Validation of the Ud-TIC scale on the problematic use of mobile phones and video games as mediators of social skills and academic performance

Validación de la escala Ud-TIC sobre el uso problemático del móvil y los videojuegos como mediadores de las habilidades sociales y del rendimiento académico

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Abstract:

In today's society, ICTs have become essential tools and supports in the daily life of adolescents, being present in all areas of their lives. They can make optimal use of them, but also an irresponsible or problematic use, especially in a stage of high vulnerability such as adolescence. To further examine the study of this social and educational problem, the following objectives are proposed: 1) to validate a dimension of an instrument on the problematic use of mobile phones, video games and the Internet; 2) to validate a dimension of a scale on social skills; 3) to describe the effect of problematic mobile phone use and video games on social skills and 4) to describe the effect of problematic mobile phone use and video games on academic performance. A sample of 195 participants from southern Spain (Murcia) was selected. A quantitative, non-experimental, survey type research design was used. The reliability and construct validity of

the instrument were calculated and descriptive statistics were performed. The instrument achieved good reliability (α = .841 ICT dimension); (α = .781 social skills dimension). Regarding the construct validity, a 6-factor model was reached that explains 64.27% of the variance, (KMO = .813; Sig <.005 ICT dimension); (KMO = .554; Sig <.005 social skills dimension), in the same way, ICTs are pointed out as mediators of academic performance and social skills. The study concludes by pointing to the Ud-TIC as a valid and reliable instrument.

Keywords: ICT, Smartphone, video games, social skills, academic performance, adolescence, problematic use.

Resumen:

En la sociedad actual, las TIC se han convertido en herramientas y soportes imprescindibles en el día a día de los adolescentes, estando presentes en todas las áreas de su vida. De estas pueden hacer un uso óptimo, pero también irresponsable o problemático, especialmente, en una etapa de alta vulnerabilidad como la adolescencia. Para profundizar en el estudio de esta problemática de carácter social y educativo, se plantean los siguientes objetivos: 1) validar una dimensión de un instrumento sobre el uso problemático del móvil, los videojuegos e Internet; 2) validar una dimensión de una escala sobre las habilidades sociales; 3) describir la interferencia del uso problemático del móvil y los videojuegos en las habilidades sociales y 4) describir la interferencia del uso problemático del móvil y los videojuegos en el rendimiento académico. Se seleccionó una muestra de 195 participantes del sur de España (Murcia). El diseño de la investigación fue de carácter cuantitativo no experimental tipo encuesta. Se calculó la fiabilidad y validez de constructo del instrumento y se realizaron estadísticos descriptivos. El instrumento alcanzó una adecuada fiabilidad (α = .841 Dimensión TIC); (α = .781 Dimensión HHSS). En cuanto a la validez de constructo, se alcanzó un modelo de 6 factores que explica el 64.27 % de la varianza, (KMO = .813; Sig< .005 Dimensión TIC); (KMO =.554; Sig< .005 Dimensión HHSS). Del mismo modo, se señala a las TIC como mediadoras del rendimiento académico y de las habilidades sociales. Se concluye el estudio con la identificación del Ud-TIC como un instrumento válido y fiable.

Descriptores: TIC, móvil, videojuegos, habilidades sociales, rendimiento académico, adolescencia, uso problemático.

1. Introduction

The widespread use of Information and Communication Technologies (hereinafter ICTs) among young people has gone beyond the boundaries of leisure, crossing over into all areas of their life (Díaz-Vicario et al., 2019).

The problematic use of ICTs is defined as all actions associated with abandoning family, educational or social obligations to spend more time on the Internet and playing video games, a reduced academic performance, preferring virtual relationships over real relationships, showing con-

cern about not receiving messages or calls, sleep disturbance as a result of mobile use, aggressiveness or irritation at interruptions when using devices, getting nervous when Internet access is withheld, etc. (Beranuy et al., 2009; Díaz-López et al., 2020). In this respect, it is necessary to point out that the problematic use of video games has been recently accepted by WHO for its inclusion as an addiction within mental illnesses (Carbonell, 2020), under the name of Gaming disorder.

In the new emerging social context, the use of ICTs by adolescents represents new potentialities, but it is also associated with the emergence of new risks in the case of their dysfunctional use (Machimbarrena et al., 2018). In this sense, adolescents constitute a risk group for developing behaviours associated with the problematic use of ICTs, as they are in constant pursuit of new sensations and, given their biological and psychosocial characteristics, they are a particularly vulnerable group (Díaz & Aladro, 2016; Yang & Tung, 2007). Several undesirable consequences resulting from the improper use of ICTs among adolescents can be highlighted, such as anxiety, FoMO, nomophobia and sleep disturbances (Aznar et al., 2020), emotional dysregulation (Gioia et al., 2021), eating disorders (Ioannidis et al., 2021) and low quality of life (Masaeli & Billieux., 2022).

