



Viral internet challenges scale in preadolescents: An exploratory study

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Abstract

In recent years, viral challenges on the Internet have become a very frequent phenomenon. These allude to the actions that are proposed to Internet users to record themselves performing a challenge and disseminate it on different online platforms so that other users will also perform it. Despite its rapid expansion, there is no evidence of any validated assessment tool of this phenomenon. To meet this need, the Viral Internet Challenges Scale (VICH-S) was designed. The main objective of this study was to establish the psychometric properties of this scale, the prevalence of different types of challenges (social, solidary, and dangerous), as well as the single or conjoint performance of these types of challenges using the VICH-S. Furthermore, the construct validity of the scale was tested with these variables: Fear of Missing Out, Loss of Connection (nomophobia), Self-Online, and Emotional Attention Online. Participants were 417 preadolescents (41.2% boys) with age ranging from 10 to 14 years. Exploratory factor analysis of the VICH-S scale revealed the existence of two factors: Challenge Satisfaction and Social Motivation. Convergent validity indicators showed positive and significant correlations between these two dimensions and the Fear of Missing Out, Loss of Connection (nomophobia), Self-Online, and Emotional Attention Online. The most frequent challenges were social challenges (80.3%), followed by solidary (20.6%) and dangerous challenges (7.7%). This study has relevant implications, as the VICH-S presents adequate psychometric properties to evaluate this barely explored and growing phenomenon of viral challenges on the Internet in preadolescence.

Keywords Viral · Internet · Challenges · Scale · Prevalence · Preadolescents

Introduction

Challenges and dares have always existed and are a common practice among adolescents, although they are difficult to conceptualize. According to Raimundi et al. (2014), a challenge is "something that must be overcome, a difficult and/or new situation or experience, about which one does not know whether it can be achieved or not". Thus, adolescents often test different skills, they strive and commit to achieving a certain goal, which is usually proposed by their peer group. In recent years, technological progress and the importance of the Internet have turned the performance of challenges into an increasingly common practice, which has become a trend

in the online context (Shroff et al., 2020). The so-called viral challenges on the Internet refer to actions proposing users to record themselves performing this challenge and disseminate it, in turn, to other users through one or various online platforms (TikTok, YouTube, Instagram, etc.) so that they will also perform it (Carriedo et al., 2019; Gordo, 2020; Jacquier, 2019). Depending on the interest that the challenge arouses, it sometimes becomes viral by its massive diffusion on the Internet, and the great capacity of social contagion of the human being, who tends to imitate the behavior of others, especially in adolescence (Hoang, 2016; Saboia et al., 2020).

According to the Statista (2021) report, 32.5% of users of TikTok, one of the most prominent online platforms in viral challenges on the Internet, are between 10 and 19 years old, with no age differences in the use of this web application (Omar & Dequan, 2020). Ditrendia (2020) indicates that, in Spain, the TikTok application is opened an average of 7 times a day by each user, with an average daily use time of 43 min. This web application has undergone spectacular growth, especially since the confinement due to COVID-19. Thus, according to the Sensor Tower (2020), TikTok had

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the highest number of downloads for any application in a trimester, with 315 million installations from the App Store and Google Play. Part of the success of online platforms that contain viral challenges is justified by the configuration and possibilities they offer. These online platforms display content similar to own preferences, opinions, and previous searches so that the user mainly sees what interests them (Olivares García & Méndez Majuelos, 2020). In addition, the content feed algorithms and hashtags (usually #challenge followed by the challenge name) help to massively spread the challenges (Ballesteros, 2020). In this regard, the challenges supported by celebrities are usually the most viralized because these individuals are followed massively by a large number of people (Hoang, 2016). This happened with one of the pioneering online viral challenges called the *Ice Bucket Challenge* in 2014, which consisted of throwing a bucket of cold water over oneself and challenging others to do likewise to raise awareness and money for the Amyotrophic Lateral Sclerosis (ALS) disease. The fact that many celebrities joined this challenge meant that, in a short time, it was seen and performed by a large number of people (Pressgrove et al., 2017). Another aspect of interest is the impermanence of the challenges, such that, although at a certain point, a challenge can be performed and followed by many people, in a short time, it ceases to call attention and another challenge captures users' attention, which makes challenges changing and varied (Jacquier, 2019). All these features make Internet challenges especially attractive to adolescents, who enjoy and spend a large part of their time watching, uploading, or sharing these challenges with each other (Olivares García & Méndez Majuelos, 2020; Sotoca et al., 2017).

