Research on quasi-social interaction and loneliness between users and smart home from the perspective of media dependence

Haoyu Wang
School of foreign studies, Shanghai Business School, China
Corresponding author E-mail: Howoo.wang@foxmail.com

Abstract: The development of media technology has given people a new experience of human-computer interaction. Understanding how human-computer conduct quasi-social interaction is of great significance for understanding the deep psychology of individuals and human-computer relationship. Based on the fact that smart home robots are widely used, from the theoretical perspective of quasi-social interaction, through the questionnaire survey of smart home robot users, the research questions and important concepts are extracted on the basis of existing literature, and the survey data are deeply interpreted and analyzed. Finally, on the path of human-machine quasi-social interaction, it is discussed that the quasi-social interaction between users and smart home will have an impact on users ' loneliness.
Keywords: Quasi-social interaction, media dependence, smart home, loneliness

1 Introduction

1.1 Background information

At the beginning of 2022, the national epidemic situation showed a multi-point distribution trend, so maintaining good hygiene habits and maintaining the distance between people became important social behaviors. In this context, as the pioneers of intelligent technology into society,‘intelligent agent’ (AI) and ‘smart home’ are increasingly becoming the basic scene of our daily life. Smart speakers of smart media and other smart homes are fixed smart media whose function is to link people and things within a fixed scene or fixed rule system. We observe that smart home can not only control household appliances at home, but also chat with people as a partner and become the object of emotional labor interaction. We are curious about this: Will the quasi-social interaction between the user and the smart home affect the user 's loneliness ?

2 Literature Review

2.1 Literature review of para-social interaction

Para-social interaction (PSI) theory was first proposed by American psychologists Horton and Whole in 1956 in a paper published in the journal Psychiatry： Mass Communication and

Para-Social Interaction Observations on Intimacy at a Distance. Specifically, it is a kind of social connection formed by the audience and the media characters, which is similar to that established by people 's daily face-to-face communication. It is called para-social interaction. The audience will have a sense of familiarity with the media characters in their hearts, and think that the media characters seem to be their close friends. The media figures as some kind of ' distant companionship '. With the changes of the times, media technology has been continuously improved, and the media used by people in high frequency has also changed. After that, the connotation of this theory has been constantly updated, and now it is used to explain a series of psychological reactions and behaviors of the audience to media figures.

With the development of the times, by the 1970 s, mass media has developed to a great extent, and people 's media participation has reached an unprecedented height. At the same time, some scholars ' research on mass media also shows the existence of quasi-social interaction. McQuail put forward that the mass media has the function of " interpersonal communication " when he studied the theory of " use and satisfaction. " In the process of using the mass media, the audience 's interpersonal needs can be met. This view is based on the theory of quasi-social interaction. Since then, the specific research on quasi-social interaction has gradually begun.

When studying the media contact behavior of the audience, German scholar Gleich found that the three factors of friendship, program content and psychological empathy will affect the degree of quasi-social interaction, and proposed that the characteristics of quasi-social interaction should be multi-dimensional. This view makes many researchers no longer confined to the study of single psychological factors affecting quasi-social interaction. In 2006, Klimmt, Schramm and Hartmann studied the negative relationship between audience and media figures in quasi-social interaction. They believed that the process of quasi-social interaction will change dynamically according to the audience’ s media contact, and pointed out that quasi-social interaction includes three levels: cognition, emotion and behavior, and these three factors gradually change with the development of audience 's media contact behavior.

2.2 Literature review of media dependence theory

To understand media dependence from the perspective of concept combing and development research: Gong Xinqiong pointed out in the three dimensions of Relationship, Conflict, Integration-understanding of Media Dependence Theory that from the perspective of relationship theory, the audience has relied on the media for instrumental or utilitarian purposes, and has also formed instrumental interests and ritual non-interests. From the perspective of conflict theory, there is a positive relationship between social conflict and media dependence. From the perspective of structural function theory, media system dependence theory maintains social integration from two aspects: balance of relations and maintenance of structure. Feng Juxiang concluded in the Characteristics and Performance of Media Dependence that with the progress and development of the media, people are increasingly dependent on the media to obtain information, and the degree of dependence is deepening. By comparing the changes in the relationship between the audience and the old and new media, Wang Huaichun clearly contrasts that the individual 's dependence on the new media is gradually becoming closer, which is manifested in the deepening of spiritual dependence and practical dependence.

