iPads and they are likely to do online shopping frequently so that those who are not keen to smart device and have no online shopping dependency are excluded. Another sample limitation is that male and female students from different grades are not even. Since we use WeChat and QQ group to issue our questionnaire and all of us are female third-year students, our friends and classmates are mostly third-year students and many of them are females. First-year and second-year students are much less than third-year students and fourth-year students, and the sex ratio in our sample indicates female students take up more percentage than that in our university. In our samples, the sex ratio is approximately 3:2 (male : female) but in 2020 the sex ratio of SUSTech undergraduates is nearly 3:1. As for the definition of online shopping dependency, since there is few reference we define it roughly by psychological and physical performance. We simply give same weight for the scores of each questions that are used in detecting dependency level, while the complex interaction among those factors and how the psychological and physical factors perform on dependency are still needed to be explored, which means the scores of some questions may have more weight than other questions in evaluation of dependency scores. Regarding to the sampling scheme, here comes a limitation when we compute the sample size. Since the quantitative answers we set up are intervals instead of certain number, when we use them to calculate sample size, middle value of the interval represents the whole interval and it resulted in inaccuracy in the standard deviation and mean of the collected response. Specifically, we chose the answer to the cost of online shopping per month to calculate sample size. However, the options we set up are intervals such as 1500 to 2500 and 2500 to 3500. In order to obtain the mean and standard

deviation of them, we use 2000 and 3000 instead but the actual cost of online shopping per month is still unknown, so the substitution is not accurate.

Considering the limitations in our survey, some improvements are expected. Firstly, it is suggested using official E-mail to issue the questionnaire. According to the computed sample size, randomly choose female and male students from different grades. Since the student ID is arranged according to gender and grade, we could select the numbers randomly in different strata (classify the student ID by gender and grade) and send them questionnaire. However, in our university it is forbidden so that we can only use WeChat and QQ groups. Secondly, the weights given to the scores of different questions is supposed to be explored. Combining psychological research on mood modification, withdrawal and self-control is helpful to support the quantification on online shopping dependency level, which is still poor in China.

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10. Appendix

10.1. Record of focus group meeting

Focus Group Meeting Report

Objectives:

1. Revise the proposed definition of online shopping dependency.
2. Explore the current situation of SUSTech undergraduates' need and use of online shopping.
3. Identify key factors affecting the level of dependency on online shopping.
4. Find out the main influences of online shopping dependency.

Participants Information:

Participant		Major	Gender	Reason
A	Junior	Finance	Male	Friend & Willing to share his shopping experience and perspectives with others
B	Senior	Materials	Female	Friend & Spends much time on online shopping
C	Sophomore	Biology	Female	Roommate & Seeing online shopping as entertainment and buy things regularly
D	Junior	Statistics	Male	Friend & Don't spend much time and money on online shopping

Discussion about the Definition of Online Shopping Dependency:

Some participants thought people who had online shopping dependency would shop online frequently and expend a lot of time on online shopping. Some held that people with online shopping dependency cost considerable money to buy a lot of things online and cannot stop shopping online. Another idea was that those people would feel uneasy and vapid if they stopped shopping online for a long time because they enjoyed the pleasant sensation of it.

Findings:

1. Motivations of Online Shopping

- Commitment to goal（Convenience, More Choices, Avoid social situations）

Answer1(Convenience): *I usually consider shopping online when I have a rigid demand for commodities since purchasing online can save money and make convenience.*

Answer2(Convenience): *Sometimes I purchase online for merchandise which are more difficult and more expensive to buy offline.*

Answer3(More Choices): *I visited online shopping regularly since there are some online shops will decide whether they would sell particular goods or not according to the popularity of such goods. And sometimes*
shopping online is the only way to get limited edition product.

