

Design and validation of an instrument to evaluate phubbing behaviors

Diseño y validación de un instrumento para evaluar los comportamientos phubbing

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Abstract

The present study reports on the process carried out to design and validate a questionnaire that evaluates phubbing behaviors and the effects of these behaviors on people's lives. These behaviors are defined as the act of ignoring people in a social environment by looking at one's phone rather than paying attention to an ongoing conversation (Błachnio and Przepiorka, 2019). The procedure employed a natural semantic network method in order to create the instrument in collaboration with a group of experts. Content validation processes pertaining to the questionnaire are presented. These employed an expert panel and examination of reliability through Cronbach's alpha coefficients following administration with a pilot sample. The sample used for content validity of the questionnaire was composed of eighteen experts. These experts discussed meanings of the word phubbing. The results obtained produced eighty-six concepts related to the term phubbing. These were structure according to the following five questionnaire dimensions: cultural, technological, social, psychological and communicational. Reliability analyses, carried out with a pilot sample of 250 individuals, suggested that the instrument was suitable for the evaluation of phubbing behaviors in young people and adults.

Keywords: phubbing; smartphone; natural semantic networks; scale; validity.

Resumen

En este estudio se muestra el proceso llevado a cabo en el diseño y validación de un cuestionario que evalúa los comportamientos phubbing y los efectos que producen en las vidas de las personas. Estas conductas pueden definirse como el acto de ignorar a las personas en un entorno social, mirando el teléfono en lugar de prestar atención a la conversación (Błachnio y Przepiorka, 2019). Mediante el método de redes semánticas naturales se describe el procedimiento seguido para la creación del instrumento con la colaboración de un grupo de personas expertas. Se presentan la validación de contenido del cuestionario a través del juicio de personas expertas y la fiabilidad obtenida a través del coeficiente Alpha de Cronbach con una muestra piloto. La muestra que participa en la validación de contenido del cuestionario está compuesta por dieciocho personas expertas, que aportan significados a la palabra phubbing. Los resultados obtenidos ofrecen a la investigación ochenta y seis conceptos relacionados con el término phubbing que determinan la estructura del cuestionario en cinco dimensiones: cultural, tecnológica, social, psicológica y comunicacional. Los análisis de la fiabilidad, obtenidos con una muestra piloto de 250 personas, afirman que el instrumento es adecuado para la evaluación de los comportamientos phubbing en personas jóvenes y adultas.

Palabras clave: phubbing; móvil; redes semánticas naturales; escala; validez.

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The development of mobile phones has brought enormous benefits to citizens, beyond the simple act of making calls and sending messages. More and more young people and

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adults are making use of these devices and adapting them to their particular interests. This has generated a great demand for them. In particular, smartphones allow Internet access, marking a before and after in communication practices and social interactions. This novelty is part of a triple revolution, promoted by phone network providers, that revolves around social networks, the Internet and mobile devices (Naval, Serrano-Puche, Sádaba & Arbués, 2016).

In recent years, there has been an expansion in information and communication technology and, as a result, the creation of devices. This fact highlights the influence that ICT has on people's lives, behaviors, life habits and, generally speaking, the way they see and understand the world. In fact, when it comes to online communication people tend to prefer smartphones (Ofcom, 2015). In this way, a situation of permanent connectivity has been reached (Serrano-Puche, 2014), making smartphones a part of people's daily lives (Roberts, Yaya & Manolis, 2014).

However, despite the undoubted benefits of smartphones, in recent years researchers have become increasingly concerned about their potential adverse effects on mental and physical health (Estévez, Urbiola, Iruarrizaga, Onaindia & Jauregui, 2017), and the quality of people's social interactions (Bernal, Rosa-Alcázar, González-Calatayud and Rosa-Alcázar, 2017). Thus, just as many people have become addicted to the Internet (Savci & Aysan, 2017), others are increasingly engaging in problematic smartphone use. This has generated interest into the possible consequences of excessive use.

One of these consequences is phubbing behavior. This is defined by Chotpitayasunondh & Douglas (2016) as "the act of snubbing others in social interactions and instead focusing on one's smartphone" (p.9). It seems to have negative consequences for the communication between individuals. This is detrimental for the satisfaction felt with regards to relationships and perceptions of personal well-being (Roberts & David, 2016). The word phubbing was conceived and included in the Macquarie dictionary for the first time in Australia in 2013.