Not all challenges are the same, nor do they involve the same actions. There is a great diversity of challenges that justify the need to appropriately classification them. Juárez-Escribano (2019), and Mahadevaiah and Nayak (2018) proposed two taxonomies that are not mutually exclusive. Specifically, Juárez-Escribano (2019) classified viral challenges on the Internet as: 1) social challenges: they are interactive challenges that pose no danger to the participants and usually have a social or family component, for example, the *Mannequin Challenge*, which consists of recording a group scene in an inert posture; 2) solidary challenges: their purpose is to make users aware of a particular social cause, help others, or encourage good behaviors, for example, the *Trashtag Challenge* shows the before and after of a natural landscape cleaned up by the user; 3) uncivil challenges: they are not dangerous, but they are considered rude, for example, the *Cheese Challenge*, which consists of throwing a slice of cheese in the face of a baby or a pet; and 4) dangerous challenges: challenges that can put people's life or physical or psychological integrity at risk, or where their privacy can be exposed. An example is the *Blue Whale Challenge*, which consists of a chain of challenges that contain self-harming

acts that lead up to the person's suicide. In line with this last type of challenges, Mahadevaiah and Nayak (2018) indicated the need to discern between "harmless challenges" in which there are no dangers, participation is simple, and they are carried out for fun, from "harmful challenges" which are negative and imply a significant risk for users. It should be noted that, although most challenges are harmless, in recent years, the performance of very dangerous challenges has become popular (Jacquier, 2019).

Different studies indicate that one of the main reasons for the prominent performance of viral challenges on the Internet is the need for social belonging (Burgess et al., 2018; Ferreira-Deslandes et al., 2020; Shroff et al., 2020). Feeling accepted and included by peers is key to positive development, especially in adolescence (Cava et al., 2011). In this way, viral challenges become a means by which adolescents can feel connected to each other (Anderson, 2020; Burgess et al., 2018; Hoang, 2016). Juárez-Escribano (2019) pointed out that the adolescents most predisposed to participate in viral challenges are those who have the most need for acceptance, appreciation, or recognition by their peers. According to this author, the prevailing need to believe that they are part of a group, as well as to feel integrated and accepted in it, makes many adolescents perform any challenge to avoid feeling like a misfit or out of place. Although the relationship between the two constructs has not yet been studied, Fear of Missing Out (FoMO) may play an important role in the performance of viral challenges as it refers to the fears and concerns that a person may experience when disconnected from their social environment (Gil et al., 2015). In this line and given that challenges have a clear orientation to the online context, this phenomenon may also be related to the dimension of nomophobia, loss of connection, which alludes to the fear of losing connection with one's online identity (González-Cabrera et al., 2017), which, in this case, would prevent them from being up to date and able to share the viral challenges with their peers.

In this line, another reason for performing viral challenges online is the opportunity offered by the applications to show the best version of oneself; this is done primarily to please others and get likes, followers, and positive comments (Ballesteros, 2020; Ferreira-Deslandes et al., 2020; Jacquier, 2019). Nikolinakou and King (2018) highlighted the importance for the user to stand out from the crowd to achieve the desired social recognition. In fact, in the online environment, a frequent practice in early adolescence is to project an idealized image of the self (Ortega-Barón et al., 2020). In turn, Dafonte-Gómez (2014) indicated that the content we share on the Internet also has to do with self-perception. Therefore, the self-online may be related to viral challenges, as different studies indicate that performing and sharing challenges is attractive to adolescents because it also allows their self-expression (Omar & Dequan, 2020),

experimenting with their self, and building the desired identity (Ferreira-Deslandes et al., 2020; Koneva & Lisenkova, 2019).

Another construct that may be closely related to viral challenges on the Internet is emotional intelligence, especially that which is related to the online context. Online emotional attention focuses on the ability to perceive, value, and express emotions accurately on the Internet; online emotional clarity focuses on understanding emotions; and the dimension of online emotion regulation refers to producing modifications in one's emotional state (González-Cabrera et al., 2016). The most viral content usually triggers strong emotions, both positive and negative, in viewers, which causes some users to overdo it by performing extreme and dangerous acts to increase their audience (Ferreira-Deslandes et al., 2020; Hoang, 2016). According to Ferreira-Deslandes et al. (2020), the great popularity of challenges among adolescents that entail some degree of danger is due, to a large part, to the attraction to risk and the search for emotions that characterizes the evolutionary stage of adolescence. On the other hand, it should also be noted that viral challenges capture the attention of users through positive emotions derived from the entertainment and fun they offer, and from positive feelings when sharing those experiences with others (Berger & Milkman, 2013; Nikolinakou & King, 2018).

In short, the peculiar characteristics of challenges partly justify the difficulty to empirically evaluate the phenomenon. To date, there is no record of any instrument to evaluate this construct that presents adequate psychometric indicators. The few studies carried out have focused on the content analysis of some specific challenges such as the *Ice Bucket Challenge* or the *Blue Whale Challenge* (Burgess et al., 2018; Pressgrove et al., 2017; Roth et al., 2020; Villani et al., 2019), case studies (Avery et al., 2016), or ad hoc designed surveys (Shroff et al., 2020) which do not cover the phenomenon in its entirety and do not provide any empirical reliability of the responses. There is also no theoretical framework on viral challenges (Jacquier, 2019; Juárez-Escribano, 2019), so approximations to constructs are currently exploratory.

