Understanding the Impact of COVID-19 on Behavior Changes and Decision Making of Chinese Students and Researchers in the UK

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Abstract With the outbreak of COVID-19 in Wuhan and the subsequent worldwide pandemic, oversea Chinese students and researchers (CSRs) have been hit twice, i.e. worrying about their families during the first phase and then experiencing the pandemic outbreak in a foreign country (UK) as a second hit. This study surveyed 179 CSRs in the UK via an online questionnaire to understand their behavioral patterns, risk assessment, and decision-making intentions during the two phases of the pandemic. The survey showed that (1) CSRs have experienced greater changes in behaviors such as leaving their rooms and going outisde, engaging social interaction, hygiene habits, and hoarding; and fewer changes in physical health, daily routines, and sleep patterns; (2) During the second phase, the concerning on risk of contracting COVID-19 was significantly increased from 7.8% to 20%; (3) About 60% of CSRs were not confident that they would get effective help in the UK, which was mainly related to the UK's pandemic prevention policy, public awareness, NHS ambulance service regulations, and the medical treatment of COVID-19 in the UK; and (4) A quarter of CSRs had returned or were planning to return to China, and nearly 3/4 of CSRs had decided to remain in the UK because of factors such as academic work, financial pressure (flight tickets have become very expensive), potential risk of infection on travel, taking a wait-and-see attitude, or being optimism that the pandemic would be over soon.

Keywords: COVID-19 and oversea Chinese; COVID-19 and behavior change; COVID-19 and decision marking

1 Introduction

COVID-19, the infection caused by a novel coronavirus, broke out in Wuhan, Hubei province, China, around early January, 2020, and then swept through most parts of China. When the epidemic had been well-controled in China, unfortunately the epidemic has evolved into a global pandemic, as announced by the World Health Organization (WHO)[1]. Oversea Chinese students and researchers (CSRs) are unique

in the sense that they have been going through both these two phases of COVID-19 pandemic; During first phase they worried about their families and friends back in China, and then in the second phase they have been worrying about themselves in a foreign country. Moreover, during the coronavirus crisis anti-Asian crimes were up 21% in the UK [2], therefore CSRs have to bear the threat and pain caused by stigmatization during the pandemic. In addition, according to *the International Students in the UK Report 2020*[3] published by the Association of British Universities, the number of international students from mainland China in the UK has reached 12.6 million (undergraduate and above), accounting for 35% of all non-EU students, as of 2018--2019 academic year statistics, and this is a big number. The above three factors make CSRs as a group, being worth investigating their behaviors during COVID-19 pandemic. What is the impact of this crisis on daily life of CSRs in the UK? Do they think they are safe? And what do they think about their chances of getting effective medical support in the UK? Answers to these questions will help UK understand the needs of CSRs, so that the country might become more attractive to CRSs, and even to international students from other countries as well.

Since the outbreak of the pandemic, research has been carried out on the status of various groups in China affected by the pandemic, such as the anxiety levels of public, medical staff, university students (Zhao et al[4]; Hu et al[5]) and the impact of the pandemic on the status of international students studying abroad (ABCP[6]), but limit research has been conducted for addressing the above questions on the impact of the pandemic on individual lifestyle of international students.

2 Methods

2.1 Participants and Study Design

Participants were recruited through the Chinese Students and Scholars Associations in the UK and the CSRs social media Wechat Groups. The survey was designed in Chinese, and recruitment was carried out via Chinese social media platform WeChat, which is the most popular social media platform among the Chinese community, and most UK universities and Chinese Students and Scholars Associations have a public account. The survey was launched at a Chinese survey platform Wenjuanxin (https://www.wenjuan.com/s/mq2Mvqs/). The study received ethical approval from the Research Ethical Committee of Faculty of Computing, Engineering and Building Environments, Ulster University, UK.

2. 2 Research Aim

The aim of this research is to carry out a survey on behavior changes among CSRs (including undergraduate students, post-graduate students, PhD researchers, post-docs, and visiting researchers from China) in the UK when the COVID-19 outbroke in China and the UK.

2.3 Survey Design

The study was conducted using a self-administered questionnaire. The questionnaire was designed to collect information on CSRs in the UK on their concerns and daily behaviors during the pandemic. It included four sections: (1) Participants' demographics information, such as educational status and study/research area; (2) Behavioral changes after the outbreak in China and the following pandemic in the UK. Questions focus on the impact of COVID-19 on the participant's social communication, shopping, sleep, hygiene, health, and information source related to the COVID-19; (3) Self-assessment of an individual's risk to the COVID-19 and the reasons; (4) Reasons behind behavioral decision-making.

2.4 Statistical Analysis

Data were analyzed using SPSS (v 25). All variables were analysed using frequencies and descriptive statistics to determine the number and percentages for each variable.

3 Results

The results consist of four parts: (1) Demographics information of participants; (2) Behavioral changes during the Pandemic; (3) Perceived risk and support; and (4) Decision making and reasons behind.

3.1 Demographics of participants

This section includes five pieces of information about the participant's age group, gender, the region of hometown, education level, and study area in the UK. We received 179 questionnaires which are 100% valid. Of the 179 participants, 97 (54%) were female and 82 (46 %) were male. The age range of participants was between 18 and 34 years, among which 145 (81%) participants were aged 18 to 28 years.
As shown in Figure 1 and Figure 2, a total of 89% of the participants' educational backgrounds were undergraduate, postgraduate, and doctoral. The majority (75%) of all participants studied in Northern Ireland.

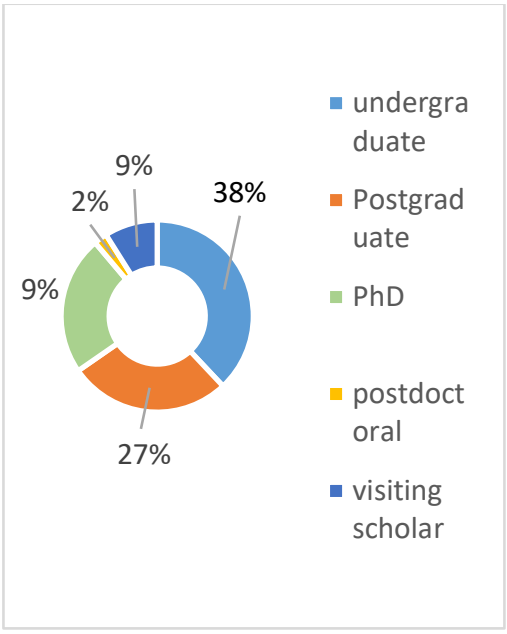

Fig. 1. Education Background

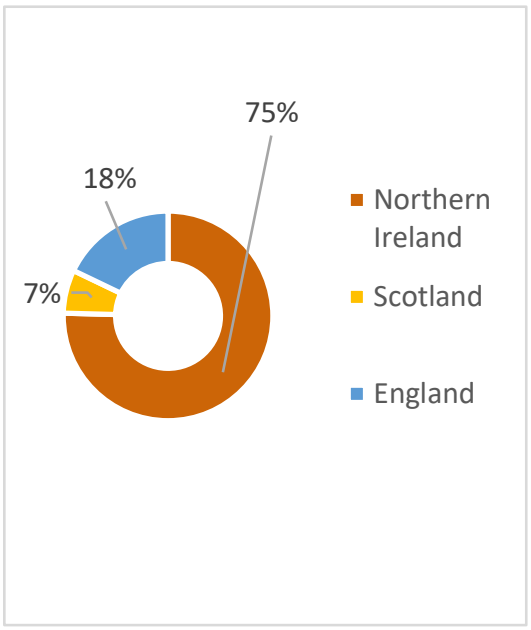

Fig. 2. Geographical Area of Study

As shown in Figure 3，participants were originally coming from 26 regions of China. 12.8% were from the Guangdong Province, followed by 11.2% from Beijing and 6.1% were from the Shaanxi Province.

