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Design and validation of a conceptual model for children's continuance intention to use video apps

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Abstract

Video apps are widely used by children worldwide. However, concerns have been raised about children's personal data disclosure and privacy risks during their consumption of video apps. This study designed and validated a conceptual model for children's continuance intention to use video apps based on privacy calculus theory and Teen Online Safety Strategies (TOSS) parental mediation framework. A cross-sectional survey of 321 Chinese middle school-aged children (aged 12–14) was conducted to validate the model. Our findings revealed that children's perceived risk had a minimal association with their perceived value. Children's perceived benefit was positively associated with their perceived value, which was positively associated with their continuance intention to use video apps. Trust also contributed to children's continuance intention to use video apps, slightly positively moderated by restrictive parental mediation. This study provided a better understanding of children's perception of privacy, trust and value in consuming video apps and identified the potential role of related parental mediation. To mitigate children's privacy risks and to enhance children's digital literacy as well as digital autonomy, we proposed some recommendations to video app designers, parents and educators. The study appeals to a more transparent and child-centred approach in designing video apps, a mixed parental mediation for facilitating children's video app usage, and educators' empowering children's autonomy in online privacy protection by improving children's digital skills and competencies.

KEYWORDS
children, continuance intention, early adolescent, parental mediation, privacy calculus, video apps

INTRODUCTION

Watching videos on video apps has become one of the most popular online activities for children worldwide. For example, according to Pew Research Center's report (2023), 95% of American teenagers (aged 13 to 17) have used YouTube in 2023. Ofcom's report indicated that TikTok had become one of the most popular video apps among UK children aged 8–15 (Ofcom, 2024). In China, more than half of middle and high school students (aged 12–18) are using diverse video apps, including Douyin,[1] Bilibili, Tencent Video and iQIYI (Su, 2022).

Along with the growing popularity, video apps are attracting increased criticism from scholars and the public due to their invasion of children's data and privacy (Chen et al., 2022). Children are being either consciously or unconsciously recorded and analysed by algorithms embedded in video apps. Their data are even further shared through APIs with other third-party developers, enabling service providers to improve and monetise products (Boeschoten et al., 2022; Zhang & Han, 2022). According to China Youth Net (2022), 86% of Chinese children (under 18) have reported their experience of disclosing personal information on the Internet.

Information breaches, oversharing of information, geo-tagging and hacking of social media accounts may exacerbate the threat to children's online privacy, leading to cyberbullying, cybercrime and other cybersecurity risks (Quayyum et al., 2021). Excessive personal data sharing could enable platforms to influence or even manipulate children's behaviours and content consumption (Zhao et al., 2022). For example, DouYin has profiled its users, nudging users toward certain content such as idealized images that might have negative impacts on the body satisfaction of young girls (Maes & Vandenbosch, 2022).

To deal with these issues, some political entities have released regulations. For example, the European Parliament and Council of the European Union (2016) issued the General Data Protection Regulation (GDPR) in 2016. The National People's Congress of The People's Republic of China (2021a, 2021b) has issued Data Security Law of China (DSL) and Personal Information Protection Law (PIPL) in 2021. DSL and PIPL set rules on web service providers, restricting them from collecting and processing personal information of children under 14 without guardians' legal consent and strictly banning children under 16 from accessing livestream shopping services without parental consent.

Early adolescence (a developmental stage between the ages of 10 and 15), marks children's transition from childhood to adulthood and this phase witnesses increased smartphone ownership, increased engagement with online video platforms and decreased parental intervention (Ofcom, 2022; Wisniewski et al., 2022). However, early adolescents may not comprehend privacy risks fully and their ability to recognize online privacy risks remains inadequate (Dennen et al., 2020; Livingstone et al., 2019; Livingstone & Olafsson, 2018; Wang, Zhang, & Wang, 2022). For example, a previous study found that teenagers aged 12–14 in Belgium had incomplete or inaccurate understandings of how and why their personal information was collected for commercial purposes (Holvoet et al., 2022). Studies by Livingstone et al. (2018) and Wang, Zhao, et al. (2022) also found that early adolescents were aware of their data collected by social media and related privacy issues, while they had no idea about how others would use their data.

Given the continuance usage of video apps among children and associated privacy risk issues, investigating the factors impacting children's continuance intention to use video apps

from a privacy perspective may provide parents, educators and child-centred app designers valuable insights about how to safeguard children's online safety in the digital society. Continuance intention refers to users' intention to continuously use a particular product, service or technology over time (Yan et al., 2021). Consumers' continuance intention to use a certain product would precisely predict their actual usage behaviour (Chen et al., 2012).

Privacy calculus theory is a well-established theory concerning the risk–benefit trade-off, and it was applied in diverse research contexts for adult consumers (Kang & Namkung, 2019). Culnan and Armstrong (1999) first coined the term 'privacy calculus' and proposed a privacy calculus model to describe individuals' willingness to disclose information and its influential factors. The model consists of three independent factors, that is perceived risk, perceived value and perceived benefit. Perceived risk is customers' perception of uncertainty of some potential outcome (Bauer, 1967). Perceived value is consumers' overall assessment of the utility of the products they pay for and receive (Zeithaml, 1998). Perceived benefit refers to the perception of the positive consequences caused by a specific action (Leung, 2013).

Some scholars applied the privacy calculus model in cross-sectional research to explore high school students' self-disclosure on social media (Wang et al., 2023) and children's (aged 10–20) attitudes toward data protection on social media (De Wolf et al., 2023). Notably, Zhou and Liu (2023) collected survey data from 1538 Chinese high school students and found that perceived privacy risk had significant positive effects on their online privacy protection behaviours, mediated by information privacy concerns. Previous research also found that perceived privacy invasions and risks significantly negatively related to users' intention to continue using a product (Zhu & Chang, 2016), while the perceived benefit positively predicted users' intention to use a product (Schulte et al., 2022).

To understand professionals' intentions and attitudes about using video conferencing apps, Sandhu et al. (2023) extended the privacy calculus model by adding mobile users' information privacy concerns (MUIPC), trust, technicality, ubiquity and social presence. Privacy concerns refer to individuals' apprehensions that their private data may be collected, used and unpredictably handled by others on digital platforms (Işıkay, 2021). MUIPC is a second-order construct of privacy concerns that includes three first-order constructs, that is perceived surveillance, perceived intrusion and secondary use of personal information. The extended model provided useful insights regarding professionals' continuance intention to use video conferencing technologies.

