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ORIGINAL RESEARCH

The Relationship between Internet Game Addiction and Sense of Meaning in Life of Adolescents: A Latent Profile Analysis

Shaoyong Ma[1,2], Yuqing Lu[3], Haijun Zhang[4], Jing Zhou[4], Jing Wang[1], Qingsong Sang[1]

[1]School of Education Science, Anhui Normal University, Wuhu, 241002, People's Republic of China; [2]School of Nursing, Wannan Medical College, Wuhu, 241002, People's Republic of China; [3]The Audit Department, Wannan Medical College, Wuhu, Anhui, 241002, People's Republic of China; [4]School of Public Health, Wannan Medical College, Wuhu, Anhui, People's Republic of China

Correspondence: Qingsong Sang; Jing Wang, Email s7210qs1@mail.ahnu.edu.cn; Wjpsy@126.com

Purpose: To investigate the heterogeneity of adolescents' (college students) sense of meaning in life, and explore the relationship between the potential categories of Life sense of meaning and Internet game addiction.

Methods: A total of 1544 adolescents were assessed with the Sense of Meaning in Life Scale and Internet Game Addiction Scale. The subtypes were analyzed by latent profile analysis, and the related factors of the subtypes of sense of meaning in life were explored by logistic regression analysis.

Results: (1) There were three subtypes of adolescents' sense of meaning in life: the lack of life sense (7.00%), the pursuit of life sense (49.40%), and the positive life sense (43.60%). Among them, the pursuit of the sense of meaning in life is more universal. (2) There is a significant difference in the subtypes of adolescents' sense of meaning in life of Internet game addiction, which is manifested as the lowest incidence of adolescents' Internet addiction with positive sense of meaning in life, the middle incidence of adolescents' Internet game addiction with the pursuit of sense of meaning in life, and the highest incidence of adolescents' Internet game addiction without sense of meaning in life.

Conclusion: Adolescents' sense of meaning in life is characterized by heterogeneity and is closely related to online game addiction. This study further clarified the differences in online game addiction among adolescents with different subtypes of sense of the meaning in life, and provided an empirical basis for the promotion of the sense of meaning in life. At the same time, it also provides an empirical basis for the prevention and intervention of internet game addiction according to the subtype characteristics of sense of meaning in life.

Keywords: sense of meaning in life, internet game addiction, potential profile analysis, adolescent

Introduction

Human life has biological properties and social properties. Its biological properties determine that survival is its primary need, while its social properties determine that its need is not only limited to survival but trying to explore the significance of life. The discussion on the sense of meaning in life is an ancient and new topic. The sense of meaning in life (MIL) refers to the subjective experience of individuals to understand and understand the meaning of their life, and realize their goals, tasks, or missions and values in life.[1] A great deal of research.[2,3] It indicates that the sense of meaning in life has an important positive effect on individuals. It not only can have a positive impact on the individual's psychology and behavior, and promote mental health, but also promotes individuals to be more positive, optimistic, and full of hope for the future. Individuals with a high sense of meaning in life have a stronger social adaptability, and will actively seek for the sense of meaning in life when facing difficulties to buffer the pressure of difficulties, while individuals without the sense of meaning in life experience more loneliness and anxiety, and enhance the experience of stress,[4] are more likely to seek improper behavior to alleviate the pressure of the dilemma. Individuals who lack meaning in life lack life goal, existence, and meaning. They tend to show more negative emotions, such as emptiness, boredom,

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anxiety, depression, and even increase the risk of suicide.[5,6] The Frankl (1967) study showed that 40% of European students had reported that life lacked a sense of meaning, while 81% of American students felt that life was aimless and lacked meaning. The research by Li Xu and Lu Qin[7] pointed out that 52.1% of Chinese college freshmen did not have a clear sense of meaning in life. The research by Ye Youhao and others[8] also shows that 29.8% of the students in a certain university in China obviously lack the sense of meaning in life. China National Mental Health Development Report (2021–2022) shows that the scores of current college students on the scale of ownership significance are lower than 531 college students in 2008[9] and in the search for meaning dimension score higher. A higher score on the seeking meaning scale seemed to suggest that current college students felt more confused about the sense of meaning in life.[10]

The current situation of adolescents' sense of meaning in life reflects the lack of attention to life education and life value. However, the current research on adolescents' sense of meaning in life is mostly conducted in the way of variable center, which groups them at the group level based on the overall subject scores, ignoring the differences of subjects on each item of the variable and unable to systematically capture the heterogeneity of the development of the research subject group, that is, different characteristics of sense of meaning in life may exist among individuals.[11] College students are the key stages of individual development, because of family of origin, study and life, interpersonal relationships, employment pressure, and other issues resulting in their hearts constantly produce conflicts. College students' self-identity is still in the development stage. When being impacted by their internal friction and the external pressure at the same time, they are easily lost in self-identity, lack of sense of meaning in life, even self-injury, violence, and other social problems. Erikson believes that in the stage of self-identity development, individuals are in the contradiction of chaotic roles and will continuously explore the value that is of great significance to them to show the outside world in a stable and unified image. Individuals in this stage have a lot of thinking and exploration on the sense of meaning in life. Therefore, this study attempted to explore the potential pattern characteristics of college students' sense of meaning in life with the individual as the center, in order to provide reference for targeted promotion of college students' sense of meaning in life and mental health promotion.