In view of the above, the main objective of this study was to analyze the psychometric properties of the scores of the Viral Internet Challenges Scale (VICH-S). In turn, as secondary objectives, this study analyzed the prevalence of the number of challenges performed in the last year in Spanish's preadolescents, and the prevalence of different types of challenges based on the classification of Juárez-Escribano (2019): social, solidary, and dangerous challenges. All analyses considered differences according to participants' sex and school stage (primary vs. secondary stage). Likewise, the prevalence and differences in the VICH-S was analyzed depending on whether preadolescents performed only one type of challenge (social, solidary, or dangerous) or whether

they performed different types of challenges at the same time. The working hypothesis was that social and/or solidary challenges would be more prevalent compared to dangerous challenges (Jacquier, 2019). Likewise, we hypothesized that there would be no differences in the performance of and/or participation in challenges depending on the school stage (Omar & Dequan, 2020). Regarding differences according to sex and the combination of challenges, as there were no consistent previous studies, the following research questions were suggested: 1) Is the prevalence among boys and girls different depending on the type of challenge (social, solidary, or dangerous)?; 2) Does one obtain a higher score on VICH-S based on whether one performs only one type of challenge (social, solidary, or dangerous) or whether different types carried out at the same time (social and solidary challenges; social and dangerous challenges; or social, solidary, and dangerous challenges)?

Method

Design and Participants

An instrumental, analytical, and cross-sectional study was carried out. The sample was obtained between January and February 2020. The initial sample included 843 students. However, for the purpose of this study, those participants ($n = 426$) who answered the following control question in the negative were eliminated: Have I participated in or performed any viral dares or challenges on the Internet in the last 12 months? Therefore, the final sample was made up of 417 participants (41.2% boys, 58.8% girls), aged between 10 and 14 years ($M = 12.20$, $SD = 0.97$) belonging to 5 educational centers located in three Spanish regions (Aragon, Principality of Asturias, and Castilla y León). The distribution of the final sample by school stage was: 119 students (42 boys, 77 girls) in the sixth grade of Primary Education; and 298 students (130 boys, 168 girls) who were in the first and second grades of Compulsory Secondary Education (CSE). This study employed a non-probabilistic incidental sampling procedure.

Instruments

The participants provided sociodemographic variables (sex, age, school stage, and school), indicated the number of challenges they had performed in the last year and marked the type of challenges they usually perform: 1) social, solidary, and/or dangerous challenges. In turn, the Spanish version of the following instruments was administered:

Viral Internet Challenges Scale (VICH-S) The authors of this manuscript created the items of this scale according

to the previous studies in this topic and following international standards for the adequate design of questionnaires (American Educational Research Association; American Psychological Association; National Council on Measurement in Education, 2014). Concretely, the design of this scale, composed of 10 items and two dimensions, followed. The semantic definition of the construct Viral Internet Challenges comes from the combination of three terms (*challenges* = challenges to be achieved or performed; *Internet* = in the online context; *viral* = content that spreads very quickly on social networks). Taking into account the etymological origin of this term, this scale evaluates the satisfaction and social motivation for the performance of and/or participation in viral challenges on the Internet. On the one hand, the first of the two dimensions, Challenge Satisfaction (consisting of 5 items) evaluates the user's satisfaction for performing viral challenges on the Internet (e.g., "Performing a challenge makes me feel good"). On the other hand, the second dimension, Social Motivation (made up of the other 5 items), evaluates social motivations, especially referring to the group of peers, which affect the performance of this type of challenges (e.g., "I perform certain challenges because I don't want to feel left out of my group of friends"). Three experts in the field of study participated in the process of validating the content of this scale and achieved high interjudge reliability throughout the process (> 0.8) in the different elements shown in the table of specifications of the questionnaire. Additionally, two cognitive interviews with preadolescents were conducted to analyze the adequacy and comprehension of the items. The Likert-type response options of the VICH-S vary between 0 (*never*) and 3 (*many*

times). The range of scores varies between 0–15 for each dimension. The items on this scale are shown in Table 1. The reliability obtained for this sample using Cronbach's alpha can be seen in Table 2.

Nomophobia Questionnaire (NMP-Q; González-Cabrera et al., 2017; León-Mejía et al., 2021) This scale is composed of 20 items and evaluates the intense fear and excessive worry of not having one's mobile or being unable to communicate through the mobile. For this study, Loss of Connection subscale was used, consisting of 5 items that evaluate the fear of loss of connection of one's online identity (e.g., "I would be nervous about being disconnected from my virtual identity."). The response format of this Likert scale varies from 0 (*strongly disagree*) to 6 (*strongly agree*). Scores range between 0 and 30. The reliability obtained for this sample using Cronbach's alpha can be seen in Table 2.