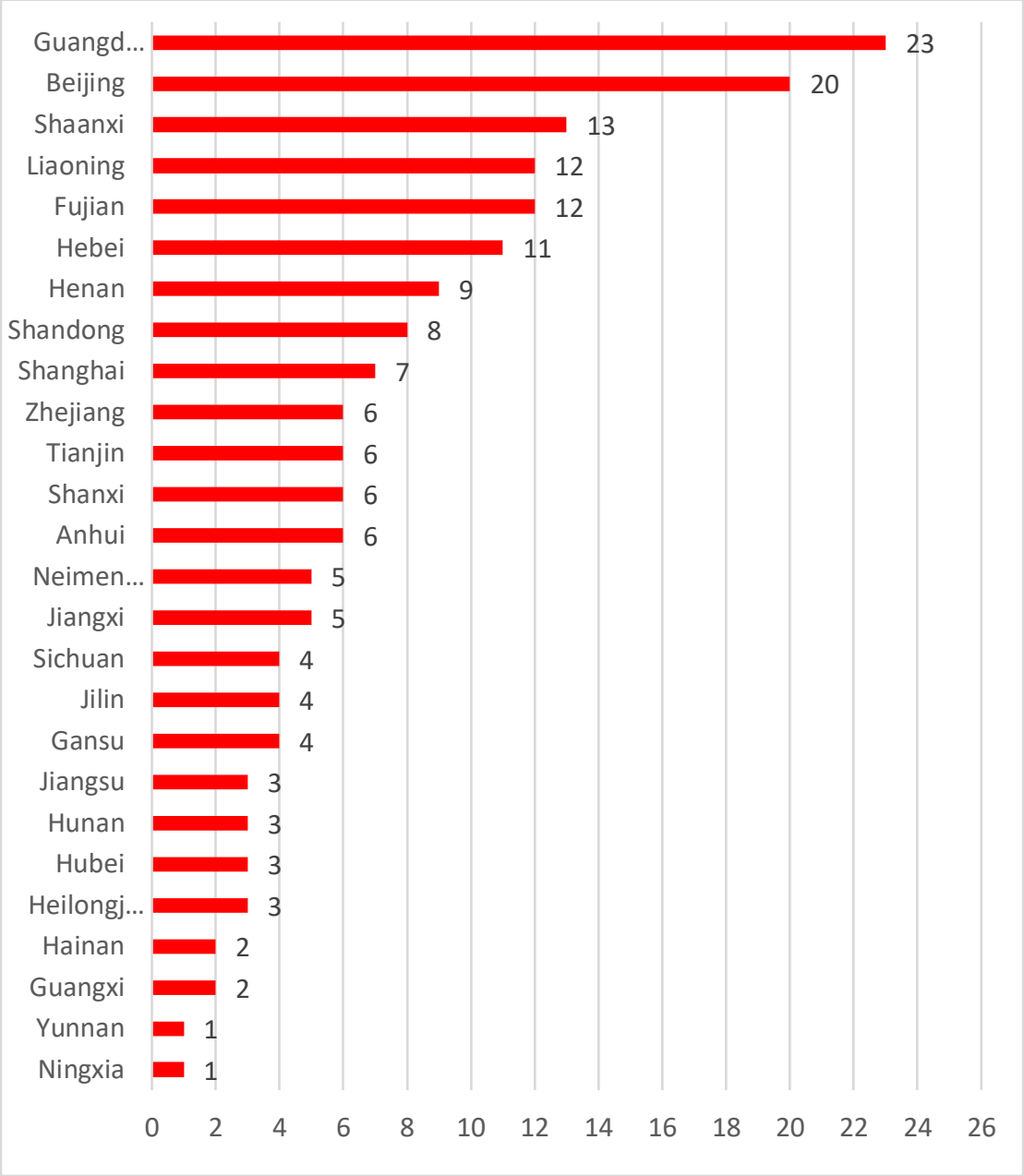

Fig. 3. Geographic Distribution of GSRs

3.2 Behavioral Changes of Students in the Pandemic

The pandemic has affected people's behavior and daily life. The CSRs, including undergraduate students, post-graduate students, PhD researchers, post-docs, and visiting researchers from China, in the UK may have been hit twice by this pandemic in two main stages: 1. the COVID-19 broke out in China; 2. the COVID-19 broke out in the UK. It is important to understand how the pandemic has an impact on their daily life, communication, attitude to future career and how they search for information and they may seek support when they need.

This section investigates changes in the behavior of CSRs in the aftermath of the outbreak, including how they first learned about the news, attitudes toward wearing

masks as a foreigner in the UK, changes in the time when they began searching for information, and changes in their lifestyles.

Question3.2.1：From which source you heard the outbreak?
Family / neighbors, schoolmates, friends / Internet (news medias, social media) / others

Most (152，85%) of participants heard this news about pandemic from the internet (news, social media, etc.)，7% of participants got this news from neighbors, schoolmates, friends，and 8% of participants learned from family members.

Question3.2.2：Did you put on face masks after you heard the outbreak of COVID-19? YES / NO / Maybe later/ Wanted but didn't

Almost 32% of participants wore the mask after the COVID-19; while there were 31% of participants chose to go unmasked; 19% said they might wear masks in the future, and 18% wanted to wear a mask, but for some reason, they didn't.

Question3.2.3：Time spent searching for information about COVID-19 compared to time spent searching for information in the past.
Much less / a little less / same / a little more / much more（1-5）

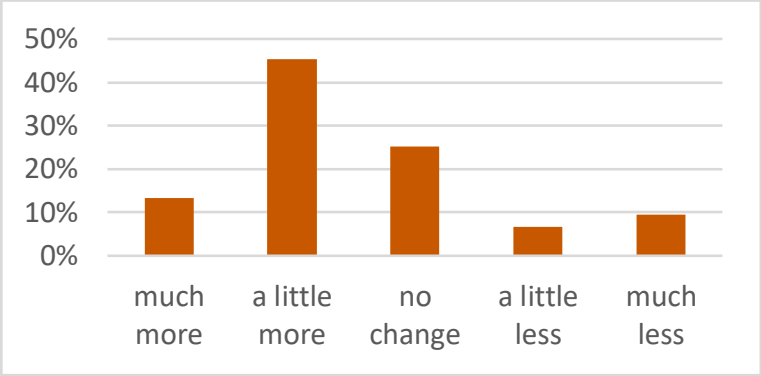

Fig. 4. The Time Change for Searching COVID-19 Related Information

As shown in Figure 4，most participants (45.3%) spend a little more time to search for information about COVID-19; and some participants (13.3%) spend much more time to search for information about COVID-19. In total, 58.8% of participants have spent more time on information searching than before and only 16% of participants reduced the searching time.