According to Maslow's hierarchical needs theory, the need for self-realization is a component of the basic needs of individuals. Maslow believes that individuals constantly overcome themselves in the pursuit of self-realization, pursue their own value, and obtain the sense of meaning in life, and the need for the sense of meaning in life is the core of individual needs.[12] The sense of meaning in life is an individual's view on the sense of meaning in life ontology, which is a kind of psychological needs at a higher level.[13] In addition, the self-determination theory points out that the satisfaction of an individual's basic psychological needs is closely related to mental health,[13] and individuals with low basic needs are more likely to develop online game addiction.[14] The sense of meaning in life, as an individual's positive psychological resource, is a protective factor for online game addiction.[15] Internet game addiction disorder (IGD), also known as Internet gaming disorder, refers to individuals who cannot control, excessively or obsessively play internet games, and prioritize them over other routine activities, such as eating, sleep, and so on,[16] which has been included in the WHO released ICD-11[17]。 Studies have shown that Internet game addiction has various negative effects on individuals, such as insomnia and emotional maladjustment,[18] which can reduce adolescents' emotional intelligence, damage interpersonal relationships, affect academic performance, and lead to behavioral problems. At the same time, it is also a risk factor for anxiety, depression, impaired social function, and even suicidal ideation and behavior.[19,20]

Frankl believed that if individuals lacked the perception of the meaning of being alive, they would fall into the emptiness of being, and then produced such problems as depression, attack addiction, and so on.[21] The sense of meaning in life is divided into the dimension of having the sense of meaning in life and the dimension of pursuing the sense of meaning in life,[22] high pursuit of meaning in life to some extent indicates a higher sense of meaning in life. However, there are inconsistent views on the relationship between the sense of meaning in life and negative emotions.[23] It was pointed out that the search for sense of meaning in life was positively correlated with negative emotions such as sadness, anger, and depression, while life satisfaction and positive emotions were negatively correlated. According to the stress response theory, when individuals experienced such emotions as pressure and anxiety, in order to relieve such discomfort and pressure, they often used negative methods such as playing online games to get rid of the uncomfortable situation[24].

The differences in the results of existing studies on the sense of meaning in life may be due to the limitations of variable-centered statistical methods. Although a large number of studies [25–27]have shown that online game addiction is

closely related to college students' sense of meaning in life. However, the relationship mechanism between the two is still a "black box", and the complex mechanism between the two needs to be further explored. At present, most studies on the sense of meaning in life focus on variables, emphasizing the independence of each dimension while ignoring the interaction between the dimensions. The individual-centered Latent profile analysis (LPA) can effectively deal with the high-order interaction effect terms among the factors of sense of meaning in life.[25] It is convenient to investigate the types of sense of meaning in life, and individual differences or heterogeneity in the development of sense of meaning in life can be determined by potential categories.[26] Latent profiling can reveal the underlying structure in the data, thereby helping to understand the mechanisms and patterns behind the data and uncover potential connections between different variables. Therefore, this study adopts LPA to accurately classify the sense of meaning in life according to the scores of the subjects on each item of sense of meaning in life. On this basis, the relationship between online game addiction and potential categories of sense of meaning in life is further investigated, so as to deeply reveal whether the potential types of sense of meaning in life of adolescents are and how to predict online game addiction. In order to reduce the addictive behavior of online games and improve the sense of meaning in life according to the potential type characteristics of the sense of meaning in life, it provides specific and targeted guiding suggestions.

Methods

Participants

The convenient sampling method was used to select the university students in Anhui province as the study subjects. The inclusion criteria included ① full-time college students; ② Volunteer to participate in this survey; ③ No history of mental illness, and no history of taking psychiatric drugs. Exclusion criteria: ① students in the internship stage; ② Ask for leave or quit during the survey; ③ Incomplete questionnaires. A total of 1600 questionnaires were sent out, and 1544 were effectively collected, with an effective recovery rate of 96.5%. Among them, 614 (39.8%) were males and 930 (60.2%) were females. There were 543 freshmen (35.2%), 427 sophomores (27.7%), 222 juniors (14.4%), 352 seniors (22.8%). There were 1124 people (72.8%) from towns and villages and 420 people (27.2%) from cities. There were only 487 (31.5%) children and 1057 (68.5%) non-only children. There were 504 student cadres (32.6%) and 1040 non-student cadres (67.4%). The age distribution was 19.47±1.469 years. See Table 1. This study has been reviewed and approved by the Ethics Committee of the School of Nursing, Wannan Medical College (ethics approval number: LL-2022BH06).

