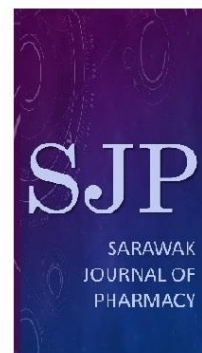


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A Survey on Users' Experience and Interests on Activity Trackers and Their Willingness of Sharing Personal Health Information from Activity Trackers

Pey Shyan Lai¹, Flovia Nayen¹, Shirlye Chai^{1,2}, Kamarudin Ahmad^{1,2}

¹ *Pharmacy Department, Miri Hospital, Sarawak*

² *Clinical Research Centre Miri*

Corresponding author name and email: Pey Shyan Lai (lai@moh.gov.my)

ABSTRACT

Introduction: The term “activity trackers” refers to all devices that provide physical activity-tracking functions. These devices include fitness bands, smartphones, and smartwatches. The data generated by sensors in these activity trackers are often presented to the user via health/wellness applications, creating a new type of personal health information. These inputs may be useful in helping the users’ activity level and health. Sharing of information of these data may help developers to develop a better device in the future and other users on achieving their activity goals.

Objective: We aimed to study the experience of the current activity trackers users among the Pharmacy Department staffs in Miri Hospital and their interests in activity trackers. Apart from that, we also aimed to examine users’ willingness to share their personal health information from activity trackers and their reasons behind.

Methods: A cross-sectional study was conducted by distributing questionnaires among the pharmacists and pharmacy assistants in Miri Hospital. We performed descriptive statistics and presented the data as frequencies and percentages for categorical data.

Results: A total of 58 staffs of the Pharmacy Department, Miri Hospital took part in this survey. Twenty-eight respondents had never used any activity tracker; 16 respondents had used it in the past, while only 14 respondents currently using the device at the time of our survey. We found that 75.9% (n=44) of the respondents are not willing to share their activity data. The reasons cited are the irrelevancy of the information to others (n=27), privacy concerns (n= 25), time restrain (n=8) and embarrassment (n=2). As for sharing platforms, Instagram (n=10) and Facebook (n=7) are the popular activity data sharing platforms among the staffs followed by Twitter (n=1) and wearable software (n=1). The main reason that they are willing to share their activity data is to share their activity progress (n=9). Other causes are to get encouragement from others (n=3), to motivate others and to compete with friends (n=1).

Conclusion: There is a lack of willingness to share activity data from activity trackers among Pharmacy Department staffs of Miri Hospital. The current popular social media for activity data sharing among the staffs were Instagram and Facebook. Amongst the staff that were involved in the study, only half are interested in using physical activity trackers. Therefore, the usage of physical trackers may increase in the future with better advancements in technology and if more awareness and knowledge on these devices are provided.

Keywords: Activity tracker, willingness, share

INTRODUCTION

Today's commercial mobile and wearable devices are often equipped with a range of sensors, such as pedometer, accelerometers, altimeters, compasses, and GPS, allowing users to collect data about their physical activities automatically (1-3). The terms "activity trackers" refer to all devices that provide physical activity-tracking functions, including fitness bands, smartphones, and smartwatches. The data generated by sensors in these activity trackers are often presented to the user via health/wellness applications, creating a new type of personal health information. Depending on the type of physical tracker, it may come with many features such as heart rate sensor, pedometer, accelerometer, sports activities tracker and sleep tracker. Nowadays, mobile devices and wearable devices have now increasingly sophisticated capabilities to capture, analyse, and provide feedback to users on their daily physical activity, sleep, and sedentary behaviours.

Activity tracker-generated personal health information is especially valuable because of its ubiquitous and factual nature (4). An activity tracker can collect data anytime and anywhere, as long as users carry or wear them with activity-tracking functions enabled. Newer devices truthfully and consistently record data about users; daily activities, as opposed to the manual input method of personal information that early self-trackers employed, which resulted in less reliable data input and collection.

Recent research studies have looked into how people adopt or engage with activity trackers. However, current research does not provide much data on activity tracker user willingness to share on personal health information, nor do researchers have an in-depth understanding of the reason or concern behind the decision made. Now that users have easy access to this new type of sensor-based and activity tracker-generated personal health information, it is time to investigate their management practices with such information and to explore how future technologies can better support their personal health information management needs. We present an exploratory survey that examines activity tracker users' willingness to share their personal health information generated by their devices and the rationale behind the decision made, with the eventual goal of generating design implications for future activity tracking technologies to better support personal health information management practices.