Question3.2.4：When COVID-19 outbreak occurred in China, how did it impact on your daily life changed? (stage 1)
1None change-2--3-4 -5 Change a lot

The changes in lifestyle frequency were compiled based on actual observations of international students, but there was no direction in the item, which could lead to misunderstanding by readers. According to the frequency of leaving the room,

participating in social activities and meeting new friends all decreased, while hygienic habits such as washing hands increased, and stockpiling of goods increased based on the rush of supermarkets in the UK. Sleep, daily routines and physical symptoms are difficult to show direction based on the current survey.

As shown in Figure 5， when COVID-19 outbreak started in China, the following four daily behaviors have changed the most from:- "Frequency of leaving your room"(27%，48), "Frequency of going out for social activities"(30%，53), "Hygienic habits (handwashing, etc.) "(30%，53), "Stocking essentials (food/hand washer/tissues, etc.) "(33%，59). Basically, about 1/3 of the participants chose "change a lot". The four daily behaviors remained the same were" physical Health symptoms (headache/sore throat/stomachache, etc.), " "Meeting new friends", "Sleeping", "Daily routine".

It can be seen that there is a big change in the existing behaviors and habits of interacting with others, while non- interpersonal behaviors such as "physical health symptoms", "sleep", and "daily routines" have not changed much. "Making new friends", on the other hand, maybe because the original life has not changed much, so there is not much change.

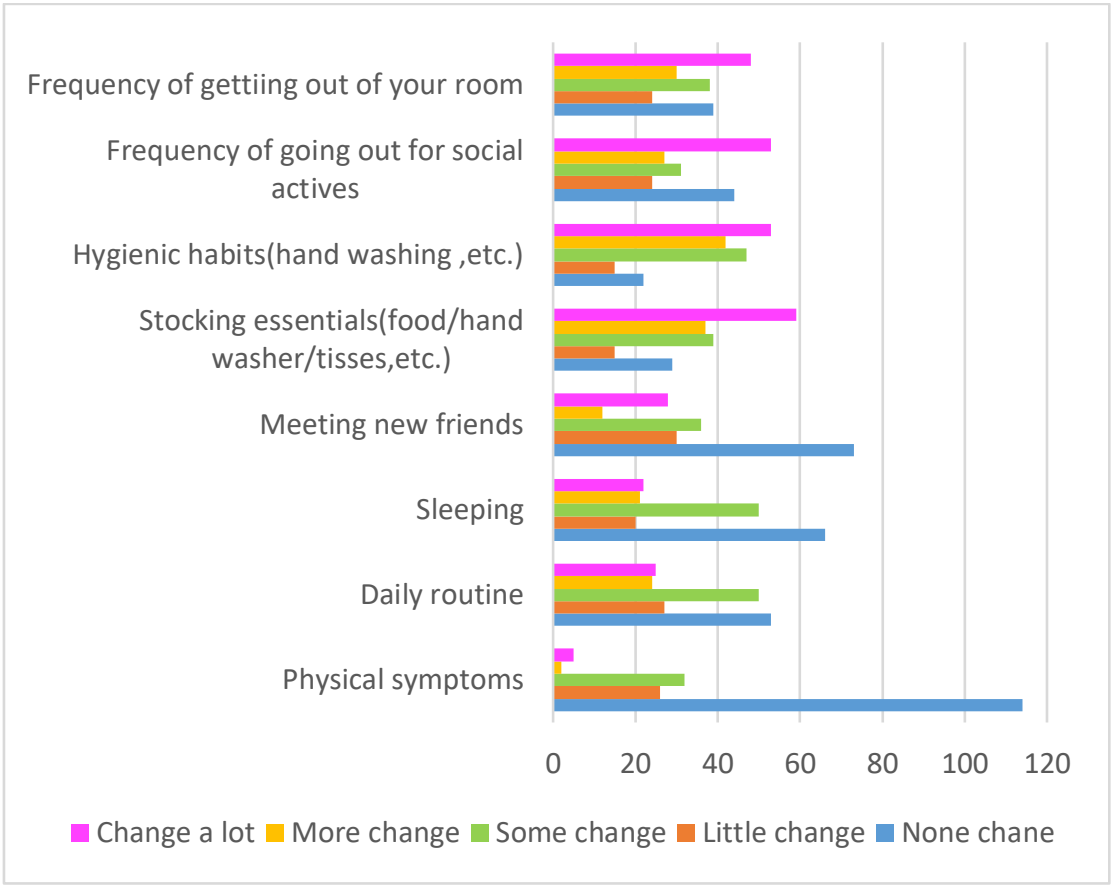

Fig. 5. Change in Behavior (stage 1)

Question3.2.5：When COVID-19 outbreak occurred in the UK, how did it change on your daily life? (stage2) (1None change-2-3-4-5 Change a lot)

With the outbreak in the UK, this stage added the question asking about wearing a mask, and it was clear that over 55% of the participants changed very much on this option. As shown in Figure 6,when the COVID-19 outbreak happened in the UK, the five behaviors that participants changed most in their daily life were " Wearing mask", " Frequency of going out for social activities", " Frequency of leaving your room", " Stocking essentials (food/hand washer/tissues, etc.) ","Hygienic habits"; The three behaviors that remained none change in the participants' daily life were " Physical health symptoms (headache/sore throat/stomachache, etc.) ", " Sleeping", and " Daily routine".

