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15TH INTERNATIONAL CONFERENCE ON EDUCATION AND NEW LEARNING TECHNOLOGIES

PALMA (SPAIN)
3RD-5TH OF JULY, 2023

CONFERENCE PROCEEDINGS

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IMPACTS OF YOUNG PEOPLE'S BEHAVIOR ON THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES

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Abstract

The rapid development and constant change in the use of information and communication technologies (ICT) offers young people immense opportunities, but also presents many risks. Although there are many studies that have analyzed the positive and negative effects of ICT on the development of young people, it appears that little is known about the various factors that are linked to its use, such as the behavioral and motivational characteristics of young people (Areepattamannil and Khine, 2017). One of the purposes of this study is to find out if there is a typology associated with a set of items that assess the perceptions of young people, aged between 15 and 25 years, about the use of ICT. On the other hand, it is also intended to assess the impacts of their behaviors on the use of ICT in the post-pandemic period due to Covid-19, based on the emotional and behavioral dimensions associated with assertiveness. Data were obtained through a questionnaire that contains, among others, sample characterization variables, a set of twenty-one items related to the use of information and communication technologies and the interpersonal behavior scale (IBS), developed by Arrindell et al. (2002). The data were analyzed using various statistical methods, among which the Categorical Principal Component Analysis (CATPCA) and the Partial Least Squares - Structural Equation Modeling (PLS-SEM). Based on the CATPCA, three main components were extracted, referring, respectively, to skills in using a mobile device (C1), using e-mail and social networks (C2) and using ICT for entertainment purposes (C3). It was verified, based on the formulated research hypotheses, that the behavioral dimension and the emotional dimension, associated with the assertive behavior of young people, have significant impacts on the use of ICT. It should also be noted, using multigroup analysis, that there are statistically significant differences between the two genders only in terms of assessing the impact of the behavioral dimension regarding skills in the use of mobile devices. In summary, it was found the existence of significant positive impacts of the two dimensions associated with assertiveness, namely the behavioral and emotional aspects of young people, in the use of ICT.

Keywords: ICT for development, interpersonal behavior scale, young people's perception; impact assessment.

1 INTRODUCTION

Adolescents and young people born in the current millennium, the so-called digital natives, grew up surrounded by information and communication technologies and deftly handle computer equipment, video game consoles and smartphones. The Organization for Economic Cooperation and Development (OECD) [1] estimates that the majority of the 2.9 billion people who have access to the Internet are adolescents and young people.

Access to the Internet and the Web to consult information and to social networks sites to carry out communication activities are a daily routine for most adolescents and young people. To this contribute the growing availability in the computer market and smartphones (whose number of units sold surpassed that of computers) at affordable prices and the ease of Internet connection in the homes of teenagers and young people and in the schools they attend.

According to Subrahmanyam and Greenfield [2], the communication activities that young people practice most often are email and instant messaging exchanges, access to social networking sites, video and photo sharing, and online multiplayer games.

Communication activities are carried out mostly using smartphones, but games require larger screens than only desktop computers or laptops have. To carry out text, image or video editing, computers are

more suitable not only for the dimensions of the screens but for the processing capacity they have, required to run the necessary specific software.

In the digital world, recognized as an indispensable context for the development of adolescents and young people [3], the use of information and communication technologies, in rapid development and constant change, offers immense opportunities for adolescents and young people, but it also presents various risks.

Many of the benefits that adolescents gain from using ICT include, among others, moderate gains in cognitive performance [4], more opportunities for socialization and self-development [5], and increased academic involvement [6].

The risks arising from the use of ICT can lead to serious physical and mental health disorders among adolescents and young people [3]. These risks include, among others, the emergence of sleep disturbances [7), cyberbullying [8], sexual harassment, self-harm, suicide [9], technostress [10], and overweight and obesity [11].

A wide range of studies have analyzed the positive and negative effects of ICT on the development of adolescents and young people. However, relatively little is known about the factors that are linked to the use of ICT by adolescents in social interactions [12]. Although the crucial roles that genetic and environmental factors play in adolescents' face-to-face social interactions in offline contexts are well documented [13], the relationships of such factors, especially environmental factors, as the behavioral and motivational characteristics of adolescents, with their social interactions in ICT-mediated contexts, are poorly investigated [12]. Such analysis is necessary to identify critical behavioral and motivational characteristics related to ICT that are crucial for the healthy psychosocial development of the first adolescents and young people of the digital age.