Research Tools

Sense of Meaning in Life Scale (MLQ-10)

The sense of Meaning in Life Scale (MLQ) revised by Wang Xinqiang[28] was compiled by Steger et al.[1] Wang Mengcheng and Dai Xiaoyang[29] explored the applicability of the Meaning in Life Questionnaire (C-MLQ) in Chinese

Table 1 Demographic Characteristics of Study Subjects (n=1544)

Variable	Number of People (n)	Proportion (%)	Variable	Number of People (n)	Proportion (%)
Gender			Wether student cadre		
Male	614	39.8	Yes	504	32.6
Female	930	60.2	No	1040	67.4
Grade			Homeplace		
Freshmen	543	35.2	Towns or villages	1124	72.8
Sophomores	427	27.7	City	420	27.2
Juniors	222	14.4	Whether they are only children		
Seniors	352	22.8	Yes	487	31.5
			No	1057	68.5

college students. MLQ consists of 10 questions and has two factors, namely "MLQ-presence" and "MLQ-search", which are used to measure the existence level and pursuit degree of an individual's sense of meaning in life. The results of exploratory and confirmatory factor analysis show that the scale has good structural validity. The scale also has good aggregation validity and differentiation validity, and it has good applicability among college students.[26] MLQ uses a 7-scale Likert scale (1 = strongly disagree, 7 = strongly agree), with higher scores indicating higher levels of meaning in life. In this study, Cronbach's a coefficient of this scale was 0.82.

Internet Game Addiction Scale (IAT-11)

The online game Addiction Scale (IAT) compiled by Gentile, revised by Yu Chengfu et al,[30] was adopted. Research shows that the scale has good reliability and validity. And it has good applicability among Chinese college students.[25] The IAT consisted of 11 questions, using the 3-point scoring method, with 1 point for "never", 2 points for "sometimes", and 3 points for "often". The higher the score, the higher the degree of online game addiction, and according to the international online game addiction demarcation standard, if 5 or more symptoms of online game addiction are met, it is classified as addiction.

Statistical Analysis

This study used Mplus8.3 to conduct a potential categorical analysis of adolescents' sense of meaning in life. The scores of ten items on the Meaning in Life Questionnaire (MLQ) were used as explicit variables, starting from the initial model of meaning in life, and the number of potential categories was gradually increased until the optimal fitting model was found and classified. The evaluation indexes of model fitting include Eckek information criterion (AIC), Bayesian information criterion (BIC), and Adjusted Bayesian information criterion (aBIC) as information indexes, and the smaller the value, the better the fitting is.[31] As a classification index, Entropy ranges from 0 to 1. The closer the value is to 1, the more accurate the classification is; if the value is greater than 0.80, the accuracy of the model classification is greater than 90%.[32] LMRT and BLRT are statistical tests that compare models to determine the optimal number of classes for a model. Corrected likelihood ratio test (LMR) and BootSTEAP-based likelihood ratio test (BLRT) were used as the test indexes of likelihood ratio. When $P < 0.05$, k class models were superior to K-1 class models. In addition, the selection of the number of categories should take into account the proportion of subjects in each category, at least more than 1% of the total sample size.[33] After completing the potential category analysis, SPSS27.0 was used to conduct a single-factor analysis to explore the distribution differences of different potential categories of meaning in life in demographic variables. On this basis, multiple logistic regression analysis was used to explore the influencing factors of different categories of life meaning. Categorical variables are represented by use cases (%), and numerical variables are represented by M±SD. $P< 0.05$ was considered as a statistically significant difference.

Results

Common Method Deviation Test

The data collected in this study were self-reported by the subjects, so there is a possibility of common methodological bias. Harman single-factor test was used to test the common method bias of the data. The results show that there are four common factors with eigenroot value greater than 1, and the interpretation rate of the first common factor is 31.15%, which is lower than the critical standard of 40%, indicating that there is no obvious common method bias in this study. The data collected in this study were self-reported by the subjects, so there is a possibility of common methodological bias. Harman single-factor test[34] was used to test the common method bias of the data. The results show that there are four common factors with eigenroot value greater than 1, and the interpretation rate of the first common factor is 31.15%, which is lower than the critical standard of 40%, indicating that there is no obvious common method bias in this study.[34]

Potential Profile Analysis of College Students' Sense of Meaning in Life

Taking 10 items of the sense of life scale as explicit variables, 1~5 potential profile models were fitted successively. The model fitting index in Table 2 shows that AIC, BIC, and aBIC decrease with the increase in the number of categories, and

Table 2 Potential Profile Analysis and Fitting Information for Different Adolescents' Sense of Meaning in Life

Category	AIC	BIC	aBIC	Entropy	LMRp	BLRTp	Category Probability
C=1	54,376.55	54,483.39	54,419.86				
C=2	49,837.17	50,002.77	49,904.29	0.88	0.00	0.00	0.39/0.61
C=3	48,018.99	48,243.36	48,109.93	0.90	0.12	0.00	0.07/0.49/0.44
C=4	47,237.19	47,520.32	47,351.95	0.85	0.35	0.00	0.03/0.27/0.41/0.29
C=5	46,625.49	46,967.39	46,764.08	0.90	0.18	0.00	0.34/0.05/0.11/0.45/0.05

the entropy of models 1–5 is above 0.80 (the highest entropy of model 3 is 0.9), indicating that the accuracy of all models is good. However, since there is a potential category less than 5% in both the 4-classification and 5-classification models, combined with the distribution of each type, it is found that there are categories with similar significance, and the 4-classification and 5-classification models are excluded. In addition, the practical significance of model 2 is not significant, and the LMR value of model 3 has not reached a significant level, but there is an obvious inflection point in model 3 combined with the decline of AIC, BIC, and aBIC in Figure 1, which proves that model 3 is superior to model 2.

