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Emotional content in cyberspace: Development and validation of E-motions Questionnaire in adolescents and young people

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Abstract

Background: Studies on emotional intelligence show that some of its dimensions are related to psychological adjustment and the quality of interpersonal relationships. Besides face-to-face interaction, nowadays, relationships are also initiated and maintained in cyberspace. Some studies suggest that emotional content is present in cyber-behavior. The objective of this study was to reveal whether emotions are expressed, perceived and managed online – a concept called E-motions, and to validate an instrument to measure this concept. **Method:** The E-motions Questionnaire was designed and together with other instruments, completed by 612 university students. Then, the questionnaire was completed by a representative sample of 2139 students in compulsory secondary education in 22 schools in all Andalusian provinces. The first sample was used for exploratory factor analysis and the second sample for confirmatory factor analysis. **Results:** The E-motions Questionnaire was validated with good psychometric properties. Four factors were found showing that emotions are perceived, expressed, used, understood and managed online. This behavior is related to some aspects of emotional intelligence and also to difficulties in identifying feelings. **Conclusions:** This new promising research field could be useful for further advancement of research into cyber-behavior.

Keywords: E-motions, interpersonal relationships, emotional intelligence, cyber-behavior, social networking sites.

Resumen

Contenido emocional en el ciberespacio: desarrollo y validación del Cuestionario E-mociones en adolescentes y jóvenes. **Antecedentes:** estudios sobre la inteligencia emocional muestran que algunas de sus dimensiones están relacionadas con el ajuste psicológico y la calidad de relaciones interpersonales. Además de las interacciones cara a cara, las relaciones se inician y mantienen también en el ciberespacio. Algunos estudios sugieren que el contenido emocional está presente en la ciberconducta. El objetivo del estudio fue descubrir si las emociones se expresan, perciben y gestionan online- concepto denominado E-mociones y validar un instrumento para medirlo. **Método:** se diseñó un Cuestionario de E-mociones que, con otros instrumentos, fue completado por 612 estudiantes universitarios. Posteriormente, dicho cuestionario fue respondido por una muestra representativa de 2.139 alumnos de la educación secundaria matriculados en 22 escuelas de todas las provincias andaluzas. Se realizaron análisis factoriales - exploratorio con la primera muestra y confirmatorio con la segunda. **Resultados:** el Cuestionario E-mociones fue validado mostrando muy buenas propiedades psicométricas con cuatro factores. Las emociones se perciben, expresan, utilizan, comprenden y gestionan en el ciberespacio. Esta conducta se relaciona con algunos aspectos de la inteligencia emocional y también con dificultades emocionales. **Conclusiones:** esta nueva línea podría ser útil para avanzar en la investigación sobre la ciberconducta.

Palabras clave: E-mociones, relaciones interpersonales, inteligencia emocional, ciberconducta, interacción online.

Emotions have always fascinated researchers in the field of psychology. Several research lines have focused on emotional expression, perception and regulation. Among them, emotional intelligence was defined as perceiving, regulating, using and understanding emotions (Mayer & Salovey, 1997) including four abilities. These abilities consisted of perceiving and expressing emotions, using emotions in facilitating thought, understanding and analyzing emotions in oneself and others, and regulating and managing emotions.

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Alexithymia was defined as difficulties in identifying and describing emotions, cognitive style oriented towards the exterior environment with little attention to the interior life (Nemiah & Sifneos, 1970). Parker, Taylor and Bagby (2001) found a significant overlap between alexithymia and emotional intelligence with negative correlations between the total scores and all the components of the scales used to evaluate each construct. Relationships were stronger for emotional intelligence with the total score in alexithymia, difficulties in identifying and describing emotions and less strong for externally oriented thinking.

Emotional intelligence is related to psychological adjustment. A review of scientific literature (Extremera & Fernández-Berrocal, 2005) showed that emotional clarity and repair were positively related to psychological adjustment whereas high scores in emotional attention were related to lower adjustment. Elipe, Ortega, Hunter and Del Rey (2012) found that involvement