Unlike adults, children's media usage behaviours and attitudes toward privacy are deeply influenced by parental mediation (De Leyn et al., 2022; Shin & Kang, 2016). Parental mediation moderates the effect of children's perceived privacy risk on privacy disclosure behaviours in social media consumption (Kang et al., 2022). To protect teens' (aged 13–19) online safety through a teen-centred perspective, Wisniewski (2018) proposed the Teen Online Safety Strategies (TOSS) parental mediation framework. The framework incorporates both parental mediation strategies and teens' self-regulation strategies. According to the framework, parental mediation of children's online safety could be categorized into three types: (1) monitoring: passively observing a teen's online activities; (2) restriction (restrictive parental mediation): placing rules and limits on a teen's online activities; and (3) active mediation: discussing with teens regarding their online activities (Wisniewski, 2018). Understanding how parental mediation influences children's perceptions of privacy and continuance intention of video apps can help parents better understand and guide children in regulating their video app consumption and protect children's privacy on video apps.

Considering the importance of children's online privacy protection issue, this study purposefully explores children's continuance intention to use video apps and their perceived value, risks, benefits, trust and privacy concerns related to video apps. To better understand the relationships among these factors, the study developed a conceptual model based on the extended privacy calculus model and TOSS parental mediation framework. In particular, the research

focuses on unpacking (1) how children perceive the value, risk, benefit and trust of using video apps; (2) whether children's perceived value, risk, benefit and trust affect their continuance intention to use video apps; and (3) whether parental mediation moderates the influence of children's perceived value and trust on their continuance intention to use video apps.

CONCEPTUAL MODEL AND HYPOTHESES

Conceptual model

To explore factors impacting children's continuance intention to use video apps from a privacy perspective, this study developed a conceptual model based on privacy calculus theory and TOSS parental mediation framework. The model (see Figure 1) comprises three parts: the initial privacy calculus model, some constructs from the extended calculus model proposed by Sandhu et al. (2023) and the parental mediation constructs. This study also detailed the privacy calculus model by examining two specific types of perceived benefit, that is utilitarianism and hedonism benefits.

Hypothesis development

Perceived value, benefit and risk

Perceived value influences a customer's decision-making process and behaviour (Kim et al., 2017). This study defines *perceived value* as children's overall perception of the value of video apps based on benefits obtained and risk sacrificed. Perceived value significantly affect users' continuance intention (Hewei & Youngsook, 2022). Therefore,

> **H1.** Perceived value will be positively associated with children's continuance intentions.

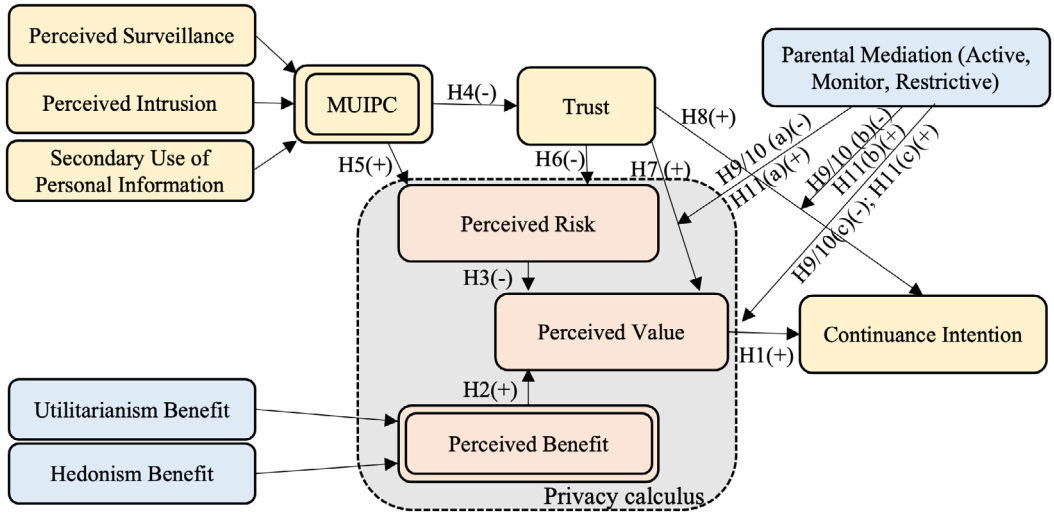


FIGURE 1 Conceptual model and hypotheses regarding children's continuance intention to use video apps. Constructs in red compose the initial privacy calculus model, constructs in yellow are the ones extended by Sandhu et al. (2023), and constructs newly added in this study are coloured blue.

Perceived benefit in our privacy-related context represents children's perception of the positive outcomes brought by sharing information in video apps. For children, utilitarian benefits include both saving money or time (Wang & Oh, 2023) and satisfying their needs for self-expression and social interaction (Flecha-Ortiz et al., 2023). Video platform users might expect to receive *utilitarian benefits* in exchange for information disclosure (Cai et al., 2018). Moreover, video apps are used by children for entertainment and *hedonism benefits* (Flecha-Ortiz et al., 2023). Children exchange their private information to gain pleasure on video apps. Hence,

H2. Perceived benefit will be positive associated with children's perceived value.

We defined *perceived risk* as children's uncertainty about the seriousness of the potential consequences of losing control over personal information. When interacting with video apps, children may perform a calculus of the risk–benefit trade-off to account for the value gained from its use. Koroleva et al. (2011) conducted a grounded semi-structured interview of 30 minutes with nine German children between 13 and 19 years old, finding that children could consciously weigh the benefits against the costs and act according to their preferences. Therefore, we suppose that children who are concerned about the risks of using video apps would have a negative effect on perceived value. Hence,

H3. Perceived risk will be negatively associated with children's perceived value.

Information privacy concerns

Privacy concerns would influence how individuals perceive situations where personal information is requested for online transactions (Malhotra et al., 2004). Consumers with high privacy concerns are more likely to experience lower levels of trust (Eastlick et al., 2006) and higher levels of perceived risk when making online purchases (Van Slyke et al., 2006). MUIPC is a comprehensive representation of concerns that account for the mobility of apps and the related risks (Sandhu et al., 2023). As a popular form of mobile social media, video apps have never been estranged from allegations of privacy intrusion (Zulkifli, 2022) and surveillance. Thus, MUIPC is a suitable and valid construct to be adopted and adapted in our study's context. Previous research has found that MUIPC have a negative effect on trust (Sandhu et al., 2023) and perceived privacy risks (Fortes & Rita, 2016; Malhotra et al., 2004; Van Slyke et al., 2006; Wu et al., 2015). Therefore,

H4. Children's information privacy concerns will be negatively associated with trust.

