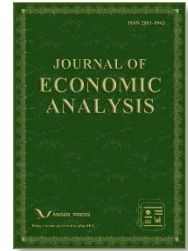




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Analysing younger online viewers' motivation to watch video game live streaming through a positive perspective

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ABSTRACT

The paper focuses on younger online viewers' motivation to watch video game live streaming on live streaming platforms. Unlike existing scholars, it analyses younger online viewers' watching motivation through a positive perspective and draws on the Play-Others-Downtime theory (P-O-D theory) and the motivation theory to establish the research model. By analysing 397 samples based on the variance-based structural equation modelling and partial least squares path modelling (SEM-PLS), the results present that younger viewers' entertainment, social and leisure purposes positively affect their watching motivation. Control variables (i.e., gender, education background, and income level) demonstrate insignificant effects across the model. Considering the influence of the COVID-19 pandemic, watching video game live streaming is essential entertainment and social activities for younger adults. Future studies should identify the positive impact of video game live streaming and guide younger viewers to participate appropriately in this activity.

KEYWORDS

Younger online viewer; Video game live streaming; the COVID-19 pandemic; the P-O-D theory; Watching motivation

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1. Introduction

As the online broadcast industry improves, video game live streaming as a kind of real-time video social media has become popular among online users. Various live streaming platforms, such as Twitch, YouTube Gaming, Douyu and Huya, integrate traditional broadcasting and online gaming features (Zhang & Hjorth, 2019). Online viewers can interact with live streamers through bullet-screen, gift-sending system and group chat functions, and their using experiences are significantly different from traditional social media platforms (L. Li & Kang, 2022b; L. Li, Kang, Feng, & Zhao, 2022). Based on the video streaming function on live streaming platforms, live streamers can present their game skills, and online viewers can discuss their performances in real time. Given this novel interactive model, live streaming platforms attract a huge user base. For instance, the number of live streamers on Twitch has increased from 2 million to 3 million between 2017 and 2018 (R. Li, Lu, Ma, & Wang, 2021). In China, more than 500 million viewers watch live streaming content, and the live streaming market has researched 1995 billion by the end of 2021 (T. Chen, Peng, Yang, Cong, & Li, 2021). Meanwhile, under the normalization of epidemic prevention and control of COVID-19, video game live streaming can effectively avoid offline contact and meet people's entertainment needs (T. Chen et al., 2021). On game streaming platforms, online viewers are not limited to being audiences, and they can communicate with other participants and comment on games, satisfying their social and entertainment purposes (Y. Li, Wang, & Liu, 2020). Attracted by the advantages of video game live streaming, more and more online viewers have engaged in related activities.

The majority of active users in video game live streaming platforms are from the younger group that is between 18 and 30 years old. According to a Chinese video game live streaming industry report (2021), the number of online users will increase from 260 million to 390 million between 2018 and 2022, and more than 53.4% of users are between 18 and 30 years old (iResearch, 2021). On the Twitch platform, about 55% of online viewers are between 18 and 34 years old, and the average age is 21 years old (De Wit, Van der Kraan, & Theeuwes, 2020). Thus, it is significant for the study to focus on younger viewers and analyse their motivation to watch video game live streaming. Based on its characteristics, video game live streaming can bring both favourable and unfavourable effects to younger online viewers, which is ignored by existing studies. As live video streaming platforms for video games are gaining popularity, more and more scholars explore younger viewers' motivation based on adverse effects related to addictive use (Cabeza-Ramírez, Muñoz-Fernández, & Santos-Roldán, 2021). They tend to associate video game live streaming activities with younger groups' mental health problems and discuss their negative impacts. However, few of them discover younger viewers' watching motivation in a positive way, i.e. the entertainment and social features provided by the video game live streaming. As younger groups face more and more work pressure and study pressure, they need to use video streaming platforms to release their mental pressure and keep their work-life balance, especially during the COVID-19 pandemic. Therefore, video game live streaming can bring positive effects for younger online viewers.

Unlike previous studies, this paper draws on the Play-Others-Downtime theory (P-O-D theory) to design influencing factors and analyse the phenomenon in a positive way (Kang, 2014). The researcher applies the symbol of the dolphin and emphasises a healthy lifestyle for the younger group from three principles. Based on the P-O-D theory, the paper analyses younger viewers' watching motivation from Play, Others and Downtime aspects, which is ignored by existing literature. In the face of over-scheduled work pressure, younger groups can be guided to find a work-life balance from these three principles (Kang, 2014). According to the P-O-D theory proposed by Kang (2014), Play means entertainment purpose, Others refer to social purpose, and Downtime means leisure purpose. All of them are established based on younger groups' lifestyles and could be satisfied by watching video game live streaming. Still, none of the scholars draws on the theory and design influencing factors from these three aspects. Hence, it is significant for the current study to explore the relationships between the P-O-D influencing factors and younger viewers' video game watching motivation, contributing to theoretical framework. To narrow the research

gap, the research question is as follows: How do factors from Play, Others, and Downtime units affect younger viewers' motivation to watch video game live streaming?

Several theoretical and practical implications can be shown in the current study. Regarding the theoretical implication, the paper focuses on the favourable effects of video game live streaming and refers to the P-O-D theory to explore younger viewers' watching intention in a positive way. The innovative point is different from traditional user motivation research. Regarding the practical implication, the study presents the advantages of video game live streaming and discusses how the live streaming content assists younger viewers in releasing their mental pressure. The study results can help video game live streaming platform managers improve their technical functions and guide them to provide a more comfortable and healthier online environment for younger viewers. It would be beneficial to drive the development of the video game live streaming industry.