Fear of Missing Out Scale (FoMO; Gil et al., 2015) This scale contains 10 items and evaluates the fears and concerns that a person may experience by being disconnected from the experiences of their social environment (e.g., "I get nervous when I find out that my friends are having a good time without me"). Likert response options range from 0 (*not at all*) to 4 (*a lot*). Scores range between 0 and 40. The reliability obtained for this sample using Cronbach's alpha can be seen in Table 2.

Self-Online Scale (SO-8; Ortega-Barón et al., 2020) This scale evaluates beliefs, concepts, and subjective representations that adolescents have of themselves as a result of online use

Table 1 Means, standard deviation, total item correlation, percentage of positive responses, and factorial loads of the VICH-S ($n=417$)

Viral Internet Challenges Scale (VICH-S)		M	SD	IT	%+	Skew	Kurt	RFL	
F1	1. When I perform a dare or a challenge, I like others to follow and also perform it	2.05	0.90	.56	71.3	0.64	-0.21	.710	.912
	2. I like to perform a dare or challenge with more people to feel part of a group	1.72	0.93	.62	46.4	1.07	0.11	.561	.939
	3. I like to comment on the dare or challenge that other people perform	1.86	0.91	.59	58.4	0.88	-0.01	.750	.953
	4. I like to be told what others think of my dares and challenges	1.73	0.94	.66	46.9	1.12	0.26	.955	.986
	5. Performing a dare or a challenge makes me feel good	1.82	0.87	.60	57.7	0.88	0.11	.591	.888
F2	6. I perform dares or challenges that my friends or contacts ask me to do on social networks	1.47	0.72	.63	36.4	1.69	2.81	.392	.912
	7. I perform certain dares or challenges because I don't want to feel left out in my group of friends	1.34	0.70	.69	24.2	2.29	5.07	.537	.967
	8. I perform a dare or challenge that is fashionable without thinking about whether it is good or bad for me	1.40	0.76	.61	27.0	2.04	3.61	.733	.973
	9. When I am asked to perform a dangerous dare or challenge, I am emboldened and I do it	1.31	0.71	.63	19.9	2.47	5.56	.925	.939
	10. If my friends insist that I should perform a dare or a challenge that I don't want to do, I end up doing it	1.31	0.68	.57	21.3	2.40	5.52	.740	.921

F1=Challenge Satisfaction, F2=Social Motivation; M=arithmetical mean; SD=standard deviation; IT=corrected item-total correlation; %+=Percentage who responded positively (at least once); Skew=Skewness; Kurt=Kurtosis; RFL=rotated factorial loadings; For items in Spanish please see Annex 1

Table 2 Pearson's bivariate correlations between the VICH-S and the dimensions of the FoMO, NMP-Q Connection, SO-8, and EIEI questionnaires

	1	2	3	4	5	6	7	8	9	α
1. Challenge Satisfaction	—									.82
2. Social Motivation	.64**	—								.84
3. Fear of Missing Out	.43**	.30**	—							.86
4. Loss of Connection	.31**	.30**	.52**	—						.91
5. Online Self-Perception	.31**	.11*	.20**	.21**	—					.80
6. Online Idealized Projection	.34**	.33**	.26**	.37**	.47**	—				.74
7. Online Emotional Attention	.32**	.31**	.36**	.34**	.17**	.40**	—			.86
8. Online Emotional Clarity	.31**	.20**	.22**	.22**	.23**	.26**	.70**	—		.87
9. Online Emotional Regulation	.35**	.20**	.31**	.24**	.24**	.21**	.64**	.70**	—	.86

** significant at $p < .001$, * significant at $p < .05$; α = Cronbach alpha; VICH-S – Viral Internet Challenges Scale; FoMO – Fear of Missing Out Scale; NMP-Q – Loss of Connection Subscale; SO-8—Self-Online Scale; and EIEI- Internet Emotional Intelligence Scale

and interactions. It consists of 8 items that are divided into two dimensions with 4 items per dimension: Online self-perception (e.g., “I have a positive attitude towards myself when I post something or talk to someone on the Internet”) and Online idealized-projection (e.g., “I think it's important to present a good image of myself on the Internet, even if it doesn't correspond to reality”). Likert-type response options range from 0 (*completely disagree*) to 3 (*strongly agree*). The range of scores can vary between 0 and 12 in each dimension. The reliability obtained for this sample using Cronbach's alpha can be seen in Table 2.