H5. Children's information privacy concerns will be positively associated with perceived risk.

Trust

Trust is defined as a psychological state in which a person has the intention to accept vulnerability based upon the positive expectations of the intentions or behaviour of another (Evans & Krueger, 2009). Trust plays a significant role in facilitating users' interaction in an uncertain environment (Aljazzaf et al., 2010). Users with a higher level of trust tend to feel safer and more secure when sharing information (Geng et al., 2021). In the context of video apps, trust

implies that users have faith in the video app's reliability and integrity and feel secure about sharing their personal information (Wirtz & Lwin, 2009). The higher they trust the video platform, the fewer privacy risks they perceive. Thus,

H6. Children's trust in video apps will be negatively associated with their perceived risk.

Besides, trust increases customers' perceived value. For example, Sirdeshmukh et al. (2002) have found that customers' trust in service providers created value by providing relational benefits. Hence,

H7. Children's trust in video apps will be positively associated with their perceived value.

Furthermore, trust is positively correlated to the continuance intention to use apps (Raza et al., 2022). Consistent with previous research, this study argues that trust will positively correlate to children's continuance intention to use video apps. Hence,

H8. Children's trust in video apps will be positively associated with their continuance intention.

Parental mediation

Parental mediation on video apps is a strategy parents apply to control, supervise or interpret video content for children, as well as to alleviate the negative effects they perceive video has on their children. This study follows the TOSS classification of *parental mediation*. Previous studies have found that restriction (restrictive parental mediation) would make children less likely to watch violent television and leisure-related Internet usage, reducing children's exposure to potential risks and harms (Ren & Zhu, 2022). Therefore,

H9a. Restrictive parental mediation will negatively moderate the association between children's trust and perceived value.

H9b. Restrictive parental mediation will negatively moderate the association between children's trust and continuance intention.

H9c. Restrictive parental mediation will negatively moderate the association between children's perceived value and continuance intention.

Further, while previous studies have found no significant direct relationship between monitoring and children's positive Internet use (Chemnad et al., 2023; Daud et al., 2014), we propose parental monitoring might function as a moderator. Parental monitoring might not directly influence all Internet use, but it could enhance children's trust, making them feel safer and thus more likely to perceive value in online platforms and continue to use these apps. Hence,

H10a. Parental monitoring will positively moderate the association between trust and children's perceived value.

H10b. Parental monitoring will positively moderate the association between trust and children's continuance intention.

H10c. Parental monitoring will positively moderate the association between perceived value and children's continuance intention.

For active mediation, previous research found that children with this mediation reported using the Internet the most (Ren & Zhu, 2022). Hence,

H11a. Parental active mediation will positively moderate the association between trust and children's perceived value.

H11b. Parental active mediation will positively moderate the association between trust and children's continuance intention.

H11c. Parental active mediation will positively moderate the association between perceived value and children's continuance intention.

RESEARCH METHODS

Instrument

To test the conceptual model, a survey instrument was developed based on questions from published literature on MUIPC, trust, privacy calculus and continuance intention. We also developed a new instrument for three-dimensional parent mediation based on previous research (Kang et al., 2022; Ren & Zhu, 2022; Rodríguez-de-Dios et al., 2018). All questions (see Appendix A) were measured using a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). We also investigated the most popular video apps and children's ownership of digital devices. The questionnaire was forth and back-translated between English and Chinese by the bilingual authors to ensure consistency.

Participants

This study is a pilot study for a large program, which aims to design an AI ethics curriculum in the context of video apps for early adolescents. We selected 11–14-year-old children (seventh and eighth graders) as participants, and the reasons are as follows. First, from 11 onward, Chinese children are more involved in online activities, including gaming, social media and video watching (China Internet Network Information Center, 2020). Children in this age group are likely to have experience in using video apps. Second, according to PIPL, only children under 14 years old require parental consent for the processing of their data (Zhang & Kollnig, 2024). This means that children need to shift to autonomous users to protect their data at 14 years old. Understanding the factors that influence early adolescents' continuance intention to use video apps before this shift can provide a starting point to safeguard them throughout adolescence. Moreover, according to the Chinese national curriculum standard, middle school students have ICT courses, where they would learn about online privacy issues in grades 7 and 8 (Ministry of Education of China, 2022). This facilitates participants to understand the questionnaires better.

Data were collected from a collaborative public middle school for this program. The school was a typical public middle school located in an urban area of Southeastern China, enrolling students from various socioeconomic backgrounds. Each grade had six classes, with about 35 students in each class. Permission was obtained from the school to deliver the link to the seventh and eighth graders in ICT classes.

Pilot test

To ensure that the questions were comprehensible to children, we conducted a pilot test. Five participants were recruited through convenience sampling. Written informed consent was obtained from both parents and children before the interview. During the pilot test, participants were encouraged to think aloud while completing the survey and to discuss any confusion or uncertainties with the researchers. Participants' feedback was recorded and used to modify the questions for the large-scale research.

Data collection

Ethical approvals were obtained from the Ethics Committe of the University as part of a larger research program. Consent was obtained from teachers, school officers, students and their parents. After their consent, we sent the survey link to children at school and they completed the survey in their computer lab. All the participants have assured anonymity to this survey and could quit the survey at any time. Participants received no financial incentives. The survey was delivered to 369 children from November 2022 to December 2022. In the end, 321 valid questionnaires were collected and the response rate was 86.99%.

Previous studies have reported a range of effect sizes in the relationship between perceived privacy risk and behavioural intention (Baruh et al., 2017; Pelaez et al., 2019). In this study, we aimed to achieve a statistical power of 95% and a significance level of 0.05, targeting a medium effect size (Cohen's $f^2 = 0.15$), as recommended for social science research (Djimeu & Houndolo, 2016; Kock & Hadaya, 2018). Our sample size of 321 was larger than the minimum sample size ($n = 153$).

Common method bias was evaluated using Harman's one-factor test, the full collinearity test and the correlation marker technique. All approaches indicated no significant common method bias in this data, with only 30.60% variance explained by the first factor, a maximum variance inflation factor (VIF) of 1.871, indicating no issue with multicollinearity among the variables, and a low maximum shared variance of 0.015.