This term arises from the union of the words phone and snubbing. It refers to the circumstance in which the advantageous novelty of permanent connectivity has gradually become a major problem amongst young people and adults.

Although research has begun to consider some of the consequences of problematic smartphone use such as phubbing (Roberts & David, 2016), very little is still known about what causes this behavior and how it has become a ubiquitous feature of modern communication. Thus, phubbing is characterized by a multidimensional structure (Barrios, Bejar & Cauchos, 2017) since smart devices have different functions. In addition, this term is linked to mobile phone addiction and, therefore, to the benefits it provides such as the internet, social networks, video games and online games. Addiction to these factors are considered as facilitators for the development of phubbing.

Hence, the present study reports on the development and validation of an instrument that was created to evaluate phubbing behaviors in young people and adults. Specifically, natural semantic network (NSN) techniques were used. These are defined as "a set of concepts chosen from memory via a reconstructive process which enables subjective evaluation of events, actions and objects" (Noriega, Castro and Loya, 1998, p.8). The origins of this technique are located mainly in disciplines such as Psychology, Artificial Intelligence and Pedagogy. These precepts are based on notions pertaining to semantic memory and episodic memory, in other words, notions that help the structure of memory and, therefore, the way in which meanings are related to be understood. According to Vargas-Garduño, Méndez and Vargas-Silva (2014, p.2), this technique is based on "the ideas and concepts built by individuals in relation to any object, topic or situation of their daily lives, with outcomes being expressed in colloquial terms." Further, "through language it is possible to know and understand many mental processes since there is a close relationship between language-thought and perception-learning".

At the same time, this technique constitutes an empirical resource of access to the cognitive organization of meanings as, through the

meanings granted by the group of participating scholars, the cognitive universe is considered in that outcomes are also the product of social learning. For this reason, the semantic structure of networks does not remain constant. Instead, it develops and more relationships are acquired as people's general knowledge increases. Furthermore, it is also modified according to the influence of the cultural environment and individuals' own life experiences (Figueroa, González and Solís, 1981).

All in all, the technique of natural semantic networks is used in this study to find out the meaning of the concept of phubbing within a group of experts. The term phubbing has recently been conceptualized and phubbing behavior is becoming more and more common in our society. However, people are not yet aware that this behavior has a very important meaning in our lives. For this reason, it is useful to uncover opinions about phubbing behaviors within a small sample of academics. This will enable us to gather all of the meanings coined by individuals regarding this term and group them into the different dimensions that will later make up the conceived instrument. The dimensions considered were conceived by the authors of the present study and came from the categorization of meanings given to the term phubbing by an expert panel. These meanings provided the main source for the creation of instrument items. In response to this aim, the process employed in line with the NSN technique is now described, together with validation and reliability outcomes for the developed instrument. The pilot sample employed for the latter met the characteristics of the population to which this instrument is targeted.

Objectives

The following objectives were set to meet the aim of the present study:

1. To design an instrument that allows the evaluation of phubbing behavior in young people and adults.
 - 1.1. To develop the natural semantic networks technique for conception of the

dimensions that make up the evaluation instrument for phubbing behaviors.

- 1.2. To verify psychometric properties of the instrument through analysis of content validity and reliability.

Method

The research was divided into three phases: (I) creation of the instrument structure obtained from natural semantic networks, outcomes following expert panel discussion of meanings and outcomes pertaining to the dimensions emerging from the categorization of meanings. (II) Validation of instrument content via expert panel (II) and (III) reliability of the generated instrument.

Phase I: Creation of instrument structure from natural semantic networks

For the creation of instrument dimensions, the technique of natural semantic networks (NSN) was developed. Eighteen male and female experts in the educational and psychological fields and from the region of Extremadura (Spain) participated. The sample was made up of 9 females and 9 males. These were selected via intentional non-probability sampling. Ages ranged between 34 and 59 years, and participants had between 10 and 30 years of professional experience in the academic field. 17 participants belonged to the University of Extremadura and 1 to the National Distance Learning University.