Internet Emotional Intelligence Scale (EIEI; González-Cabrera et al., 2016) This 15-item scale evaluates the meta-knowledge traits of emotional states in online environments and contains three dimensions with 5 items in each dimension: Online Emotional Attention (e.g., “I pay attention to my emotions when something happens to me on the Internet”), Online Emotional Clarity (e.g., “I can tell someone else about my emotions when I'm on the Internet”), and Online Emotion Regulation (e.g., “On the Internet, if something negative happens, I try to control myself before I act”). The Likert response options of this scale vary from 0 (*strongly disagree*) to 4 (*strongly agree*). The range of scores can vary between 0 and 20 in each dimension. The reliability obtained for this sample using Cronbach's alpha can be seen in Table 2.

Procedure

The battery of questionnaires was administered during school hours to the students in online format through the Survey Monkey© platform. The participants completed the questionnaires in the computer classroom or on tablets under the supervision of the teachers of each classroom. The time required to complete the battery of questionnaires ranged

from 20 to 30 min, depending on the age and reading comprehension of the participants.

Ethical Considerations

This study was conducted with the approval of all the schools that participated in the study. Through official channels, the heads of each school handed the students, parents or legal guardians a passive consent form in which they were provided with a contact, and informed about the purpose of the study, the characteristics of the research team promoter, and their right not to participate. In addition, two online meetings (on different dates and times) were held with families to explain the research and answer their questions. In this way, the parents/guardians of the students who did not want to participate returned this signed consent explicitly indicating their disagreement. The acceptance rate of families to participate in the study was over 99%. Adolescents were informed that their participation was voluntary and anonymous (and only slightly less than 2% declined to participate in the study).

This study was approved by the Research Ethics Committee of Research Ethics Committee of International University of La Rioja (PI: 004/2019). The juvenile prosecutors' offices were also informed of the study. There were no exclusion criteria, except for the refusal of the students or their legal guardians to participate.

Statistical Analysis

To perform the statistical analyses, we used the statistical package for the social sciences SPSS v. 25.0 (IBM Corp, 2020), and Factor Analysis v. 11.02.04 (Lorenzo-Seva & Ferrando, 2006). First, the psychometric properties of each item on the VICH-S were analyzed, calculating the arithmetic mean, the standard deviation, the item-total correlation, and the skewness and kurtosis (see Table 1). A multiple

criterion was followed for the selection of items without technical deficiencies, consisting of the items meeting at least two of the following three statistical indices: a) mean between 1 and 2; b) standard deviation equal to or lower than 1; c) item-total correlation equal to or greater than 0.35 (Carretero-Dios & Pérez, 2005).

To analyze the factorial structure, exploratory factor analysis (EFA) was performed using the extraction method of Robust Diagonally Weighted Least Squares (mean and variance scaled for robust chi squared) (RDWLS-MV) and Robust Promin rotation. For the choice of the number of dimensions to be preserved, theoretical and statistical criteria such as the Kaiser value, the Eigenvalue, and Schwarz's Bayesian Information criterion (BIC) dimensionality test were considered. To assess the goodness of fit of the indices, the criteria of Hu and Bentler (1999) were considered: RMSEA values below 0.06 indicated an excellent fit, between 0.06 and 0.08 acceptable fit, and CFI and NNFI values of 0.95 or higher reflect a good fit. In turn, the internal consistency of the instruments used was determined by estimating the alpha Cronbach coefficient. The following analyses were also performed: (1) Pearson bivariate correlations to determine the convergent validity of the VICH-S; (2) frequency analysis, central tendency, and dispersion measures; (3) t-test for independent samples; (4) calculation of the effect size (Cohen's *d* or eta squared, as appropriate); (5) analysis of variance with post-hoc Games-Howell comparisons. A value of $p \leq 0.05$ was considered significant.

Results

Evidence of Validity of the VICH-S Scores

Table 1 shows psychometric indicators of the VICH-S: mean, standard deviation, and item-total correlation. All items met at least two of the three statistical indices for item selection without technical deficiencies. Regarding the calculation of the skewness and kurtosis of each item, the values indicated a positively skewed distribution.

Factorial Structure

First, the suitability of the data to perform EFA was corroborated. The Kaiser-Meyer-Olkin (KMO) index yielded a value of 0.9061. The results indicate two factors with eigenvalues greater than the unit, which explain 61.1% of the variance (51.1% and 10.0%, respectively). Additionally, Schwarz's BIC-based dimensionality test also suggested the existence of two factors. Adequate fit indices were obtained for this two-factor model: $\chi^2 (26, n = 418) = 44.874$, $p = 0.012$; RMSEA = 0.045, 95% Confidence interval [0.022, 0.057], CFI = 0.99, NNFI = 0.99. The first factor was called

Challenge Satisfaction because it is related to the satisfaction or pleasure obtained by performing or participating in challenges, while the second factor, called Social Motivation, is more related to items that refer to participating in challenges for social reasons or group membership. A correlation of 0.64 was obtained between the two factors. The factorial weights can be observed in Table 1. In all cases, they were higher than 0.40, as recommended by several authors (Gaskin & Happell, 2014; Izquierdo et al., 2014).