Furthermore, one of the concerns surrounding the improper use of ICTs is the vast amount of time that young people are spending in front of screens. In this respect, from an international perspective, review articles (Kokka et al., 2021) state that over 90% of adolescents in the United States and Japan and 72% in China use the Internet at all hours. Moreover, this widespread use now exceeds 20% for Indian and Iranian adolescents. In Spain, according to the results of the Digital Marketing Trends study (Rivero, 2016), adolescents dedicate over 40% of their daily time to the use of ICTs. Prevalence data on the problematic use of ICTs place the problematic use of smartphones among British adolescents at 10% (López-Fernández et al., 2014), 23% in the case of Chinese adolescents (Long et al., 2016), while other studies report a prevalence of problematic Internet use of 17% among Brazilian adolescents. In the Spanish context, previous studies among adolescents report a prevalence of 9.8% of problematic Internet use, 9% in the case of problematic mobile use and 10.7% of problematic video game use (García-Oliva et al., 2017). However, as far as we know, only one national study provides data on the prevalence of problematic ICT use, as a whole, with figures of problematic ICT use among Spanish adolescents of 10% (mobiles, game consoles and other devices with an Internet connection) (Díaz-López et al., 2020).

The problem addressed in this study is of particular importance and of grave concern among teachers, families and the scientific community, given the increase of minors who are neglecting other activities in their lives that should be a priority for their social and academic development, instead dedicating their time to ICTs (Vilca & Vallejos, 2015; Gómez-Gonzalvo et al., 2020).

Socially speaking, Sánchez-Díaz de Mera and Lázaro-Cayuso (2017) indicate that the use of ICTs has changed the way people communicate, arguing that ICTs occupy an almost fundamental place within the socialisation process, having an indisputable influence on the manner in which young people interact and communicate with their social network (Solano & Perugini, 2019; López-de-Ayala-López et al., 2022). Furthermore, ICTs have an impact on the behaviour and attitude of young people (García-Oliva et al., 2017; Gracia-Granados et al., 2020). In this vein, previous studies have shown how young people find major differences between face-to-face and virtual communication (Viñals & Cuenca, 2016). In this regard, Díaz-Vicario et al. (2019), maintain that virtual communication inhibits real encounters, and the widespread use of ICTs promotes a preference for contact through such channels, also analysing how, in the past decade, gatherings with friends are much less frequent, with friendships being abandoned to spend more time on the Internet.

With regard to the impact of ICTs in the academic sphere, in the last decade, Espinar and López (2009) already warned of the emergence of a lack of motivation towards studies as a result of technological over-stimulation, which, according to Rodríguez-Gómez et al. (2018), is counter-productive when employed for academic responsibilities. In the same vein, Lloret et al. (2017) stated that high levels of intensity and frequency of use of video games are inversely associated with school performance and with academic interests in general. Gómez-Gonzalvo et al. (2020) reported an inversely proportional relationship between academic performance and frequency of use of ICTs and Díaz- López et al. (2021) pointed out the existence of statistically significant connections between the high frequency of use of mobiles and video games and poor performance in instrumental subjects.

After conducting an extensive search for data collection instruments related to this problem in national and international scientific literature, several were found adapted to Spanish speaking students, but none that covered the problematic use of mobiles, video games and other devices during adolescence. Thus, some cover an age range that is not focused on adolescence (Labrador et al., 2013), in other studies, the questionnaires were performed ad hoc without including validity and reliability indicators (Díaz-Vicario et al., 2019), other instruments are focused exclusively on examining the problematic use of the Internet (Beranuy et al., 2009; Pulido-Rull et al., 2011; Rial et al., 2015), the problematic use of mobiles (Beranuy et al., 2009), or the problematic use of game consoles (Chamarro et al., 2014) and others employ Internet addiction questionnaires (Moral-Jiménez & Fernández-Domínguez, 2019). As a result, it was necessary to design and validate a scale to study the problematic use of ICTs, including the usual ICTs used among adolescents: mobile telephones, game consoles and other devices with an

Internet connection, such as computers and tablets. Furthermore, to meet the research objectives, it was necessary to include a scale on social skills and academic performance.

The apparent metamorphosis of the social and educational contexts with regard to ICT use by adolescents has become a cause for social concern in a high number of countries. This empirical study offers an approach to the issue, seeking to provide a valid and reliable instrument to address this problem. Four objectives were formulated, which are addressed in this article: 1) to validate a dimension of an instrument on the problematic use of ICTs; 2) to validate a dimension of a scale on social skills; 3) to describe the effect of problematic ICT use on social skills and 4) to describe the effect of problematic ICT use on academic performance.

2. Method

2.1. Participants
The selected sample was formed by a total of 195 participants (Table 1). The sample size is deemed to be sufficiently large for the statistical significance of an exploratory factor analysis (Tabachnick & Fidell, 2013).

TABLE 1. Distribution by gender and school year of participants.

		Frequency	Percentage
Gender	Male	111	56.9
	Female	84	43.0
	Total	160	100.0
Year	1st	59	30.0
	2nd	52	26.6
	3rd	47	24.1
	4th	37	18.9
	Total		100.0

Source: Own elaboration.