Therefore, this study aimed to study the experience of the current activity trackers users among Pharmacy Department staffs in Miri Hospital and their interests on activity trackers. Apart from that, we also aimed to examine users' willingness to share their personal health information from activity trackers and their reasons.

METHODS

This is a cross-sectional study using a respondent self-administered questionnaire to acquire the respondent's interests and experience in using activity trackers. We recruited a total of 58 respondents from the Pharmacy Department, Miri Hospital. This includes fully registered pharmacists, provisionally registered pharmacists, and pharmacist assistants.

The questionnaire consists of 3 parts and 11 main questions. The first part (Question 1 to 4) are the questions to obtain the respondent's demographic details, including the level of education, gender, age and their physical activity levels. The second part (Question 5 to 8) assesses their interests in physical activity and experience of current activity tracker users. As current physical activity trackers allowed the users to share their activities on social media, we attempted to acquire the respondent's willingness to share personal health information management and their possible reasons. Hence, the third part (Question 9 to 11) evaluates the willingness to share personal health information management among the respondents. For some questions, respondents were allowed to select more than one option provided and write any other answer if it is not listed to explore other possible answers to be obtained. The questionnaire is attached in Appendix 1.

We performed descriptive statistics using SPSS Statistics version 21 and presented the categorical data obtained from as frequencies and percentages.

RESULT

Table 1: Demographic details of the respondents (n=58)

Demographics	n (%)
Level of education	
Diploma	6 (10.34)
Undergraduate	49 (84.48)
Postgraduate	3 (5.17)
Gender	
Male	12 (20.69)
Female	46 (79.31)
Age (years)	
21 – 30	35 (60.34)
31 – 40	20 (34.48)
41 – 50	0 (0)
51 – 60	3 (5.17)

The sample was comprised of 58 pharmacy staffs in Miri Hospital, 12 males and 46 females. Table 1 shows the demographics of the respondents in our study.

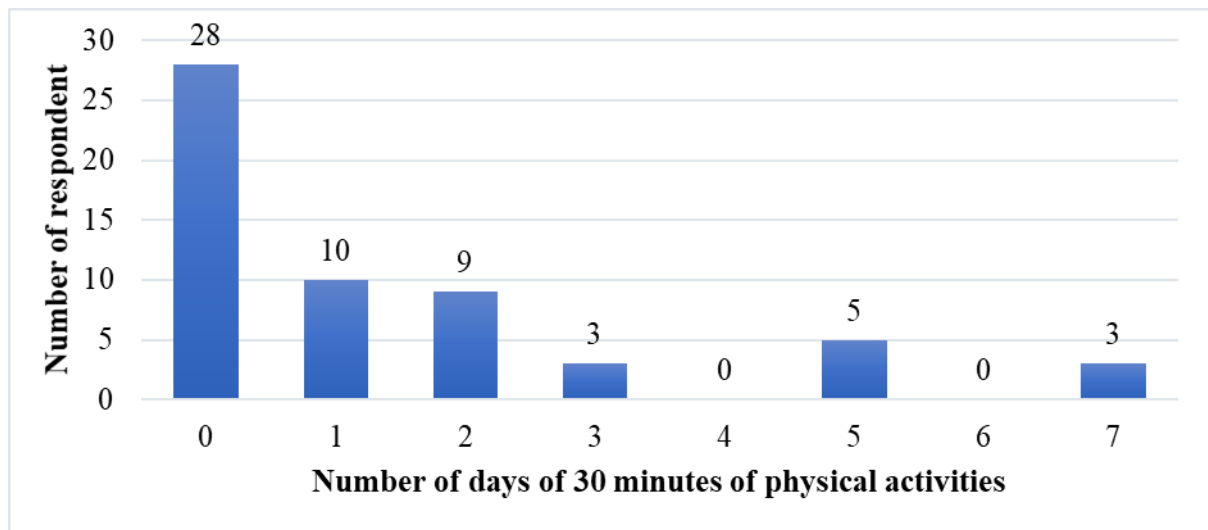


Figure 1: Number of respondents who performed physical activities of at least 30 minutes