in bullying was related to high scores in emotional attention and low scores in emotional repair, and that victims had higher probability to show low emotional clarity and high emotional attention. Elipe, Mora-Merchán, Ortega-Ruiz and Casas (2015) found that emotional clarity and repair were negatively related to cyber-victimization and emotional attention was positively related to dejection and annoyance after suffering cyber-victimization. A systematic review on the relationship between emotional intelligence and aggression (García-Sancho, Salguero, & Fernández-Berrocal, 2015) showed that almost all the included studies found negative significant relationships between these two variables. Nevertheless, results on the relationship between emotional intelligence and bullying are inconsistent (see a review by Zych, Farrington, Llorent, & Ttofi, 2017). Nowadays young people and adolescents initiate and maintain interpersonal relationships in face-to-face situations and through cyberspace (Ortega-Ruiz, Casas, & Del Rey, 2014). Negative interactions in cyberspace such as cyberbullying are intensively studied. Although the history of research on cyberbullying is short (Zych, Ortega-Ruiz, & Del Rey, 2015), the number of studies on the topic is high and it is increasing exponentially (Zych, Ortega-Ruiz, & Marín-López, 2016).

Positive interpersonal interactions have been studied in cyberspace, although the number of studies on the topic is still low. Del Rey, Sánchez and Ortega (2012) focused on prosocial cyber-behavior finding that students´ knowledge on this topic is scarce. Information and communication technologies can be positively used in educational settings (Spears et al., 2013). The number of studies on emotional content in cyberspace is low. A narrative review about emotions in computer-based communication (Derks, Fischer, & Bos, 2008) revealed that emotions were frequently expressed during online interaction and that negative emotions were expressed even more than in face-to-face interaction. Kramer, Guillory and Hancock (2014) conducted an experiment with 689,003 Facebook users in which they manipulated the emotional content displayed in news feed. They found that people´s expression of emotional content was related to an increase or a reduction of positive or negative emotional content in their news feed. Volkova and Bachrach (2015) analyzed thousands of tweets and concluded that users expressed different emotions such as joy, sadness or anger. Gaspar, Pedro, Panagiotopoulos and Seibt (2016) reported that people tried to make sense of important unexpected or stressful events on the internet after analyzing affective expression on Twitter during a food contamination incident. An analysis of language emotionality on Facebook conducted by Bazarova, Taft, Choi, and Cosley (2013) showed that less negative emotion words were displayed in the status updates than in the wall posts or private messages and that the emotional expression was related to self-presentational concerns. Thus, emotions are present in online communication.

There are many instruments that focus on emotional intelligence or competence in general. In Spain, TMMS-24 validated with adults and adolescents (Fernández-Berrocal, Extremera, & Ramos, 2004) and MSCEIT for participants aged 17 and older (Extremera, Fernández-Berrocal, & Salovey, 2006) are probably the most popular instruments to measure self-reported and performance emotional intelligence, respectively. Recently, TMMS-24 was adapted to be used specifically in relation to cyber-behavior in adolescents (González-Cabrera, Pérez-Sancho, & Calvete, 2016) with questions related to emotional attention, clarity and repair during online interaction. On the other hand, the number of instruments focused on emotional content in online communication is very low. Kramer et al. (2014) measured this content through an analysis of Facebook posts (in a massive study of hundreds of thousands of Facebook users without specifying age) which were classified to positive or negative emotion categories based on valence. Volkova and Bachrach (2015) classified tweets based on hashtags (e.g., #joy, #sadness) with Tweeter users of all ages (about two thirds below 25 years old and one third above 25, no further details provided). Gaspar et al. (2016) analyzed and classified keywords (participants´ age not provided) whereas Bazarova et al. (2013) used software that classified Facebook posts according to a dictionary in adults between 18 and 31 years old. None of these studies developed or used a self-reported questionnaire that would measure emotional content present in online communication in young people and adolescents.

Taking into account the importance of emotions in psycho-social adjustment and interpersonal relationships, together with the fact that these relationships are frequently initiated and maintained in cyberspace, the current study focused on emotions expressed, perceived, used and managed online. The objective of this study was to design and validate a questionnaire to measure emotional content in cyberspace and discover whether emotions are expressed, perceived, used and regulated online – a concept labeled E-motions. Relationships between E-motions, perceived emotional intelligence and emotional difficulties (alexithymia) were explored in this study. It was hypothesized that emotions are expressed, perceived, used and regulated online and that E-motions are positively related to perceived emotional intelligence and negatively related to difficulties in describing and identifying feelings (subscales of alexithymia).

Method

Participants

This study was conducted with two different samples. The first sample, selected by convenience included 639 students of the University of Cordoba (Spain) (65.5% women), enrolled in different courses of the Degree in Primary Education, Degree in Early Childhood Education, Degree in Mechanical Engineering and Degree in Informatics. Twenty seven reported not using social networking sites and were eliminated from the study. The final sample included 612 participants (65% women, M_{age} = 20.79; SD = 2.71). Out of these participants, 199 were selected to participate in the re-test but 21 were absent during the data collection and, therefore 178 students participated in the re-test (10.55% attrition).