For the application of NSNs, data was collected through a questionnaire which was designed and disseminated through *Google Drive Forms*. Questionnaires were distributed to 30 people via an email which invited them to participate. The questionnaire included a section dedicated to sociodemographic data (sex, age, workplace and years of experience). Another section provided respondents with 21 blank lines to respond to the "stimulus word" phubbing. The aim of this was to analyze the concept in order to know its meaning. Based on this technique, requested responses are based on three fundamental criteria:

- a. To clearly and precisely define the stimulus word (phubbing). This is done using “defining words” (verbs, adverbs, nouns and adjectives without using articles or prepositions) which are considered to be related to the stimulus word.
- b. To rank the defining words on a scale from 1 to 10, in which 1 pertains to words most considered to be related to the stimulus word and 10 pertains to the least related words.
- c. To provide at least five defining words for the stimulus word.

Likewise, in order to avoid conditioning participants’ responses, they were not informed about the meaning of phubbing. This meant that they could only respond according to their own experiences.

Data collection was carried out between December 2017 and January 2018. Following application of this procedure, 18 responses were received. This allowed information to be

gathered on the meaning of the term phubbing. As suggested by Zermeño, Arellano and Ramírez (2005) and Pérez Cruz (2015), the following normalization process was followed in which defining words were grouped together according to the following criteria:

- All plural words were converted into their singular form.
- Synonyms were grouped together to form the same term.
- Only the main concept of sentences was considered.
- Cases were eliminated when fewer than 5 defining words were given.

Finally, as proposed by Figueroa, González and Solís (1976), Reyes (1993) and Valdez (1998), we proceeded to analyze all defining words. Values produced from this analysis are indicated in table 1, according to guidelines proposed by Gutiérrez, Alcaide & Carbonero (2017).

Table 1. *Nomenclature and calculation procedure for the NSN*

Value	Definition	Analysis
J	Size of the semantic network. Total words generated by participants.	Sum of all defining words following the normalization process.
M	Semantic weight. The defining word with the highest score, leading it to be first placed in the preliminary ranking.	Frequency of each repeated defining word and the value attributed to it on a scale of 1 to 10.
NR <i>or</i> SAM	Network core or set concepts in the network with the greatest semantic weight. The ranking indicates the defining words that best describe the stimulus word.	List of the first 25 defining words with the greatest semantic weight or M value.
G	Network density as seen through the frequency of concept inclusion at the core of the network.	The semantic weight of the main concept is subtracted from the semantic weight of the second main concept and this, in turn, is subtracted from the third, and so on.
DSC <i>or</i> FMG	Quantitative semantic distance between defining words.	The defining word with the most semantic weight at the core of the network is considered to be 100%. Values of the following defining words are then obtained according to a rule of three.

Outcomes from the expert panel on meanings

Replies obtained through the procedure of natural semantic networks were analyzed in Microsoft Excel, through which defining

words were recorded, alongside their respective hierarchies and assigned values.

Data processing began with analysis of the J value or network size. This produced a total of 144 defining words which had been generated by participants. Following the normalization process, 87 words were obtained which determined the semantic richness of the conceptual network. Next, the process for identifying the M value or semantic weight is shown using the rating scale presented in Table 2.

It is important to understand how M values and rationality are calculated after assigning semantic values to each of the hierarchical positions. Valdez (1998) explains that defining words occupying the highest hierarchical position should have the most semantic weight in subsequent calculations. In this way, a maximum of 10 hierarchical positions should be considered. This means that weights are simply inverted (table 2). If the hierarchical order runs from 1 to 10, the corresponding assigned weights run from 10 to 1, as can be seen in table 2. In the present study, Reyes

(1993)'s so-called "modified NSN" technique was followed. This consists of obtaining more than 10 responses from each participant. In this case, values higher than 10 in the hierarchical order are replaced by the number "10" (which would be value "1"). In this way, negative scores are avoided.

Table 2. Scale of values for the hierarchy of defining words

Hierarchy	Value
1°	10
2°	9
3°	8
4°	7
5°	6
6°	5
7°	4
8°	3
9°	2
10°	1

As a result, a list of defining words with their respective values was obtained and the M, FMG and G values were found. This is displayed in table 3.

Table 3. SAM set, M values, FMG values and G values.