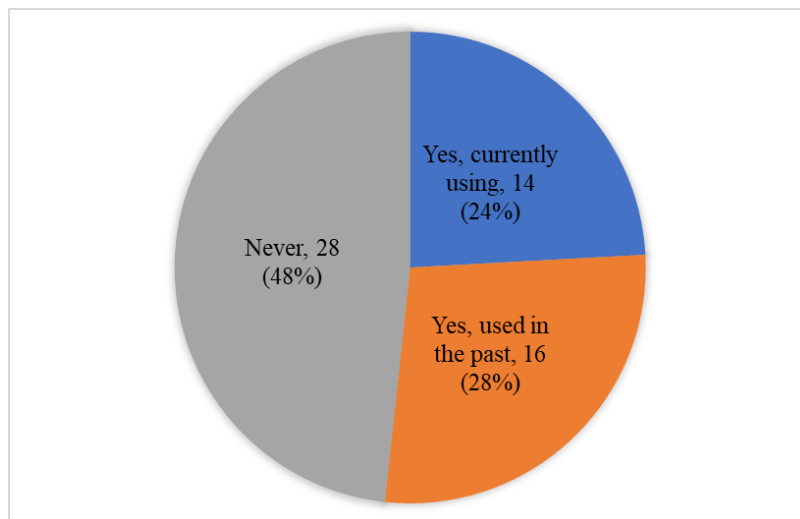


Figure 2: Experience in using activity trackers

There are eight respondents (13.8%) performed 30 minutes of physical activities for at least five times weekly (Figure 1). Figure 2 shows the number of respondents who were using, had used it in the past and had never used physical activity trackers. Respondents who were using physical trackers and had used it in the past were further asked on the type of activity trackers that they used, how often and how regular they used the physical trackers (Figure 3). The average duration of using their activity tracker regularly was between 3 and 4 months. However, one-fifth of our respondents who were using activity trackers had

experience in using their device regularly for more than 12 months. We also found that some respondents used more than one type of activity trackers which was made possible by the ability of devices to have more than one function. Majority of the users used activity tracker in smartphone applications (n=22). Meanwhile, accelerometer, pedometer and heart rate monitor have 11, 5 and 7 votes respectively. Among the 30 respondents, 13 respondents wore their activity trackers only during exercises; meanwhile, 10 respondents wore it only during waking hours and 7 respondents wore it all day and all night.

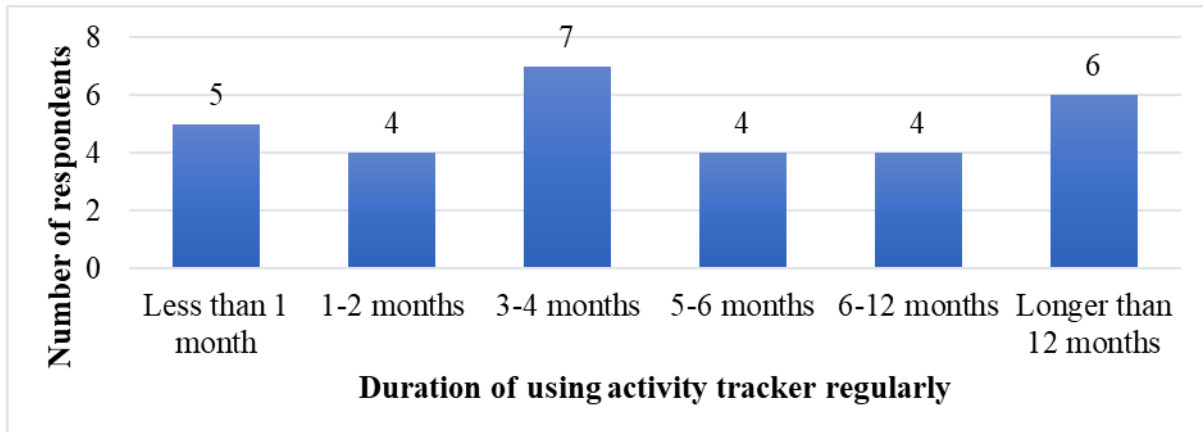


Figure 3: Duration of using activity tracker regularly (at least four days in a week)