2. Literature review

2.1. Younger online viewer group

Younger viewers refer to the viewer group between 18 and 30 years old, and they are more familiar with live streaming content and more interested in video game content than other age groups. According to a Chinese video game live streaming industry report (2021), more than 53.4% of users are from the younger group, and approximate 66% of viewers spend more than 10 hours on video game live streaming content (iResearch, 2021). With the younger viewer population growing and their watching time increasing, most previous research explores younger viewers' motivation based on adverse effects related to addictive use and negative psychology, as Table 1 shows (Cabeza-Ramírez et al., 2021; Singh, Singh, Kalinić, & Liébana-Cabanillas, 2021). Few of them systematically analyse younger viewers' watching motivation from positive perspectives, such as releasing mental pressure, keeping a work-life balance, and building a social network with peers. Unlike other age groups, younger online viewers face the dual pressures of their studies and work and desperately need an activity to release stress. Meanwhile, because of the normalization of epidemic prevention and control, younger individuals are a vulnerable group for depression and anxiety (Benke, Autenrieth, Asselmann, & Pané-Farré, 2020). Influenced by the COVID-19 pandemic, younger people suffer from a higher prevalence of anxiety disorders and depressive symptoms than older people (Huang & Zhao, 2020). It should be concerned by related scholars. Unlike offline entertainment activities, video game live streaming can offer younger viewers an attractive approach to meeting their social and entertainment needs (T. Chen et al., 2021). Hence, video game live streaming can compensate for younger viewers' mental needs and reduces the risk of anxiety. In light of this, it is significant for the current study to focus on younger online viewer groups and discuss the advantageous influences of watching video game live streaming based on a theory.

Table 1. Summary of watching motivation literature.

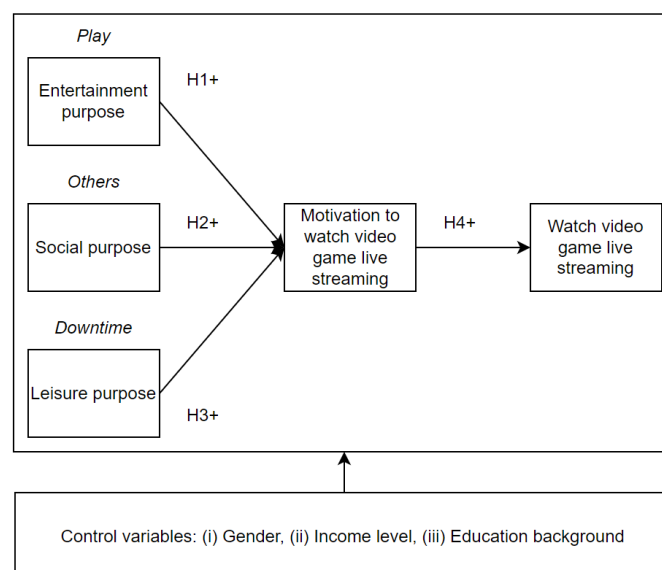
Perspective	Proposed opinion	Reference
Negative perspective	The addiction to heavy viewing	(Singh et al., 2021)
	Receiving hurtful comments or using the platforms to troll other users	(Cabeza-Ramírez et al., 2021)
	Escaping from the reality	(C.-Y. Chen & Chang, 2019)
Positive perspective	Turning a video game hobby into a professional opportunity	(Cabeza-Ramírez et al., 2021)
	Releasing stress	(Y. Li et al., 2020)
	Satisfying para-social experiences	(X.-Y. Xu, Niu, Jia, Nthoiwa, & Li, 2021)

2.2 Watching motivation based on the P-O-D theory

The P-O-D theory as a psychological theory can be utilised to guide individuals to improve their lifestyles, and it has been widely applied in the pedagogy area (Kang, 2014). Although this theory has guiding significance for studying individual behaviours, no research has applied it to study users' watching behaviours. Based on the P-O-D theory, the "P" means Play that can create new tracks in the emotional brain and satisfy individuals' entertainment purposes. This is because Play can allow the younger group to be comfortable with uncertain life environments and enhance their courage to face reasonable risks. Thus, Play is significantly related to younger online viewers' watching motivation and meets their entertainment purposes. Others (O) refer to the social network that is valued by human beings (Kang, 2014). Various interactive functions, such as video streaming function, virtual gift-sending system, and group chat function, satisfy online viewers' social purpose. According to the research proposed by Li et al. (2020), watching video game live streaming can provide younger viewers with an opportunity to interact with other audiences and engage in online game communities (Y. Li et al., 2020). The feeling of being part of a community can satisfy younger viewers' social purpose and increase their ties with others (Jibril, Kwarteng, Chovancova, & Pilik, 2019). The social purpose factor is vital for younger groups, especially during the COVID-19 lockdown period. Given the characteristics of live streaming interaction, younger viewers' social purpose can be satisfied. The "D" stands for Downtime. Most younger viewers face study and working pressure, which causes they are over-scheduled (Kang, 2014; Shanahan et al., 2022). Video game live streaming as interesting content could be helpful for younger viewers to release mental pressure and meet their leisure purpose. In light of this, based on the P-O-D theory, younger online viewers' watching motivation can be explored from entertainment purpose, social purpose and leisure purpose aspects, contributing to theoretical innovation.

In addition to applying the P-O-D theory, this study also draws on the motivation theory to present the relationship between influencing factors and younger viewers' watching motivation and behaviours. The motivation theory can be used to explain what drives people to achieve a particular outcome (Seifert, 2004). Although the population of younger viewers on live streaming platforms is proliferating, few scholars have applied the motivation theory to explore younger online viewers' watching motivation and behaviours and discuss them from a positive perspective (Cai, Wohn, Mittal, & Sureshababu, 2018). Given its theoretical basis, the motivation theory can be helpful in systematically displaying younger viewers' watching experiences and presenting how their watching motivations are affected by P-O-D influencing factors.

Figure 1. The research model.



3. Research model and hypotheses

The research model is established based on the P-O-D theory and the motivation theory, as Figure 1 shows. Unlike prior scholars, this paper refers to the P-O-D theory to design influencing factors and systematically analyse younger viewers' watching motivation from Play, Others and Downtime aspects (Kang, 2014). Meanwhile, to detailly show online viewers' video game watching experience, the study has applied the motivation theory to understand what drives an individual to watch video game live streaming on live streaming platforms (Seifert, 2004).