Defining words	M Value	FMG Value	G Value
Mobile	76	100%	0
Disparagement	66	87%	10
Addiction	47	62%	19
Isolation	36	47%	11
Inattention	28	37%	8
Disrespectful	28	37%	0
Discourtesy	26	34%	2
Asocial	25	33%	1
Disconnection	24	32%	4
Adolescence	23	30%	1
Dependence	22	29%	1
Technology	20	26%	2
Communication	20	26%	0
Socialization	18	24%	2
Self-control	16	21%	2
Relationship	16	21%	0
Loneliness	15	20%	1
Connection	15	20%	0
Discomfort	15	20%	0
Virtual	13	17%	2
Network	13	17%	0
Attention	13	17%	0
Education	12	16%	1
Problematic	11	14%	1
Barrier	11	14%	0

Outcomes pertaining to the dimensions created from the categorization of meanings

The aforementioned data analysis considered a global reading of the 25 defining words that constitute the SAM set. Following this, defining words were grouped into dimensions conceived by the authors and conceptualized following review of existing literature. For this process, a thematic criterion was used. Dimensions were, therefore, identified from the defining words that were relevant to the same topic. Table 4 indicates the defining words grouped into each dimension.

Identified dimensions were conceptually developed as follows:

- *Cultural dimension (CUL):*

The cultural dimension is defined by Montiel (2016) as the set of customs or way of life that

characterizes and identified a society. More specifically, culture pertains to knowledge, beliefs and law. However, more universally, culture refers to the art, morals and habits making up the behavioral models and value systems that regulate the actions of individuals belonging to the same social group.

The acceleration of technological innovation means that, little by little, the pace of technology is exceeding humans' capacity for adaptation. Thus, as stated by Valle Rojas & Silva (2017), "being up-to-date" in relation to information, practices, customs and gadgets has become valuable, although little time has been invested in assessing the novelty of change and the current situation. In other words, "living in a state of permanent novelty has become a state of continuous connection" (p.188).

Table 4. Defining words organized according to dimensions

Dimensions	Defining words
Technological (TEC)	Mobile, disconnection, technology, connection, virtual, network, tool, device, tablet, WhatsApp, infotoxicity, digital, gamification, google, internet, email, native, technocentric and app
Communicative (COM)	Communication, barrier, hypercommunication, interruption, advertising, fragmentation
Social (SOC)	Isolation, asocial, relationship, loneliness, problematic, socialization, bubble, remoteness, ignorance, rejection, indifference, disdain, escape, snub, neglect, silence, interaction
Cultural (CUL)	Contempt, inattention, rudeness, adolescence, disrespectful, attention, education, harassment, courtesy, desirability, impropriety, indifference, respect, ignorance, discomfort, unconsciousness, behavior, habit, minor, neologism, dislike, public, immediacy, crime, training, parallel, girl, immaturity
Psychological (PSI)	Addiction, dependence, self-control, malaise, obsession, psychology, physiological, illusionism, cowardice, concentration, disgust, dissociation, dispersion, alienation, egocentricity, insecurity

- *Technological dimension (TEC):*

As described by Valencia and Serna (2016), the potential of technology is due to the characteristics of ICT. These include information storage and dissemination, providing access to large amounts of information. Another is dynamism and formalism, which makes it possible to present dynamic information in a coherently structured and logical nature. A third example is hypermedia and multimedia, which favor the presentation of information in different formats in a non-linear way. A fourth example is

interactivity, which makes it possible to manipulate information in a bidirectional way. Finally, connectivity allows networking, opening up new possibilities for group and collaborative work and increasing the quality of learning experiences.

Regarding connectivity, the emergence of the Internet represents the most extensive means of communication that has ever existed. When it was created it claimed to be an instrument for free communication, developed with open and freely accessible computing. It is considered to be an essential means of communication which

cannot be limited to just a few sectors, with access theoretically being given to all social groups (Gutiérrez-González, 2017).

Traditionally, the term social has been used to refer to people, groups or communities that participate in interaction processes in the same setting and context. Likewise, society or community is defined as an organization resulting from a process, where people and groups share common activities and objectives which give them a sense of belonging. They may or may not share common territory (Zapata, 2002).

Currently, advancement of the information society has transformed important forms of social interaction, with the quantity and variety of social relationships within the network increasing exponentially (Reig, 2012). According to Peña Martínez and Sánchez Cabellé (2017), virtual social networks “refer to the set of web services which enable the creation of a public or semi-public profile within a system that allows the creation of online communities in which information can be shared and exchanged” (p.53). Since the emergence of social networks and the development of smart mobile devices, society seems to be leaning towards a paradigm shift that is associated with the way in which people experience the reality of hyperconnectivity (Jenkins, Ito & Boyd, 2015). This already constitutes a third evolutionary force of humanity (Malone & Berstein, 2015) as it acts as a mediating element in the mutual relations between human beings and technology (Fernández Rodríguez and Gutiérrez Pequeño, 2017).