In the multi-index decision of model selection, apart from statistical indicators, the practical significance of classification is also very important. Model 3 explains the data better and makes more sense in practical applications. The latent profile analysis diagram shows that the mean distribution of model 3 and the other two classes is significantly different in three dimensions. In addition, the BLRT test results of model 3 are significant, indicating that the classification model 3 is better than the classification model 2. Model 3 shows a better trend in entropy, AIC, BIC, aBIC, and other indicators, and has practical classification significance. Considering the model adaptation index and the interpretability of actual types, this study considers the three categories of models to be the best models.

The average potential category attribution probability of the potential categories (rows) to which the subjects were most likely to be classified was listed by the potential categories (columns). As shown in Table 3, the average probability of belonging for the three potential categories is above 0.90, and ranges from 94.8% to 96.2%. The results show that the discriminant power of the three models is more accurate. The details are shown in Table 3.

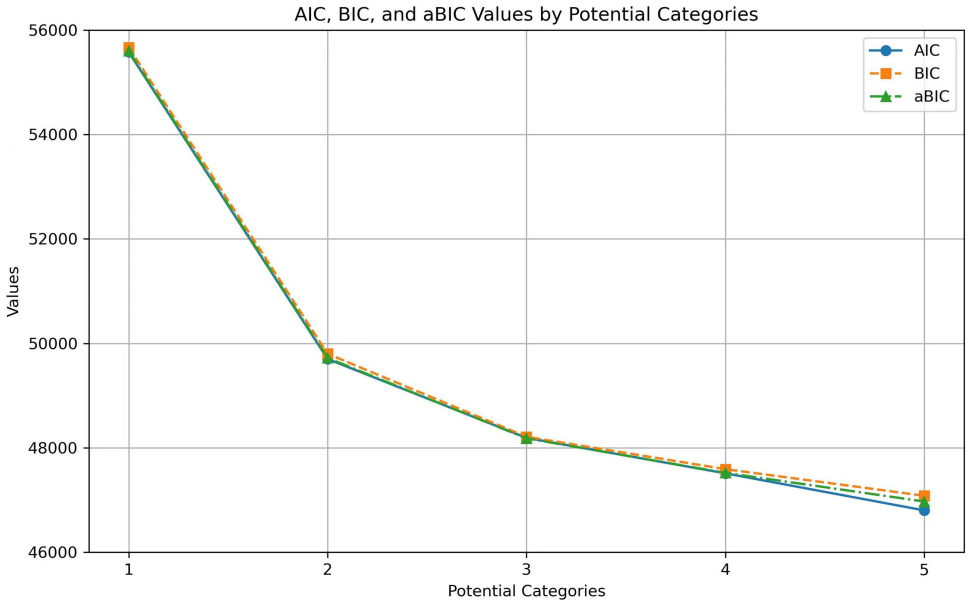

Figure 1 Fitting Potential Profile Model.

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Table 3 Average Attribution Probability of Each Potential Category (%)

Potential Categories	C2	C3
C1	0.049	0.000
C2	0.948	0.043
C3	0.038	0.962

Designation of Potential Categories of Adolescents' Sense of Meaning in Life

The distribution of scores of the three potential sections of adolescent life sense of meaning in each item of the life sense scale is shown in Figure 2. Nomenclature was made according to the scoring characteristics of each category. The scores of research object in C1 on each item were significantly lower than those of other categories except for a reverse scoring question, so it was named as "type lacking sense of meaning in life", involving 109 subjects (7.00%); C2 was higher than C1 but lower than C3 in score, and the score fluctuated greatly on each item. It was relatively stable in the sense of ownership title, while it scored higher in the pursuit of the above sense of meaning title. Hence, C2 was named as "the pursuit of life sense", with a total of 762 subjects (49.40%). C3 had the highest score, and C3 was higher than C1 and C2 in all items except for the ninth reverse score item, so this category was named as "positive sense of meaning in life type", involving 673 people (43.60%).

Univariate Analysis of Potential Categories of Adolescents' Sense of Meaning in Life

Based on the results of the above analysis of the potential characteristics of sense of meaning in life, this study further explored the effects of gender, age, grade, whether it was student cadre, relationship with roommates, relationship with parents, and parents' educational level on college students' sense of meaning in life. The results of the three potential profiles were taken as the dependent variable, and the above demographic information was taken as the independent variable. The chi-square test results are shown in Table 4. The results showed that among the above demographic variables, except for gender and age, the differences in other factors of college students' sense of life in different groups were statistically significant ($P < 0.05$).