Behavioral characteristics related to ICT refer not only to the availability of ICT at home and at school but also to the effective use of ICT in those places [14]. Although a large body of studies have documented the positive relationships between the availability and use of ICT at home and at school with a variety of academic outcomes [15-17] there are only sparse studies that demonstrate the links between the availability and use of ICT at home and at school and the use of ICT for social interaction [12].

Motivational characteristics related to ICT include, among others, self-efficacy in using ICT, as well as interest and enjoyment in using ICT [14]. Self-efficacy in the use of ICT refers to the confidence of adolescents and young people in their abilities to perform simple and complex tasks related to computer use and Internet access [18]. Therefore, self-efficacy with ICT can be further classified into self-efficacy in basic and advanced ICT skills [18].

In short, face-to-face and ICT-mediated social interactions are undoubtedly essential for the healthy cognitive, emotional, and social development of adolescents and youth [19-21]. However, the degree and extent of such interactions, especially those mediated by ICT, can vary greatly from individual to individual [1, 18], in part due to huge variations in the use of ICT by adolescents for a variety of purposes in different contexts [22]. Given individual differences in ICT-mediated social interactions and their critical role in adolescent development, it is crucial to examine what factors, especially malleable environmental ones, are associated with adolescents' use of ICT for social interactions.

For this reason, the objective of the study developed by Areepattamannil and Khine [12] was twofold: first, to investigate the associations of adolescents' behavioral characteristics associated with ICT with their frequency of use of ICT for social interaction; and, secondly, to examine the relationships of adolescents' motivational characteristics associated to ICT with the frequency of use of ICT for social interaction. In that study, empirical evidence was found of the existence of positive relationships between the behavioral and motivational characteristics of adolescents associated with the use of ICT and the frequency of use of those technologies for social interaction. Despite these benefits, the pathological or addictive effects of using ICT can negatively affect the physical, cognitive and psychological development of adolescents.

2 METHODOLOGY

The data collection of the present study was done through a questionnaire. The survey was conducted on a sample of 347 young Portuguese between the ages of 15 and 25 (40.3% aged 15-20 years and 59.7% aged 21-25), 53.3% with basic and secondary education and 46.7% with higher education. Of those respondents, 35.7 % were male and 64.3% were female. Figure 1 shows the distribution (%) of the respondents according to some sociodemographic variables.

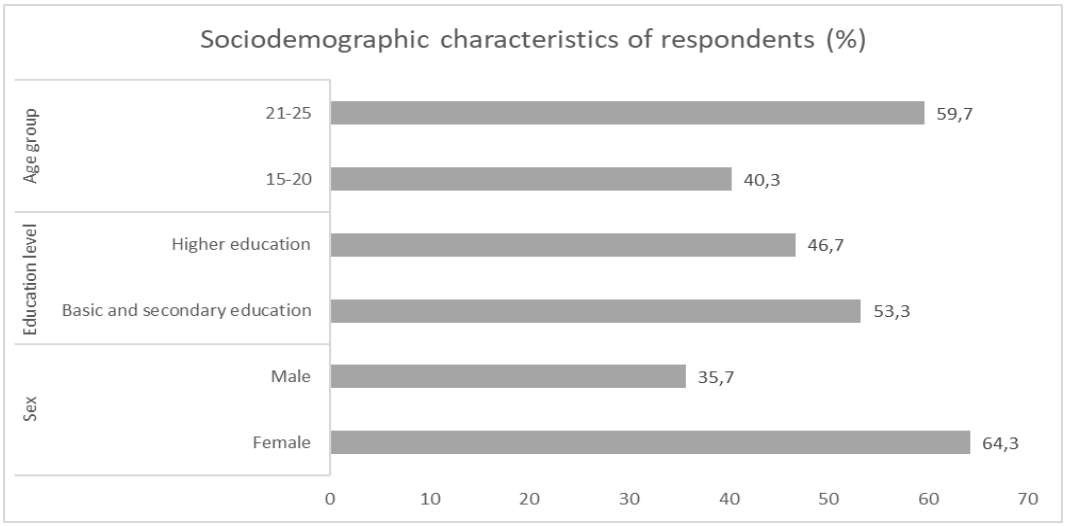

Figure 1. Sociodemographic characteristics of respondents

About 53.9% of the respondents reveal that the economic perception associated with their household income is low, while 46.1% consider it adequate.