Data analysis

Partial least squares structural equation modelling (PLS-SEM) technique was applied for data analysis. The reasons for using PLS-SEM were threefold. First, this technique is suited for situations when data are not normally distributed (Goodhue et al., 2012). Second, it is helpful to analyse models for exploratory research and theory development (Hair et al., 2012). Furthermore, PLS-SEM works particularly well with small sample sizes and high-order constructs (Afthanorhan, 2014). We adopted the PLS-SEM technique in data analysis for the following reasons: (1) our data were not normally distributed ($p < 0.001$, Kolmogorov–Smirnov test), (2) we proposed a conceptual model that had never been tested before, (3) our conceptual model included formative construct variables, and (4) we had a sample size of 321. We followed the guidelines proposed by Hair et al. (2019) for the use of PLS-SEM, model estimation specification and evaluation. We also reported the effect size (Cohen f^2) for each hypothesis. The thresholds of large, medium and small effect sizes are 0.35, 0.15 and 0.02 (Aguirre-Urreta & Rönkkö, 2015). All data were analysed in SmartPLS 4 (Ringle et al., 2022).

RESULTS

Descriptive analysis

The average age of the participants was 12.87 years old ($SD = 0.74$). It was found that 72.27% of them had their own digital devices. Most of them (94.39%) reported that they had parents' control over using digital devices. The three most commonly used video apps were Douyin, Bilibili and Baidu. Table 1 shows detailed demographic characteristics and video apps used by participants.

Measurement model

A measurement model was developed to assess construct reliability, convergent validity, discriminatory validity and indicator reliability. The detailed measurement model results are shown in Appendix B.

Although we developed items for three types of parental mediation according to TOSS parental mediation framework, the active mediation and monitoring dimension failed to reach the criteria of composite reliability. Thus, only restrictive parental mediation was remained and presented in the model.

All constructs had composite reliability higher than 0.70 indicating the suitability and internal consistency of the constructs. All constructs had average variance extracted higher than 0.50 signifying convergent validity of the measurement model. The loadings of all items were higher than 0.70, validating indicator reliability. Fornell–Larcker criterion was satisfied. The constructs and the conceptual research model were thus valid to further test the structural model. VIF statistics ranged between 2.065 and 4.893, indicating no issue with multicollinearity among the variables. All weights were statistically significant, and therefore we concluded that the structural model presented a good measurement model.

TABLE 1 Demographic characteristics and video apps most used by children ($n = 321$).

	n	%	Video apps	*n*	%
Grade			Douyin	215	58.27
Grade 7	172	53.58	Bilibili	199	53.93
Grade 8	149	46.42	Baidu	186	50.41
Gender			iQIYI	167	45.26
Male	148	46.11	Tencent video	150	40.65
Female	173	53.89	Little red book	142	38.48
Device control			Taobao	112	30.35
With device control	303	94.39	WeChat video	104	28.18
Without device control	18	5.61	Kuaishou	100	27.10
Device ownership			Yoku video	92	24.93
Yes	232	72.27	Mango TV	84	22.76
No	89	27.73	Xigua video	52	14.09
			Migu video	45	12.20

Note: The video apps used by children was a multi-choice question.

Test of the structural model

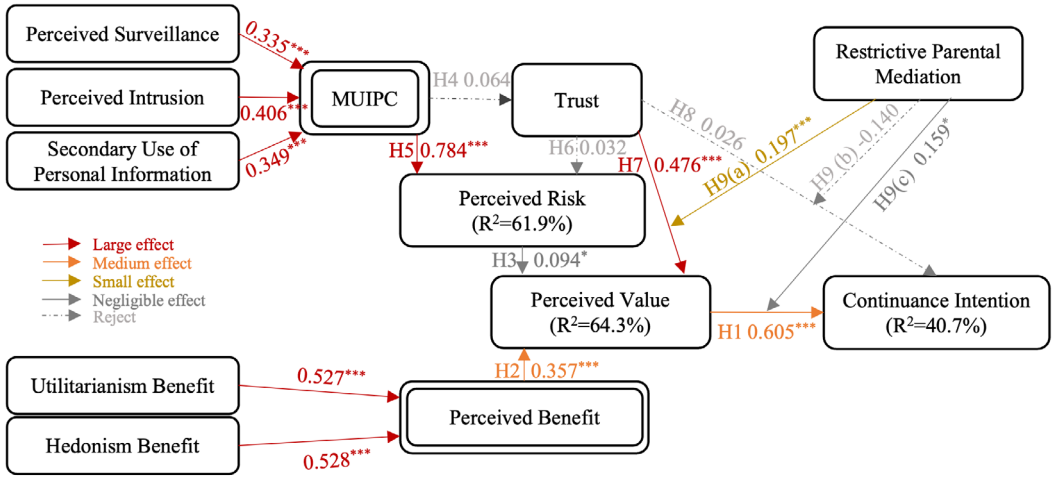
The PLS results are shown in Figure 2. Since the active mediation and monitoring dimension failed to reach the criteria of construct reliability, *H10(a)–(c)* and *H11(a)–(c)* were removed from the model. Hypothesized constructs' significance levels were performed using bootstrapping with 5000 resamples. The minimum R^2 in our model is 40.8% and the maximum number of arrows pointing to a construct is three.

The model explained 40.7% of the variation in continuance intention. The positive association between perceived value and continuance intention was significant ($\beta = 0.605$; $p < 0.001$, *Cohen* $f^2 = 0.258 > 0.150$, medium effect). However, the positive association between trust and continuance intention ($\beta = -0.026$; $p = 0.735 > 0.05$, *Cohen* $f^2 = 0.000 < 0.020$, minimal effect) was not significant. Hence, *H1* was supported, whereas *H8* was not supported.

Regarding perceived value, the model explained 64.3% of its variation. Perceived benefit ($\beta = 0.357$; $p < 0.001$, *Cohen* $f^2 = 0.200 > 0.150$, medium effect), trust ($\beta = 0.476$; $p < 0.001$, *Cohen* $f^2 = 0.354 > 0.350$, large effect) and perceived risk ($\beta = 0.094$; $p = 0.019 < 0.05$, *Cohen* $f^2 = 0.015 < 0.020$, minimal effect) were found to be statistically significant in contributing to the perceived value of apps. However, the effect size for the association between perceived risk and perceived value was minimal. Thus, *H2* and *H7* were supported, while *H3* was not supported.

The negative association between MUIPC and trust ($\beta = -0.064$; $p = 0.313 > 0.05$, *Cohen* $f^2 = 0.004 < 0.020$, minimal effect) was not found to be significant. Consequently, *H4* was not supported.