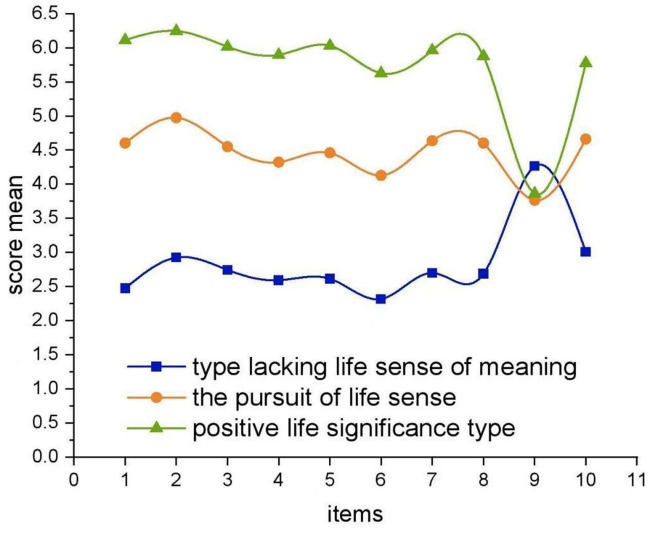

Figure 2 The Mean Scores of The Three Potential Categories of Adolescents' Sense of Meaning in Life on 10 Items.
Notes: The horizontal coordinate refers to the two dimensions of the sense of meaning scale. T2, T3, T7, T8, and T10 belong to the dimension of sense of meaning pursuit, while T1, T4, T5, T6, and T9 belong to the dimension of sense of meaning existence.

Table 4 A Single-Factor Analysis of The Potential Categories Affecting Adolescents' Sense of Meaning in Life (%)

Project	Potential Categories of the Sense of Meaning in Life				
	Lack of Sense of Meaning in Life	Search Sense of Meaning	Active Sense of Meaning in Life	x^2	*P*
Gender				1.363	0.506
Man	49 (8.0)	302 (49.2)	263 (42.8)		
Woman	60 (6.5)	460 (49.5)	410 (44.1)		
Grade				16.962	<0.05
Freshman	25 (4.6)	260 (47.9)	258 (47.5)		
Sophomore	29 (6.8)	230 (53.9)	168 (39.3)		
Junior	20 (9.0)	101 (45.5)	101 (45.5)		
Senior	35 (19.9)	171 (48.6)	146 (41.5)		
Student Cadre				15.168	<0.001
Yes	39 (7.7)	213 (42.3)	252 (50.0)		
No	70 (6.7)	549 (52.8)	421 (40.5)		
Relationship with Roommates				24.186	<0.001
Better	97 (6.5)	729 (49.0)	661 (44.5)		
Bad	12 (21.0)	33 (70.2)	12 (25.5)		
Relationship with Father				17.006	<0.001
Harmonious	98 (6.6)	732 (49.2)	658 (44.2)		
Not Harmonious	11 (19.6)	30 (53.6)	15 (26.8)		
Relationship with Mother				15.896	<0.001
Harmonious	101 (6.7)	739 (49.1)	665 (44.2)		
Not Harmonious	8 (20.5)	23 (59.0)	8 (20.5)		
Father's Education				37.526	<0.001
Illiterate	7 (22.6)	20 (64.5)	4 (12.9)		
Primary School	28 (9.4)	165 (55.4)	105 (35.2)		
Junior School	36 (5.8)	298 (47.8)	287 (46.0)		
High School or Technical Secondary School	31 (7.5)	183 (44.5)	197 (47.9)		
University or Above	7 (3.8)	96 (52.5)	80 (43.7)		
Mother's Education				17.685	0.024
Illiterate	11 (11.3)	58 (59.8)	28 (28.9)		
Primary School	33 (7.2)	236 (51.3)	191 (41.5)		
Junior School	31 (12.5)	276 (50.4)	241 (44.0)		

(*Continued*)

Table 4 (Continued).

Project	Potential Categories of the Sense of Meaning in Life				
	Lack of Sense of Meaning in Life	Search Sense of Meaning	Active Sense of Meaning in Life	x^2	*P*
High School or Technical Secondary School	25 (7.9)	139 (44.1)	151 (47.9)		
University or Above	9 (7.3)	53 (42.7)	62 (50.0)		
Age Bracket				4.748	0.093
≤20 years old	75 (6.6)	580 (50.9)	484 (42.5)		
≥21 years old	34 (8.4)	182 (44.9)	189 (46.7)		

The three potential categories of sense of meaning in life were taken as independent variables, and the total score of Internet game addiction was taken as a dependent variable for one-way analysis of variance. The results are shown in Table 5. The results showed that there were significant differences in the average scores of Internet game addiction among college students of different potential categories of sense of meaning in life (F=40.029, P<0.001) The difference between each two potential categories was statistically significant (P<0.001) in that Category 1 (M=18.20, SD=5.075) > Category 2 (M=16.68, SD=4.434) > Category 3 (M=15.06, SD=3.946).