To assess the emotional and behavioral dimensions of assertiveness, the Scale for Interpersonal Behavior developed by Arrindell et al. [23-24] was used in the present research. This scale assesses two dimensions of psychological functioning associated with assertiveness, the affective/emotional and the behavioural, based on a set of 25 items/answers, each referring to different social situations. The questionnaire also includes 21 questions related to the use of Information and Communication Technologies (ICT) evaluated on a 5-point Likert scale (1-never, 2-rarely, 3-sometimes, 4-often, 5-always). The description of this last set of items presented is shown in Table 1.

Table 1. Description of the 21 items regarding the use of ICT.

V1	Check Facebook page or other social networks
V2	Check Facebook at work or school
V3	Check personal email
V4	Send or receive files by email
V5	Check work or school email
V6	Send, receive and read emails
V7	Read email on mobile phone
V8	Download multimedia files provided by people using a computer
V9	Watching video clips through a computer
V10	Watching shows/movies on a computer
V11	Send and receive text messages using a mobile phone
V12	Use applications (for any purpose) available on the mobile phone
V13	Browsing the web using a mobile phone
V14	Check your cell phone for text messages
V15	Listening to music via mobile phone
V16	Taking pictures with the cell phone
V17	Searching for information using a mobile phone
V18	Search internet videos using any device
V19	Search for images or photos on the Internet using any device
V20	Clicking "Like " on shared content (posts) on a social network
V21	Read/view shared content (posts) on social networks

Subsequently, nonlinear (Categorical) Principal Components Analysis (CATPCA) was applied to a matrix containing the description of the participants concerned with these 21 items related to the use of Information and Communication Technologies.

CATPCA aims to reduce the dimensionality of the data, starting from several original variables, relatively high, and obtaining a smaller number of uncorrelated variables (principal components), which are, as much as possible, representative of the original information [25]. The main advantages of nonlinear over linear PCA are: the possibility of using categorical (nominal and ordinal) variables based on optimal quantification (While performing PCA, CATPCA converts every category of the variables to a numeric value); to handle and discover nonlinear relationships between variables; it does not assume linear relationships among numeric variables nor the multivariate normality of the data (e.g., [25]).

The results provided by the CATPCA, presented in the next section, highlight three very important factors (F1, F2 and F3) associated with the use of ICT. Therefore, the research model to be investigated, in the present research, is shown in Figure 2 and the respective hypotheses to be tested are listed below the figure.