Finally, the model explained 61.9% of the variation in perceived risk. The relationship between MUIPC and perceived risk ($\beta = 0.784$; $p < 0.001$, *Cohen* $f^2 = 1.605 > 0.350$, large effect) was statistically significant. However, trust was not found to be significantly associated with perceived risk ($\beta = 0.032$; $p = 0.404 > 0.05$, *Cohen* $f^2 = 0.003 < 0.020$, minimal effect). Therefore, *H5* was supported, whereas *H6* was not supported.



Note. The asterisks indicate the p-values of the PLS-SEM regression results between two factors.
*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.

FIGURE 2 Results of structural model and hypotheses of children's continuous using intention on video apps.

Moderation effect of restrictive parental mediation

Restrictive parental mediation (RPM) positively moderated the association between trust and perceived value ($\beta = 0.197$; $p \leq 0.001$, *Cohen* $f^2 = 0.088 > 0.020$, small effect), even though the effect size is small. Thus, *H9(a)* was not supported (see Figure 3). This may imply that when parents restrict children's usage of video apps, early adolescents' trust in video apps is likely to impact more on their perceived benefit. For children with low trust in video apps, RPM is likely to lead to a lower perceived value, that is for children with high trust in video apps, RPM is likely to lead to a higher perceived value. However, this difference may diminish as trust increases, even in the opposite direction. RPM had no significant moderation effect on the association between trust and continuance intention ($\beta = -0.140$; $p = 0.073 > 0.05$, *Cohen* $f^2 = 0.014 < 0.020$, minimal effect); *H9(b)* was not supported. Additionally, restrictive parental mediation positively moderated the association between perceived value and continuance intention ($\beta = 0.159$; $p = 0.027 < 0.05$, *Cohen* $f^2 = 0.018 < 0.020$, minimal effect). However, considering the effect size for the relationship was minimal, *H9(c)* was not supported.

DISCUSSION

This study explored Chinese early adolescents' perception of value, risk, benefit, trust and their continuance intention to use video apps. To do so, a conceptual model was designed and validated based on privacy calculus theory and TOSS parental mediation framework. A cross-sectional survey of 321 Chinese early adolescents was conducted to validate the model. PLS-SEM technique was applied for data analysis. Embedding our results into the existing literature, we discussed theoretically to explore possible explanations for our results.

To begin with, we found a positive association between perceived value and children's intentions to continue using video apps (*H1*). This finding matches that of studies on video conference apps (Sandhu et al., 2023) and mobile government services (Wang et al., 2020). Perceived benefit was positively association with perceived value (*H2*). Children's perceived hedonism benefits are higher than utilitarian benefits, suggesting that entertainment purpose may be more important than educational or informational value when children use video apps.

Children's perceived risk had a minimal effect on perceived value (*H3*), which is not aligned with previous research focused on adults (Xie et al., 2021; Zhong & Chen, 2023) and high school students (Youn, 2005). Such a finding indicates that, even though children may realize and perceive the risks of their information disclosure behaviours in using video apps, they may

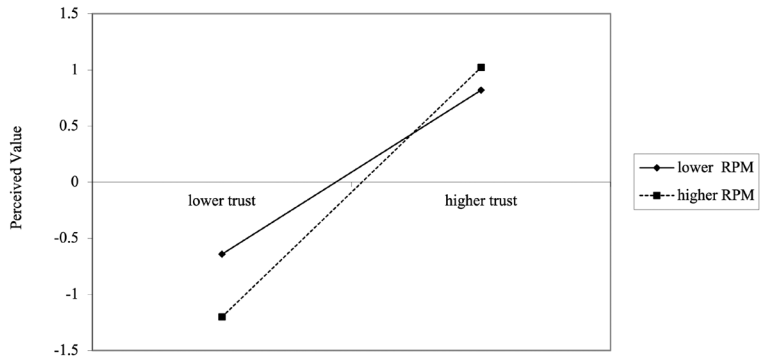


FIGURE 3 Moderation effect of restrictive parental mediation (RPM) on trust and perceived value (with a small effect size).

not take the perceived risk into account when they calculate the value of video apps. Children may become accustomed to being hacked or having their identity or privacy invaded through the datafication process (Hundley & Shyles, 2010), and may even view it as a norm that companies would benefit through the monetisation of their data (Wang et al., 2023).

Another potential explanation for *H3* is that children may lack the requisite knowledge regarding privacy disclosures on video apps. Previous research has evaluated the differences in health-related risk perception between adolescents and adults and found that children's health-threatening behaviours may be due to their underestimation of the risk associated with activities they pursued and their optimistic attitudes about avoiding harm and misfortune (Cohn et al., 1995). In the context of using video apps, children may not fully understand the consequences and ethical issues of privacy breaches or they may think they could successfully avoid the related risks. However, interpretation should be cautious because the effect size is minimal.

The study found that information privacy concerns (MUPIC) positively associated the perceived risk associated with the use of video apps (*H5*). This finding aligns with previous research (Sandhu et al., 2023; Wiegard & Breitner, 2019). Children's relatively high level of privacy concerns may lead to privacy risk-coping and advice-asking behaviours (Jia et al., 2015). Through comparing the means of different dimensions of MUPIC, that is the secondary use of personal information (SUPI), perceived intrusion (PI) and perceived surveillance (PS), we found that children were more concerned about SUPI, compared to PI and PS. This may imply that children are more cautious if their information is shared and utilized by other entities.

The influences of trust as a link (mediating role) between MUPIC and perceived risk, as well as between MUPIC and continuance intention, were not found to be significant (*H4, H6 and H8*). These results indicate that children's trust in video apps is not related to privacy concerns and perceived risk. This contradicts some findings in adult groups (Bansal & Zahedi, 2014; Wu et al., 2012). We argue that for children, privacy concerns may not be a predictor of trust, and trust does not mediate the relationship between privacy concerns and perceived risk. Besides, the result showed that trust was positively associated with the perceived value of video apps (*H7*), indicating that the more children trust video apps, the higher the value they are likely to perceive. This finding aligns with previous studies (Jayashankar et al., 2018; Bosón Ponte et al., 2015). Interestingly, trust was not significantly positively associated with continuance intention (*H8*), which contradicts the findings on adults' continuance intention to use mobile banking and e-government apps (Hooda et al., 2022; Oliveira et al., 2014). This suggests that trust alone is not enough to explain children's continuance intention to use video apps; rather, it is perceived value, which is a mixed evaluation determined by perceived risk and perceived benefit, that may explain their continuance intention to use video apps.