2.2. Research Design
A quantitative, non-experimental, survey type research design was used, in accordance with the ethical standards related to autonomy and privacy required for studies of this type (Pérez-Juste et al., 2012). Likewise, ethical considerations were taken into account and consent and informed assent documents were provided to participants.

2.3. Procedure

The procedure for the design of the Ud-TIC instrument followed the 5 phases described below:

1. Review of validated instruments:

    A search was conducted for instruments employed among the Spanish adolescent population related, on one hand, to ICT use and, on the other, to social skills. The following instruments were selected: a) CERI questionnaire, a questionnaire on Internet-related experiences ($\alpha = .776$) (Beranuy et al., 2009); b) CERM questionnaire, a c on mobile telephone-related experiences ($\alpha = .805$) (Beranuy et al., 2009); c) CERV questionnaire, a questionnaire on video game-related experiences ($\alpha = .870$) (Chamarro et al., 2014, and e) CHASO, a social skills questionnaire ($\alpha = .880$) (Caballo & Salazar, 2016).

2. Adaptation and reduction of the scales:

    The most relevant items were selected to fulfil the research purpose. Item selection was subject to the following criteria: a) level of adequacy to evaluate experiences related to ICT use and social skills; b) level of coherence of each of the elements with the dimension in which it is included and c) level of clarity of writing.

3. Introduction of new items:

    Socio-demographic items were included, related to academic performance and the effect of ICTs on school performance. Likewise, family supervision, technological stress and time restrictions on ICT access variables were collected. The Ud-TIC questionnaire has 3 dimensions:

    – Dimension 1: socio-demographic and academic performance data.
    – Dimension 2: problematic ICT use.
    – Dimension 3: social skills.

    The chosen title was "Ud-TIC, maladaptive use of information and communication technologies" (Annex 1).

4. Content validity:

    To calculate the content validity, the opinion of three experts in educational research methodology was sought (Table 2).

TABLE 2. Reformulation, modification, inclusion and elimination of items based on expert judgement.

	Item V	Elimination of the item from the questionnaire.
Dimension 1. Sociodemographic data	Item V	The Municipality item is added.
	Item XV	Modification of the answer options: Who supervises your Internet access? The answer option "grandparents" is added.

Dimension 2. ICTs	Item X	Modification of the wording of the item from "Do you suffer sleep disturbance due to aspects related to video game use?" to "Do you stay up late playing video games?".
	Item 4	Modification of the wording of the item from "you stop what you are doing to connect" to "you abandon what you are doing to connect".
	Item 14	Modification of the wording of the item from "How often do you say things on your mobile that you would not say in person?" to "Do you say things on your mobile that you would not say in person?".
	Item X	The item "Do you get angry or irritated when somebody bothers you while you are connected?" was deleted, as it is redundant with items 13 and 17 "Do you get angry or irritated when somebody bothers you while you are using your mobile?" and "Do you get angry or irritated when somebody bothers you while you are playing video games?", respectively.
	Item 10	Modification of the wording of the item: "To what extent do you feel anxious when you do not receive messages or calls?" To "Do you feel anxious when you do not receive messages or calls?".
Dimensión 3. Habilidades sociales (*estas modificaciones se realizaron tras la aplicación de la primera prueba piloto)	Item 20	Modification of the wording of the item "Apologise when my behaviour has bothered somebody" to "Apologise in person when my behaviour has bothered somebody".
	Item 21	Inclusion of the item: "Apologise online when I have hurt somebody's feelings".
	Item 23	Modification of the wording of the item "Say NO when I am asked to do something that I do not like to do" to "Say NO face-to-face when I am asked to do something that I do not like to do".
	Item 24	Inclusion of the item: "Say NO online when I am asked to do something that I do not like to do".
	Item 26	Inclusion of the item: "Keep calm online when I make a mistake".
	Item 27	Modification of the wording of the item "Express a different opinion" to "Express a different opinion face-to-face".
	Item 28	Inclusion of the item: "Express a different opinion online".
	Item 29	Modification of the wording of the item "Respond appropriately to criticism" to "Respond appropriately to criticism in person".
	Item 30	Inclusion of the item: "Respond appropriately to criticism online".

Source: Own elaboration.

5. Pilot study:

A Secondary School was asked to participate in the study. Upon acceptance, the participating groups were selected. Informed consent documents were provided to parents, and informed assent documents to the minors (both endorsed by the Ethics Committee of the university).

The instrument was applied to eight groups of adolescents. A total of 195 adolescents from a Secondary School participated, of which 56.9% were males and 43% were females. With regard to distribution by school year, 30% were students from the first year of secondary education, 26.6% from the second year of secondary education, 24.1% from the third year of secondary education and 18.9% from the fourth year of secondary education. Application was in paper format and data collection was performed during tutorial sessions, in the presence of the responsible researcher and the tutor. Data analysis delivered insufficient internal consistency for dimension 3, social skills (α = .622), the minimum value of which must be .70 to be considered reliable (Grande & Abascal, 2003).