In addition, many scholars have found another way to analyze media dependence from

different cultural perspectives, which has improved the breadth and depth of research. Huang Juanjuan pointed out in the Phenomenon of Media Dependence of the Audience in the Context of Social Networks-based on the Perspective of Media Ecology that the current understanding of the phenomenon of media dependence is relatively one-sided, mainly focusing on two viewpoints: one is critical technology, the other is the audience 's obsession with the use of media, ignoring people 's rational thinking. Therefore, she looks at the characteristics and development of media dependence theory from the perspective of media ecology, which is helpful to the harmonious development of media ecosystem. From the perspective of social environment, Zhang Xi explores the Influencing Factors of Audience Media Dependence from the Perspective of Social Environment. Taking " Zhihu " as an example, from the perspective of social environment, taking " Zhihu " as the research carrier, this paper explores the influencing factors of media dependence, and points out that in the new media environment, the reason why the audience depends on the media is the process of interaction of many factors. Zhu Qinghe and Zhang Junhui 's Media Dependence of Grassroots Culture and its Social Utility explained the phenomenon of media dependence from a multidisciplinary perspective. Sun Li pointed out in Research on Social Media Dependence from the Perspective of Youth Subculture that the emergence of media allows individuals to gain identity, and can quickly find groups with their own youth subcultures to achieve communication and gain a sense of belonging. Therefore, youth groups are prone to the phenomenon of media dependence. In The Phenomenon of Social Media Dependence from the Perspective of Media Ecology, Nie Ying analyzes and discusses why audiences rely on social media from the perspective of media ecology, and points out that the key to avoiding media dependence is to build a sound media literacy. Liu Zhensheng in the Social Media Dependence and Media needs Research-Taking College Students ' Weibo Dependence as an Example, through quantitative investigation, found that there is a general community among college students.

2.3 Questions raised

Through literature review, it can be seen that the academic research on media dependence has achieved fruitful results, and the research objects are also diverse. However, in the search and reading of the literature, the author found that the literature on the phenomenon of group media dependence with smart home as the main object is still relatively limited. Therefore, this paper chooses the phenomenon of ' group dependence on smart home ' as the research object, in order to make a meaningful exploration in this direction.

Therefore, this article will try to answer the following questions from the perspective of media dependence: Will the quasi-social interaction between users and smart homes have an impact on users' loneliness? Will it enhance users' loneliness? Will users have a strong dependence on the media?

3 Research methods

This paper adopts the research methods of questionnaire survey and interview. Through questionnaire survey, it analyzes and screens out whether the user's quasi-social interaction with smart home will affect the user's loneliness from the perspective of media dependence. Through quantitative research, this paper tries to analyze and demonstrate the degree of quasi-social interaction between users and smart homes, and whether the quasi-social interaction between

users and smart homes will have an impact on users' loneliness?

3.1 Questionnaire survey method

3.1.1 Hypothesis establishment

Based on the above problems, the corresponding hypothesis is proposed here:

H1: The degree of quasi-social interaction between users and smart home is proportional to their loneliness.

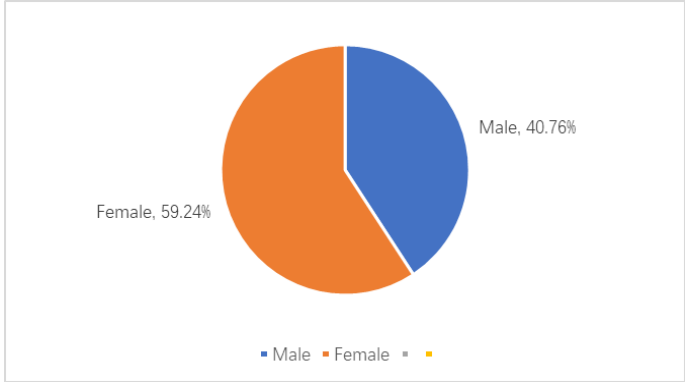
H2: Media dependence has a significant positive impact on loneliness.

In order to prove the hypothesis, this paper adopts the questionnaire survey method to sample the whole and make the questionnaire. Through Internet sampling, the researchers finally obtained 175 valid samples, with a pass rate of 25.5%. The questionnaire was compiled through the questionnaire star data platform and used its management platform for data distribution and storage. After deleting the samples with the same IP and answering for extreme (too short or too long) samples, 175 samples were finally obtained.