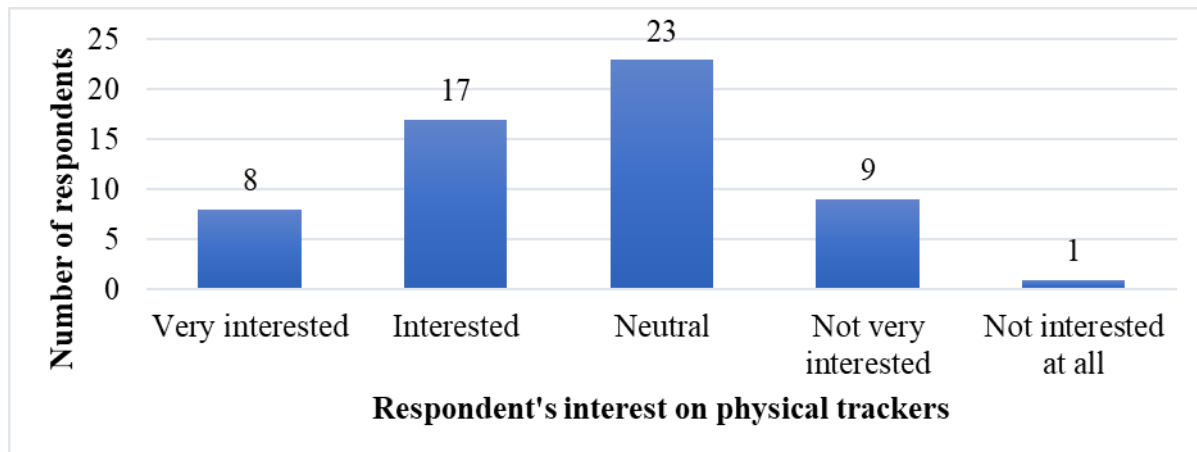


Figure 4: Respondents' interests to use activity trackers

As shown in Figure 4, 43.1% of the respondents showed their interest in physical trackers, while 39.7% of the respondents had a neutral opinion and 17.2% not interested. Among the 25 interested respondents, seven respondents were willing to wear the physical trackers all day, and all night meanwhile, 11 and 7 respondents were willing to use activity trackers during exercise and during waking hours, respectively. We found the main reasons

the respondents not interested in using an activity tracker as they believed that activity trackers did not help them to increase their activity levels and the cost of physical activity trackers. About 18% of the respondents had no time to use an activity tracker meanwhile 6% of the respondents had difficulty in understanding technology. Another reason cited by a respondent was the belief that the activity trackers did not play a vital role in keeping fit. In his opinion, tracking calories and self-discipline are more effective in keeping fit.

Other than that, we found that the majority (n=44, 75.9%) of the respondents was willing to share their activity data. The main reasons that avoid the respondent from sharing their activity data on the social network are the irrelevancy of the information to others (n=27) and privacy purpose (n=25). Apart from that, it may be due to time restraint (n=8) and embarrassment (n=2).

As for the sharing platform, we found that ten respondents were willing to share their activity data on Instagram. Seven respondents were willing to share on Facebook, a respondent on Twitter and the wearable software, respectively. The primary motivation was to share their activity progress (n=9), to get encouragement from others (n=3), to motivate others (n=4) and competition with friends (n=1).

DISCUSSION

The objective of this study was to explore the user's experience and interests of using activity trackers and to understand their willingness to share personal health information management from activity trackers and the underlying reasons. WHO recommended adults of age 18 to 64 years old should perform at least 150 minutes of moderate-intensity exercise per week, which may be equivalent to 5 days of 30 minutes' exercise. In our study, we found that the pharmacy staffs in Miri Hospital lead a sedentary lifestyle whereby 86.2% do not meet the WHO recommended levels of physical activity for adults of aged 18 to 64 years old (5).

Meanwhile, in term of the knowledge and awareness of the availability of these physical trackers, we found that all the respondents had heard of at least one of the device types. Smartphone applications were the most popular ones due to the popularity with ease of accessibility and ownership of a smartphone. Vast choices of application software are available in smartphones' application store (such as Google Play, App Store, and Xiaomi App) makes it more favourable compared to wearable devices. This also explains the popularity of smartphone applications among the current and previous activity tracker users. However, the accuracy of data provided by the smartphone applications might be questionable, as compared to the specifically-designed wearable devices.