The second study included a representative sample of students of secondary compulsory education in Andalusia. Twenty two high schools were selected with a total of 2139 students (50.9% girls), which accounts for 95% of reliability and a sampling error of 2.1%. They were randomly selected using a multi-stage stratified sampling considering all the provinces (Almeria - 9.1%, Cadiz - 12.6%, Cordoba - 8.8%, Seville - 22.9%, Granada - 13.9%, Huelva - 4.9%, Jaen - 9.1 % and Malaga - 18.7%), public (77.3%) and private (22.7%) schools and small (18.2%), medium (36.4%) and big (45.5%) cities/towns. The mean age of the participants was 13.79 years (SD = 1.40) ranging from 11 to 19 (grade 1: 542 students, M_{age} = 12.21, SD = 0.64; grade 2: 555 students, M_{age} = 13.36, SD = 0.81; grade 3: 529 participants, M_{age} = 14.36, SD = 0.85; grade 4: 508 participants M_{age} = 15.35, SD = 0.80).

Instruments

- Toronto Alexithymia Scale (TAS-20), Spanish version (Páez et al., 1999) contains three subscales: difficulty in describing emotions, difficulty in identifying feelings and externally-oriented thinking. We did not use the third scale given that it is not directly related to focus of this study (emotional content). Difficulty in describing feelings (5 items) and difficulty in identifying feelings (7 items), both have a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The Cronbach's alphas in the Spanish version (Páez et al., 1999) were between .70 and .82 for difficulty in identifying feelings and between .75 and .82 for difficulty in describing feelings. The Cronbach's alphas in the current study were .85 and .72, respectively.
- Perceived emotional intelligence evaluated through the Trait Meta-Mood Scale 24 (TMMS-24; Fernández-Berrocal et al., 2004) with 24 items with a 5-point Likert response scale ranging from 1 (strongly disagree) to 5 (strongly agree). Items are grouped in 3 factors with 8 items each and excellent Cronbach's alphas (Fernández-Berrocal et al., 2004): Emotional attention (α = .90), emotional clarity (α = .90) and emotional repair (α = .86). Cronbach's alphas in the current study were also excellent for all the three factors (.88, .88 and .85, respectively).
- E-motions Questionnaire was designed specifically for this study. This initially included 40 items designed by a group of experts (see procedure). After the analyses, the final version contains 21 items with 5-point Likert response scale ranging from 1 (strongly disagree) to 5 (strongly agree). A four-factor solution was found with very good Cronbach's alphas > .76 (see Results).

Procedure

This was an instrumental study conducted during the academic year 2014/2015 (sample 1 – university students) and 2015/2016 (sample 2 – representative sample of adolescents). It was approved by the Ethics Committee of the University of Cordoba (Spain). The first version of E-motions Questionnaire was designed by three experts, senior researchers in the field of emotions and cyber-behavior. These items were based on a thorough review of literature on emotional competence in general and emotional content in cyberspace. A pilot study was conducted with 168 participants selected by convenience and snowball sampling. They were asked to answer the questionnaire and give feedback on its content (results not published). Items were then assessed by 5 independent experts who scored each item from 1 to 5 on whether they were understandable, belonged to the construct and were appropriate for the subscale. Items kept for the final version had mean scores above 4.

Schools were contacted and, after informing the parents, chair-teachers approved and authorized the study. The objectives of the study were explained and verbal consents were obtained from the participants. Students were told that there were no correct and incorrect answers, asked to think about their emotions and behaviors when interacting online and answer as honestly and accurately as possible. The questionnaires were finished in about 30 minutes by the students during their regular classroom hours supervised by senior researchers. Participation was voluntary and anonymous. Participants were allowed to reject or withdraw from the study at any moment. In sample 1, all the participants finished the survey and in the sample 2, 15 decided to withdraw. In four groups of the sample 1 (with 199 subjects), a re-test was conducted three months later (with a code for matching the questionnaires).

Data analysis

An Exploratory Factor Analysis (EFA) was performed with the first sample. This was done with polychoric correlations, extraction through principal axis, parallel analysis and promax rotation with FACTOR 10 (Lorenzo-Seva & Ferrando, 2015). Items with loadings < .40 or loadings on more than one factor were eliminated. Cronbach's alphas were calculated for each factor and the total scale, together with means, standard deviations, kurtosis, skewness, communalities, correlations item-total. PASW-Statistics 18 (SPSS, 2011) was used to calculate Cronbach's alphas when eliminating an item, Pearson correlations among all the subscales of the E-motions questionnaire, perceived emotional intelligence and difficulty in identifying and describing emotions. Correlations were also calculated for test and re-test scores in each subscale and the total score.