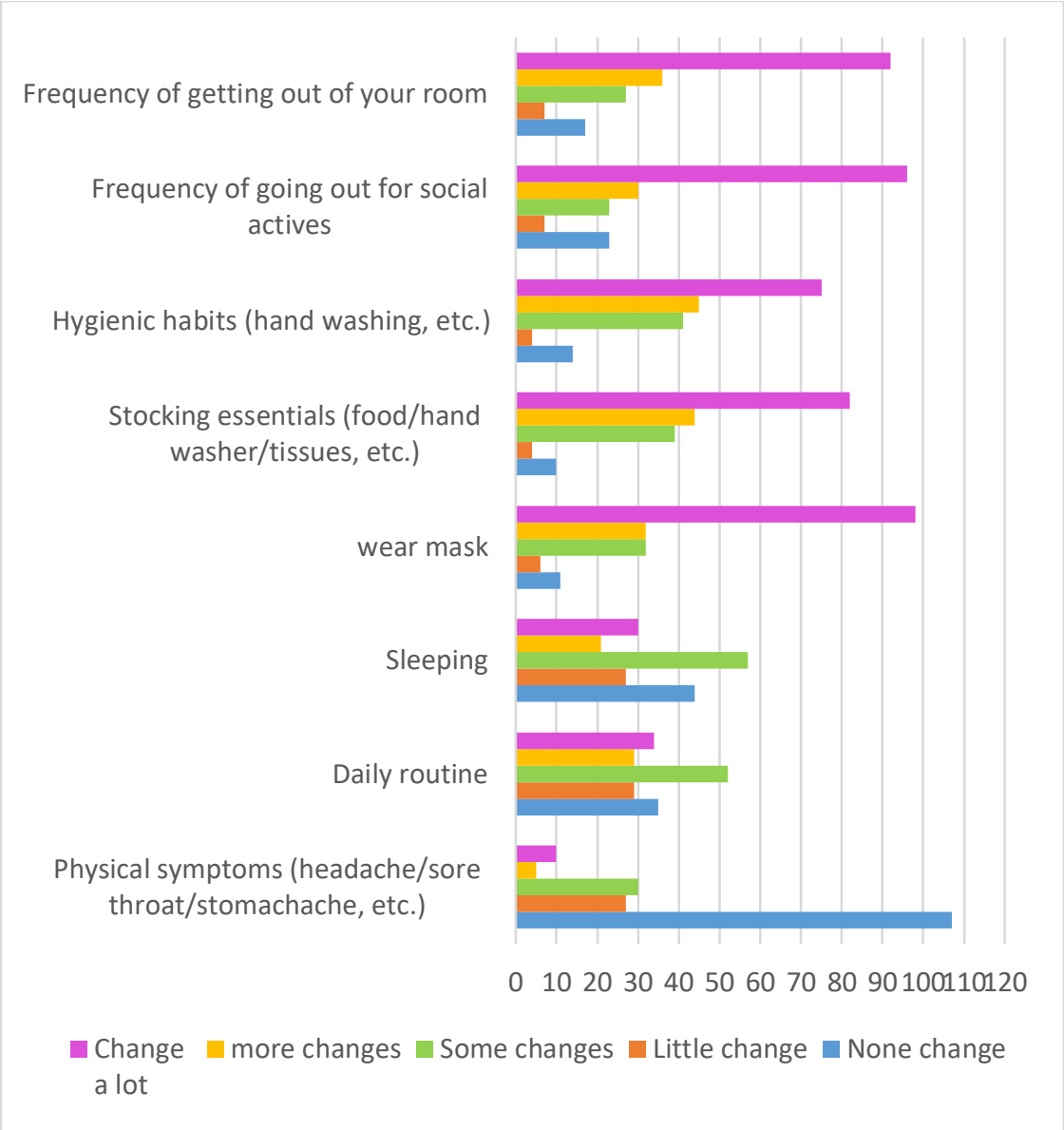

Fig. 6. Change in Behavior (stage 2)

3.3 Perceived Risk and Support

It is also important how CSRs perceive their own risk/safety at both stages. This section includes 5 questions: the assessment of the likelihood of being diagnosed;

confidence in receiving effective medical assistance when needed; the reasons for that confidence assessment; the support expected; and the support received.

Question3.3.1: How likely you thought you would be diagnosed as COVID-19? Please indicate the extent to which you agree with each of the following statements using one of the three options.(high possibility; uncertain; high possibility)

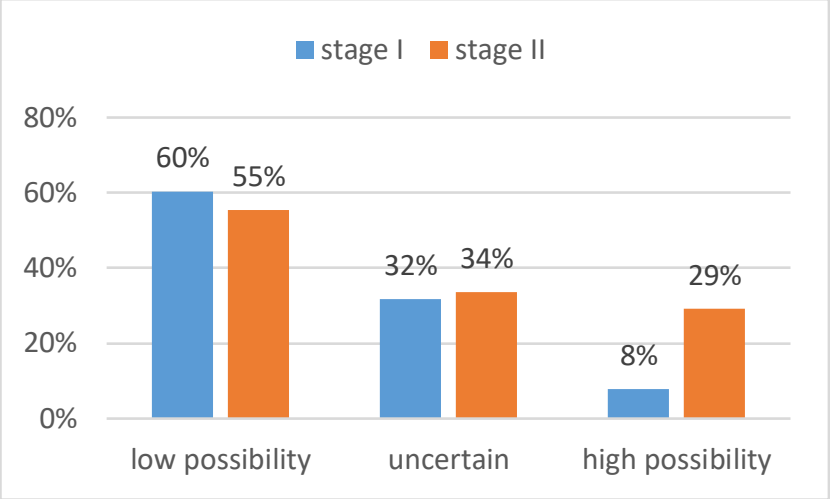

Fig. 7. Possibility of Diagnosed as COVID-19

It can be seen that in stage I (Figure 7), the number of participants who think they could have a high risk of infection is relatively small, only 7.82%; mostly (60%) think that they could have a very low risk of infection, etc., and about 32% of participants think that there is uncertainty.

In stage II, the number of participants who thought there was uncertainty about infection increased by 2%, while the proportion of those who thought there was a high risk of infection increased significantly, with the proportion rising by more than 20% from 8% to nearly 1/3(29%) of the participants.

Question3.3.2: *How much confidence you have for receiving effective medical treatment in case you were diagnosed with COVID-19? Please indicate the extent to which you agree with each of the following statements using one of the three options (low confidence; uncertain; high confidence).*

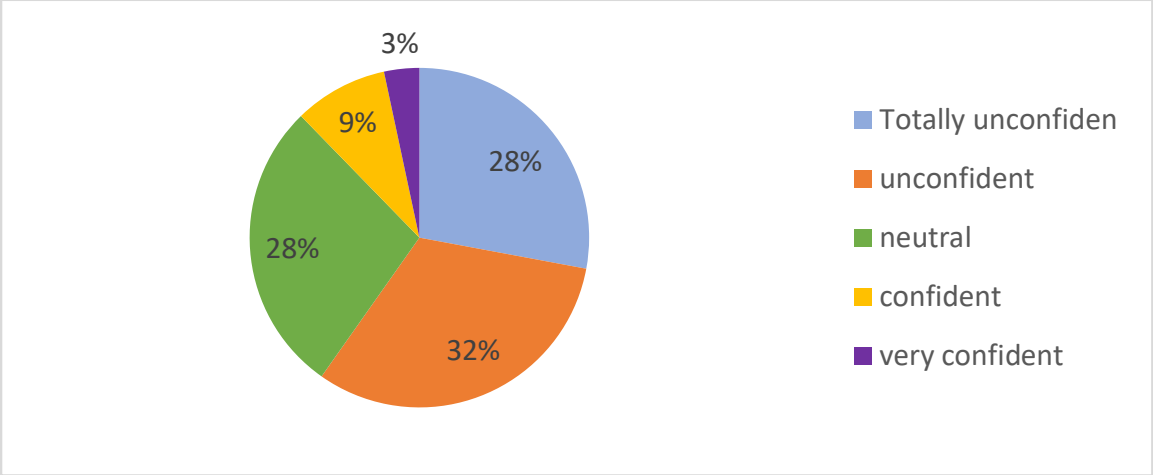

Fig. 8. Confidence in Receiving Effective Treatment

Whether or not you have access to effective medical assistance is the most important indicator of international students' sense of security. More than half (60%) of participants have low confidence in this, of which nearly half (28%) participants have no confidence at all, and the rest also have very low confidence. Nearly one-third of participants (28%) are neutral about this, and only about 12% (9%+3%) participants are confident about this.