Finally, the opinion of the experts was once again consulted, and a distinction was made between face-to-face social skills and virtual social skills.

3. Data analysis

Data analysis started with the assessment of the adequacy of the sample by applying the Kaiser-Meyer-Olkin (KMO) test, with values exceeding 0.5, and Bartlett's test of Sphericity, with significant values. Likewise, to determine construct validity, an exploratory factor analysis was performed through the principal component method, the extraction of factors with own values above 1 and Varimax rotation (Lima-Rodríguez, et al., 2012). For reliability analysis, Cronbach's alpha coefficient was applied with values above .70. Finally, the descriptive statistics were calculated. Data analysis was conducted using the SPSS statistical package, version 24.

4. Results

To fulfil the first objective, related to the validation process of the ICT dimension, reliability analysis and construct validity were calculated. Data analysis delivered a high level of internal consistency for this dimension (α = .841). Likewise, the value of the "corrected item-total" correlation revealed the absence of zero or negative values. Thus, the statements correlate with the total (Table 3).

The Kaiser-Meyer-Olkin (KMO) sampling adequacy indicator obtained was .813, indicating the relevance of applying the exploratory factor analysis to the selected sample. Bartlett's test of Sphericity, for its part, showed a significance level of .000.

TABLE 3. Item-total statistics in the ICT dimension

	Scale mean if the item has been deleted	Scale variance if the item has been deleted	Corrected item-total correlation	Squared multiple correlation	Alfa if the item is deleted
1. How often do you use a game console?	46.32	137.657	.318	.518	.843
2. How often do you use a mobile telephone?	45.46	134.797	.380	.424	.836
3. How often do you use other devices with an Internet connection?	46.19	132.333	.495	.388	.831
4. How often do you abandon what you are doing to spend more time connected to the Internet?	46.91	135.004	.478	.513	.833
5. Do you think that your academic performance has been negatively affected by your Internet use?	46.78	133.002	.493	.455	.831
6. When you have problems, does connecting to the Internet help you escape from them?	46.56	128.452	.504	.390	.830
7. Do you get angry or irritated when somebody bothers you while you are connected?	46.75	129.350	.505	.555	.830
8. Do you find it easier to interact online or in person?	46.77	131.174	.432	.369	.834
9. Have you ever risked losing a relationship or an academic opportunity due to your mobile use?	47.53	135.512	.381	.357	.836
10. Do you think that your academic performance has been negatively affected by your mobile use?	46.99	131.917	.524	.519	.830

Item					
11. To what extent do you feel anxious when you do not receive messages or calls?	47.27	131.932	.506	.442	.831
12. Do you suffer sleep disturbance due to aspects related to mobile use?	47.53	135.410	.434	.454	.834
13. Do you feel the need to spend increasingly more time on your mobile to feel satisfied?	47.20	129.522	.590	.586	.827
14. Do you get angry or irritated when somebody bothers you while you are using your mobile?	47.04	131.693	.518	.543	.830
15. How often do you say things on your mobile that you would not say in person?	46.78	134.199	.394	.477	.835
16. How often do you abandon what you are doing to spend more time playing video games?	47.22	135.584	.428	.488	.834
17. Do you think that your academic performance has been negatively affected by your video game use?	47.18	130.202	.585	.528	.828
18. Do you get angry or irritated when somebody bothers you while you are playing video games?	46.82	128.325	.441	.433	.834
19. Do you feel the need to spend increasingly more time playing to feel satisfied?	47.30	132.926	.483	.462	.832
20. Do you stop going out with friends to spend more time playing video games?	47.64	139.455	.275	.385	.839

Source: Own elaboration.

Furthermore, data analysis revealed six components that explain 64.27% of the total accumulated variance, the own values being above one in both cases (Table 4). After the analysis, those items with a greater factor loading were grouped into each factor, although they also saturate in other factors with a lower factor loading. These factors were classified as follows:

Factor 1 (Items 15, 8, 2, 11, 3). Mobile telephone-related experiences.

Factor 2 (Items 20, 19, 5, 17, 10, 18). Video game consumption-related experiences.

Factor 3 (Items 4, 6, 16). Abandonment of tasks and escaping from problems.

Factor 4 (Items 7, 14). States of irritability.

Factor 5 (Item 1). Game console frequency of use.

Factor 6 (Items 12, 9, 13). Sleep disturbance.

TABLE 4. Component matrix statistics in the ICT dimension.