Confirmatory Factor Analysis (CFA) through structural equation modelling was performed with EQS 6.2 (Byrne, 2006) on the second sample. This was conducted with maximum likelihood robust method and polychoric correlations. Model fit was tested taking into account a combination of different indexes. Acceptable fit was considered with CFI value above .90, RMSEA below .08, NFI above .90, CFI and TLI close to 1 (Bentler, 1990).

Results

E-motions questionnaire

The Kaiser-Meyer-Olkin test showed that data were adequate for EFA (*KMO* = .92). Factor analysis yielded 4 factors that explained 72.19% of the total variance (see table 1). This model was confirmed through the CFA (Figure 1) with an adequate fit. Those 4 factors were E-motional expression (items focused on expressing emotions online), E-motional perception (perceiving emotions of others during online interaction), Facilitating use of e-motions (using emotions during online interaction to facilitate interpersonal relationships and thought) and finally Understanding and management of e-motions (understanding and control of emotional content during online interaction). Given the adequate fit to the structure found through the EFA, alternative models were not tested.

As shown in table 1, the mean scores in all the items were above 1 showing that the participants express, perceive, use, understand and manage emotions in online interactions. Distributions were close to normal and all the commonalities were above .45. Correlations between all the items and the total score were moderate to strong and Cronbach´s alpha did not improve with an elimination of any item. Women scored higher than men in E-motional expression (M = 9.83, DT = 4.11 vs. M = 8.46, DT = 3.87, t = 3.99, p < .01), E-motional perception (M = 9.61, DT = 2.87 vs. 8.39, DT = 3.12, t = 4.81, p < .01) and Understanding and management of e-motions (M = 21.55, DT = 7.09 vs. M = 20.02, DT = 7.82, t = 2.40, p < .05). Floor and ceiling scores were < 5%.

Table 1
Exploratory factor analysis, means, standard deviations, skeweness, kurtosis, communalities and item-total correlations of the E-motions questionnaire (N = 612)

	Loadings				M	SD	Skeweness	Kurtosis	h^2	r item-total
Factor 1: E-motional expression Cronbach's alpha = .85; explained variance: 44.08%	F1	F2	F3	F4	9.36	4.07	.42	-.55		
Item 1	**.78**	.03	.11	.07	2.23	1.20	.62	-.68	.77	.56
Item 2	**.71**	.07	.28	-.01	2	1.08	.93	.09	.82	.62
Item 3	**.53**	0.21	-.01	.10	3.01	1.45	-.17	-1.36	.45	.50
Item 4	**.69**	.13	.22	-.01	2.10	1.15	.79	-.35	.75	.60
Factor 2: E-motional perception Cronbach's alpha = .76; explained variance: 13.67%					9.18	3.01	-.41	-.46		
Item 5	.25	**.82**	-.14	-.06	3.01	1.25	-.27	-.97	.66	.54
Item 6	.04	**.66**	.01	.05	2.84	1.19	-.08	-.85	.50	.51
Item 7	.13	**.75**	-.17	-.02	3.31	1.21	-.52	-.60	.51	.45
Factor 3: Facilitating use of e-motions Cronbach's alpha= .92, explained variance: 8.37%					11.34	5.14	.83	.01		
Item 8	-.01	.20	**.62**	.04	2.20	1.10	.49	-.73	.57	.61
Item 9	.22	-.01	**.79**	-.08	1.84	1	.99	.26	.75	.61
Item 10	.12	-.11	**.80**	.06	1.87	1.04	1.03	.30	.70	.59
Item 11	.17	-.16	**.92**	-.03	1.76	1	1.11	.40	.85	.60
Item 12	.01	-.09	**.95**	-.01	1.76	.94	.95	.01	.83	.61
Item 13	-.01	-.02	**.90**	-.08	1.80	1	1.05	.31	.74	.57
Factor 4: Understanding and management Cronbach's alpha = .88; explained variance: 6.05%					21.01	7.38	-.24	-.63		
Item 14	-.10	.27	.16	**.55**	2.71	1.21	-.06	-1.10	.66	.65
Item 15	-.09	.18	.16	**.56**	2.68	1.17	-.04	-1	.59	.62
Item 16	-.12	.39	.05	**.51**	2.75	1.18	-.12	-.95	.67	.63
Item 17	.25	-.19	-.20	**.91**	2.90	1.40	.01	-1.29	.66	.48
Item 18	.29	-.17	-.29	**.89**	2.90	1.14	-.04	-1.27	.63	.52
Item 19	-.06	.07	.04	**.74**	2.14	1.16	.53	-.85	.63	.56
Item 20	-.20	.03	.41	**.49**	2.24	1.15	.43	-.86	.55	.58
Item 21	-.09	-.05	.35	**.56**	2.63	1.20	.03	-.96	.53	.59
Total E-motions (α = .92; α eliminating any item = .91 - .92)					50.68	15.19	-.02	-.07		