3.1 Effect of influencing factors

Entertainment purpose means younger online viewers get pleasure and delight while watching video game live streaming content (Bulo & Tumbuan, 2015). Video game live streaming is a form of online activity that can hold the attention and interest of younger online audiences. Unlike traditional social media platforms, comprehensive features of live streaming platforms can be convenient for them to participate in online activities (L. Li, Kang, Zhao, & Feng, 2022). Specifically, the streamers display exquisite game skills based on the live streaming function, and online audiences can watch and enjoy through this interactive process (Y. Li et al., 2020). Frequent interaction can meet online viewers' entertainment requirement. According to the survey developed by Gros et al. (2017), entertainment is the most basic motivation for online viewers to watch live streaming content (Gros, Wanner, Hackenholt, Zawadzki, & Knautz, 2017). Thus, to satisfy their entertainment purpose, younger online viewers will watch video game live streaming, and the paper proposes:

Hypothesis 1: Entertainment purpose positively affects younger online viewers' motivation to watch video game live streaming.

Social purpose refers to the objective of developing and maintaining relationships with other people (Boyd & Ellison, 2007). As internet-based social media platforms, video game live streaming platforms can build social networking and connect individuals with others. Live streamers can share their game strategies and chat with online viewers, and online viewers can express their opinions and reward live streamers (Y. Li et al., 2020). Affected by the COVID-19 pandemic, online communication and interaction on live streaming platforms satisfy online viewers' purpose of making friends. Therefore, video game live streaming platforms allow younger viewers to communicate with live streamers and other audiences, providing them with an opportunity to make friends and engage an online community, and the paper supposes:

Hypothesis 2: Social purpose positively affects younger online viewers' motivation to watch video game live streaming.

Leisure purpose means the aim to alleviate the stress of life and get a pleasant experience (Kleiber, Hutchinson, & Williams, 2002). As mentioned before, most younger adults face the dual pressures of study and work, resulting in mental anxiety and depression (Yin, 2022). According to the relevant statistics stated by Yin (2022), nearly 900,000 younger graduates have not found suitable jobs in 2020. Intangible employment stress significantly harms their mental health. Video game live streaming as a leisure activity for younger viewers has the potential to release their work pressure and relieve their negative emotions (Kleiber et al., 2002). Younger viewers can focus on the interesting gaming content and interact with other online viewers to release their mental tension. Considering its positive effect, the paper claims:

Hypothesis 3: Leisure purpose positively affects younger online viewers; motivation to watch video game live streaming.

Based on the motivation theory, individuals' motivation has a positive relationship with their final behaviours, which has been identified by existing studies (L. Li & Kang, 2023; L. Li, Kang, & Sohaib, 2021; Seifert, 2004). Therefore, younger online viewers' watching motivation has a positive impact on their watching behaviours, and

the paper posit:

Hypothesis 4: Younger online viewers' watching motivation positive affects them to watch video game live streaming.

3.2 Effect of control variables

The research model (see Figure 1) is established to test the hypotheses, and gender, income level and education background are included as control variables in this research. Existing scholars have identified that online viewers' watching motivation is affected by their gender, income level, and educational background (Lu & Chen, 2021; Lv, Zhang, Su, & Yang, 2022). Thus, the study needs to explore the potential effects of gender, income level and educational background.

4. Methodology

4.1 Research setting

This study utilises Chinese online viewers as samples and promotes an online survey among them. The online questionnaire method has many advantages for the current study, such as comprehensive coverage and uniformity (Rowley, 2014). Meanwhile, compared with other countries, Chinese video game live streaming commerce is improved rapidly, and many video game live streaming platforms, such as Douyu and Huya, have millions of online users (T. Wang, Chen, Ye, Lu, & Yu, 2022; Zhou, Zhou, Ding, & Wang, 2019). For example, the Douyu platform is one of the most popular video game live streaming platforms in China, and it attracts more than 159 million monthly active users (Jia, Rao, & Shen, 2021). Given its comprehensive functions, such as posting bullet screens, voting on the streams, and chatting during live streaming, the study decides to distribute online questionnaires among the online viewers from the Douyu live streaming platform. Based on the fast development of video game live streaming in China, the Chinese video game live streaming environment is chosen as the research context.

4.2 Measurement

All constructs measured in this paper are employed based on existing scholars. For instance, entertainment purpose is measured utilising three questions from Lee and Ma's research (2012), and leisure purpose is measured based on the study from Xu et al. (2012). In addition to basic information statistics, the main questionnaire content is shown in Table 2. To improve users' responses, the questionnaire form utilises the Likert 7-point scale (Dawes, 2008), ranging from the lowest score=1 to the highest score =7.

4.3 Data collection

Wjx.cn platform is chosen as the questionnaire design platform because its link can conveniently be forwarded to Chinese users, and it has academic design functions, which is proven by previous research (L. Li & Kang, 2022a; J. Wang et al., 2020). The invitation letter has been shown in advance to assist participants in understanding the research topic and questions. Meanwhile, since most Chinese participants are unfamiliar with English, scholars have translated the online questionnaire into Chinese. Furthermore, considering that different live streaming platforms have different features and functions, this study mainly focuses on online viewers who are from the Douyu platform to improve data quality. Between 1st July 2022 to 1st August 2022, 435 online questionnaires have been received from the Douyu platform users. Among these 435 questionnaires, inappropriate responses have been deleted, including the same responses, same IP address, incomplete responses, and mismatched platforms. Finally, 397

questionnaires are valid for this research, and the rate of return is 91.26%.

Table 2. The list of questionnaire contents.