Rotated component matrix[a]

	Component					
	1	2	3	4	5	6
15. How often do you say things on your mobile that you would not say in person?	.7.25					
8. Do you find it easier to interact online or in person?	.649					
2. How often do you use a mobile telephone?	.613		.323			-.373
11. Do you feel anxious when you do not receive messages or calls?	.601					
3. How often do you use other devices with a connection?	.583				.422	
20. Do you stop going out with friends to spend more time playing video games?		.826				
19. Do you feel the need to spend increasingly more time playing to feel satisfied?		.567		.306		
5. Do you think that your academic performance has been negatively affected by your Internet use?	.308	.562	.494			

17. Do you think that your academic performance has been negatively affected by your video game use?		.557			.392	
10. Do you think that your academic performance has been negatively affected by your mobile use?	.396	.514	.396			
18. Do you get angry or irritated when somebody bothers you while you are playing video games?		.504		.500	.308	
4. How often do you abandon what you are doing to spend more time connected to the Internet?			.811			
6. When you have problems, does connecting to the Internet help you escape from them?	.354		586			
16. How often do you abandon what you are doing to spend more time playing video games?			.528	.331	.391	.305
7. Do you get angry or irritated when somebody bothers you while you are connected?				.815		
14. Do you get angry or irritated when somebody bothers you while you are using your mobile?	.307			.771		
1. How often do you use a game console?					.817	
12. Do you suffer sleep disturbance due to aspects related to mobile use?				.301	-.479	.460
9. Have you ever risked losing a relationship or an academic opportunity due to your mobile use?						.750
13. Do you feel the need to spend increasingly more time on your mobile to feel satisfied?	.481					.530

Source: Own elaboration.

To fulfil the second objective, related to the validation process of the social skills dimension, reliability analysis and construct validity were calculated. Data analysis delivered a high level of internal consistency for this dimension (α = .747). However, data analysis revealed three items with a corrected item-total correlation lower than .30. After detecting these items, they were deleted. As a final result, the value obtained by Cronbach's alpha coefficient for the dimension, which was .781 (Table 5).

TABLE 5. Item-total statistics in the social skills dimension.

	Scale mean if the item has been deleted	Scale variance if the item has been deleted	Corrected item-total correlation	Squared multiple correlation	Cronbach's alpha if the item has been deleted
1. Apologise online when my behaviour has bothered somebody.	46.57	60.252	.398	.372	.767
2. Apologise in person when I have hurt somebody's feelings.	45.57	63.723	.371	.476	.771
3. Express affection or support (hug, caress) when somebody close to me needs it.	45.69	59.339	.423	.458	.765
4. Say NO face-to-face when I am asked to do something that I do not want or do not like to do.	45.97	58.617	.413	.589	.766
5. Say NO online when I am asked to do something that I do not want or do not like to do.	45.54	57.373	.518	.548	.755
6. Keep calm online when I make a mistake in front of others.	46.20	60.753	.400	.591	.767

7. Keep calm in public when I make a mistake.	45.97	62.852	.300	.309	.776
8. Express an opinion face-to-face different to that of the person who I am talking to.	45.80	61.224	.342	.291	.773
9. Express an opinion online different to that of the person who I am talking to.	45.86	61.185	.416	.314	.766
10. Respond (appropriately) in person to criticism that has bothered me.	46.11	56.692	.493	.711	.757
11. Respond (appropriately) online to criticism that has bothered me.	45.97	56.029	.536	.787	.752
12. Speak in public in front of strangers.	46.20	60.518	.335	.385	.774
13. Speak in public in front of people I know.	45.11	64.751	.377	.357	.772

Source: Own elaboration.

Data analysis indicated the relevance of applying the exploratory factor analysis to the selected sample (KMO=.554). Likewise, it showed an adequate significance level through Bartlett's test of Sphericity (.000 >.005). Five components were identified that explained 61.31% of the total accumulated variance, the own values being above one in both cases. In this respect, factor analysis established the grouping of the items around 5 factors. The component matrix includes how all the items group their highest weights around five components or factors (Table 6). Values over .45 were obtained in all cases.

These factors were called:

Factor 1: (Items 5, 4, 13, 1, 8, 9). Assertive Communication.

Factor 2: (Items 10, 11, 12). Interact with strangers in public.

Factor 3: (Items 3, 2). Express affection and apologise.

Factor 4: (Item 7). Keep calm in public.

Factor 5: (Item 6). Keep calm online.

TABLE 6. Component matrix statistics in the social skills dimension

Rotated component matrix[a]

	Factor				
	1	2	3	4	5
5. Say NO online when I am asked to do something that I do not want to do.	.775	.032	.164	-.033	.173
4. Say NO face-to-face when I am asked to do something that I do not want to do.	.714	.011	-.002	-.080	.009
1. Apologise online when my behaviour has bothered somebody.	.552	.080	.179	.159	.195
13. Speak in public in front of people I know.	.550	.118	-.103	.093	-.314
8. Express an opinion face-to-face different to that of the person who I am talking to.	.473	.047	-.003	.125	-.020
9. Express an opinion online different to that of the person who I am talking to.	.454	.176	.152	-.218	-.122
10. Respond (appropriately) in person to criticism that has bothered me.	.079	.890	.118	.078	-.029
11. Respond (appropriately) online to criticism that has bothered me.	.100	.853	.214	.092	.035

12. Speak in public in front of strangers.	161	.395	-.047	.348	-.198
3. Express affection or support (hug, caress) when somebody close to me needs it.	.248	.060	.812	.510	-.117
2. Apologise in person when I have hurt somebody's feelings.	.044	.266	.742	-.199	-.050
7. Keep calm in public when somebody plays a joke on me/criticises me.	-.025	.179	.024	.832	.209
6. Keep calm online when somebody plays a joke on me/criticises me.	.094	-.039	-.141	.160	.971

Source: Own elaboration.