Test-retest analysis

CFA for retest showed a good fit of the data to the model (*SB Chi-square* = 316.23, *df* = 183; $p < 0.05$; *CFI*= .98, *NFI* = .95, *NNFI* = .98, *RMSEA* = .07, *90% CI* = .056 – .081.). All the test-retest correlations were significant ($p < .01$), moderate to strong. The correlation in the E-motions Questionnaire total score was $r = .62$; for E-motional expression it was $r = .66$; for E-motional perception it was $r = .55$; for Facilitating use of e-motions it was $r = .56$; for Understanding and management it was $r = .54$.

Relationships between E-motions, perceived emotional intelligence and difficulty in expressing and identifying emotions

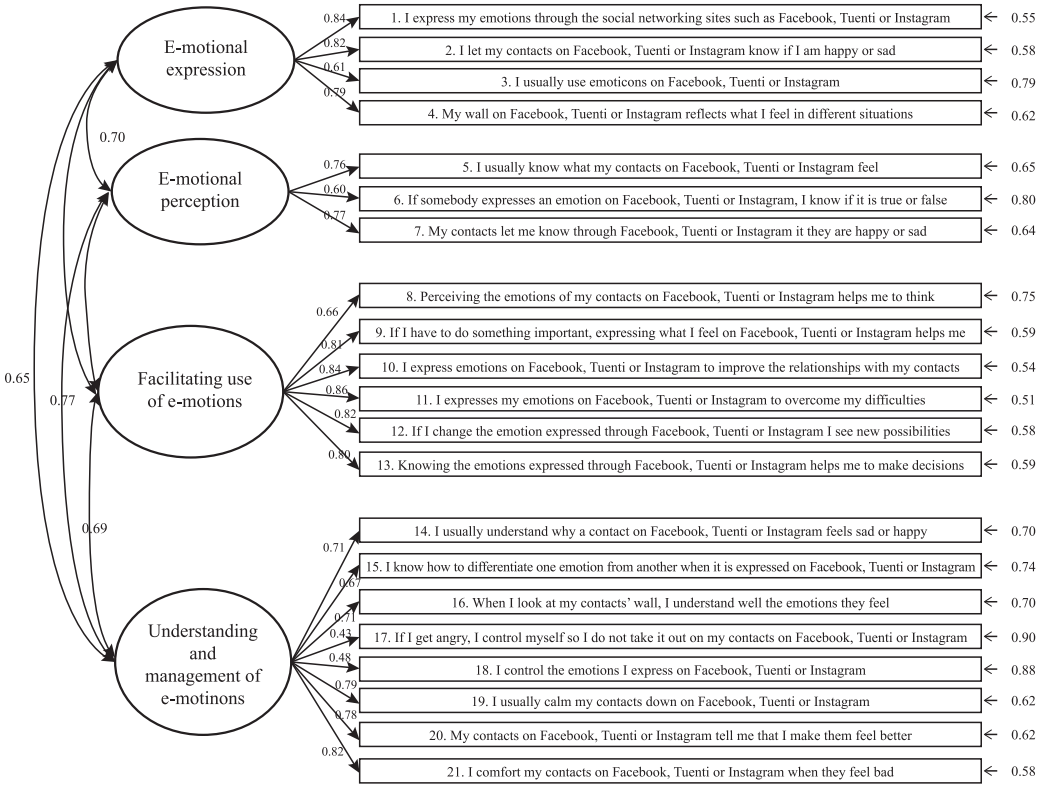
Table 2 shows correlations among the total scores and subscales of E-motions Questionnaire, TMMS-24 and Difficulty in identifying and perceiving emotions (TAS-20).