Variable	Item	Measurement
Entertainment purpose (Lee & Ma, 2012)	EP1	It helps me pass the time.
	EP2	To combat boredom.
	EP3	Because it is entertaining.
Social purpose (Lee & Ma, 2012; C. Xu, Ryan, Prybutok, & Wen, 2012)	SP1	There is a sense of human contact.
	SP2	There is a sense of human warmth.
	SP3	To keep in touch with people.
Leisure purpose (C. Xu et al., 2012)	LP1	To have a good time.
	LP2	To enjoy the pleasure of interacting with people.
	LP3	Because it makes me feel less tense.
Motivation to watch video game live streaming (Lee & Ma, 2012)	ML1	I intend to watch video game live streaming.
	ML2	I expect to watch video game live streaming.
	ML3	I plan to watch video game live streaming.
Watch video game live streaming (C. Xu et al., 2012)	WL1	I often watch video game live streaming.
	WL2	As I use live streaming platforms, I often watch video game content.
	WL3	I engage in video game live streaming channels.

5. Data analysis

Regarding these 397 respondents (Table 3), all of them are between 18 and 30 years old. 50.88% are males, and 48.86% are females. Regarding participants' age, 34.87% are between 18 and 25 years old, 33.95% are between 26 and 40 years old, and 31.18% are more than 40 years old. Meanwhile, 33.49% have an income level between 0 and 5000 RMB, and 34.64% are between 5001 and 10000 RMB. Of their education background, 37.18% have a high school or junior college background, and 32.33% have a bachelor's. The demographic of respondents is similar to the online users' profiles of live shopping in China (O. Wang, Somogyi, & Charlebois, 2020).

Table 3. The basic information of respondents (N=397).

Demographic Variables	Category	Frequency	Percentage (%)
Gender	Male	202	50.88%
	Female	195	49.12%
Income level (RMB/ Monthly)	0-5000	121	30.48%
	5001-10000	157	39.55%
	≥10001	119	29.97%
Education background	High school or junior college	106	26.70%
	Bachelor's degree	184	46.35%
	Master's degree or above	107	26.95%

The research uses variance-based structural equation modelling (SEM) and partial least squares (PLS) path modelling based on SmartPLS 3.3.3 to analyse data and test the research model. PLS-SEM is reasonable for researchers to study measurement model parameters and calculate structural path coefficients (Chin, Marcolin, & Newsted, 2003). Meanwhile, SmartPLS 3.3.3 has the most comprehensive and improved functions to promote PLS-SEM analysis (Sarstedt & Cheah, 2019).

5.1 Measurement model

To check the measurement model, the study needs to be involved in evaluations of reliability, convergent

validity, and discriminant validity (Hair, Black, Babin, Anderson, & Tatham, 1998). According to the research of the author Chin (1998), three criteria, including average variance extracted (AVE), composite reliability (CR), and Cronbach's Alpha, need to be utilised to examine the reliability of the research model. For instance, Cronbach's Alpha should be greater than 0.70, CR should be higher than 0.70, and AVE should be greater than 0.50 (Chin, 1998). As Table 4 states, all data results meet the requirements, indicating acceptable reliabilities.

Table 4. The results of factor loadings, AVE, CR and Cronbach's Alpha.

Item	Indicator	Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
EP	EP1	0.975	0.965	0.977	0.934
	EP2	0.958			
	EP3	0.967			
LP	LP1	0.963	0.950	0.968	0.909
	LP2	0.933			
	LP3	0.964			
ML	ML1	0.953	0.945	0.965	0.901
	ML2	0.950			
	ML3	0.945			
SP	SP1	0.957	0.951	0.968	0.910
	SP2	0.952			
	SP3	0.954			
WL	WL1	0.966	0.963	0.976	0.931
	WL2	0.957			
	WL3	0.972			

Note: EP=Entertainment purpose, LP=Leisure purpose, ML=Motivation to watch video game live streaming, SP=Social purpose, WL=Watch video game live streaming

The convergent validity and discriminant validity need to be assessed by the confirmatory factor analysis. As Table 4 presents, the factor loadings within their intended constructs are highly correlated, showing that the measurement model meets the requirement of convergent validity and discriminant validity (Alkutbi, Alrajawy, Nusari, Khalifa, & Abuelhassan, 2019; Chin, 1998; N. Wang, Sun, Shen, & Zhang, 2018). Meanwhile, the range of marked items shown in Table 4 is from 0.933 to 0.975, which is significantly higher than 0.707. It indicates that the model meets the convergent validity (Wong, 2016). Furthermore, AVE can also be used to check the convergent validity. As Table 4 shows, the AVE results are higher than the proposed AVE value of 0.50, demonstrating the convergent validity of the model (Hair, Black, Babin, & Anderson, 2010).

In addition to the convergent validity, the discriminant validity can be tested by checking the Fornell-Larcker criterion. The AVEs' square root on the diagonals (Table 5) can be utilised to evaluate whether the discriminant validity of the model is acceptable (Chin, 1998; Fornell & Larcker, 1981). As shown in Table 5, the AVEs' square root on the diagonals is significantly higher than other correlations, meeting the discriminant validity requirement.

Table 5. Discriminant validity based on Fornell-Larcker criterion.

	EP	LP	ML	SP	WL
EP	0.967				
LP	0.838	0.954			
ML	0.826	0.867	0.949		
SP	0.854	0.908	0.867	0.954	
WL	0.872	0.906	0.856	0.909	0.965

Note: The diagonals represent the square root of AVE, and the lower cells represent the correlation among constructs.

5.2 Structural Model Evaluation

Regarding the model fitness, the paper applies the standardised root mean square residual (SRMR) and normed-fit index (NFI) as indicators. To be specific, SRMR values should be less than the threshold of 0.8, and NFI values need to be higher than the threshold of 0.8 (Asghar, Arif, Iqbal, & Seitamaa-Hakkarainen, 2022). For the current study. The SRMR is 0.064, which is lower than 0.08, indicating an acceptable fit (Kline, 2011). The NFI is 0.871, significantly higher than 0.8, indicating a proper model fit (Tabachnick & Fidell, 2001). Therefore, the research model has a good model fit.