Association of the VICH-S with Other Variables (FoMO, NMP-Q, SO-8, and EIEI)

To establish convergent validity, significant correlations were obtained between the dimensions Challenge Satisfaction and Social Motivation and all the constructs analyzed in this study (see Table 2). Particularly relevant were the positive and significant correlations ($p < 0.001$) between the two dimensions of the VICH-S with the Fear of Missing Out and the dimension of Loss of Connection ($r = 0.43$ and 0.31 respectively, for Challenge satisfaction; and $r = 0.30$ and 0.30 for Social Motivation). On another hand, positive and significant correlations ($p < 0.001$) were also observed between Idealized Projection of the Self with Challenge Satisfaction ($r = 0.34$) and Social Motivation ($r = 0.33$). Finally, the positive correlation ($p < 0.001$) between Challenge Satisfaction and Online Emotional Attention ($r = 0.32$) and Emotion Regulation ($r = 0.35$) was also relevant.

Differences as a Function of Sex and School Stage

There were no significant differences based on sex in Challenge Satisfaction or Social Motivation ($t = -0.50$, $p = 0.620$ and $t = 1.64$, $p = 0.103$, respectively). In relation to the school stage, there were significant differences in the dimension of Challenge Satisfaction between 6th grade of Primary Education and 1st-2nd grade of CSE ($t = 3.07$, $p = 0.002$, $d = 0.035$). On the contrary, there were no significant differences in the dimension of Social Motivation ($t = 0.85$, $p = 0.397$).

On another hand, Table 3 shows the prevalence according to sex and school stage as a function of the types of challenges performed. In particular, the percentage of boys performing dangerous challenges was significantly higher than that of girls ($\chi^2 = 19.45$, $p < 0.001$).

Prevalence of Challenge Types and the Total Number of Challenges Performed

The most frequent type of challenges performed by the preadolescents in this study were social challenges (80.3%). Moreover, 20.6% of the participants acknowledged having performed solidary challenges, and 7.7%

Table 3 Prevalence of types of challenges depending on sex and school stage

	Group	<i>f</i> (%)	χ^2 (<i>p</i>)	Group	<i>f</i> (%)	χ^2 (<i>p</i>)
Social challenges (<i>n</i> =335)	Boys	131 (31.4%)	3.23 (.072)	6th grade Primary	94 (22.5%)	0.19 (.663)
	Girls	204 (48.9%)		1st-2nd grade CSE	241 (57.8%)	
Solidary challenges (<i>n</i> =86)	Boys	31 (7.4%)	1.21 (.272)	6th grade Primary	27 (6.5%)	0.43 (.510)
	Girls	55 (13.2%)		1st-2nd grade CSE	59 (14.1%)	
Dangerous challenges (<i>n</i> =32)	Boys	25 (6.0%)	19.45 (.000)	6th grade Primary	7 (1.7%)	0.75 (.385)
	Girls	7 (1.7%)		1st-2nd grade CSE	25 (6.0%)	

f=frequency, %=percentage; χ^2 =Chi-square, *p*=significance

performed dangerous challenges in which their physical or psychological integrity and/or privacy were endangered. Considering the performance of and/or participation in challenges of a single type or of different types of challenges at the same time, Table 4 shows that the most frequent is the performance of only social challenges (57.2%), followed by the performance of social and dangerous challenges conjointly (15.3%).

Concerning the number of challenges carried out in the last year, of the 333 preadolescents who answered this question, 67.4% admitted having performed between one and twelve challenges, and 12.5% more than thirteen challenges (13–50 challenges).

Differences in the VICH-S Depending on the Combination of Types of Challenges Performed

Table 4 shows that in the dimension Challenge Satisfaction, there were significant differences between the single or combined performance of the different types of challenges ($F=6.46, p<0.001, \eta^2=0.085$). Specifically, the differences were between the combination of all types of challenges (social, solidary, and dangerous) and between social and dangerous challenges and social challenges. Concerning the dimension Social Motivation, there were also significant differences depending on the combination of challenges ($F=8.69, p<0.001, \eta^2=0.111$). In this case, the differences were, on the one hand, between the group of

Table 4 Differences in the Viral Internet Challenges scale depending on the combination of types of challenges performed