The completion rate of Internet sampling survey is relatively low, and the specificity of smart home is not high. The completion rate of this questionnaire is not high. Other sampling methods also have the problem of low completion rate. For example, the response rate of CATI method of PPS sampling is also very low. It should be noted that this paper adopts non-probability sampling with convenient operation, short time and relatively low cost, because non-probability samples can meet the purpose of this study, that is, to explore the relationship between variables. Coupled with the influence of factors such as capital and implementation difficulty and the influence of factors such as implementation difficulty, it is necessary to find a balance between the scientificity and feasibility of the research sampling method. Therefore, this study studies non-probabilistic samples by issuing online questionnaires.

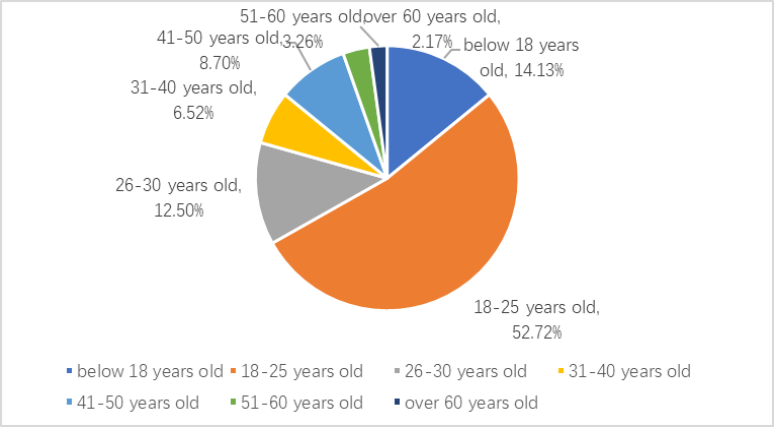
1.Statistical analysis of the basic situation of respondents

Table1 Gender



According to the questionnaire survey, the gender distribution of men and women is relatively balanced, with women accounting for 59.24% and men accounting for 40.76%.

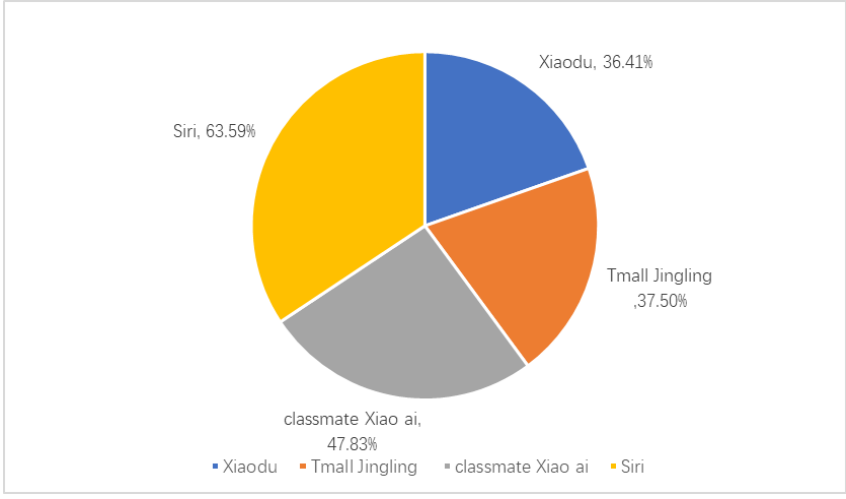
Table 2 Age



According to the data analysis, most of them are young people aged 18-25 years old, accounting for 52.73% of the sampled users, followed by the group under 18 years old, accounting for 14.13% of the total user group. The proportion of users aged 26-30 years old is slightly lower than that of users under 18 years old, which is 12.5%, followed by users aged 41-50 years old, accounting for 8.7%, 31-40 years old users accounted for 6.52%, a very small number of 51-60 years old group, and over 60 years old group, accounting for 3.26% and 2.17% respectively.