After this process, a validated version of the Ud-TIC instrument was obtained (Annex 1).

To fulfil the third objective, focused on describing the social skills of adolescents in person and online (Table 7), 34.6% of the minors reported that they find it easier to interact online than in person. Furthermore, 33.3% stated that they say things on their mobile that they would not say in person. With regard to the prefer-ence for virtual relationships over face-to-face relationships, 10% of the adolescents admitted that they had stopped going out with their friends in order to spend more time at home playing video games online, while 61% indicated that it had happened on occasion. As for expressing opposing opinions with another person (Table 7), similar scores were obtained, regardless of the form of communication; face-to-face interaction (M=3.91; Sd=1.24), and online interaction (M=3.86; Sd= 1.08).

TABLE 7. Descriptors in the "social skills" dimension.

	Always	Almost always	Quite often	On occasion	Never	M	Sd	Md
Do you find it easier to interact online?	11.3 %	6.3 %	17 %	32.9 %	32.5 %	2.26	1.32	2
Do you say things on your mobile that you would not say in person?	6.35 %	8 %	19 %	36.3 %	30.3 %	2.24	1.15	2

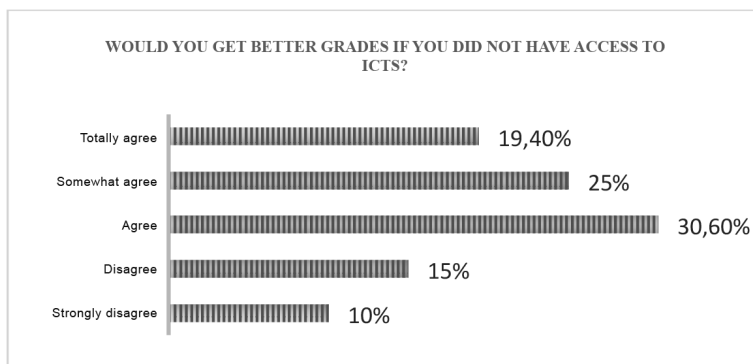|							
Do you stop going out with friends to spend more time playing video games?	2 %	5 %	3 %	61 %	29 %	4	1.45	4
Express a different opinion face-to-face	8.6 %	2.9 %	20 %	25.7 %	42.9 %	3.91	1.24	4
Express a different opinion online	2.9 %	8.6 %	22.9 %	31.4 %	34.3 %	3.86	1.08	4

Source: Own elaboration.

In the case of the fourth objective, the impact of problematic ICT use on academic performance was assessed. It is worth noting that 75% of participants stated that they would get better grades if they did not have access to ICTs (Graph 1) (M=3.29; Sd=1.22; Md=3).

In this vein, 32% of the young people declared that their academic performance has been negatively affected by prolonged Internet use (M=2.24; Sd=1.04; Md=3). As a result, 23% admitted that they abandon their daily chores to spend more time on the Internet (M=2.12; Sd=.914; Md=2).

Finally, it is worth pointing out the statistically significant relationship between problematic mobile use and the abandonment of school work (x^2 (16) = 40.753, $p \leq 0.05$, V = 0.005). In this respect, data analysis showed that 52.8% of students who use their mobile *at all hours* abandon their school work for technology use, while, among the students who only use their mobile *when they need it,* cases of abandonment of school work dropped to 18.5%.

GRAPH 1. ICTs as mediators of grades.

WOULD YOU GET BETTER GRADES IF YOU DID NOT HAVE ACCESS TO ICTS?

- Totally agree — 19,40%
- Somewhat agree — 25%
- Agree — 30,60%
- Disagree — 15%
- Strongly disagree — 10%

Source: Own elaboration.

5. Discussion and conclusions

Research into the effects of mobile and video game use on the social relationships and academic performance of adolescents is not only relevant but also fundamental in today's society. Discussion of the results is first organised in relation to the validation of the Ud-TIC questionnaire, and, secondly, regarding the problematic use of ICTs and their impact on social skills and academic performance.