Combination of challenges	<i>f</i> (%)	Challenge Satisfaction				Social Motivation			
		<i>M</i> (<i>SD</i>)	<i>F</i> (<i>p</i>)	η^2	Post-hoc	<i>M</i> (<i>SD</i>)	<i>F</i> (<i>p</i>)	η^2	Post-hoc
Social challenges (a)	202 (57.2%)	3.48 (3.04)	6.46 (<.001)	.085	e, f > a	1.35 (1.85)	8.69 (<.001)	.111	f, e > d; e > a
Solidary challenges (b)	7 (2.0%)	4.00 (3.56)				4.00 (4.35)			
Dangerous challenges (c)	11 (3.1%)	3.72 (3.20)				2.09 (2.21)			
Social and solidary challenges (d)	45 (12.7%)	4.51 (2.84)				1.18 (1.28)			
Social and dangerous challenges (e)	54 (15.3%)	5.27 (3.59)				2.94 (3.29)			
Social, solidary, and dangerous challenges (f)	34 (9.6%)	6.44 (4.32)				3.56 (4.42)			

n=353; participants who responded to the item about these types of challenges; there is no sample *n* in the combination of: solidary and dangerous challenges; *M*=arithmetic mean; *SD*=standard deviation; *p*=significance; *F*=Fisher's *F*; η^2 =effect size; Post hoc: Games Howell post-hoc test. a, b, c, d, e, and f, respectively, are the combination of these types of challenges

all types of challenges and social and dangerous challenges; and between social and solitary challenges and social and dangerous challenges. On the other hand, there were significant differences in the Social Motivation scale between social challenges and dangerous challenges and social challenges (See Table 4).

Discussion

Despite the rapid growth of viral challenges on the Internet in recent years, different authors insist that the lack of studies reflects a theoretical and methodological gap in this topic (Jacquier, 2019; Juárez-Escribano, 2019). In this sense, the present study offers the first instrumental approach that operationalizes viral challenges on the online context and from which adequate psychometric properties of its scores have been obtained. The Viral Internet Challenges Scale (VICH-S) is a rigorous and empirically validated scale that has as its specific objective to evaluate the satisfaction and social or group membership motivations that affect the performance of and/or participation in viral challenges on the Internet.

Concerning the main objective of this study, as conceptualized, the results of the EFA of the VICH-S yield a two-factor scale (Challenge Satisfaction and Social Motivation) that explains a high percentage of the variance, with satisfactory item-total correlations and factorial loads in all items. In addition, reliability analyses indicated high internal consistency across the two dimensions of this scale. We also highlight the convergent validity of the two dimensions of the VICH-S with other constructs such as the Fear of Missing Out and Loss of Connection to the online identity (part of nomophobia). In this line, as Jacquier (2019) and Ferreira-Deslandes et al. (2020) indicate, viral challenges on the Internet are very popular for adolescents, in part, because they offer the possibility of reaffirming and increasing the feeling of belonging and connection with others. That is why adolescents are often willing to risk performing extreme and dangerous challenges as long as they are not left out of their group of friends or people who are relevant to them (Juárez-Escribano, 2019). In this sense, it should be noted that, although the act of performing a specific viral challenge usually originates in an individual act, challenges gain momentum and interest by moving from one person to another on the Internet, thus creating a collective mass action through the imitative interaction of the challenge (Burgess et al., 2018).

In this sense, the positive and significant correlation between the VICH-S and the self-online, specifically with the idealized projection of the self, is also noteworthy. In line with other studies, these results show that viral challenges on the Internet are performed in part because it is an easy way to get positive feedback from other users and stand out

from the crowd (Ferreira-Deslandes et al., 2020). For this purpose, adolescents show a positive image of themselves in the online context to please others and get likes, followers, and positive comments (Jacquier, 2019; Ortega-Barón et al., 2020; Shroff et al., 2020). Regarding the correlations with Online Emotional Attention, the positive emotions generated by seeing, commenting on, and/or performing challenges with others can be a factor that reinforces their use. In addition, as indicated by Shroff et al. (2020), one of the main reasons for performing challenges is the immediacy of the rewards. Thus, it is usual that when a minor upload a challenge, they perceive and want to see *ipso facto* what emotional impact their feat is having on the audience.

On another hand, regarding prevalence, following the classification of Juárez-Escribano (2019), the most performed viral challenges on the Internet are the so-called social challenges (80.3%), followed by solitary challenges, in which other people are helped or positive actions are carried out such as caring for the environment (20.6%). These high percentages confirm our working hypothesis and are in line with the idea of Jacquier (2019), who indicates that most challenges are usually harmless. Although dangerous challenges are less frequent (7.7%), we should not underestimate this percentage due to their severity. In this line, it is important to know the harm to which our adolescents are exposed in social networks and how to prevent these dangerous challenges, because access to self-harming or violent content can normalize this type of behaviors (Gámez-Guadix et al., 2020; Villani et al., 2019). In future lines of research, it would be appropriate to include uncivil challenges in the taxonomy, following the classification of Juárez-Escribano (2019).