Question 3.3.3: Why do you think so? (up to three selections)

Among the reasons for getting effective support (as shown in Figure 10), participants showed high confidence in the option of "the support from the local (Chinese) student union or consulate"; it reflects the active support they have provided. On the "language factor", although some participants had some confidence, overall no one showed high confidence in this factor; on all other options low confidence was more prominent, reflecting the overall low confidence of participants in the various environmental factors involved.

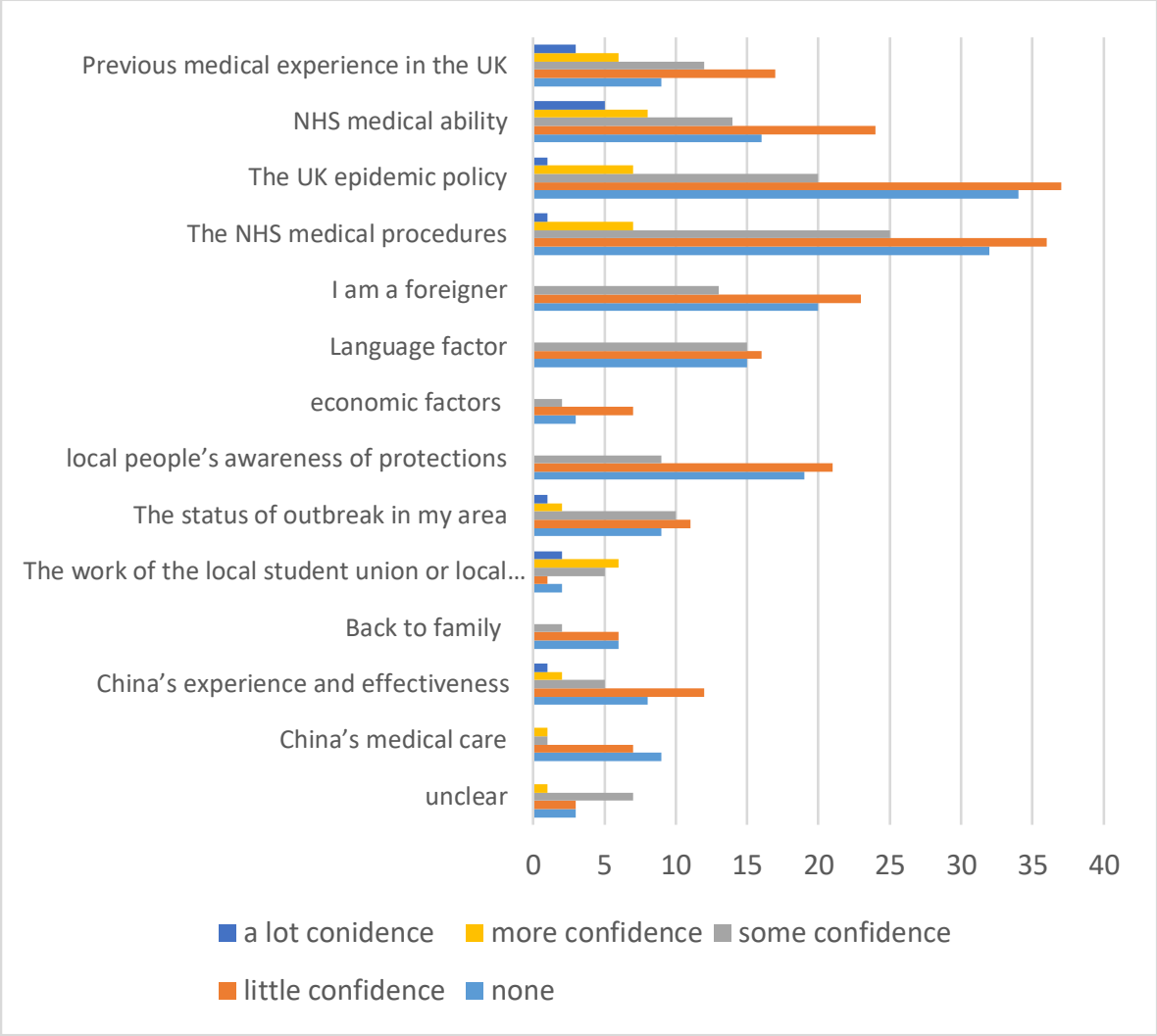

Fig. 9. Summary of Reasons for Confidence in Receiving Effective Treatments

Table1 chi-square test: the reason for effective treatment

Q45	none	little confidence	some confidence	more confidence	a lot of confidence	chi-square sig
Unclear	3	3	7	1		0.412
China's medical care	9	7	1	1		0.081
China's experience and effectiveness	8	12	5	2	1	0.627
Back to family	6	6	2			0.323
The work of the local student union or local consulate	2	1	5	6	2	0.000*
The status of the outbreak in my area	9	11	10	2	1	0.973
local people's awareness of protections	19	21	9			0.003*

economic factors	3	7	2			0.283
Language factor	15	16	15			0.068
I am a foreigner	20	23	13			0.006*
The NHS medical procedures	32	36	25	7	1	0.093
The UK epidemic policy	34	37	20	7	1	0.006*
NHS medical ability	16	24	14	8	5	0.049*
Previous medical experience in the UK	9	17	12	6	3	0.281

According to the results of the chi-square test (Table1), the participants' opinions were significantly different on these options, such as "the local population's awareness of protection", "I am a foreigner", "the UK's pandemic prevention policy", "NHS pandemic prevention and medical care level" and "policy of the local federation or consulate".

Question3.3.4: At your area, which is your most desired anti-epidemic help? (up to three selections)