With regard to the validation process of the Ud-TIC questionnaire, in the case of the ICT dimension, on one hand, data were included in relation to the frequency of use of the three most widely used elements among adolescents; the mobile phone, Internet and game consoles (Fernández & Martínez, 2015), and, on the other hand, information regarding experiences related to the maladaptive use of each of them, in a clear, precise and concise manner. In terms of the psychometric properties of the Ud-TIC questionnaire, it delivered high reliability, similar to that found by the authors of the three scales on which the Ud-TIC is based (Beranuy et al., 2009; Chamarro et al., 2014). Furthermore, items were included related to the academic performance of adolescents, such as motivation towards their studies, dedication to study time, effort and dedication to their school work and their perception of how ICTs impact their school performance. Inclusion of this variable in the Ud-TIC questionnaire is one of the potentialities of this study, given that

prior research was focused on analysing the role of mobile phones and video games in the improvement and sophistication of the learning processes and academic performance of adolescents (Tárraga-Mínguez et al., 2017; Altuzarra-Artola et al., 2018; García-Martín; Cantón-Mayo, 2019), disregarding the consequences of their abuse in academic terms. However, in recent years, the findings of the scientific community have started to be taken on board and mobiles and video games have been identified as one of the main distractions in terms of the correct academic performance of adolescents (Marín et al., 2018; Díaz-López et al., 2021; Gómez-Gonzalvo et al., 2020).

As for the social skills dimension of the questionnaire, its relevance can be appreciated given that social interaction models following the extensive use of the Internet require updated tools for their study (García, 2010; Segovia et al., 2016). In this respect, the dimension obtained high reliability and factor analysis established the grouping of the items around five factors, coinciding with the skills posed by Losada (2018). The indexes obtained are similar to Caballo and Salazar (2017). Based on these results, it can be stated that, following the analysis of the instrument's pilot project, optimal results were achieved in terms of the internal consistency and construct validity of the Ud-TIC.

Moreover, upon analysing face-to-face and virtual social skills, it was

found that three in ten adolescents find it easier to interact online than in person. These results are consistent with those found by Fondevila et al. (2014).

Analysis of the academic performance variable showed that three in four adolescents suffer the consequences of the problematic use of ICTs on their grades. These results are in line with Díaz-López et al. (2021) and differ from those found by Díaz-Vicario et al. (2019), in which less than half of the adolescents stated that ICT use makes them lose time that could be spent on their studies.

6. Limitations and future research

As for limitations and future research, it is worth noting that this study is part of broader research that culminated in the doctoral thesis of Díaz-López (2021). For the instrument design and validation, the adequate sample for the psychometric study of the instrument was employed, although it is true that as a germinal and reference study, it is necessary to expand the age range of the students, specifically from primary education to upper secondary education.

Likewise, as a limitation and future line of research, information must be collected from other sources, such as the family and teaching staff at schools, to thus triangulate the information and further examine the source of the problem.

As a line of research, we consider that procedures should be put in place to collect information on students, including genetic, family, social and cultural information. This would be very interesting to be able to interpret and justify the results obtained.

As future lines of research for this study, and as knowledge transfer, a parental training programme has been created and is being implemented in schools, families and town councils regarding the adaptive use of ICTs, given that family supervision has been shown to be a determining factor in the healthy relationship between young people and ICTs, as it is a mediator of frequency of use, technological stress and academic performance.

To sum up, we would like to highlight that the Ud-TIC questionnaire is a valid and reliable instrument, making it possible to approach the study of an unprecedented social and educational problem, enabling the collection of data, not only in terms of problematic ICT use, but also as to how this situation expands into the two most decisive contexts in the stage of adolescence, the social sphere and the educational sphere. This instrument and the research conducted by Díaz-López (2021) seek to shed light on this problem and help us to understand the consequences of the problematic use of technology in the young people of generation Z, who, as part of an entirely digitalised society, need ICTs for their social and educational survival.

ANNEXES
Annex 1

Ud-TIC questionnaire

[The following is the validated questionnaire in its original Spanish version]

Cuestionario **Ud-TIC**

*Es importante que rellenes este cuestionario con la mayor sinceridad posible. La información que des en el mismo será anónima. Su finalidad es contribuir a la realización de un estudio a nivel regional. Gracias por tu colaboración.

DIMENSIÓN 1. DATOS DE IDENTIFICACIÓN, SOCIODEMOGRÁFICOS Y ACADÉMICOS

Datos personales (Tacha con una X)

I. Edad: 11-12____13-14____15-17____   II. Curso: 1º____2º____3º____4º____
III. Sexo: H___M____   IV. Tipo de centro: Público____Concertado____Privado____Municipio:

Datos escolares (Rodea con un círculo)

V. Nota de la última evaluación de Lengua	1	2	3	4	5	6	7	8	9	10
VI. Nota de la última evaluación de matemáticas	1	2	3	4	5	6	7	8	9	10
VII. Nota de la última evaluación de sociales	1	2	3	4	5	6	7	8	9	10
VIII. Nota de la última evaluación de inglés	1	2	3	4	5	6	7	8	9	10

	1.Muy en desacuerdo	2.En desacuerdo	3.Ni de acuerdo ni en desacuerdo	4.Bastante de acuerdo	5.Totalmente de acuerdo
IX. ¿Podrías sacar mejores notas?	1	2	3	4	5
X. ¿Dedicas tiempo suficiente al estudio?	1	2	3	4	5
XI. ¿Dedicarías más tiempo si no tuvieras acceso a tecnologías?	1	2	3	4	5