2.Statistical analysis of the use of smart home robots

Table 3 Use Categories

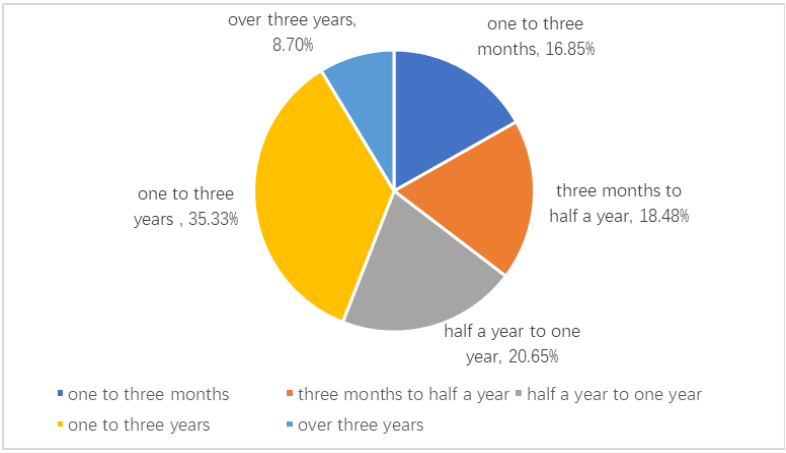


From the questionnaire, it can be found that the proportion of mainstream smart homes in the market is relatively average. Among them, the use of siri accounts for 63.59% of the total user group, classmate Xiaoai account for 47.83% of the total user group, Tmall Jingling account for

37.5%, and Xiaodu account for 36.41%.

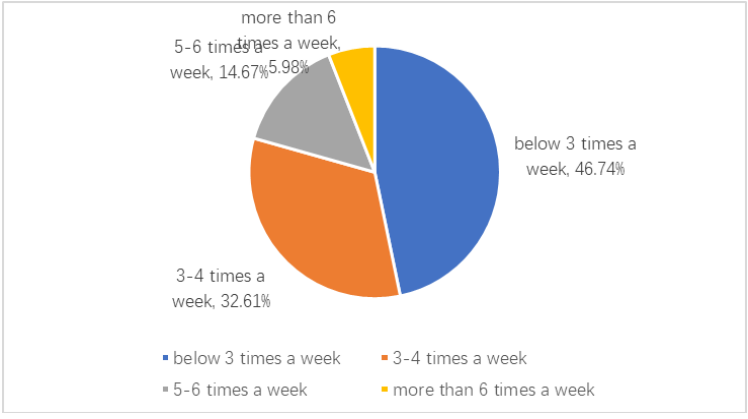
3.Use time

Table 4 Durable Hours



35.33% of the users used for 1-3 years, 20.65% for half a year to 1 year, 18.48% for three months to half a year, 16.85% for one to three months, and 8.7% for more than 3 years.

Table 5 Frequency of use



According to the questionnaire, 46.74% of them are less than 3 times a week, 32.61% are 3-4times a week, 14.67% are 5-6 times a week, and 5.98% are more than 6 times a week.

4 Research findings and discussion points

4.1 The dependence of smart home robots is significantly related to the duration of use

The single factor anova test compares the mean values of the samples to determine whether

there is a difference in the mean value of the population represented by the samples. If the difference is significant, it can prove that different factors have an impact on the test indicators. Because the observation variables such as loneliness and the basic use of smart home robots are mostly categorical variables and discontinuous, it is impossible to use correlation analysis and regression analysis to verify their relationship with the dependence of smart home robots. Therefore, this section uses single-factor anova analysis to test the dependence of smart home robots on loneliness and the difference in basic use.

For the measurement of loneliness, the researchers selected the items of the widely used Loneliness Scale (third edition) of D.Russell to measure the loneliness of smart home robot users. UCLA Loneliness Scale (UCLA Loneliness Scale, University of California at Los Angels) was developed by Russell, Peplau and Cutrona in 1980 according to the feelings of life.

Table 6 Dependence on smart home robots

Description								
Dependence on smart home robots								
	Number of casesv	mean value	Standard deviation	Standard error	95 % confidence interval of the mean		mini-mum value	maxi-mum value
					Lower limit	Upper limit		
one to three months	31	14.58	4.233	.760	13.03	16.13	6	25
three month to half a year	34	15.65	2.473	.424	14.78	16.51	10	21
half a year to one year	38	14.45	2.390	.388	13.66	15.23	9	18
one to three years	65	14.94	2.461	.305	14.33	15.55	6	21
over three years	16	12.50	3.464	.866	10.65	14.35	7	17
grand total	184	14.70	2.987	.220	14.26	15.13	6	25

Table 7 Smart home robot dependence anova analysis

ANOVA					
Dependence on smart home robots					
	quadratic sum	degree of freedom	mean square	F	significance
groups	114.495	4	28.624	3.374	.011
interclass	1518.462	179	8.483		
grand total	1632.957	183			

Through data analysis, it can be seen that the dependence of smart home robots is significantly related to the length of use. With the increase of the length of use of smart home, the greater the dependence on smart home robots.