Moreover, a common method variance (CMV) can be a problem because self-report questionnaires are used to promote data collection (Zainol, Yahaya, & Osman, 2018). Based on Hair et al. (2019) and Kock's research (2015), this study can use the score of variance inflation factor (VIF) to inspect the CMV (Hair, Risher, Sarstedt, & Ringle, 2019; Kock, 2015). The occurrence of a VIF higher than ten can be proposed as an indication of pathological collinearity, and it is also an indication that the research model may be contaminated by common method bias (Aminu & Shariff, 2014; Hair, Black, Babin, Anderson, & Tatham, 2010). According to the data analysis results, the VIF score for all constructs is between 1.023 and 6.957, and hence the study can present that there are no collinearity problems detected.

The variables and measurement items used in the analysis are adopted from previous research. This ensures reliability and validity. To further check the robustness, the paper has tested for non-linearity, and the quadratic effect is examined using the two-stage approach with 5000 bootstrapping two-tailed technique (Sarstedt et al., 2020). The results indicate that there is a significant quadratic relationship between all independent variables and the dependent variable, as Table 6 shows. This finding suggests that there is non-linearity in the relationship between the latent variables. Overall, these results provide valuable insights into the nature of the relationship between the variables and can inform future research in this area.

Table 6. Quadratic effect.

Path	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Quadratic Effect 1_EP-ML -> ML	-0.107	-0.108	0.035	3.075	0.002
Quadratic Effect 2_SP-ML -> ML	0.118	0.118	0.04	2.945	0.003
Quadratic Effect 3_LP-ML -> ML	-0.083	-0.083	0.037	2.265	0.024
Quadratic Effect 4_ML-WL -> WL	-0.131	-0.131	0.031	4.201	0.000

5.3 Description of Hypothesis Testing

To assess each path's significances and the t-statistical test, this paper utilises bootstrapping on SmartPLS 3.3.9 (Hair Jr, Hult, Ringle, & Sarstedt, 2016). First, as Table 7 presents, the bootstrapped results show that all three control variables (i.e., gender, education background, and income level) demonstrate insignificant effects across the models. According to Table 7, the hypotheses can be supported because t-statistics results are notably higher than 1.96 (Hair Jr et al., 2016). Specifically, entertainment purpose ($\beta=0.229$, $t=3.891$, $p<0.001$), social purpose ($\beta=0.342$, $t=5.225$, $p<0.001$) and leisure purpose ($\beta=0.365$, $t=5.630$, $p<0.001$) significantly affect younger viewers' motivation to watch video game live streaming, supporting Hypothesis1, Hypothesis2 and Hypothesis3. Meanwhile, younger viewers' watching motivation significantly influence them to watch video game live streaming ($\beta=0.848$, $t=64.049$, $p<0.001$), supporting Hypothesis 4.

6. Discussion and implications

6.1 Key findings

Table 7. Hypotheses results.

Path	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
EP -> ML	0.229	0.230	0.059	3.891	0.000
Educational level -> ML	0.003	0.004	0.021	0.129	0.897
Educational level -> WL	0.049	0.050	0.026	1.891	0.059
Income level -> ML	-0.025	-0.028	0.025	1.019	0.309
Income level -> WL	0.017	0.019	0.028	0.611	0.542
LP -> ML	0.365	0.360	0.065	5.630	0.000
ML -> WL	0.848	0.847	0.013	64.049	0.000
SP -> ML	0.342	0.345	0.065	5.225	0.000
gender -> ML	-0.016	-0.015	0.022	0.704	0.482
gender -> WL	-0.012	-0.014	0.027	0.452	0.652

Based on data analysis results, several key findings can be found. First, entertainment purpose as a Play factor significantly affects younger online viewers' motivation to watch video game live streaming. The research accords with prior studies that entertainment is the primary motivation for online viewers to use live streaming platforms. Second, social purpose from the others unit is important for online viewers while watching video game live streaming. Online social interaction provided by video game live streaming platforms can enhance connections with strangers and strengthen ties with peers. Third, leisure purpose as a Downtime factor positively affects online viewers' watching intention on live streaming platforms. Online viewers can reward live streamers through the gift-sending system and communicate game strategies with other audiences while watching video game live streaming. It satisfies younger viewers' leisure purposes. Furthermore, younger viewers' watching motivation positively affects them to watch video game live streaming. Finally, for younger online viewers, three control variables, including gender, education background, and income level, demonstrate insignificant effects across the relationships.

6.2 Theoretical and practical implications

Although the problematic use of video game live streaming has become an academic concern, almost none scholars systematically analyse younger online viewers' watching motivation in a positive way (Cabeza-Ramírez et al., 2021; C.-Y. Chen & Chang, 2019). Getting video game live streaming in perspective can help scholars understand it more fully and manage it appropriately. With the improvement of video game live streaming platforms, many younger online viewers are attracted by video game live streaming and tend to engage in related activities. In addition to focusing on its adverse impacts, the study should also consider its positive influence on younger viewers' mental health, such as releasing mental pressure, providing social opportunities, and keeping a work-life balance. Its positive impact is indispensable in younger viewers' daily life. Meanwhile, unlike previous literature, the paper starts from a psychological point of view and establishes the research model based on the P-O-D and motivation theories. It mainly focuses on younger online viewers' watching motivation and analyses influencing factors from three aspects, including Play, Others and Downtime units. It helps explain how younger online viewers' entertainment, social and leisure purposes are satisfied by watching video game live streaming, providing a new research perspective for future studies.

Regarding the practical implication, watching video game live streaming is essential for younger viewers while considering their actual situations. First, younger online viewers face the dual pressures of study and work unlike other age groups. A suitable entertainment activity can help them alleviate the stress of life and get a pleasant experience, which is beneficial for their mental health. Meanwhile, influenced by the COVID-19 pandemic, the younger group are at high risk for mental illness (Huang & Zhao, 2020). As an example, most offline social and entertainment activities have been cancelled by local governments, which disrupts younger adults' everyday lives.