Answer4(Avoid social situations): *Shopping offline is a disaster for me since the shop assistants are always too friendly and ask me a lot of questions, which makes me uncomfortable.*

- Commitment to entertainment and experience

Answer: *I would open the online shopping app Taobao when I was boring, since the live broadcast for advertising is attractive. Visiting Taobao (an online shopping app) is one of my pastime.*

2. Dependency Attributes (Key Factors Affecting Online Shopping Dependency)

- Excessive consumption (Money and Time) because of lack of self-control

Answer1(Money): *When watching live-streaming ads, I spent too much money without*

awareness; I had no idea how much I spend until I saw the astonishing annual bill.

Answer2 (Time): *I browse Taobao almost every night and I find it time-consuming.*

- Withdrawal

Answer1: *I made up my mind to be thrifty next month, but only to find that I still spent too much on online shopping.*

Answer2: *If I have not bought anything online or received packages for a long time, I will feel empty and unhappy.*

- Mood modification

Answer1: *When I buy something I like, I feel excited when I pay it and when I receive it.*

Answer2: *I would feel a bit disappointed and regretful if the goods do not meet my expectation or if I buy something useless out of impulse.*

Answer3: *Appreciating my favorite goods helps me relieve the pressure.*

3. Influences of Online Shopping

- Physical Health (Negative)

Answer: *Online shopping is a main reason of staying up and it disrupted my body clock.*

- Time-consuming (Negative)

Answer: *It distracts my attention on study, especially when I prepared for my exam.*

- Money-consuming (Negative)

Answer: *Electronic payment made me no idea of money. I can't help buying things more than I can afford by Alipay. I didn't know how much I spent on online shopping so I just kept buying.*

- Mental Health: Enjoyment and Entertain (Positive)

Answer1: *When I received my package, I felt extremely happy because I forgot what I bought and it was a surprise. I thought online shopping had a positive effect on my emotion.*

Answer2: *For the things I like or I spend much time selecting, I always feel happy when I receive them and even waiting for them is a joyful experience. During the final exam, buying stuff online delights me.*

Questions Asked:

1. Under what circumstances would you shop online?
2. How do you feel when you shop online? After your order online? And when you get and unpack your package?
3. What kind of products do you usually buy online? Which kind of products do you spend more time buying, necessities or products related to your interests?
4. What percentage roughly of your shopping is online? Do you often buy things online that you regret?
5. Do you shop online when you are stressed or in a bad mood? And does online shopping make you feel better after shopping online?
6. Do you think about shopping online when you are doing other things? How would you feel if you were interrupted during online shopping?
7. How much do you think you spend money on online shopping? Is it too much? Are you guilty of spending too much money on online shopping?
8. In addition to the above, how does online shopping affect you?
9. What do you think is online shopping dependency? Do you think you have online shopping dependency? Do people around you think you shop a lot online?

10.2. Questionnaire

南科大本科生网购依赖调查问卷

同学你好，这是一份关于网络购物的调查问卷，意在了解南科大本科生的网购依赖情况。问卷调查结果将用于我们抽样调查课程的小组项目，我们会对问卷填写内容严格保密并在使用后销毁问卷。请你根据自己的实际情况作答，感谢你的参与！（注意：请根据疫情发生之前的情况作答）

1.（多选,最多五项）你的兴趣爱好是什么？

A.美妆护肤　　B.二次元（动漫、手办等）　　C.运动健身
D.美食　　E.追剧（看各种类型电视剧）　　F.摄影
G.打游戏　　H.艺术（美术、音乐等）　　I.手工手账
J.养宠物　　K.其它，请列出_____