- *Psychological dimension (PSI):*

According to Carpio, Pacheco, Flores and Canales (2000), psychology is the science that studies the behavior of people, together with the specific circumstances of their environment, biomedical disciplines and sociocultural characteristics. Placing ourselves within this context, the use of technology and the Internet has forced people to live in a more accelerated way. Changes have been so abrupt that they keep us in constant expectation about the future. This causes insecurity and restlessness in people

which impacts and influences physical and mental health. Physical or mental health is referred to with more emphasis in those vulnerable groups whose health is affected in a more definitive way by technology, as is the case of adolescents and youth (Henao, 2016).

The precipitous growth of the Internet raises challenges related to its compulsive and pathological use. Currently, there are many authors (Chóliz, Echeburúa, Labrador, 2010; Sánchez Carbonell, Beranuy, Castellana, Chamarro and Oberst, 2008; Echeburúa and Corral, 2010) who have investigated behavior linked to the use and abuse of technology. This is referring to as behavioral addiction, or socio-addiction, and disorders not related to substances (Cía, 2017; APA, 2013). Moreover, with regards to dysfunctional use of technology, other terms related to pathological, dependent and excessive use are employed. As González-Bueso, Santamaría, Fernández, Merino, Montero and Ribas (2018) explain, the association between internet addiction and mental health is clear. However, an important drawback of these studies is that, whilst they have investigated internet use, controls have not yet been implemented.

- *Communicational dimension (COM):*

Forms of communication between people have been constantly evolving since the appearance of human beings. The first cultures exclusively used oral communication and were devoid of writing. Following the later invention of writing and the introduction of the printing press, a change occurred that was revolutionary since it allowed the democratization of knowledge, allowing information to cross barriers. Emergence of the Internet, social networks, email and smartphones has caused communication to acquire characteristics that it has never had before. These include absolute immediacy, a global character, the potential for continuous and constant connection, and the infoxication that people are subjected to in their daily lives (Labora, 2017). Consequently, new media products since the invention of the Internet have modified and brought changes to the areas of communicating, interacting and expressing.

In this sense, Carrillo, Solano, Roxana, Benjumea and Segura (2017) refer to communication conceived as a network in which information, meanings and influences are transmitted leading to the generation of attitudes, opinions and actions within members of a society (p. 108).

Finally, once the dimensions were conceptualized, defining words were organized according to their corresponding dimension and the weight of these was calculated. This was performed in order to know the weight they have within the overall instrument.

Table 5. Semantic weight values for all dimensions

Dimension	Defining word	M Value	Dimension	Defining word	M Value
Cultural (total=344) Weight dimension in % = 34.5% % Proposal approx. = 34%	Disparagement	66	Technological (total=231) Weight dimension in % = 23.1% % Proposal approx. = 23%	Mobile	76
	Inattention	28		Disconnection	24
	Discourtesy	26		Technology	20
	Adolescence	23		Connection	15
	Disrespectful	28		Virtuality	13
	Attention	13		Network	13
	Education	12		Tool	10
	Bullying	10		Device	9
	Courtesy	10		Tablet	9
	Desirability	10		WhatsApp	8
	Incorrectness	10		Infotoxicity	8
	Indifference	10		Digital	7
	Respect	10		Gamification	5
	Unawareness	9		Google	4
	Discomfort	9		Internet	3
	Unconsciousness	9		E-mail	2
	Behavior	8		Native	2
	Habit	8		Technocentrism	2
	Less	8		App	1
	Neologism	8		Isolation	36
Disgust	7	Asocial	25		
Public	6	Relationship	16		
Immediacy	4	Loneliness	15		
Offense	3	Problematic	11		
Training	3	Social	18		
Parallel	3	(total=196)	10		
Girl	2	Bubble	10		
Immaturity	1	Remoteness	10		
Psychological (total=170) Weight dimension in % = 17% % Proposal approx. =17%	Addiction	47	Ignorance	10	
	Dependence	22	Indifference	10	
	Self-control	16	Rejection	8	
	Discomfort	13	Disdain	6	
	Obsessiveness	10	Leakage	6	
	Psychology	8	Snub	5	
	Physiological	7	None	4	
	Illusionism	7	Silence	3	
	Cowardice	6	Interaction	1	
	Concentration	6	Communicational	20	
	Dislike	6	(total=58)	11	
	Dissociation	6	Barrier	11	
	Dispersion	5	Interruption	10	
Alienation	4	Hypercommunication	9		
Egocentrism	4	Advertising	7		
Unsafety	3	Fragmentation	1		
			Total	997	