According to the mental health survey designed by Huang and Zhao (2020), younger people suffer from a higher prevalence of anxiety disorders and depressive symptoms than older people. Unlike offline activities, watching video game live streaming can avoid offline contact and meet younger viewers' entertainment, social and leisure needs, especially during the normalization of epidemic prevention and control. Online viewers can maintain social relationships with peers and release mental stress through the video game live streaming activities. Therefore, future studies should accept the positive impact of video game live streaming and guide younger viewers to participate correctly in this activity.

6.3 Limitations and future study

It could be the first time to draw on the P-O-D theory to explore online viewers' watching motivation, and there would be some theoretical limitations while designing the research model. The P-O-D principle aims to focus on parenting skills in the field of psychology rather than user motivation. Meanwhile, it advocates that young people maintain a healthy life in a natural way rather than relying on electronic devices. Hence, future studies must keep examining the validity of the P-O-D theory, i.e., applying it to test other age groups' watching motivation or using it to focus on online users' other motivations. Furthermore, the study selects samples from the Douyu platform that might be different from the video game live streaming in Western countries, such as Twitch and YouTube Gaming. Considering the limitation of data collection, future studies should make comparisons between Eastern online viewers and Western online viewers and discuss the uniqueness between different platforms, providing specific managerial suggestions for platform managers.

7. Conclusion

Considering the rapid development of video game live streaming, the paper analyses younger online viewers' motivation to watch video game live streaming. Unlike existing studies, it draws on the P-O-D theory and the motivation theory to establish the research model, aiming to explain younger viewers' watching motivation in a positive way. Through the data analysis, the study demonstrates that watching video game live streaming can satisfy younger viewers' entertainment, social and leisure purposes. It is important entertainment for younger viewers during the COVID-19 pandemic. Therefore, future studies should identify the positive impact of video game live streaming and guide younger viewers to participate properly in this activity.

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Declaration of Competing Interest

The authors claim that the manuscript is completely original. The authors also declare no conflict of interest.

Reference

- Alkutbi, S., Alrajawy, I., Nusari, M., Khalifa, G. S., & Abuelhassan, A. E. (2019). Impact of Ease of Use and Usefulness on the Driver Intention to Continue Using Car Navigation Systems in the United Arab Emirates. *International Journal of Management and Human Science (IJMHS)*, 3(1), 1-9.
<https://ejournal.lucp.net/index.php/ijmhs/article/view/790>

- Aminu, I. M., & Shariff, M. N. M. (2014). Strategic orientation, access to finance, business environment and SMEs performance in Nigeria: Data screening and preliminary analysis. *European Journal of Business and Management*, 6(35), 124-132. <https://core.ac.uk/reader/234626040>
- Asghar, M. Z., Arif, S., Iqbal, J., & Seitamaa-Hakkarainen, P. (2022). Social Media Tools for the Development of Pre-Service Health Sciences Researchers during COVID-19 in Pakistan. *International journal of environmental research and public health*, 19(1), 581. <https://doi.org/10.3390/ijerph19010581>
- Benke, C., Autenrieth, L. K., Asselmann, E., & Pané-Farré, C. A. (2020). Stay-at-home orders due to the COVID-19 pandemic are associated with elevated depression and anxiety in younger, but not older adults: results from a nationwide community sample of adults from Germany. *Psychological Medicine*, 1-2. <https://doi.org/10.1017/S0033291720003438>
- Boyd, D. M., & Ellison, N. B. (2007). Social network sites: Definition, history, and scholarship. *Journal of computer-mediated Communication*, 13(1), 210-230. <https://doi.org/10.1111/j.1083-6101.2007.00393.x>
- Bulo, A. A., & Tumbuan, W. A. (2015). The Effect of Intrinsic and Extrinsic Motivation on Employee Performance at 21cinplex, Manado. *Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis dan Akuntansi*, 3(3). <https://doi.org/10.35794/emba.3.3.2015.9384>
- Cabeza-Ramírez, L. J., Muñoz-Fernández, G. A., & Santos-Roldán, L. (2021). *Video game streaming in young people and teenagers: Uptake, user groups, dangers, and opportunities*. Paper presented at the Healthcare. <https://doi.org/10.3390/healthcare9020192>
- Cai, J., Wohn, D. Y., Mittal, A., & Sureshababu, D. (2018). *Utilitarian and hedonic motivations for live streaming shopping*. Paper presented at the Proceedings of the 2018 ACM international conference on interactive experiences for TV and online video. <https://doi.org/10.1145/3210825.3210837>
- Chen, C.-Y., & Chang, S.-L. (2019). Moderating effects of information-oriented versus escapism-oriented motivations on the relationship between psychological well-being and problematic use of video game live-streaming services. *Journal of behavioral addictions*, 8(3), 564-573. <https://doi.org/10.1556/2006.8.2019.34>
- Chen, T., Peng, L., Yang, J., Cong, G., & Li, G. (2021). Evolutionary game of multi-subjects in live streaming and governance strategies based on social preference theory during the COVID-19 pandemic. *Mathematics*, 9(21), 2743. <https://doi.org/10.3390/math9212743>
- Chin, W. W. (1998). Commentary: Issues and opinion on structural equation modeling. In: JSTOR. <https://www.jstor.org/stable/249674>
- Chin, W. W., Marcolin, B. L., & Newsted, P. R. (2003). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. *Information systems research*, 14(2), 189-217. <https://doi.org/10.1287/isre.14.2.189.16018>
- Dawes, J. (2008). Do data characteristics change according to the number of scale points used? An experiment using 5-point, 7-point and 10-point scales. *International journal of market research*, 50(1), 61-104. <https://doi.org/10.1177/147078530805000106>
- De Wit, J., Van der Kraan, A., & Theeuwes, J. (2020). Live streams on twitch help viewers cope with difficult periods in life. *Frontiers in psychology*, 11, 586975. <https://doi.org/10.3389/fpsyg.2020.586975>
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, 18(1), 39-50. <https://doi.org/10.1177/002224378101800313>
- Gros, D., Wanner, B., Hackenholt, A., Zawadzki, P., & Knautz, K. (2017). *World of streaming. Motivation and gratification on Twitch*. Paper presented at the International conference on social computing and social media. https://doi.org/10.1007/978-3-319-58559-8_5
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis: International version*. New Jersey, Pearson. <https://doi.org/10.4236/oalib.1102796>
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. (2010). *Multivariate data analysis (7th editio)*. Harlow: Pearson Education Limited. <https://doi.org/10.4236/oalib.1102796>
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (1998). *Multivariate data analysis (Vol. 5)*: Prentice hall Upper Saddle River, NJ. <https://doi.org/10.4236/jhrss.2017.53017>
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European business review*. <https://doi.org/10.1108/EBR-11-2018-0203>
- Hair Jr, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). *A primer on partial least squares structural equation modeling (PLS-SEM)*: Sage publications. <https://au.sagepub.com/en-gb/oce/a-primer-on-partial-least-squares-structural-equation-modeling-pls-sem/book244583#preview>