Although the effect size for *H9(a)* was small, our finding suggests a potential positive moderating role of restrictive parental mediation. We carefully discuss the implications of this result with the literature on parental mediation and children's media usage behaviours. The parent–child relationship is redefined during early adolescence, which is a significant transitional period and crossroads between childhood and young adulthood (Caissy, 1994). Early adolescents desire more independence and begin to assert their autonomy and values. They may regard restrictive parental mediation as a challenge to their video apps 'autonomy.' To advocate their autonomy and own viewpoint, children may enhance their perceived value. For example, with restrictive parental mediation, they would hold more positive attitudes toward forbidden behaviours (Nathanson, 2002). Additionally, parents' and early adolescents' different perceived values may also lead to adolescents' misunderstanding of parental mediation. For example, the study found that American teens and their parents do have different ideas about the value and purpose of using digital media (Kim & Davis, 2017).

IMPLICATIONS

This study contributes to understanding children's ongoing intentions to use video apps and related privacy concerns. To do so, we adopted an extended privacy calculus theory model, Sandhu et al.'s (2023) work, to a new age group, early adolescents. We further added parental mediation based on TOSS parental mediation framework into the theoretical model and tried to develop a measurement for parental mediation according to the framework. To the best of our knowledge, no study has evaluated the privacy calculus process and how parental mediation moderates this process concerning children's continuance intention to use video apps. The proposed model has the potential to be applicable in other online datafied contexts, such as educational technology products and digital media services, especially considering the role of parental mediation.

Our findings also provide important implications for video app designers, parents and educators. For video app designers, considering participants' relatively high score of perceived risk, the low score of trust and their relationships to continuance intention to use these apps, our study appeals to a more transparent and child-centred approach in designing video apps. Transparency design could foster trust (Kizilcec, 2016). It enables children and their families to track how their data and information are processed by app providers and third-party software development kit. For example, the KOALA Hero Toolkit was designed to help children and parents collaboratively grasp how children's data are collected, transmitted and processed in mobile apps, fostering critical thinking and encouraging family engagement in data management and responsible app usage (Wang et al., 2024). Notably, increased transparency, such as visualizing platforms' function mechanism and datafication process, is one of the children's critical demands for digital platforms (Wang et al., 2023; Zhu et al., 2024). Child-friendly versions of video apps that incorporate more transparent and clear visualizations of the datafication process and privacy policies are future directions for designers. These enhancements may help children and their families to understand privacy risks and improve their trust in these apps.

For parents, our results implicated that a mixed parental mediation might be a more proper strategy for facilitating children's video app usage. Even though the effect size was small, restrictive parental mediation may lead to children's low perceived value and continuance intention when their perceived trust in video apps is low. However, it may lead to a rebellious 'fight' as children's perceived trust in video apps grows. Restrictive parental mediation may also lead children to disclose private information without assessing risk on their own (Kang et al., 2022). To balance setting appropriate restrictions and supporting their child's autonomy, parents may reflect on their values and beliefs regarding children's autonomy and the role of digital media in their children's lives, and apply a combination of mediation strategies accordingly (Young et al., 2024). Parents could also utilize tools to support their mediation efforts. For instance, such parental mobile monitoring technologies as mobile online safety applications could help children understand privacy needs and increase their acceptance of parental mediation strategies (McNally et al., 2018).

Educators could empower children's autonomy in online privacy protection by improving children's digital skills and competencies. Relatively high scores of privacy concerns and perceived risk of video apps indicated that children were concerned about their privacy in using video apps and were aware of the potential privacy risk. Users' perceptions might lead to their online privacy management behaviours (Wisniewski, 2018). Online privacy management skills and critical thinking about digital technologies are also essential components of digital skills and competencies (Iordache et al., 2017). To create an effective learning experience, curriculum design strategies such as project-based learning, game-based learning and situated learning could be applied. For example, game-based learning and child-centred curriculum design were effective in improving children's knowledge of online safety (eg, cybersecurity) and developing their digital literacy (Maqsood & Chiasson, 2021).

CONCLUSION, LIMITATIONS AND FUTURE DIRECTIONS

Children are increasingly attracted to use video apps. Exploring their continuance use intention and their perception of privacy concerns become an important issue to educators and researchers. This study designed a conceptual model for children's continuance intention to use video apps based on privacy calculus theory and TOSS parental mediation framework. Data collected from 321 Chinese early adolescents were used to validate the model. Our findings revealed that: (1) children's perceived risk had minimal effect on perceived value; (2) children's perceived benefit was positively associated with their perceived value, which in turn was positively associated with children's continuance intention to use video app; (3) children's trust also had a positive association with continuance intention, moderated slightly positively by restrictive parental mediation. Theoretically, our model deepened the understanding of early adolescents' perception of privacy on social media, especially on video apps, and the effect of parental mediation associated with video apps. Practically, this study proposed some recommendations for video app designers, parents and educators to help children understand privacy risks, balance between parental mediation and children's autonomy, and empower children by improving their digital literacy.

Our research has several limitations. First, the cross-sectional design limits our ability to establish causal relationships between variables. Future experimental and longitudinal studies could provide stronger evidence for causality. More advanced statistical methods, such as Bayesian methods (Kruschke et al., 2012), could further validate our findings. Second, while we aimed to validate three types of parental mediation, only the restrictive dimension was validated. Recent studies have developed tools to assess parental monitoring and active mediation (Young et al., 2024), which future research could adopt to explore these dimensions. Thirdly, children in different age groups may experience different usage patterns and parental mediation on video apps. This study focused on early adolescence, a key transition stage in online behaviours, while future research could explore younger children or high school students and include parents for a more comprehensive view. Finally, this study provides insights through the data collected from 321 Chinese children. Given the minimal effect sizes observed, larger samples are needed to investigate these small effects and cross-cultural variations in children's privacy calculus theory. Finally, research on children data privacy demands comprehensive ethical statements. This study was conducted in collaboration with a partner school, underwent an ethical commitment, and informed teachers, children, and their parents. Future large-scale study should make clear ethics statement adressing both children and their caregivers.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Endnote

[1]Douyin and TikTok are similar video apps in different language and they are owned by the same company.