Completion of this process made it possible to create a large group of questions about phubbing behaviors. This set of questions, 70 in total for the first version, were developed taking as a starting point a literature review on the topic addressed. This covered the dimensions created and defining words, with the aim of identifying perceptions of phubbing behaviors.

Data analysis and outcomes following application of the NSN technique enabled identification of six dimensions and preliminary redaction of the items. This process is now explained in the following sections.

Analyses used in the present study were in accordance with NSNM procedures. This was considered appropriate in order to obtain a greater variety of results as it gives each participant the option to provide up to a maximum of 21 defining words.

On the other hand, in accordance with Zermeño, Arellano and Ramírez (2005), the vast majority of studies included in the literature review performed, only used defining words from the SAM set. In other words, only those with greater semantic weight were considered. However, these results only specify the semantic network core, omitting other defining words and, therefore, important meanings. When grouped into dimensions, such meanings allow for representations to be developed that are more consistent with the mental capacity of the studied group. This enriches data interpretation. For this reason, J value outcomes, pertaining to all defining words, were used in the present study to group words into each dimension.

Outcomes from the natural semantic networks show how the network core for the term phubbing has a great cultural, technological and social component for the total sample. The first association to emerge was with the term mobile as this was the most common defining word. This was followed by disparagement and isolation. In the same way, outcomes regarding the least punctuated but highly hierarchically positioned words, with a large psychological and communicational component, are addiction and communication. Other meanings provided for the term

phubbing, which stand out for their semantic weight or M value, are inattention, disrespectful, discourteous, social, disconnection, adolescence and dependence.

Likewise, it has been established that the main objective of using the NSN technique is to understand the meaning of phubbing within the studied participant group. The aim of this is to design the instrument. However, two or more groups are not used to compare results coming from different samples or analyze data according to sociodemographic differences within the expert sample.

Phase II: Content validity outcomes from the expert panel

To validate the content and structure of the instrument, a new form was made, using a 5-point Likert scale (1: Always, 2: Almost always, 3: Sometimes, 4: Rarely, and 5: Never) composed of the 6 dimensions identified below (sociodemographic, cultural, technological, social, psychological and communicational) and the group of 70 items created for each dimension.

The form had the following aims:

- a. To validate the six-dimensional structure by assessing its appropriateness (whether dimensions are easily understood, that is, they have appropriate syntactics and semantics) and relevance (dimensions are essential or important, that is, they must be included).
- b. To validate the adequacy and relevance of the 70 items.
- c. To respond to the open questions in order to provide suggestions for improvement and final assessment of the instrument (whether it is valid or invalid, including proposals for improvement).

Thus, 30 invitations were emailed to experts in the educational and psychological fields at the University of Extremadura, inviting them to participate in the content validation of the questionnaire. Eleven responses were received and analyzed in Microsoft Excel to calculate, firstly, averages and standard deviations for the evaluated aspects of all dimensions (table 6)

and items (table 7) making up the questionnaire. Secondly, a qualitative analysis was conducted to reveal understanding of the

questions, objectives of the questionnaire and its global evaluation.

Table 6. Descriptive statistics pertaining to scale dimensions, according to means and standard deviations.

		Adequacy		Relevance	
		\bar{x}	Sx	\bar{x}	Sx
Dimension 1	Sociodemographic data	5	0	5	0
Dimension 2	Cultural	3.90	1.86	3.63	1.80
Dimension 3	Technological	3.90	1.86	3.90	1.86
Dimension 4	Social	3.63	1.80	3.63	1.80
Dimension 5	Psychological	3.81	1.83	3.81	1.83
Dimension 6	Communicational	3.72	1.84	3.72	1.84

Table 7. Descriptive statistics pertaining to scale items, according to means and standard deviations.