Logistic Regression Analysis of Potential Categories of Adolescents' Sense of Meaning in Life

The three potential categories of sense of meaning in life were taken as dependent variables, and the variables with statistical significance in univariate analysis were taken as independent variables. The "pursuing the sense of meaning in life" was taken as the reference group for multi-distance logistics regression analysis. The assignment values of each variable were as follows: the dependent variable lacked sense of meaning in life type=1, the pursuit of sense of meaning in life type=2, and the positive sense of meaning in life type=3. The total score of internet game addiction is taken as a covariate; There was a significant negative correlation (P<0.001) between the relationship with father/mother (harmony=1, discord=2), father/mother education (illiteracy=1, primary school=2, junior high school=3, high school or technical secondary school=4, university or above=5) and the sense of meaning in life and Internet game addiction. The

Table 5 A One-Way ANOVA Analysis of Online Game Addiction in Adolescents With Different Potential Profile Categories of Sense of Meaning in Life

Project	Internet Game Addiction
Lack of the Sense of Meaning in Life	18.20±5.075
Pursuing the Sense of Meaning in Life	16.68±4.434
Positive Meaning in Life	15.06±3.946
F	40.029**
LSD	C1>C2**
	C1>C3**
	C2>C3**

Note: **P < 0.001.

specific manifestations were as follows: compared with the types that lacked the sense of meaning in life, the ones with higher total scores of Internet game addiction were more likely to be classified as lacking the sense of meaning in life (OR=1.095, P=0.001).

Compared with adolescents of the positive meaning in life type, the type with higher total scores of Internet game addiction was more likely to be classified to the type as pursuing the sense of meaning in life (OR=0.925, P<0.001). It indicated that the higher the total score of Internet game addiction was, the lower the sense of meaning in life would be. Compared with the type of lacking of the sense of meaning in life, the type of lacking life meaning that the father's educational level was illiterate OR in primary school, junior high school, senior high school, or technical secondary school was more likely to be classified as the type of lacking of the sense of meaning in Life ($OR_{illiteracy}$=5.372, $P_{illiteracy}$= 0.023; $OR_{primary\ school}$=3.854, $P_{primary\ school}$=0.018; $OR_{junior\ high\ school}$=2.961, $P_{junior\ high\ school}$=0.047; $OR_{high\ school\ or\ technical\ secondary\ school}$= 3.533; $P_{Senior\ high\ school\ or\ technical\ secondary\ school}$=0.014), and the mother's educational level of junior high school was more likely to be classified as the type of pursuing sense of meaning in life compared with the level of university or above (OR=0.304, P=0.024). Compared with the type of the positive meaning in life-seeking, the father with the educational level of junior high school, senior high school, or technical secondary school compared with the level of university or above ($OR_{junior\ high\ school}$=1.670, $P_{junior\ high\ school}$=0.027; $OR_{high\ school\ or\ technical\ secondary\ school}$=1.618; $P_{high\ school\ or\ technical\ secondary\ school}$=0.026) was more likely to be classified as the type of the pursuing the sense of meaning in Life. See Table 6.

Table 6 Logistic Regression Analysis of Potential Categories of Adolescents' Sense of Meaning in Life

Variable	*B*	*SE*	WaldX2	*P*	*OR*	95% CI	
						Lower Limit	Upper Limit
Lack of Sense of Meaning in Life (C1)							
Intercept	−0.216	1.210	0.032	0.858			
Internet Game Addiction	0.091	0.029	10.088	0.001	1.095	1.035	1.159
Father's Education							
Illiterate	1.681	0.737	5.199	0.023	5.372	1.266	22.787
Primary School	1.349	0.570	5.604	0.018	3.854	1.261	11.776
Junior School	1.086	0.546	3.958	0.047	2.961	1.016	8.629
High School or Technical Secondary School	1.262	0.511	6.099	0.014	3.533	1.298	9.620
University or Above					a*		
Mother's Education							
Illiterate	−0.952	0.640	2.213	0.137	0.386	0.110	1.353
Primary School	−0.991	0.547	3.282	0.070	0.371	0.127	1.084
Junior School	−1.190	0.526	5.126	0.024	0.304	0.109	0.852
High School or Technical Secondary School	−0.628	0.508	1.524	0.217	0.534	0.197	1.446
University or Above					a*		
	0.566	0.815	0.482	0.488	1.761	0.356	8.709
	1.990	0.976	4.156	0.041	7.319	1.080	49.613
	2.048	0.932	4.825	0.028	7.749	1.247	48.152

(*Continued*)

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Table 6 (Continued).