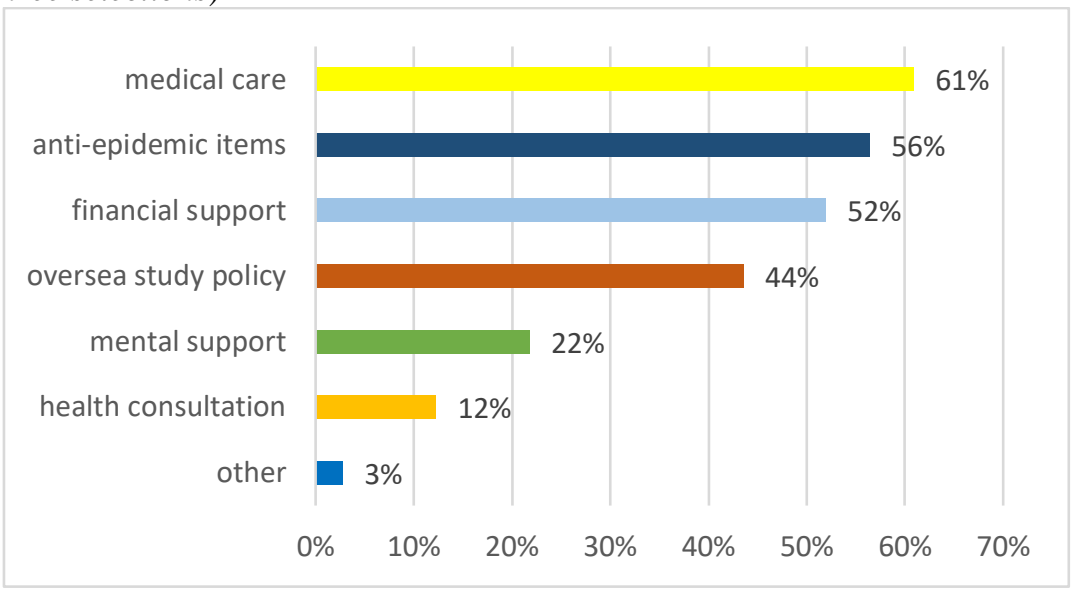

Fig. 10. Summary of Desired Support

Over 50% of the demanding options are "medical care"、 "anti-pandemic items" and "financial support". It means that at this stage, material needs related to pandemic protection are most important to the participants. Subsequently, the options for international students were "oversea study policy", "mental support", and "health counseling for medical care and pandemic prevention". About 3% of the participants chose "Other" and all of them indicate "Airfare", "Airline tickets", and such on.

Question3.3.5: When COVID-19 outbreak in the UK, what's kind of supports did the following groups provided you? (multiple selections)

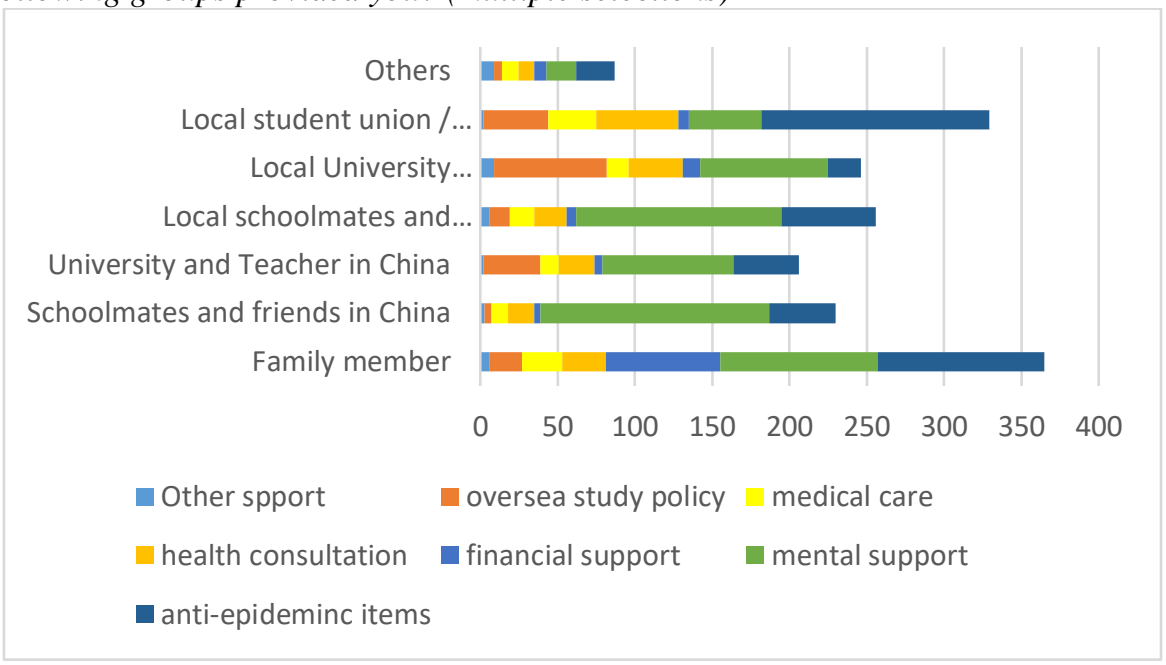

Fig. 11. Overview of Support Received

The "medical care," which ranks first in Figure 10, was provided relatively little by seven support groups. The "anti-pandemic items" and "mental support" were both provided a lo by the seven support groups.

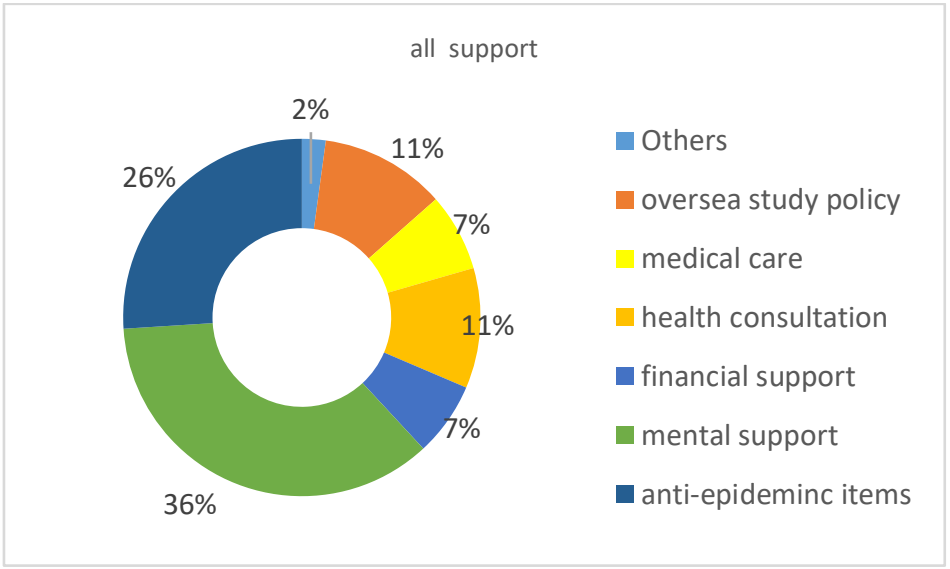

Fig. 12. Percentage of Support Received

Participants have received the most support in the form of "mental support", followed by "anti-pandemic items", "health counseling for medical care and pandemic prevention" and" oversea study policy ", "financial support" and "medical care", and finally, "other elements of uncertainty".