	Adequacy		Relevance			Adequacy		Relevance	
	\bar{x}	Sx	\bar{x}	Sx		\bar{x}	Sx	\bar{x}	Sx
Item 1	5	0	5	0	Item 21	4.54	1.03	4.54	1.03
Item 2	4.90	0.30	5	0	Item 22	4.54	1.03	4.27	1.27
Item 3	4.72	0.64	4.72	0.64	Item 23	4.63	0.80	4.36	1.12
Item 4	4.45	0.93	4.45	0.93	Item 24	4.09	1.37	4	1.34
Item 5	4.90	0.30	4.81	0.60	Item 25	4.27	1.34	4.27	1.34
Item 6	5	0	5	0	Item 26	5	0	4.72	0.90
Item 7	4.81	0.60	4.81	0.60	Item 27	4.45	1.29	4.45	1.29
Item 8	4.72	0.64	4.72	0.64	Item 28	4.81	0.40	4.54	0.93
Item 9	4.45	1.29	4.45	1.29	Item 29	4.81	0.40	4.63	0.67
Item 10	4.72	0.64	4.45	0.82	Item 30	4.54	0.82	4.54	0.82
Item 11	4.72	0.64	4.72	0.64	Item 31	4.36	1.28	4.27	1.42
Item 12	4.63	0.80	4.63	0.80	Item 32	4.72	0.64	4.72	0.64
Item 13	4.72	0.64	4.72	0.64	Item 33	4.63	0.80	4.63	0.80
Item 14	4.72	0.64	4.72	0.64	Item 34	4.54	0.82	4.54	0.82
Item 15	4.45	1.21	4.45	1.21	Item 35	4.72	0.64	4.45	1.03
Item 16	4.54	1.03	4.54	1.03	Item 36	4.72	0.64	4.36	0.67
Item 17	4.45	1.21	4.45	1.21	Item 37	4.81	0.60	4.81	0.92
Item 18	4.90	0.30	4.72	0.64	Item 38	4.72	0.64	4.72	0.64
Item 19	4.90	0.30	4.72	0.30	Item 39	4.81	0.60	4.54	1.03
Item 20	4.90	0.30	4.63	0.92	Item 40	4.72	0.64	4.72	0.64

Results of the quantitative assessment of the questionnaire were positive. Considering that the rating scale has five response options, the lowest average score ($\bar{x}=3.64$, $Sx=1.80$) was given for definitions of the social dimension. With regards to evaluation of the items, the question with the lowest score ($\bar{x}=4$, $Sx=1.3$) was question number 33 which related to writing. This was not included in the final version of the questionnaire due to the duplication of questions. In addition, qualitative assessment of participants'

observations was generally positive. It led to the elimination of different questions from several dimensions due to their duplication or the merging of a large number of items. Many of these items were scored in very similar way. In order to simplify and group elements that were very similar to each other, the original scale was reduced from a total of 70 items to 40. 7 items were incorporated into the sociodemographic data dimension, 33 items on phubbing behaviors were incorporated into the cultural dimension (16), 3 into the

technological dimension, 6 into the social dimension, 4 into the psychological dimension and 4 into the communicative dimension.

Phase III: Instrument reliability within a pilot sample

In this phase, internal consistency of the questionnaire was ascertained through Cronbach's alpha coefficients. The questionnaire was prepared within *Google Drive Forms* with the aim of uncovering the degree to which items coincided with participants' beliefs and habits, as indicated on a 5-point Likert scale (1: Always, 2: Almost always, 3: Sometimes, 4: Rarely, and 5: Never).

The questionnaire was administered to a pilot sample made up of 250 individuals, of

which 167 were female, 81 were male and 2 preferred not to be classified. Ages ranged from under than 25 years to older than 60 years. Educational level varied from university degrees (47.6%), postgraduate education (14.4%), vocational training (14%), secondary education (12%), doctoral studies (6.4%), school graduates (4.8%) and youth guarantee programs (0.4%). Further, 61.3% were predominately workers, 13.5% students, 9.7% students and workers, 11% unemployed and 4.5% retired.

Descriptive statistical analysis of the 33 items that made up the questionnaire and related to the phubbing construct was conducted. The 7 items related to sociodemographic data were eliminated from this analysis.