As for differences according to sex, although the results of this study do not reveal significant differences between boys and girls in either of the two dimensions of the VICH-S, a higher prevalence of boys perform dangerous challenges. In accordance with this result, different studies show that boys take more risks than girls because they have higher levels of competitiveness and dominance (Pellegrini & Archer, 2005), they attach more importance to the benefits of risk (Gardner & Steinberg, 2005), and are more influenced by their peers (Steinberg & Monahan, 2007). de Boer et al. (2017) also indicate that boys are more at risk in the presence of their peers. Furthermore, the hormonal changes during adolescence could also influence why boys are more likely to engage in dangerous challenges due to the increasing levels of testosterone according to other studies (Peper et al., 2013; Stanton et al., 2011). The results obtained in this study are in this line because the performance of challenges has a large social component. As far as the school stage is concerned, the working hypothesis is partially fulfilled. The results, in accordance with the study of Omar and Dequan (2020), do not indicate differences in Social Motivation but the students

of 6th grade of Primary Education were observed to have higher scores in Challenge Satisfaction. This result may be due to the novelty of performing these challenges for the younger children in comparison to older adolescents, who have more autonomy and use a greater diversity of web applications. Finally, in terms of combining several types of challenges at once, the results show that preadolescents who perform several types of viral challenges on the Internet at once have higher scores on each of the dimensions of the VICH-S. Possibly, this may be because a greater variety of challenges seems to cause greater satisfaction and social motivations when performing them.

Limitations

This study is not without limitations that should be taken into account. In the first place, the VICH-S is self-reported, this aspect and the supervision of teachers during the administration of the instruments, might have conditioned the students due to possible biases and social desirability. In future research, additional qualitative measures or hetero-reports with parents and teachers could be used to better understand this novel phenomenon. Second, this research is an exploratory approach to the VICH-S. In future work, a confirmatory factor analysis of the scale could be performed, as well as an analysis of its predictive validity and test–retest reliability. Thirdly, we must be cautious in generalizing these results to other samples, ages and cultures because sampling was not probabilistic. Finally, it should be noted that the great scarcity of studies on the subject sometimes prevents comparing the results obtained in a study with previous research.

Despite these issues, this study has some very relevant implications because it offers an evaluation tool (VICH-S), validated with scientific and methodological rigor for the school, clinical, and scientific community and society in general.

Conclusions

In future research, the VICH-S may be an evaluation tool of interest to determine the extent of this phenomenon in educational centers, and to help train parents in terms of better education in values and greater parental supervision and mediation, especially in the face of dangerous challenges (Ferreira-Deslandes et al., 2020; Livingstone et al., 2017). In turn, this evaluation tool can also be useful to analyze the impact of future training, prevention, and intervention actions around this increasing theme. Knowing this phenomenon better can not only prevent risks in minors but can also promote actions aimed at promoting online viral challenges to become a positive educational tool to share group experiences, such as practicing and improving physical skills,

according to the studies in this topic regarding the use of challenges in the subject of Physical Education (Carriedo et al., 2019; Sotoca et al., 2017).

In conclusion, the complexity, plurality, and transience of viral challenges make it difficult to quantify the performance of this increasingly frequent online behavior in young people. In this sense, this study is a significant contribution because the VICH-S was elaborated with conceptual and methodological rigor, obtaining adequate criteria of validity and reliability, which allow us to better know this incipient phenomenon.

Authors' Contributions Conceptualization: [Jessica Ortega-Barón, Juan Manuel Machimbarrena, Joaquín González-Cabrera]; Methodology: [Jessica Ortega-Barón, Irene Montiel]; Formal analysis and investigation: [Jessica Ortega-Barón, Juan Manuel Machimbarrena]; Writing—original draft preparation: [Jessica Ortega-Barón, Juan Manuel Machimbarrena]; Writing—review and editing: [Joaquín González-Cabrera, Irene Montiel]; Funding acquisition: [Joaquín González-Cabrera]; Resources: [Joaquín González-Cabrera]; Supervision: [Joaquín González-Cabrera].

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Data Availability The datasets generated and/or analysed during this study are not publicly available because they are currently part of a larger study but are available from the corresponding author upon reasonable request.

Declarations

Ethics Approval The project was approved by the Research Ethics Committee of International University of La Rioja (Spain) (PI: 004/2019) and the Juvenile Prosecutor's Office was informed. This study was conducted in accordance with the ethical standards established in the Declaration of Helsinki of 1964 and its subsequent modifications or comparable ethical standards.

Consent to Participate Through official channels, the heads of each school gave the students' parents or legal guardians a passive consent form in which they were provided with a contact, and informed about the purpose of the study, the characteristics of the research team promoter, and their right not to participate. In this way, the parents/guardians who did not want the minor to participate returned this signed consent explicitly indicating their disagreement.

Conflict of Interests There are no financial, work, or other relationships that may constitute a conflict of interest concerning this work.

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