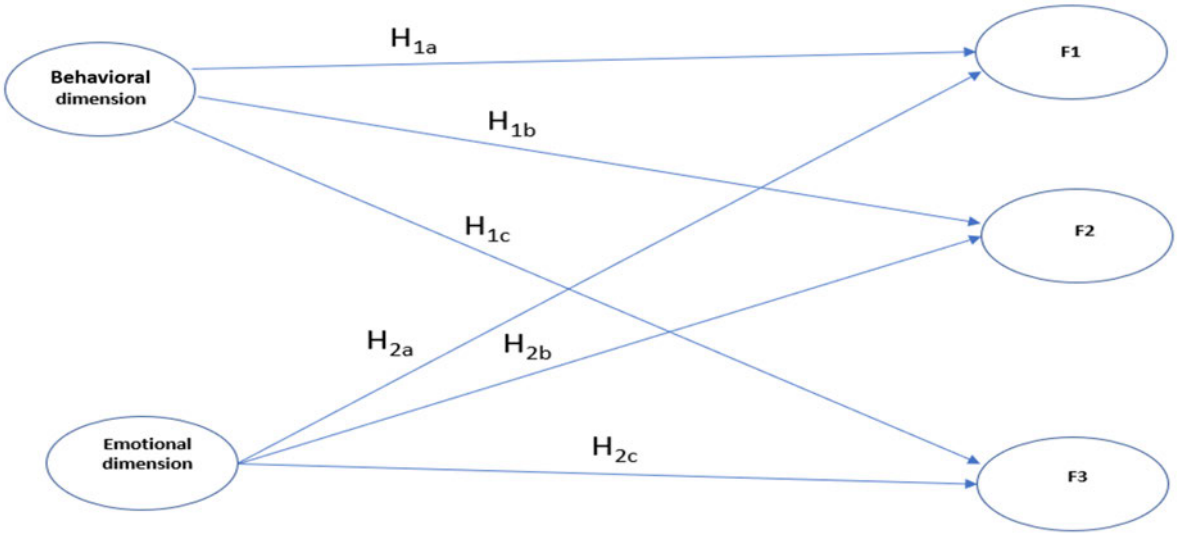

Figure 2. Research model

H1a: The behavioral dimension associated with the assertiveness of young people has significant impacts on the use of technologies related to F1.

H1b: The behavioral dimension associated with the assertiveness of young people has significant impacts on the use of technologies related to F2.

H1c: The behavioral dimension associated with the assertiveness of young people has significant impacts on the use of technologies related to F3.

H2a: The emotional dimension associated with the assertiveness of young people has significant impacts on the use of technologies related to F1.

H2b: The emotional dimension associated with the assertiveness of young people has significant impacts on the use of technologies related to F2.

H2c: The emotional dimension associated with the assertiveness of young people has significant impacts on the use of technologies related to F3.

In order to evaluate the above-mentioned research hypotheses, defined within the scope of this work, the data were subsequently analyzed by applying the Partial Least Squares Structural Equation Modeling (PLS – SEM) algorithm, using the SmartPLS 3.0 software [26]. The evaluation of the PLS-SEM is carried out in two stages: (i) evaluation of the measurement model (relationships between indicators and constructs); and (ii) evaluation of the structural model (relationships between constructs). The measurement model was evaluated in terms of: i) internal consistency (Cronbach's Alpha) and composite reliability (Composite Reliability); ii) convergent validity through average variance extracted (Average Variance Extracted - AVE); and iii) discriminant validity based on Fornell Larcker criteria, cross loadings and Heterotrait-Monotrait Ratio (HTMT).

3 RESULTS

Regarding the use of ICT, around 50% or more of young people reported that they always use the cell phone for activities such as browsing the web, listening to music, using applications (for any purpose) and sending and receiving text messages (items V13, V15, V12, V11, respectively).

Based on the application of CATPCA, with Varimax rotation and Kaiser Normalization, it was found that the three extracted factors explain about 77.3% of the variation in the data. Factor 1 (most relevant items: 11, 12, 13, 14, 16, 17, 18, 19, 20), referring to skills in using mobile devices, explains about 35% of the data variation. Factor 2 (most relevant items: 1, 3, 4, 5, 6, 7, 15, 21), associated with the use of e-mail and social networks, explains about 27%. Finally, factor 3 (most correlated items: 2, 8, 9, 10), relative to entertainment, explains about 15.3% of the variation in the data.

After removing one of the items from the emotional dimension (outer loadings less than 0.50 [27]), the final PLS-SEM model was arrived at, which evaluates the satisfactory properties in terms of reliability and convergent validity, as can be seen from Table 2, which contains a summary of the evaluation results of the measurement model (reflective model). The Structural Model, in turn, was evaluated using the coefficient of determination R^2 and the results obtained using Boostrapping.

Table 2. Reliability and convergent validity indicators

	Cronbach's Alpha	***Composite Reliability***	***Average Variance Extracted (AVE)***
Behavioral_D	0,945	0,950	0,504
Emotional_D	0,947	0,950	0,515
F1	0,958	0,963	0,725
F2	0,924	0,939	0,689
F3	0,728	0,832	0,557

Analyzing the Table 3 it appears that all pairs of constructs have values below 0.90, which indicates adequate discriminant validity of the constructs. On the other hand, based on the assessment of the quality of this criterion after using Bootstrapping, it was also found that the relationships between all these pairs of constructs present confidence interval values that do not include the value 1 in any of the situations, which reinforces the discriminant validity of these constructs.