XII. ¿Supervisan tus padres el uso que haces de Internet o redes sociales?   Sí___   No ___

XIII. ¿Supervisan tus padres el tiempo que dedicas a de jugar a videojuegos?   Sí___   No ___

XIV. ¿Supervisan tus padres el tipo de videojuegos a los que dedicas tu tiempo?   Sí___   No ___

XV. ¿Quién te supervisa el acceso a Internet? 1. Nadie 2. Mi madre 3. Mi padre 4. Mis padres 5. Mis abuelos 6. Otros_

XVI. ¿Cuándo tienes acceso a Internet? 1. Nunca_   2. Por las tardes_   4. Por las noches_   3. Todo el día

XVII. ¿Te sientes estresado o nervioso cuando no tienes acceso a Internet?   Sí___   No ___

DIMENSIÓN 2. USO DE LAS TICs (Indica que opción se ajusta más a tu situación)

	Nunca	Rara vez	Solo los fines de semana	Varias veces a la semana	Todos los días
1. ¿Con qué frecuencia haces uso de la videoconsola?	a	b	c	d	e

	Nunca	Solo cuando lo necesito	Con frecuencia	Mucho	A todas horas
2. ¿Con qué frecuencia haces uso del teléfono móvil?	a	b	c	d	e
3. ¿Con qué frecuencia haces uso de otros dispositivos con conexión a Internet?	a	b	c	d	e

	Nunca	Algunas veces	Bastantes veces	Casi siempre	Siempre
4. ¿Abandonas las cosas que estas haciendo para estar mas tiempo conectado a Internet?	a	b	c	d	e
5. ¿Piensas que tu rendimiento académico se ha visto negativamente por el uso de Internet?	a	b	c	d	e
6. Cuando tienes problemas, ¿conectarte a Internet te ayuda a evadirte de ellos?	a	b	c	d	e
7. ¿Te resulta más fácil o cómodo relacionarte con la gente a través de Internet que en persona?	a	b	c	d	e
8. ¿Has tenido el riesgo de perder una relación o una oportunidad académica por el uso del móvil?	a	b	c	d	e
9. ¿Piensas que tu rendimiento académico se ha visto afectado negativamente por el uso del móvil?	a	b	c	d	e
10. ¿Te sientes inquieto cuando no recibes mensajes o llamadas?	a	b	c	d	e
11. ¿Te quedas despierto hasta tarde jugando a videojuegos o con el móvil?	a	b	c	d	e
12. ¿Sientes la necesidad de invertir cada vez más tiempo en el móvil para sentirte satisfecho?	a	b	c	d	e
13. ¿Te enfadas o te irritas cuando alguien te molesta mientras utilizas el móvil?	a	b	c	d	e
14. ¿Dices cosas por el móvil que no dirías en persona?	a	b	c	d	e
15. ¿Abandonas lo que estás haciendo para jugar más tiempo a videojuegos?	a	b	c	d	e
16. ¿Piensas que tu rendimiento académico se ha visto afectado negativamente por el uso de videojuegos?	a	b	c	d	e
17. ¿Te enfadas o te irritas cuando alguien te molesta mientras estás jugando a videojuegos?	a	b	c	d	e
18. ¿Sientes la necesidad de invertir cada vez más tiempo jugando para sentirte satisfecho?	a	b	c	d	e
19. ¿Dejas de salir con tus amigos para pasar más tiempo	a	b	c	d	e

DIMENSIÓN 3. HABILIDADES SOCIALES (indica qué opción es más característica de ti en   cada una de las situaciones descritas)

	Muy poco característico de mi	Poco característico de mi	Moderadamente característico de mi	Bastante característico de mi	Muy característico de mi
20. Pedir disculpas en persona cuando mi comportamiento ha molestado a otra persona.	a	b	c	d	e
21. Pedir disculpas en Internet cuando he herido los sentimientos de alguien	a	b	c	d	e
22. Dar una expresión de afecto o apoyo (abrazo, caricia) cuando alguien cercano lo necesita	a	b	c	d	e
23. Decir a la cara NO cuando me piden algo que no quiero o no me gusta hacer	a	b	c	d	e
24. Decir NO en Internet cuando me piden algo que no quiero o no me gusta hacer	a	b	c	d	e
25. Mantener la calma cuando me equivoco delante de otras personas	a	b	c	d	e
26. Mantener la calma en Internet cuando me equivoco delante de otras personas	a	b	c	d	e
27. Expresar una opinión diferente a la de la persona con la que estoy hablando cara a cara	a	b	c	d	e
28. Manifestar una opinión distinta a la de la persona con la que estoy hablando a través de internet	a	b	c	d	e
29. Responder (adecuadamente) en persona a una crítica que me ha molestado	a	b	c	d	e
30. Responder (adecuadamente) a una crítica que me ha molestado a través de Internet	a	b	c	d	e
31. Hablar en público ante desconocidos	a	b	c	d	e
32. Hablar en público ante persona conocidas (compañeros, familiares…)	a	b	c	d	e

Source: Own elaboration.

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