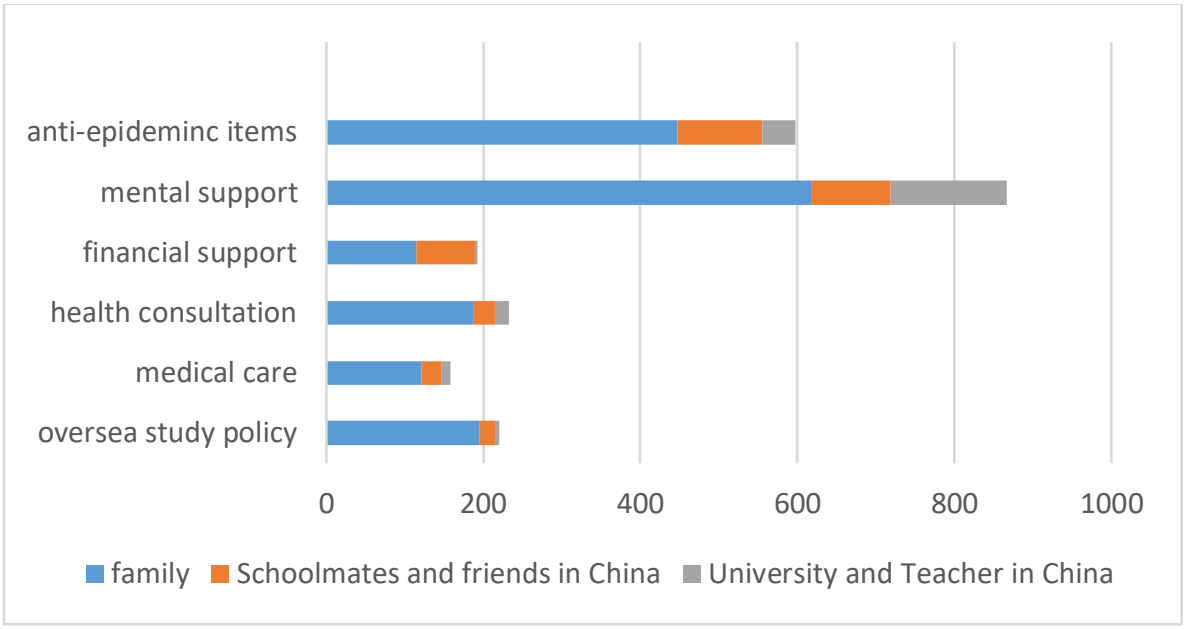

Fig. 13. Received Support from China

The support received from families is mainly "anti-pandemic material", "mental support "and "financial support" for vaccination. The support from Chinese classmates and friends is mainly "mental support", "anti-pandemic material" and "health consultation" for anti-pandemic information. Chinese universities and teachers mainly provided support in forms of "mental support", "anti-pandemic material" and "oversea study policy".

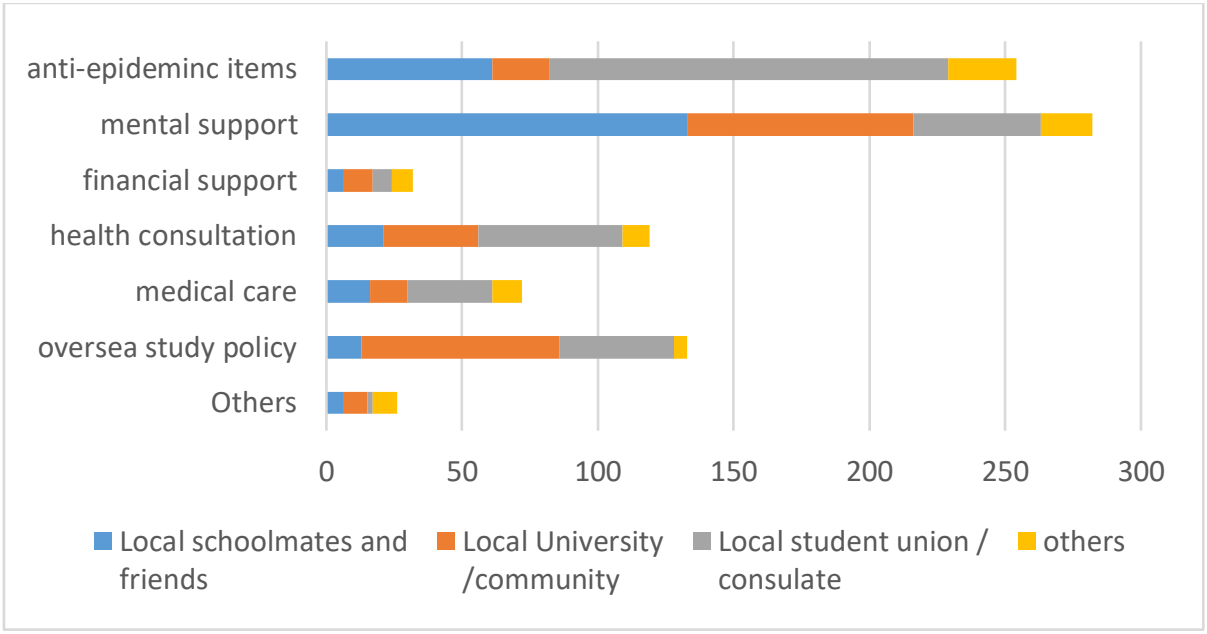

Fig. 14. Received Support from the UK

Local students/friends mainly provided "mental support " and "anti-pandemic material " support to CSRs. Local universities/communities provided "mental support " as well as support on "oversea study policy" . Local Chinese student

unions/consulates mainly provide "anti-pandemic material ", "mental support", "health consultation" for pandemic-prevention information and "oversea study policy".

3. 4 CSRs' Decision Making and Reasons Behind

This part includes 2 questions: the CSRs' decision and the reasons to support decision making.

Question3.4.1: After the COVID-19outbreak occurred in the UK, your decision is? Plan to go back; Already go back; Stay at ease, believing the epidemic will pass; Temporally stay in the UK, acting depends on the situation; Want to go back but have to stay in the UK.

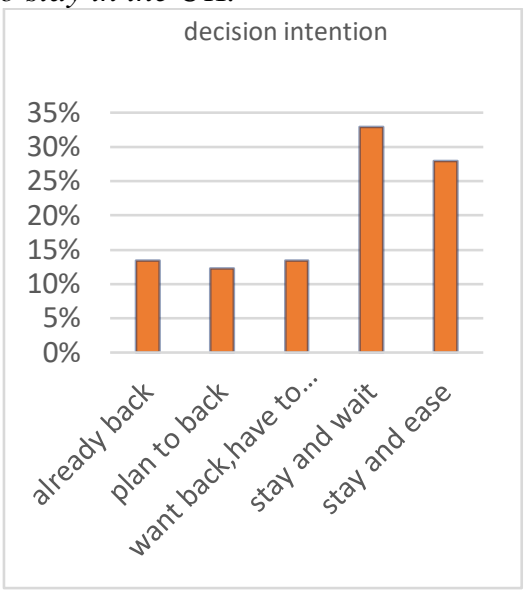

Fig. 15. Distribution of Five Decisions

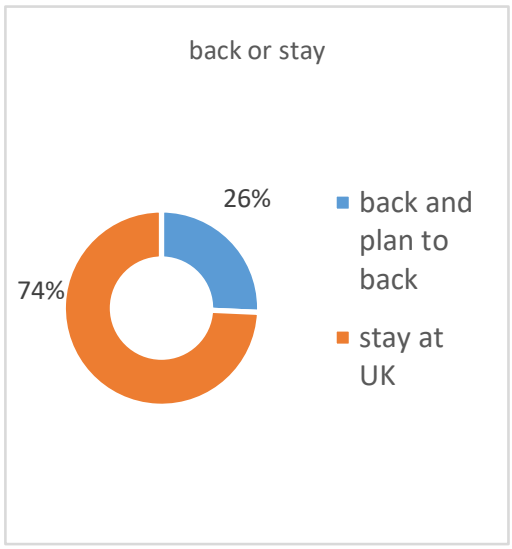

Fig. 16. Final Decision

In terms of specific choices, "wait-and-see" is the most popular choice, at 33%. This was followed by those who thought the pandemic would pass and waited with confidence (28%). The rest participants are those who have gone back, intend to go back, and want to go back but have to stay(Figure 15).