Variable	*B*	*SE*	WaldX2	*P*	*OR*	95% CI	
						Lower Limit	Upper Limit
	0.912	0.979	0.867	0.352	2.489	0.365	16.965
					a*		
Active Life Sense of Meaning (C3)							
Intercept	0.086	0.832	0.011	0.918			
Internet Game Addiction	−0.078	0.017	21.756	<0.001	0.925	0.896	0.956
Father's Education							
Illiterate	−0.910	0.616	2.183	0.140	0.403	0.120	1.346
Primary School	0.121	0.261	0.216	0.642	1.129	0.677	1.881
Junior School	0.513	0.233	4.863	0.027	1.670	1.059	2.634
High School or Technical Secondary School	0.481	0.216	4.981	0.026	1.618	1.060	2.470
University or Above					a*		
Mother's Education							
Illiterate	−0.680	0.361	3.538	0.060	0.507	0.250	1.029
Primary School	−0.446	0.282	2.498	0.114	0.640	0.368	1.113
Junior School	−0.497	0.267	3.477	0.062	0.608	0.361	1.026
High School or Technical Secondary School	−0.242	0.255	0.898	0.343	0.785	0.476	1.295
University or Above					a*		

Notes: The model was used as the reference "to explore the sense of meaning in life (C2)"; C1 was lack of life sense and C3 was positive life sense. a* is the reference group.

Discussion

In this study, the potential profile analysis was used to explore the potential categories of adolescents' sense of meaning in life, and the correlation between online game addiction and the potential categories of sense of meaning in life was further analyzed. The results of this study have proven from the side that the sense of meaning in life of adolescents is not a single feature with high or low level, but a multidimensional trait, which can be divided into the lack of life meaning type, the pursuit of life meaning type, and the positive life meaning type. The profile types are basically consistent with those obtained in previous studies.[35] This study shows that compared with those who lack meaning of life and those who seek meaning of life, the high score of online game addiction is more likely to be classified as lack of meaning of life; Compared with the positive meaning of life, the high score of online game addiction is more likely to be classified as the meaning of life seeker. The study further confirmed the correlation between the sense of meaning of life and online game addiction, and further demonstrated the correlation between the multidimensional qualitative differences between individuals and different online game addiction scores. The results are consistent with those of Huang Shihua et al.[25]

Adolescent Life Sense of Meaning Three Categories of Classification Model

The differences in individual psychological characteristics are not only reflected in the differences in level but also in structure.[36] Potential profile analysis inherits the "person-centered" statistical thought of traditional potential category analysis and focuses on heterogeneity among individuals, which can not only depict quantitative differences among

individuals more accurately but also summarize multidimensional qualitative differences among individuals.[37] This study examined the subtypes of adolescents' sense of meaning in life from an individual-centered perspective with the level of life meaning as the index and analyzed the relationship between internet game addiction, parents' educational level, and the subtypes of life meaning. The study found that adolescents' sense of meaning in life was divided into three subtypes: "lacking sense of meaning in life (7.0%)", "pursuing sense of meaning in life (49.4%)" and "positive sense of meaning in life (43.6%)". This is basically consistent with the results of Ma Chao et al's study[35] on the heterogeneous characteristics of high school students' sense of meaning in life. This study showed that the scores of subtypes of adolescent life sense of meaning were significantly different in life sense of meaning, which better reflected the heterogeneity characteristics of life sense of meaning.

The Potential Classification Characteristics of Adolescents' Sense of Meaning in Life

Among them, the types of seeking for life sense of meaning and positive life meaning were more common in the group, while the type of lacking life sense of meaning was the minority in the youth group, accounting for only 7.0% of the subjects. The scores on the 10 items of life sense of meaning in this group were much lower than those of the other two types of subjects except the item "I don't have a clear goal in life", which indicated that although this group still had certain life goals, it not only lacked the perception of life sense but also lacked the motivation to actively seek life sense. The scores of positive life sense in all the items of life sense except for the life goal item were significantly higher than those of the lacking sense and pursuing sense. This type of life sense had a higher level of meaning, and both the experience of life meaning and the seeking of life meaning were at a higher level.

The type of seeking for life meaning was in the middle of the three types in the score of life meaning, and its score fluctuated slightly on each item, while its score was higher on the item of seeking for life meaning, which indicated that it had strong motivation to actively seek for the sense of meaning in life. This study showed that the types of pursuing life meaning and positive life meaning accounted for the vast majority of the subjects (93%), indicating that most of the life meaning of college students as a whole was at a high level, which to some extent reflected the attention paid by the society and colleges to the mental health of college students, especially the attention paid to life education for college students. But it should also be noted that 49.4% of the subjects for the 'pursuit of life sense of meaning type', the overall level of life sense of meaning is higher, but in the search for meaning subscale has a higher score, according to the 'China National Mental Health Development Report' which seems to suggest that the current college students feel more confused about the sense of meaning in life.[10]

In addition, this study found that the groups of three subtypes of sense of meaning in life had lower scores in the clarity of life goals, indicating the confusion of college student groups on life goals, which also confirmed the above discussion by Fu Xiaolan et al[10] to a certain extent. It is suggested that colleges and universities should pay attention to the establishment of college students' life goals and improve the clarity of life goals when conducting the course teaching of mental health education and career planning, design theme education activities to help college students understand life planning, and clarify the planning value to establish positive life goals.