Table 8. Cronbach's alpha for all dimensions and items, and the number of items per dimension

Dimension	Dimensional alpha	Items within the dimension	Overall alpha
Cultural	.875	16	.937
Technological	.742	3	
Social	.785	6	
Psychological	.733	4	
Communicational	.732	4	

Results indicate good reliability for the overall scale and all of its factors. An $\alpha = .937$ was obtained for the overall scale, $\alpha = .875$ for the cultural dimension, $\alpha = .785$ for the social dimension, $\alpha = .752$ for the communicational dimension, $\alpha = .742$ for the technological dimension and $\alpha = .733$ for the psychological dimension. All Cronbach's alpha values were higher than 0.7, which indicates high reliability of the designed evaluation tool.

Thus, the final version of the instrument was made up of 33 questions that measure phubbing behaviors and seven that evaluate sociodemographic variables.

Conclusions

The purpose of the present study, as mentioned in the general study objectives, was

to design an instrument to evaluate phubbing behaviors in young people and adults.

As specified in the objective "to develop the natural semantic networks technique in order to conceive the dimensions making up the evaluation instrument for phubbing behaviors", it can be determined that the NSN technique is a useful and novel approach for exploring the meanings attributed by participating experts to the term phubbing. In support of this, the J value obtained provided a total of 86 defining words, contributing a wealth of semantic knowledge about phubbing in the studied group. The J value, or total of defining words, is very relevant to the technique because it indicates the way in which the experts conceived the word phubbing.

The usefulness of the technique is also evidenced by obtaining the M value, or

semantic weight, of each defining word. That is, the NSN permits the detection of not only what and how many meanings perceived in relation to a certain concept, but also the importance given to these in the semantic network via the ranking of meanings. Another positive aspect of the technique is that the defining words obtained made it possible to create the instrument dimensions relevant to evaluating phubbing behaviors, with this being the objective of the present study.

Nevertheless, the SAM set shows the 25 defining words with the greatest semantic weight (M value) with respect to the word stimulus. Firstly, results of the SAM set on phubbing reveal the defining word mobile. Secondly, the defining word contempt was revealed, coinciding with the etymological meaning of the term phubbing (phone and snubbing).

At the same time, it is possible to affirm that the different dimensions of the questionnaire provide new evidence for the study. They suggest that the term phubbing has a great cultural component, since societal norms mean that people need to feel connected to others (Chotpitayasunondh & Douglas, 2016). Likewise, this instrument is intended for young and adult smartphone users and so is not limited to studying phubbing behavior in students or in relationships, as was the case in previous research (Roberts & David, 2016; Roberts, Yaya & Manolis, 2014).

Further, phase I of the NSN procedure provided the most relevant dimensions of phubbing behaviors following theoretically considerations and subsequent expert discussion in the content validation of the instrument. This also enabled the weight of each dimension in the construct to be established, with its content later also being able to be defined. Following this, 70 pertinent items that made sense in the context were written. This was done to ensure that an adequate number of items relevant to the construct would be represented.

The instrument considers a Likert scale in which respondents must express their beliefs in

relation to specific situations in accordance with five response options. This decision facilitated the application and correction of the instrument. In this sense the approach agrees with Pedrosa, Suárez and García-Cueto (2014) who pointed out that Likert scales are in great demand and are simple because they offer an easy way to quantify and express the characteristics of individuals in numerical data.

As specified in phase II of the present study, the structure and content of the instrument was validated by a group of experts from the fields of education and psychology. This process contributed greatly to the pertinent adjustments to the wording of the definitions, enabling improvements to the quality of the items and dimensions. Subsequently, these were modified to improve coherence and were eliminated or the wording of items was improved. In this way, a pilot instrument of 40 items organized between 5 dimensions was elaborated. This was consistent with the preliminary established questionnaire structure.

Instrument administration to the participating pilot sample through an online dissemination procedure counted on the participation of 250 individual. This sample had similar characteristics to the population from which the final sample came from. This number of participants is adequate for carrying out psychometric analysis (Burgos and Escalona, 2017).

Additionally, reliability indicators of the pilot instrument were considered adequate ($\alpha = 0.937$) for the overall scale, confirming the internal consistency of the instrument. In this way, it can be concluded that the processes used for research design, data analysis and application phases were rigorous. This allows us to confirm that the instrument is scientifically appropriate.

In summary, a phubbing behavior questionnaire composed of 40 items has satisfactory consistency for measuring the construct of phubbing. This has important implications for the evaluation of young people and adults.

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