2. 你使用网购平台（包括只浏览但不购买的情况）的频率大约为：

A.从不（请跳过第 3 题，直接进入第 4 题）
B.平均每周小于一天
C.每周一到两天
D.每周三到五天
E.每周至少六天

3. 大多数情况下，你一次使用购物平台（包括只浏览但不购买的情况）的时长为：

A.半小时以下
B.半小时到一小时
C.一小时到两小时
D.两小时以上
E.不清楚

4.（多选，最多三项）你平时主要使用网购平台做什么？

A.购买需要的产品
B.浏览网购平台定向推荐的产品
C.浏览特定店铺的产品
D.观看直播推销或商品测评内容
E.参与促销优惠活动
F.其他，请列出_____

5.（多选，最多五项）你在网购平台上主要购买哪些类型的产品？

A.食品,保健品　　B.数码产品及配件　　C.书籍及音像制品
D.日用百货　　E.服装鞋帽　　F.化妆品及美容用品
G.文体用品　　H.珠宝配饰　　I.玩具，收藏品
K. 其他，请列出_____

6.（多选，最多三项）除了仅在线上销售的商品，你主要因为什么原因选择线上购物而不是线下？

A.价格便宜/线上有优惠活动

B.想要购买的东西在线下很难买到
C.线上购物省时省力
D.线下销售人员过于热情令人尴尬
E.不好意思去实体店选购某些商品
F.其他，请补充_____

7. 你在网络平台上看商品测评/推销内容的频率大约为：
A.从不（请跳过第 8 题，直接进入第 9 题）
B.平均每周小于一天
C.每周一到两天
D.每周三到五天
E.每周至少六天

8. 大多数情况下，你一次在网络平台上看商品测评/推销内容的时长为：
A.半小时以下
B.半小时到一小时
C.一小时到两小时
D.两小时以上
E.不清楚

9. 你一个月的生活费是：
A.1500 元以下
B.大于等于 1500 元，小于 2500 元
C.大于等于 2500 元，小于 3500 元
D.3500 元及以上
E.不清楚或不愿透露

10. 你一个月的网购花费是：
A.500 元以下
B.大于等于 500 元，小于 1000 元
C.大于等于 1000 元，小于 1500 元
D.大于等于 1500 元，小于 2000 元
E.2000 元及以上
F.不清楚

11. 你在网购中使用消费信贷产品(包括但不限于花呗，白条)支付的金额是：
A.不使用
B.使用，500 元以下
B.大于等于 500 元，小于 1000 元
C.大于等于 1000 元，小于 1500 元
D.1500 元及以上
F.不清楚

12-16 题请根据你自身符合的程度来回答

12. 我在网购过程中（包括浏览商品，下单，拆快递）感到很开心
A.完全符合

B.比较符合
C.一般
D.不太符合
E.完全不符合

13. 我网购时会买一些并不需要的东西
A.完全符合
B.比较符合
C.一般
D.不太符合
E.完全不符合

14. 我本来只打算逛一段时间，但一旦开始浏览网购平台就会花费超过自己打算的时间（花费原本计划时间的大约两倍及以上）
A.完全符合
B.比较符合
C.一般
D.不太符合
E.完全不符合

15. 我因为网购消费过多而感到自责
A.完全符合
B.比较符合
C.一般
D.不太符合
E.完全不符合

16. 如果网购受到限制（断网等），我会想尽一切办法去实现网购这件事
A.完全符合
B.比较符合
C.一般
D.不太符合
F.完全不符合

17.（多选，最多三项）你觉得网购给你带来了哪些正面影响？
A.提供了购物便利
B.缓解学习压力
C.网购带来了好心情
D.网上促销节省了日常开支
E.没觉得带来什么正面影响
F.其他，请补充_____

18.（多选，最多三项）你觉得网购给你带来了哪些负面影响？
A.影响身体健康（如：网购引起的熬夜破坏作息规律）
B.导致金钱花费超过预期
C.耽误做其他事情
D.导致冲动消费增多

E.没觉得带来什么负面影响
F.其他，请补充_____

19. 你的年级:
A.大一　B.大二　C.大三　D.大四　E.其他（休学等）

20. 你的性别:
A.男　B.女

21. 请问你是**南科大**的**在读本科生**（包括休学）吗？
A.是　B.不是

问卷到此结束，我们保证对你的回答内容严格保密，再次感谢你的参与！