The Relationship Between Potential Categories of Adolescents' Sense of Meaning in Life and Internet Game Addiction

The results of this study showed that there were significant differences in the level of Internet game addiction among adolescents with different subtypes of sense of meaning in life, and the sense of meaning in life had a significant negative correlation with Internet game addiction, which was similar to that of Kaya[15] The results of the study are consistent. The level of online game for adolescents who lacked the sense of meaning in life was the highest, while the level of Internet game addiction for adolescents with the positive sense of meaning in life was the lowest. The sense of meaning in life was closely related to addiction tendency and addictive behavior,[38] the level of sense of meaning in life is a protective factor of internet game addiction. The pursuit of the sense of meaning in life is an integral part of the basic psychological needs of individuals. According to the self-determination theory, when the basic needs of individuals are not met, internet game addiction is more likely to occur,[14] lack of sense of meaning in life type individuals tend to play online games to

promote the need to meet, although there are studies have shown that adolescents in online games to find the presence and sense of meaning,[39] but excessive online games can also make this kind of exploration is more uncomfortable, and may lead to the occurrence of Internet game addiction.[40]

Other studies have shown that boredom, negative emotions, and other experiences are the main components of the lack of meaning in life.[41] According to stress buffering theory, the lack of sense of meaning in life makes individuals more vulnerable to stress,[42] when individuals face the pressure situation, will produce negative emotions such as anxiety, may use negative coping styles such as addictive behavior to escape from the pressure situation.[24,43] According to the compensatory network usage theory, one can surf the internet in order to escape from reality or relieve negative emotions.[44] And boredom and negative emotions lead to individuals being more prone to addiction tendency or behavior.[45] Individuals who lack the sense of meaning in life lack the experience of life meaning and the power to pursue life meaning, so they tend to meet their own needs through online games, and form the tendency or behavior of Internet game addiction. Individuals with a positive sense of meaning in life tend to experience what they value and pay attention to those achievements in real life. The individual with high sense of meaning in life has more power to pursue the sense of meaning in life, which will increase the pursuit of the sense of meaning in life,[46] make the individual tend to focus on creating the sense of meaning in life in real life, abandon the persistent and meaningless online behavior.[47]

This study explores the potential types of meaning of life and its relationship with online game addiction, and deepens the research on the heterogeneity of meaning of life and the influencing factors of online game addiction. Some studies[48] pointed out that individuals can seek the sense of meaning of life through the establishment of social relations, so as to enhance the sense of meaning of life. Maslow[49] also believed that individuals would have some kind of "peak experience" in the process of pursuing self-realization. It is an important source of the sense of gain and value, and is conducive to improving the sense of meaning of life. The above studies all show that the sense of meaning of life can be improved. This study provides a basis for the enhancement of the sense of meaning of life, and provides a new perspective for the identification and intervention of adolescents' online game addiction.

The findings suggest that adolescents' sense of meaning of life is obviously heterogeneous, and targeted intervention strategies should be carried out according to specific types when enhancing their sense of meaning of life. For groups lacking sense of meaning of life, it is necessary to enhance the motivation to seek meaning of life while improving their experience of meaning of life. Experience and pursuit of the sense of meaning of life "double wheels" to promote the continuous and stable improvement of the sense of meaning of life; For groups seeking meaning of life, we should pay attention to the impact of negative emotions on the meaning of life experience. Therefore, we should appropriately strengthen the intervention of meaning of life experience, enhance meaning experience, and improve the overall level of meaning of life. According to the scores of lack of meaning of life, pursuit of meaning of life and positive meaning of life subtypes, we should carry out special activities related to life goals for these three subtypes.

Studies have shown that loss of meaning in life is an important cause of online game addiction.[50] Sense of meaning of life negatively predicts Internet addiction in adolescents,[51] and the results of this study are consistent with the above research results. Individuals with low sense of meaning in life lack internal life goals and motivation to pursue life meaning, lead an empty life, and tend to use addictive activities to reduce the sense of meaninglessness and emptiness, which leads to addictive behaviors.[30] This study provides a new perspective for the intervention of online game addiction through the enhancement of the sense of meaning in life. In addition, the results of this study show that the three subtypes of sense of meaning of life are significantly negatively correlated with online game addiction, and the individuals who lack sense of meaning of life have the highest level of Internet addiction. Therefore, when carrying out intervention for online game addiction, not only the influence of sense of meaning of life but also the types of sense of meaning of life should be considered. Therefore, according to the subtype characteristics of the sense of meaning of life, we can develop multiple targeted intervention strategies for online game addiction.

Compliance With Ethical Standards

All the methods were performed in accordance with the Declaration of Helsinki. The study was approved by the Ethical Committee of school of Wannan Medical College. Informed consent was obtained from all individual participants included in the study.

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The authors report no conflicts of interest in this work.

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