Eliza, the world 's first chat robot, did not understand the true emotions and meanings behind the user 's words when it came out. She can only process the text and match the sentences as a response, or repeat the words of the other party as an interpretation. However, people still show more enthusiasm and trust than the designers expected (Weizenbaum, 1966). In the process of interaction with smart home robots, human users ' essentially lonely self-talk has become a form of being listened to. To a certain extent, users regard smart home robots as a projection of self-expression.

As smart home robots become more and more perfect in terms of personalized features and functions, smart home robots perform more and more emotional labor in line with human psychological expectations in accordance with predetermined procedures and rules. Users will unconsciously default that smart home robots really produce sympathy and compassion. As a media character, the smart home robot is similar to the actor who uses the props to preset the image, just for the good performance effect. Human users may also forget that smart home robots only express emotions under rules and fall into a deeper dependence on social robots. According to the public data released by Microsoft Bing China, the top ten words that humans say to Xiao Bing include ' Do you like me ', ' I love you ', ' I 'm out of love, comfort me ' and ' How about no girlfriend ' and many other emotional words. When smart home robots replace people for emotional labor, users may be overindulged in cheap and easy-to-get virtual relationships to eliminate loneliness, resulting in social consequences of collective escape from real relationships.

4.2 Loneliness was significantly correlated with the frequency of equipment use

Table 8 Degree of loneliness

Description								
Degree of loneliness								
	Number of cases	mean value	Standard deviation	Standard error	95 % confidence interval of the mean		mini-mum value	maximum value
					Lower limit	Upper limit		
below 3 times a week	86	5.16	1.510	.163	4.84	5.49	2	10
3-4 times a week	60	6.03	1.221	.158	5.72	6.35	3	8
5-6 times a week	27	5.74	1.196	.230	5.27	6.21	3	8

more than 6 times a week	11	5.18	1.401	.423	4.24	6.12	3	8
grand total	184	5.53	1.418	.105	5.33	5.74	2	10

Table 9 Anova analysis of loneliness degree

ANOVA Degree of loneliness					
	quadratic sum	degree of freedom	mean square	F	significance
groups	29.329	3	9.776	5.199	.002
interclass	338.476	180	1.880		
grand total	367.804	183			

Through data analysis, it can be seen that the more devices are used, the higher the frequency of use of the device, the higher the loneliness. People project their desire to talk to a smart home robot that can communicate with him in time to obtain timely feedback, but at the same time, the user himself understands that the smart home robot is an emotionless machine, so the feeling of loneliness is gradually increasing.

Sherry Turkle, a social psychologist at Massachusetts Institute of Technology, has long been concerned about the relationship between people and technology. Teckel believes that all socialized robots will know how to perform a caring performance on human beings. The social robots created by human beings are becoming the other of equal interaction with human beings. Social robots are playing the role of friends, family members and even lovers. However, social robots that express emotions according to rules and carry out emotional labor cannot bring real friendship to human beings. According to Professor Turkel, the warmth, care and listening shown by social robots are particularly valuable and true when the relationship between people is increasingly alienated. This kind of warmth, care and listening will even make human users selectively ignore that social robots have no consciousness at all and do not really understand our fundamental weaknesses. The degree of users ' quasi-social interaction with social robots will increase, and the degree of media dependence will further deepen. With the rapid development of technology, after the smart home robot replaces human beings into the field of emotional labor, the entire human emotional communication has become the object of robot emotional labor. How to avoid real emotions being wrapped into digital and algorithmic production platforms, and how to avoid the calculated human emotions as raw materials for capital proliferation is worth pondering.

4.3 The degree of quasi-social interaction between users and smart home is proportional to their loneliness.

The results show that both research hypotheses are verified. First, the degree of quasi-social

interaction between users and smart home robots has a significant negative impact on loneliness, and the H1 hypothesis is established ; second, the user 's media dependence has a significant positive impact on loneliness, and the H2 hypothesis is established. The above chart data show that the masking effect of the model is obvious, and the positive coefficient of quasi-social interaction on loneliness through media dependence path is much larger than the direct negative coefficient. That is, the quasi-social interaction between users and social robots has a significant positive impact on loneliness through the masking effect of media dependence.