Other activity trackers, namely accelerometer, pedometer and heart rate monitor had a significantly lower number of users. On the contrary, an Australian national survey reported that pedometers were more typically used compared to other types of activity tracker (6). Another survey conducted in Alberta, Canada, reported that FitBit® was the most commonly used brand of the accelerometer (7).

User's experience and interests

Many respondents were not interested in using an activity tracker. The most common reason for not being interested in activity tracker reported is the perception that the activity tracker will not increase their activity levels, similar to that reported in a study carried out by Alley et al. (6). In the study, 47% of the participants were not interested in activity tracker due to an unwillingness to increase their activity (6). However, in our study, none of our respondents chose this option, probably because of awareness of the importance of the physical activity among healthcare workers. One of the respondents stated that “activity trackers do not play a vital role in keeping fit but tracking own calories and self-discipline do”. The second common reason related to the cost of owning an activity tracker (refers to wearable devices) and lack of time. A study by Lee and Lee found the participants with more awareness on a wearable activity tracker are more interested in health, have a higher IT-related self-efficacy and perceive the device less expensive had greater intention to have activity tracker than those who were not (8). This may be a possible reason for the lower number of interested respondents in this study. However, further tests on the knowledge and awareness of activity tracker not tested to validate this assumption.

Based on our findings, the activity tracker users' mainly used their activity trackers during exercise and during waking hours. On the other hand, among the interested respondents, further questions on how often they willing to wear the activity trackers also asked. The percentage of respondents willing to wear the monitor during exercise remained the highest compared to respondents willing to use during only waking hours and around the clock. This may be due to the fact that the data provided (such as the number of steps, distance travelled, estimated calories burned based on the type of activity and speed of running or walking) during exercise and waking hours are more significant for the users in achieving their goal of fitness. About 23% of the users wore their activity trackers all day and all night. These group of users may be interested in data that can be collected continuously, such as data on the sleeping pattern and heart rate. These data may be useful for them to evaluate their quality of life and health.

In addition, our study found that respondents used their device regularly for an average of 3 to 4 months. Comparatively, Vallance et al. study found the participants used their device for around eight months before stopping (7). On the other hand, Alley et al. reported that almost 40% of those who used their activity tracker for less than a month (6). A similar percentage of users found to use their devices for one to six months while only 27% found to use their activity tracker for more than six months. Other studies had also reported the use of activity tracker among one-fourth to half of its users decreases over time (9,10).

The willingness to sharing on social media

Most of our respondents were not willing to share their activity data on a social network with the main reason for the irrelevancy of the information to others and privacy purpose. The thoughts of “irrelevancy of the information to others” is a perception, although it may be true, depending on the type of data, some data may be relevant to others which may be for a good or a bad cause. From the activity data that we provide, it may give ideas to others on the type of activities that they may try. However, as we share our activity data on the social network, some of the application may record the place that we visit as some devices are equipped with GPS. This may be dangerous for victims of stalking, harassment, a target for burglary or identity thief. Based on the activities that we posted online, it provides ideas to burglars for their robbing plans.

Sharing of activity progress is the main reason the respondents are willing to share their activity data. This may be a form of self-satisfaction or self-encouragement to an individual. Another possible reason is to get encouragement from others and to motivate others. For example, an individual who would like to lose weight may find it difficult to achieve their weight goal if there is not enough self-determination. Supports from others may boost their confidence and willingness to continue their fitness routine. However, Maher et al reported the main reason for sharing on a social network is to compete with friends (17%) followed by sharing activity progress (9%), to give motivation to others (8.5%), to gain encouragement (6.5%) and other reasons (2%) (11). Maher et al. reported a similar result. Most of their participants (77%) does not share their data in the social network (11).

An internet users survey conducted in 2018 by Malaysians Communications and Multimedia Commissions on 24.6 million of social networking users, 97.3% own Facebook account while 57.0%, 48.3%, 31.3%, 23.8%, and 13.3% own Instagram, YouTube, Google+, Twitter and LinkedIn account (12). The remaining 0.7% of users own other types of social network apart from listed (12). Our result is contradictory with the users' data, in which

71.43% of our respondents are willing to share their activity on Instagram while 50% of the respondents who are willing to share on Facebook. A respondent is willing to share on Twitter, which probably because of the smaller number of Twitter users compared to Facebook and Instagram. Meanwhile, a respondent is willing to share the data on the wearable device software only. Sharing data on the wearable device may have more privacy from the public compared to sharing them on social media.