If we distinguish between suburbs based on the current intention to go back or not, the current situation is as shown above (Figure 16). Only about 1/4 of participants have returned or are planning to return, and nearly 3/4 of participants are still staying in the UK whether they want to or not.

Question3.4.2: The reasons you made the decision? (up to 3 selections)

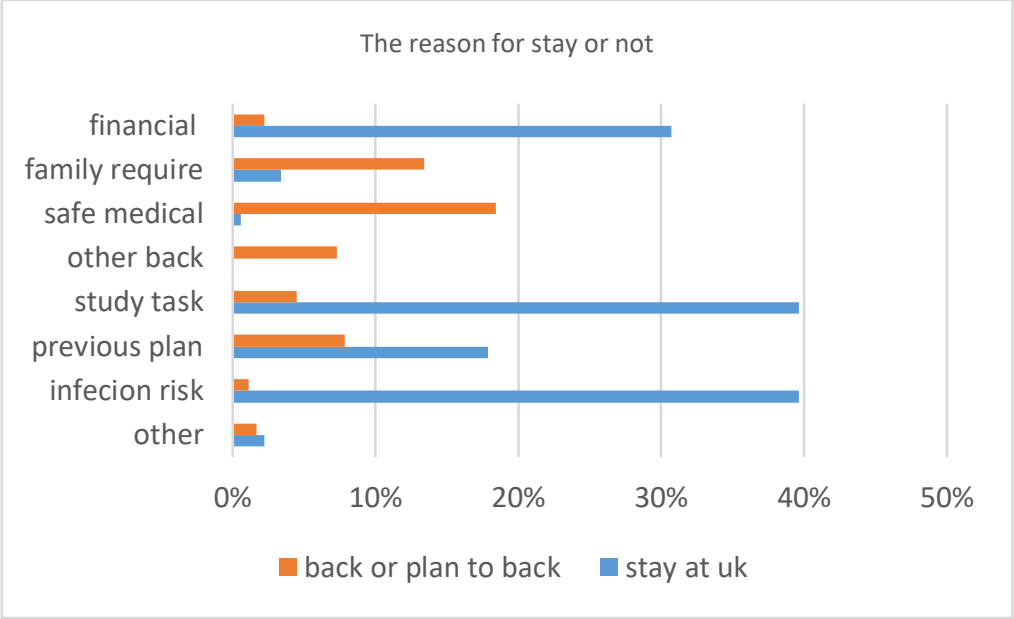

Fig. 17. Reasons Behind the Decision Making

Table2 Chi-square Test: reasons behind the decision

Choice reason	*stay*	*back*	*chi-square sig*
other	*4*	*3*	*0.289*
other back	*0*	*13*	*0.000**
**family require*	*6*	*24*	*0.000**
same as previous	*32*	*14*	*0.394*
financial issue	*55*	*4*	*0.000**
infection risk on the way	*71*	*2*	*0.000**
study task	*71*	*8*	*0.000**
safe medical consideration	*81*	*33*	*0.188*
sum	***320***	***101***	

We can see from the results of Chi-square test (Table2) that there are significant differences between the two types of choices for participants to go back or not. The participants who choose "stay" are mainly based on the economic factor, the risk of cross-infection on the road, and the task of studying afterward; these are mostly objective factors.The participants who chose "back" were mainly based on interpersonal factors such as "the request of family members" and "all other international students around have gone back".

4 Discussion

The outbreak of the pandemic in China has made CSRs make significant changes in their lifestyles and behaviors, such as taking more protective measures than local people. When the outbreak had not yet broken out and the UK government was not

enforcing home quarantine, CSRs had already begun to make significant changes in "wearing masks", "leaving their rooms less often", "having less contact outside", and "changing their hygiene habits".

Behavioral changes were in the area of multiple interpersonal interactions and little change in self- related aspects such as sleep, routines, and physical and mental symptoms.

CSRs have multiple factors influencing their assessment of their own well-being in the event of a foreign pandemic. In general, with the outbreak of pandemics in the UK, CSRs think that they are more likely to be infected with pandemics, and they are less confident that they will be able to get effective medical treatment, based on their awareness of the UK government's "Buddhist anti-pandemic" measures and their status as foreigners. More than half (60%) of participants have low confidence in this, and only about 12% (9%+3%) participants are more confident about it.

CSRs in crisis need medical assistance support most, followed by support such as anti-pandemic items and financial support, and then " soft support" such as oversea study policy, and mental support. CSRs receive the most support in the form of anti-pandemic items and mental support, and almost all of these resources are provided at both home and abroad. Financial support is mainly provided by families. The work of local student federations/consulates (distributing anti-pandemic materials and providing information on pandemic prevention) has had a significant effect. It is almost impossible for CSRs to secure the content of the overall national regulation, such as the UK's pandemic prevention policy, medical and ambulance protection, and China's aviation policy for pandemic prevention requirements.

As of July 5, there were significant differences between the two final behavioral decision choices of CSRs to "go back to China" and "stay in the UK". The three-quarters of participants chose to stay in the UK, which included the proactive choices of "want back, have to stay","wait and see how the pandemic develops" and those believe the pandemic will pass(stay and ease). The participants who chose to "stay in the UK" were influenced by a variety of factors, such as academic needs, financial pressure (flight restrictions), risk of cross-contamination on the road, and their original plans, etc. The participants who chose to "go back" were influenced by interpersonal factors, such as "family" and "people around them have left".

In conclusion, the majority (3/4) of participants stayed in the UK although they experienced two pandemic shocks in the UK and did not think they have enough safety in the pandemic. On the one hand, it is based on the security of pandemic prevention materials, psychological care, and study abroad related policies at home and abroad, and on the other hand, it is also based on the consideration of future development. In terms of the "fight or flight" mode of crisis response, 1/4 chose to run away and 3/4 chose to fight.

5 Limitation of this study

This study had some limitations. Firstly, our sample was small. Furthermore, limitations of the current study include the use of a self-designed questionnaire and

the reliance upon self-reporting in the midst of the constantly changing prevalence of COVID-19. In addition, this study focused on changes in CSRs' behavioral change, risk of COVID-19 infection, confidence in receiving effective assistance, and final choice to return home or not, and did not measure their psychological statuses, such as anxiety and depression levels. Future studies could add this component and be comparable to most current studies in China (health care workers, university students, and other groups).

6 Conclusion

The conclusion of this paper is: Despite the fact that CSRs has a significantly higher assessment of infection risk in the second stage (34% uncertain, 29% high risk), and perceive themselves as less likely and less confident to be rescued (60% low confidence), 3/4 of the participants still chose to stay in the UK based on a number of realistic and subjective factors (subsequent studies, flight tickets, risk of infection on the road, etc.). As a result, our findings are based on cross-sectional data from local convenient samples. However, in reality, from May to July, there have been some changes in the UK's epidemic prevention and control policies and public responses. The future study could explore the changes in the mindset of CSRs and the influence of relevant factors in this changing environment of epidemic prevention and control in the UK.

7 Reference:

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