The masking effect was originally used to refer to a phenomenon in which people's senses are weakened under the interference of the external environment. In academic research, the main effect of the influence between two variables is weakened by the 'masking variable'. According to the judgment method of MacKinnon et al. (Mackinnon, Krull & Lockwood, 2000) on the mediating effect and the suppressing effect, the results of this study show that the user's quasi-social interaction has a weakening effect on loneliness, but the media dependence has a masking effect on this negative effect, and on the whole, it shows a positive effect. That is to say, the higher the degree of quasi-social interaction between users and smart home robots, the more media dependence they will have on social robots, which will deepen users' loneliness.

5 Conclusion

This paper makes a cross-sectional study on the quasi-social interaction between users and smart home robots through questionnaires. Although the immediacy of the survey makes the theoretical starting point of this study quasi-social interaction, but the long-term use of smart home robot users have largely formed a more stable quasi-social relationship with the smart home robot. The media dependence of smart home robots affects human social practice and social interaction behavior, and also brings some problems worthy of further attention.

First of all, the wide application of smart home robots has extended the development space of quasi-social interaction theory. There are two paradigms in the study of quasi-social interaction theory : deficiency paradigm and global-use paradigm. The defect paradigm proposes that the quasi-social interaction between media figures and audiences can make up for and replace the shortcomings of interpersonal communication in real life. The general paradigm emphasizes that quasi-social interaction is a universal experience. Whether the audience is satisfied with the real social relationship, it is possible to carry out quasi-social interaction with media figures. Studies have shown that the degree of individual quasi-social interaction is not proportional to loneliness (Schiappa, Allen & Gregg, 2007). Similar research results make the general paradigm more acceptable in later studies.

Secondly, the deepening media dependence on smart home robots may lead to the commercial and political manipulation of user emotions. The conclusion of this paper shows that media dependence on smart home robots will significantly positively affect users ' loneliness. In the book " group loneliness, " Teckel mentioned the warning phenomenon brought by this special emotional expression of human beings : ' Today we have seen that people insist on returning the original robot they sent to repair, rather than choosing another copy '. If human beings are based on loneliness.

References

[1]. Horton, D., & Richard Wohl, R. (1956). Mass communication and para-social interaction: Observations on intimacy at a distance. psychiatry, (03), 215-229.

[2]. McQuail, D. (1984). With the benefit of hindsight: Reflections on uses and gratifications research. Critical Studies in Media Communication, (02), 177-193.

[3]. Gleich, U. (1997). Parasocial interaction with people on the screen. New horizons in media psychology: Research cooperation and projects in Europe, 35-55.

[4]. Klimmt, C., Hartmann, T., & Schramm, H. (2006). Parasocial interactions and relationships. Psychology of entertainment, 291-313.

[5]. Gong Xinqiong. (2011).Relationship, conflict, integration-understanding the three dimensions of media dependence theory. Contemporary communication, (06), 28-30.(in Chinese)

[6]. Feng Juxiang. (2012). Performance and characteristics of 'media dependence '.Modern audiovisual (10), 22-26.(in Chinese)

[7]. Huang Juanjuan. (2016). Media dependence of audiences in the context of social networks - Based on the perspective of media ecology. Young journalists, (09), 86-87.(in Chinese)

[8]. Zhang Qian. (2015). Exploring the influencing factors of audience media dependence fromthe perspective of social environment - taking social media ' Zhihu ' as an example. Journalism Research Guide, (15), 193+303.(in Chinese)

[9]. Zhu Qinghe and Zhang Junhui. (2013). Media dependence and social utility of ' grassroots culture '. Modern communication, (06), 16-20.(in Chinese)

[10]. Sun Li. (2016).Research on social media dependence from the perspective of youth subculture. Southeast communication, (03), 32-34.(in Chinese)

[11]. Nie Ying. (2015). Social media dependence from the perspective of media ecology. Dongyue Luncong, (02), 189-192.(in Chinese)

[12]. Liu Zhensheng. (2013). Social Media Dependence and Media Needs - A Case Study of College Students ' Weibo Dependence. University of Journalism, (01), 119-129.(in Chinese)

[13]. Russell, D., Peplau, L. A., & Cutrona, C. E. (1980). The revised UCLA Loneliness Scale: concurrent and discriminant validity evidence. Journal of personality and social psychology, (03), 472.

[14]. MacKinnon, D. P., Krull, J. L., & Lockwood, C. M. (2000). Equivalence of the mediation, confounding and suppression effect. Prevention science, (01), 173-181.