There were positive significant relationships between difficulty in identifying feelings and the total score in the E-motion Questionnaire, E-motional expression and Facilitating use of e-motions. There were also positive significant relationships between all the scales and total scores in E-motions with emotional attention and the total score in perceived emotional intelligence. There was a positive significant relationship between emotional clarity, understanding, and management of e-motions.

Discussion

This work focused on emotional content in online communication that was measured through a newly designed and validated questionnaire (E-motions Questionnaire). This questionnaire was found to have four factors and showed good psychometric properties. Its descriptive analyses confirm that people express, perceive, use and manage emotions during online communication, findings that are in line with previous studies (e.g., Bazarova et al., 2013; Kramer et al., 2014).

The results of the current study show that E-motional expression and E-motional perception are two different factors when interacting online. This is coherent with the nature of the cyberspace itself where it is possible to perceive emotions of others without expressing own emotions. Some people might be passive users of social networking sites and watch their contacts



S-B Chi-Square = 1509.34; *df* = 183; $p < .01$; *NFI* = .98; *NNFI* = .98; *CFI* = .98; *RMSEA*

Figure 1. Confirmatory Factor Analysis of the E-motions Questionnaire (*N* = 1977)

Table 2
Correlations between E-motions, difficulty in identifying and describing emotions and perceived emotional intelligence (*N* = 178)

	Total e-motions	**E-motional expression**	**E-motional perception**	**Facilitating use of e-motions**	**Understanding and management**
Difficulty in identifying feelings	.13**	.12**	.08	.19**	.04
Difficulty in describing feelings	0	-.02	-.04	.06	-.04
Emotional attention	.22**	.20**	.14**	.16**	.17**
Emotional clarity	.06	-.01	.06	-.03	.10*
Emotional repair	.05	-.03	.04	.05	.06
Total perceived emotional intelligence	.17**	.08*	.12**	.09*	.16**

** $p < .05$; ** $p < .01$*

without expressing anything at all. It is also possible to express own emotional states without paying any attention to other people's messages. This situation is therefore different from a face-to-face interaction in which people necessarily perceive each other´s emotional states. Physical clues and emotional expression such as the tone of the voice, continuously changing facial or body expression, the smell, etc., are absent in online communication which seems to be emotionally more distant and colder. With these particularities, the results of the current study showed that emotional content is present online, similarly to what was found during a task performed online by Guillory et al. (2011).

The current study also found that emotions are used online, involved in making decisions, used to maintain relationships or to see new possibilities. Regulating and managing emotions were also found in online settings and grouped in a single factor called Understanding and management of e-motions. These findings are in line with other research that suggested emotional management in online interaction (Bazarova et al., 2013).

Higher scores in E-motional expression and Facilitating use of E-motions are related to more difficulties in identifying feelings and more emotional attention. Given that alexithymia is considered to be a "negative mirror image" of emotional intelligence (Páez & Velasco, 2001), negative correlations were expected between emotional content online and emotional difficulties. Nevertheless, this study showed that difficulties in identifying emotions were related to more expression and use of emotions online. Previous

studies found that high scores in emotional attention were related to more physical symptoms in stressful situations (Goldman, Kraemer, & Salovey, 1996) and more involvement in cyberbullying (Elipe et al., 2015). In a new line of studies, preference for online social interactions was found to be negatively related to emotional intelligence (Casale, Tella, & Fioravanti, 2013) and low adjustment to social norms was related to more involvement in cyberbullying (García, Romera, & Ortega, 2015). Thus, it is possible that individuals who pay a lot of attention to their emotions and have difficulty in identifying feelings tend to express more emotional content online and use this content to facilitate thought. This could be related to problematic internet use and future studies should explore possible relationships of these variables and abuse of technologies or involvement in cyberbullying.

It was also found that high scores in E-motional perception and Understanding, and management show a slightly different pattern. None of these variables show relationships with difficulty in identifying or describing feelings. E-motional perception is only related to emotional attention. Understanding and management of E-motions is related to emotional attention and clarity. Previous studies found that emotional clarity was related to less depression and anxiety (Fernández-Berrocal et al., 2006) or less bullying victimization (Elipe et al., 2012). Thus, possible protective role of these dimensions should also be studied in future.

The current study validated an instrument to measure self-reported emotional content in online interaction in adolescents and young people. It would be interesting to conduct future studies on the topic in different populations and age groups (e.g., upper secondary education). Finding possible relationships between emotional content online and other variables could shed new light on phenomena such as cyberbullying or abuse of technology. It is possible that this new promising line of research will help in further advancement of the field.

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