Table 3. Discriminant Validity – Heterotrait-Monotrait Ratio (HTMT)

	Behavioral _D	***Emotional_D***	***F1***	***F2***
Emotional_D	0,031			
F1	0,602	0,143		
F2	0,499	0,316	0,813	
F3	0,425	0,261	0,753	0,714

Examining the results obtained, it appears that the interpersonal behaviors associated with assertiveness based on the behavioral (Behavioral _D) and emotional dimensions (Emotional_D) explain, respectively, 37.5% of the F1 construct, 33.4% of the F2 construct and 28.8% of the F3 construct. Using the Bootstrapping procedure, available in PLS-SEM, the relative significance of all hypotheses under investigation was tested, and the respective results are shown in Table 4.

Table 4. Results concerning the hypotheses to be tested.

	Coefficient (B)	*T Statistics*	*p-value*
Behavioral _D -> F1	0,599	17,072	**0,000**
Behavioral _D -> F2	0,489	13,592	**0,000**
Behavioral _D -> F3	0,419	10,377	**0,000**
Emotional_D -> F1	0,119	2,438	**0,015**
Emotional_D -> F2	0,299	7,953	**0,000**
Emotional_D -> F3	0,252	5,119	**0,000**

All hypotheses tested are supported by the results provided by the PLS – SEM algorithm, in addition to being proven, they have significant positive effects.

The most assertive behaviors, at a behavioral or emotional level, have an impact on the uses that students make of technology in their personal and professional lives.

Based on a multigroup analysis using gender as a segmentation variable, it was also found that there are statistically significant differences between the two genders only in terms of assessing the impact of the behavioral dimension on Factor 1, as shown in Table 5.

Table 5. Multigroup analysis results – segmentation variable: gender

	Path Coefficients-diff *(GROUP_Gender(1.0) - GROUP_Gender(2.0))*	***p-value new*** *(GROUP_Gender(1.0) vs GROUP_Gender(2.0))*
Behavioral_D -> F1	-0,182	**0,014**
Behavioral_D -> F2	-0,047	0,551
Behavioral_D -> F3	-0,074	0,444
Emotional_D -> F1	0,216	0,325
Emotional_D -> F2	0,190	0,338
Emotional_D -> F3	-0,103	0,775

4 CONCLUSIONS

When young people practice assertive behaviors, they will obtain satisfactory responses in their interpersonal exchanges. Assertive subjects tend to have favorable self-esteem, self-confidence, confidence in their convictions, adaptability, self-control, sociability, frustration tolerance, determination, persistence, entrepreneurship, and interest in the opinion of others. Moreover, assertive behavior plays one role in the use of several technologies (phone, e-mail), by young people. If young people have good assertive behavior, then they will interact positively with others, by communicating what is felt to others honestly, and openly, but if young people have low assertiveness, they feel that it is difficult to express their opinions directly with other people.

The main conclusion of this study is that there is an influence and a relationship between the assertive behavior (behavioral and emotional) and the use of ICT considering the mentioned three factors, so the formulated research hypotheses cannot be rejected. The practical implication of this study is: assertive behaviors (behavioral and emotional dimensions) are important to all individuals, especially young people.

Assertive behaviors at the level of the behavioral dimension have stronger effects on the three factors associated with the frequency of the use of ICT, compared to those concerned the emotional dimension. Based on the structural model developed, it should be emphasized that assertive behaviors in terms of the behavioral dimension have more pronounced impacts, mainly in terms of “skills in using mobile devices” and “use of e-mail and social networks”. It should also be noted that in the case of the emotional

dimension associated with assertive behaviours, the highest effects are at the level of “use of e-mail and social networks” and “entertainment”.

Regarding the multigroup analysis (MGA), the moderating role of gender was only significant in the relationship between the behavioral dimension and the factor “skills in using mobile devices”, with a greater impact being observed in males, compared to females, that is, there are statistically significant differences between young males and females in terms of the impacts of the behavioral dimension on “skills in using mobile devices”.

In the future, the moderating and mediating role of other variables, namely socio-demographic (for example, by age group) and psychological, associated with young people, should be investigated to try to better understand the multiple interrelationships that are established between assertive behaviors (behavioral and emotional) and the frequency of the use of ICT for social interaction. Thus, it is important to emphasize that detailed knowledge can be useful in the training of young people with support tools that help reinforce their assertive behaviors, especially in the case of more fearful young people.

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