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APPENDIX A

INITIAL QUESTIONS

Constructs	Authors
Hedonic benefits	Venkatesh et al. (2012), Fernandes and Pereira (2021)
HB1. Sharing my personal info on video apps lets me access fun stuff.	
HB2. Sharing my personal info on video apps lets me access things I enjoy.	
HB3. Sharing my personal info on video apps lets me access entertaining things.	
Utilitarian benefits	De Kerviler et al. (2016), Fernandes and Pereira (2021)
UB1: Sharing my personal info on video apps helps me get info about products or services.	
UB2: Sharing my personal info on video apps helps me watch videos at a discount.	
UB3: Sharing my personal info on video apps saves me time when I'm online.	
Continuous intention	Sandhu et al. (2023)
CI1. I plan to keep using video apps.	
CI2. I plan to continue using video apps. (discard)	
CI3. I will keep using video apps.	
Perceived intrusion	
PI1: I feel like, because I use video apps, people know more about me than I'm okay with.	
PI2: I think that because I use video apps, private stuff about me is now easier for others to find than I would like.	
PI3: I feel like, because I use video apps, there is information about me out there that could invade my privacy if the app uses it.	
PI4: I feel like, because I use video apps, there is information about me out there that could invade my privacy if other people use it.	
Perceived risk	
PR1: Sharing info on video apps could be risky.	
PR2: Sharing info on video apps could lead to losing something important.	
PR3: There is too much uncertainty about sharing info on video apps.	
PR4: Sharing info on video apps could cause unexpected problems.	
Perceived surveillance	
PS1: I think my location is being tracked on video apps at least sometimes.	
PS2: I'm worried video apps are collecting too much info about me.	
PS3: I'm worried video apps are keeping track of what I do on my phone.	
Perceived value	
PV1: Using video apps is worth the money I have to pay.	
PV2: Using video apps is worth the effort I put in.	
PV3: Using video apps is worth the time I spend on them.	
PV4: Overall, video apps give me good value.	
Secondary use of personal information	
SU1: I'm worried video apps might use my personal info for other things without telling me or asking for permission.	
SU2: When I share my info to use video apps, I am concerned the apps might use it for other purposes.	
SU3: I am worried video apps might share my personal info with other companies without asking me.	
Trust	
Tr1. I like to trust video apps.	
Tr2. I find video apps trustworthy.	
Tr3. I like the reliability of video apps.	
Parental mediation	

Constructs	Authors
Restrictive parental mediation	Rodríguez-de-Dios et al. (2018), Kang et al. (2022), Ren and Zhu (2022)
RPM1. My parents do not let me use video apps.	
RPM2. I am not allowed to use video apps.	
RPM3. Parents limit my usage (e.g., time) of video apps.	
Active parental mediation	
APM1. Parents and I talked about video apps. (discard)	
APM2. My parents taught me how to use video apps. (discard)	
APM3. My parents told me the precautions of using video apps. (discard)	
Monitor parental mediation	
MPM1. Parents monitor my video app usage. (discard)	
MPM2. Parents monitor me when I am watching videos on the video app.(discard)	
MPM3. My behaviours on video apps are monitored by my parents. (discard)	

APPENDIX B

MEASUREMENT OF PLS MODEL

A measurement model was developed to assess construct reliability, convergent validity, discriminatory validity and indicator reliability. The measurement model results are shown in Tables B1–B3. Table B1 shows descriptive statistics, composite reliability (CR), correlation and average variance extracted (AVE), whereas Table B2 shows loadings and cross-loadings. Table B3 shows the Fornell–Larcker criterion. Even though we developed items for three kinds of parental mediation (ie, restriction, active mediation and monitoring) according to the TOSS framework, the active mediation and monitoring dimension failed to reach the criteria of composite reliability (CR). Thus, only *restrictive parental mediation* was remained and presented in the model. The initial items are attached in the Appendix B.

Composite reliability (CR) was used to test construct reliability. All constructs had CR higher than 0.7 indicating the suitability and internal consistency of the constructs (Henseler et al., 2009; Straub, 1989). The average variance extracted (AVE) was used to test convergent validity. All constructs had AVE higher than 0.50 signifying convergent validity of the measurement model (Fornell & Larcker, 1981; Hair et al., 2012). Indicator reliability was assessed based on the criteria that the loading should be higher than 0.7 (Churchill, 1979; Henseler et al., 2009). The loadings of all items were higher than the required threshold, thus validating indicator reliability.

Following Fornell–Larcker criterion, loadings were applied to assess the discriminant validity of the constructs (Henseler et al., 2015). Fornell–Larcker criterion required that the square root of AVE (in bold) of items by a construct be larger than the correlation of the latent construct with the discriminant construct (Fornell & Larcker, 1981). This criterion was satisfied. The constructs and the conceptual research model were thus distinct to test the structural model (see Table B3).

The measurement model was used to analyse the significance, weights and multicollinearity of constructs. Variance inflation factor (VIF) statistic was used to assess multicollinearity (Table B4), which ranged between 2.065 and 4.893. Multicollinearity among the variables was not an issue in the measurement model since VIF values are below the threshold of 10 (Marquardt, 1970; Mason et al., 2003). Furthermore, all weights were statistically significant, and therefore we concluded that the structural model presented a good measurement model.

TABLE B1 Descriptive statistics, composite reliability, correlation and average variance extracted.

	Mean	SD	CR	HB	UB	CI	RPM	PI	PR	PS	PV	SUPI	Tr
HB	3.207	1.240	0.953	**0.933**									
UB	2.800	1.294	0.942	0.797	**0.918**								
CI	3.179	0.889	0.941	0.475	0.497	**0.943**							
RPM	3.100	1.128	0.859	0.006	−0.007	−0.218	**0.820**						
PI	3.511	1.143	0.951	0.144	0.098	0.133	0.11	**0.910**					
PR	3.741	1.138	0.963	0.148	0.058	0.167	0.178	0.668	**0.931**				
PS	3.491	1.210	0.971	0.118	0.056	0.107	0.087	0.884	0.675	**0.957**			
PV	2.953	1.151	0.932	0.615	0.677	0.606	−0.084	0.177	0.167	0.112	**0.879**		
SUPI	3.744	1.146	0.972	0.192	0.113	0.153	0.187	0.700	0.827	0.694	0.170	**0.960**	
Tr	2.670	1.261	0.969	0.593	0.676	0.446	0.002	0.090	0.083	−0.001	0.723	0.080	**0.956**

Note: Values in diagonal (bold) are the square root of AVE. As the active mediation and monitoring dimension failed to reach the criteria of composite reliability (CR). Thus, only restrictive parental mediation (RPM) was remained and presented in the model.