- Huang, Y., & Zhao, N. (2020). Chinese mental health burden during the COVID-19 pandemic. *Asian journal of psychiatry*, 51, 102052. <https://doi.org/10.1016/j.ajp.2020.102052>
- iResearch. (2021). *2021 China Game Live Streaming Industry Research Report*. Retrieved from <https://report.iresearch.cn/report/202108/3829.shtml>
- Jia, A. L., Rao, Y., & Shen, S. (2021). *Analyzing and Predicting User Donations in Social Live Video Streaming*. Paper presented at the 2021 IEEE 24th International Conference on Computer Supported Cooperative Work in Design (CSCWD). <https://doi.org/10.1109/CSCWD49262.2021.9437676>
- Jibril, A. B., Kwarteng, M. A., Chovancova, M., & Pilik, M. (2019). The impact of social media on consumer-brand loyalty: A mediating role of online based-brand community. *Cogent Business & Management*, 6(1), 1673640. <https://doi.org/10.1080/23311975.2019.1673640>
- Kang, S. K. (2014). *The Dolphin Parent: A Guide to Raising Healthy, Happy, and Self-Motivated Kids*: Penguin Canada. [https://books.google.com.au/books?hl=en&lr=&id=T1n5AgAAQBAJ&oi=fnd&pg=PT9&dq=Kang,+S.+K.+\(2014\).+The+Dolphin+Parent:+A+Guide+to+Raising+Healthy,+Happy,+and+Self-Motivated+Kids:+Penguin+Canada.&ots=_nHEFSNwsU&sig=6ZdXK2DpeiRAVERHHvP_Vb4EEqM&redir_esc=y#v=onepage&q&f=false](https://books.google.com.au/books?hl=en&lr=&id=T1n5AgAAQBAJ&oi=fnd&pg=PT9&dq=Kang,+S.+K.+(2014).+The+Dolphin+Parent:+A+Guide+to+Raising+Healthy,+Happy,+and+Self-Motivated+Kids:+Penguin+Canada.&ots=_nHEFSNwsU&sig=6ZdXK2DpeiRAVERHHvP_Vb4EEqM&redir_esc=y#v=onepage&q&f=false)
- Kleiber, D. A., Hutchinson, S. L., & Williams, R. (2002). Leisure as a resource in transcending negative life events: Self-protection, self-restoration, and personal transformation. *Leisure sciences*, 24(2), 219-235. <https://doi.org/10.1080/01490400252900167>
- Kline, R. B. (2011). Principles and practice of structural equation modeling (3. Baski). New York, NY: Guilford. https://www.researchgate.net/profile/Cahyono-St/publication/361910413_Principles_and_Practice_of_Structural_Equation_Modeling/links/62cc4f0ed7bd92231faa4db1/Principles-and-Practice-of-Structural-Equation-Modeling.pdf
- Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of e-Collaboration (ijec)*, 11(4), 1-10. <https://doi.org/10.4018/ijec.2015100101>
- Lee, C. S., & Ma, L. (2012). News sharing in social media: The effect of gratifications and prior experience. *Computers in human behavior*, 28(2), 331-339. <https://doi.org/10.1016/j.chb.2011.10.002>
- Li, L., & Kang, K. (2022a). Impact of opportunity and capability on e-entrepreneurial motivation: a comparison of urban and rural perspectives. *Journal of Entrepreneurship in Emerging Economies*(ahead-of-print). <https://doi.org/10.1108/JEEE-06-2022-0178>
- Li, L., & Kang, K. (2022b). Understanding the real-time interaction between middle-aged consumers and online experts based on the COM-B model. *Journal of Marketing Analytics*, 1-13. <https://doi.org/10.1057/s41270-022-00196-1>
- Li, L., & Kang, K. (2023). Why ethnic minority groups' online-startups are booming in China's tight cultural ecosystem? *Journal of Entrepreneurship in Emerging Economies*, 15(2), 278-300. <https://doi.org/10.1108/JEEE-08-2021-0322>
- Li, L., Kang, K., Feng, Y., & Zhao, A. (2022). Factors affecting online consumers' cultural presence and cultural immersion experiences in live streaming shopping. *Journal of Marketing Analytics*, 1-14. <https://doi.org/10.1057/s41270-022-00192-5>
- Li, L., Kang, K., & Sohaib, O. (2021). Investigating factors affecting Chinese tertiary students' online-startup motivation based on the COM-B behaviour changing theory. *Journal of Entrepreneurship in Emerging Economies*(ahead-of-print). <https://doi.org/10.1108/JEEE-08-2021-0299>
- Li, L., Kang, K., Zhao, A., & Feng, Y. (2022). The impact of social presence and facilitation factors on online consumers' impulse buying in live shopping—celebrity endorsement as a moderating factor. *Information Technology & People*(ahead-of-print). <https://doi.org/10.1108/ITP-03-2021-0203>
- Li, R., Lu, Y., Ma, J., & Wang, W. (2021). Examining gifting behavior on live streaming platforms: An identity-based motivation model. *Information & Management*, 58(6), 103406. <https://doi.org/10.1016/j.im.2020.103406>
- Li, Y., Wang, C., & Liu, J. (2020). A systematic review of literature on user behavior in video game live streaming. *International journal of environmental research and public health*, 17(9), 3328. <https://doi.org/10.3390/ijerph17093328>
- Lu, B., & Chen, Z. (2021). Live streaming commerce and consumers' purchase intention: An uncertainty reduction perspective. *Information & Management*, 58(7), 103509. <https://doi.org/10.1016/j.im.2021.103509>
- Lv, X., Zhang, R., Su, Y., & Yang, Y. (2022). Exploring how live streaming affects immediate buying behavior and continuous watching intention: A multigroup analysis. *Journal of Travel & Tourism Marketing*, 39(1), 109-135. <https://doi.org/10.1080/10548408.2022.2052227>
- Rowley, J. (2014). Designing and using research questionnaires. *Management Research Review*. <https://doi.org/10.1108/MRR-02-2013-0027>