LIMITATION AND RECOMMENDATION

This study had a limited sample size and included only the Pharmacy Department staffs in Miri Hospital. Besides, the proportion of female respondents (79.31%) was also more than male respondents (20.69%). We did not include the questions which explore the reason why the users are interested in using the activity tracker, type of activities that they used with their activity trackers and the reason that they stopped using the trackers. This could be the direction for future research.

CONCLUSION

In conclusion, the Pharmacy Department staffs in Miri Hospital have a lack of willingness to share their activity data from activity trackers. The current popular social media for activity data sharing among the staffs were Instagram and Facebook. Half number of the staffs are interested in the physical activity trackers. Therefore, the number of physical trackers users may increase in the future if more awareness and knowledge on this device are provided or with better advancement of future technology.

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APPENDIX 1:

1. In the last week, how many days did you get 30 minutes of physical activity?
_____days

2. What is the highest level of education that you have completed?
 - a) Diploma or equivalent
 - b) Undergraduate Bachelor Degree
 - c) Post graduate Degree

3. Sex
 - a) Male
 - b) Female

4. How old are you? _____ years old

The questions are about physical activity trackers. These are used to track activity levels, including how many steps are taken, body movement, heart rate, and calories and provide you with feedback on activity goals and progress. They are small monitors worn on the wrist, hip or chest and some can also be used with apps for smart-phones.

5. Have you ever heard of ANY particular types of physical activity trackers?
 - a) Heart rate monitor (no specific brand/type)
 - b) Pedometer (no specific brand/type)
 - c) Accelerometer (eg. LG Lifeband, iHealth activity monitor, Polar Loop, Garmin Vivofit, Fitbit, Jawbone)
 - d) Smart phone application (eg. Run Keeper, Map my fitness, Moves)
 - e) Specify any others if not listed

6. a. Have you ever used an activity tracker?
 - a) Yes, I am currently using an activity tracker
 - b) Yes, I have in the past
 - c) Never

If (Ans: c), skip to Q7)

b. What type of activity tracker do/did you use?

- a) Heart rate monitor (no specific brand/type)
- b) Pedometer (no specific brand/type)
- c) Accelerometer (eg. LG Lifeband, iHealth activity monitor, Polar Loop, Garmin Vivofit, Fitbit, Jawbone)
- d) Smart phone application (eg. Run Keeper, Map my fitness, Moves)
- e) Specify any others if not listed

c. How often do/did you wear your activity tracker?

- a) Only during exercise
- b) Only during waking hours
- c) Only at night
- d) All day and all night

d. How long do/did you regularly use the activity monitor for? By this we mean using it for at least 4 days per week?

- a) Less than 1 month
- b) 1-2 month
- c) 3-4 months
- d) 5-6 months
- e) 6-12 months
- f) Longer than 12 months

7. a. Would you be interested in using a physical activity tracker?

- a) Very interested
- b) Interested
- c) Neutral
- d) Not very interested
- e) Not interested at all

If (ans: c, d or e) skip to q8

b. How often would you be willing to wear a monitor?

- a) Only during exercise
- b) Only during waking hours
- c) Only at night
- d) All day and all night

8. What is the main reason that you would NOT be interested in using an activity tracker?

Tick all that apply.

- a) Cost
- b) Problems understanding the technology
- c) I don't have the time
- d) I don't think it would help me increase my activity levels
- e) I don't want to increase my activity levels
- f) Others (please specify)

9. Where do/did you share your activity on social networks? Tick all that apply.

- a) Facebook
- b) Twitter
- c) Instagram
- d) With the wearable's software
- e) I don't share my activity data
- f) Others (please specify)

If (ans: e) skip to q11.

10. Why do you share your activity data on social network? Tick all that apply.

- a) To share progress
- b) To compete with friends
- c) To get encouragement from others
- d) To motivate others
- e) Others (please specify)

11. What refrain you from sharing your activity data on social network? Tick all that apply.

- a) Privacy
- b) I don't have the time
- c) The information is not relevant to others
- d) Embarrassment
- e) No sharing platform
- f) Others (please specify)