Abbreviations: CI, continuance intentions; CR, composite reliability; HB, hedonism benefit; PI, perceived intrusion; PR, perceived risk; PS, perceived surveillance; PV, perceived value; RPM, restrictive parental mediation; SD, standard deviation; SUPI, secondary use of personal information; Tr, trust; UB, utilitarian value.

TABLE B2 Loadings and cross-loadings.

Construct	Item	HB	UB	CI	RPM	PI	PR	PS	PV	SUPI	Tr
HB	HB1	**0.935*****	0.748	0.444	−0.009	0.147	0.137	0.129	0.558	0.188	0.549
	HB2	**0.945*****	0.753	0.445	0.037	0.132	0.149	0.116	0.565	0.195	0.553
	HB3	**0.919*****	0.728	0.440	−0.011	0.123	0.127	0.086	0.600	0.154	0.557
UB	UB1	0.686	**0.907*****	0.396	0.024	0.088	0.072	0.048	0.609	0.128	0.579
	UB2	0.718	**0.911*****	0.485	−0.020	0.072	0.042	0.062	0.635	0.092	0.628
	UB3	0.787	**0.936*****	0.487	−0.021	0.108	0.046	0.044	0.621	0.093	0.655
CI	CI1	0.440	0.441	**0.938*****	−0.222	0.134	0.158	0.103	0.537	0.140	0.423
	CI3	0.454	0.496	**0.948*****	−0.191	0.117	0.157	0.099	0.603	0.148	0.418
RPM	RPM6	−0.008	0.016	−0.199	**0.934*****	0.094	0.142	0.066	−0.091	0.147	0.034
	RPM7	0.009	−0.044	−0.187	**0.826*****	0.116	0.150	0.103	−0.054	0.209	−0.061
	RPM8	0.030	−0.005	−0.148	**0.666*****	0.062	0.165	0.055	−0.050	0.118	0.009
PI	PI1	0.136	0.103	0.123	0.119	**0.864*****	0.585	0.850	0.145	0.600	0.106
	PI2	0.071	0.051	0.079	0.069	**0.930**	0.643	0.824	0.128	0.657	0.058
	PI3	0.154	0.086	0.123	0.101	**0.920*****	0.602	0.767	0.187	0.660	0.081
	PI4	0.164	0.117	0.160	0.114	**0.927*****	0.601	0.779	0.187	0.630	0.086
PR	PR1	0.144	0.041	0.151	0.180	0.583	**0.906*****	0.601	0.139	0.737	0.048
	PR2	0.107	0.021	0.134	0.148	0.588	**0.933*****	0.635	0.138	0.740	0.046
	PR3	0.150	0.058	0.183	0.153	0.637	**0.958**	0.631	0.191	0.784	0.096
	PR4	0.147	0.090	0.152	0.182	0.673	**0.927*****	0.644	0.153	0.813	0.113
PS	PS1	0.131	0.047	0.097	0.078	0.814	0.675	**0.944*****	0.104	0.686	0.004
	PS2	0.097	0.048	0.097	0.069	0.866	0.638	**0.962*****	0.103	0.650	−0.012
	PS3	0.113	0.066	0.113	0.104	0.858	0.626	**0.966*****	0.114	0.659	0.006
PV	PV1	0.557	0.630	0.536	−0.070	0.185	0.164	0.126	**0.869*****	0.157	0.667
	PV2	0.573	0.593	0.513	−0.085	0.151	0.161	0.095	**0.925*****	0.137	0.637
	PV3	0.463	0.568	0.527	−0.024	0.100	0.039	0.040	**0.853*****	0.079	0.658
	PV4	0.569	0.588	0.554	−0.117	0.185	0.220	0.128	**0.869*****	0.223	0.579

(Continued)

TABLE B2 (Continued)

Construct	Item	HB	UB	CI	RPM	PI	PR	PS	PV	SUPI	Tr
SUPI	SUPI1	0.175	0.112	0.173	0.173	0.680	0.815	0.672	0.165	**0.968*****	0.096
	SUPI2	0.203	0.113	0.182	0.185	0.675	0.809	0.673	0.189	**0.965*****	0.081
	SUPI3	0.175	0.100	0.085	0.180	0.659	0.755	0.654	0.136	**0.947*****	0.051
Tr	Tr1	0.573	0.643	0.442	0.021	0.103	0.087	0.015	0.684	0.093	**0.951*****
	Tr2	0.545	0.629	0.424	0.031	0.070	0.084	−0.011	0.671	0.064	**0.963*****
	Tr3	0.581	0.666	0.412	−0.043	0.086	0.066	−0.006	0.718	0.070	**0.953*****

Abbreviations: CI, continuance intentions; HB, hedonism benefit; PI, perceived intrusion; PR, perceived risk; PS, perceived surveillance; PV, perceived value; RPM, restrictive parental mediation; SUPI, secondary use of personal information; Tr, trust; UB, utilitarian value. The significance levels of outer loading is marked by *p<0.050, **p<0.010, ***p<0.001.

TABLE B3 Fornell–Larcker criterion (FL criterion).

Construct	HB	UB	CI	RPM	PI	PS	PR	PV	SUPI	Tr
HB	0.933									
UB	0.797	0.918								
CI	0.475	0.497	0.943							
RPM	0.010	−0.012	−0.219	0.820						
PI	0.144	0.098	0.133	0.112	0.911					
PS	0.118	0.056	0.107	0.091	0.884	0.957				
PR	0.148	0.058	0.167	0.183	0.668	0.675	0.931			
PV	0.616	0.677	0.606	−0.081	0.178	0.112	0.167	0.879		
SUPI	0.192	0.113	0.153	0.194	0.700	0.694	0.827	0.170	0.960	
Tr	0.593	0.676	0.446	−0.006	0.090	−0.001	0.083	0.723	0.080	0.956

Abbreviations: CI, continuance intentions; HB, hedonism benefit; PI, perceived intrusion; PR, perceived risk; PS, perceived surveillance; PV, perceived value; RPM, restrictive parental mediation; SUPI, secondary use of personal information; Tr, trust; UB, utilitarian value.

TABLE B4 Formative measurement model evaluation.

Formative construct (second-order construct)	Construct	Weights	VIF
MUIPC	Perceived intrusion (PI)	0.406***	4.893
	Secondary use of personal information (SUPI)	0.335***	4.826
	Perceived surveillance (PS)	0.349***	2.065
Benefit	Hedonism benefit (HB)	0.528***	2.778
	Utilitarianism benefit (UB)	0.527***	3.323

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.