- Sarstedt, M., & Cheah, J.-H. (2019). Partial least squares structural equation modeling using SmartPLS: a software review. *Journal of Marketing Analytics*, 7(3), 196-202. <https://doi.org/10.1057/s41270-019-00058-3>
- Sarstedt, M., Ringle, C. M., Cheah, J.-H., Ting, H., Moisescu, O. I., & Radomir, L. (2020). Structural model robustness checks in PLS-SEM. *Tourism Economics*, 26(4), 531-554. <https://doi.org/10.1177/13548166188239>
- Seifert, T. (2004). Understanding student motivation. *Educational research*, 46(2), 137-149. <https://doi.org/10.1080/0013188042000222421>
- Shanahan, L., Steinhoff, A., Bechtiger, L., Murray, A. L., Nivette, A., Hepp, U., . . . Eisner, M. (2022). Emotional distress in young adults during the COVID-19 pandemic: evidence of risk and resilience from a longitudinal cohort study. *Psychological Medicine*, 52(5), 824-833. <https://doi.org/10.1017/S003329172000241X>
- Singh, S., Singh, N., Kalinić, Z., & Liébana-Cabanillas, F. J. (2021). Assessing determinants influencing continued use of live streaming services: An extended perceived value theory of streaming addiction. *Expert Systems with Applications*, 168, 114241. <https://doi.org/10.1016/j.eswa.2020.114241>
- Tabachnick, B. G., & Fidell, L. S. (2001). *SAS for windows workbook for Tabachnick and Fidell using multivariate statistics*: Allyn and Bacon. https://books.google.com.au/books/about/SAS_for_Windows_Workbook_for_Tabachnick.html?id=Bh1uzgEACAAJ&redir_esc=y
- Wang, J., Jing, R., Lai, X., Zhang, H., Lyu, Y., Knoll, M. D., & Fang, H. (2020). Acceptance of COVID-19 Vaccination during the COVID-19 Pandemic in China. *Vaccines*, 8(3), 482. <https://doi.org/10.3390/vaccines8030482>
- Wang, N., Sun, Y., Shen, X.-L., & Zhang, X. (2018). A value-justice model of knowledge integration in wikis: The moderating role of knowledge equivocality. *International Journal of Information Management*, 43, 64-75. <https://doi.org/10.1016/j.ijinfomgt.2018.07.006>
- Wang, O., Somogyi, S., & Charlebois, S. (2020). Food choice in the e-commerce era: a comparison between business-to-consumer (B2C), online-to-offline (O2O) and new retail. *British Food Journal*. <https://doi.org/10.1108/BFJ-09-2019-0682>
- Wang, T., Chen, T., Ye, Z., Lu, Y., & Yu, H. (2022). *The Comprehensive Comparison of Huya Live and Twitch*. Paper presented at the 2022 2nd International Conference on Enterprise Management and Economic Development (ICEMED 2022). <https://doi.org/10.2991/aebmr.k.220603.199>
- Wong, K. K.-K. (2016). Mediation analysis, categorical moderation analysis, and higher-order constructs modeling in Partial Least Squares Structural Equation Modeling (PLS-SEM): A B2B Example using SmartPLS. *Marketing Bulletin*, 26. http://marketing-bulletin.massey.ac.nz/V26/MB_v26_T1_Wong_2016.pdf
- Xu, C., Ryan, S., Prybutok, V., & Wen, C. (2012). It is not for fun: An examination of social network site usage. *Information & Management*, 49(5), 210-217. <https://doi.org/10.1016/j.im.2012.05.001>
- Xu, X.-Y., Niu, W.-B., Jia, Q.-D., Nthoiwa, L., & Li, L.-W. (2021). Why do viewers engage in video game streaming? The perspective of cognitive emotion theory and the moderation effect of personal characteristics. *Sustainability*, 13(21), 11990. <https://doi.org/10.3390/su132111990>
- Yin, L. (2022). From Employment Pressure to Entrepreneurial Motivation: An Empirical Analysis of College Students in 14 Universities in China. *Frontiers in psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.924302>
- Zainol, Z. B., Yahaya, R., & Osman, J. (2018). Application of relationship investment model in predicting student engagement towards HEIs. *Journal of Relationship Marketing*, 17(1), 71-93. <https://doi.org/10.1080/15332667.2018.1440143>
- Zhang, G., & Hjorth, L. (2019). Live-streaming, games and politics of gender performance: The case of Nüzhubo in China. *Convergence*, 25(5-6), 807-825. <https://doi.org/10.1177/1354856517738160>
- Zhou, J., Zhou, J., Ding, Y., & Wang, H. (2019). The magic of danmaku: A social interaction perspective of gift sending on live streaming platforms. *Electronic Commerce Research and Applications*, 34, 100815. <https://doi.org/10.1016/j.elerap.2018.11.002>