Digital technologies and eudaimonic well-being in the emerging adults

Manuela Zambianchi[1]
Universitá di Bologna- Italia

Referring to the theoretical assumptions of Positive Technology, the study examined attitudes towards ICTs, the use of specific technologies and their relationship with eudaimonic psychological well-being (PWB) in emerging adults. 193 emerging adults (mean age 21.61, *SD* = 2.99; range 19-30; female 85, male 108; participated in the research. The use of specific information technologies is positively associated with the possession of favorable attitudes to them, and with different components of eudaimonic psychological well-being. The use of emails is positively linked to greater global eudaimonic well-being, a greater sense of personal growth, the presence of numerous life projects and satisfactory social relations. The use of predominantly iconic systems such as Instagram appears instead linked to a lower perceived autonomy.
Keywords: emerging adults, information technologies, eudaimonic well-being, Positive Technology.

Tecnologías digitales y bienestar psicológico en adultos emergentes
Refiriéndose a los supuestos teóricos de la Tecnología Positiva, el estudio examinó las actitudes hacia las TIC, el uso de tecnologías específicas y su relación con el bienestar psicológico eudaimónico (PWB). 193 adultos emergentes (edad promedio 21.61, DE = 2.99; rango 19-30; mujer 85, hombre 108) participaron en la investigación. El uso de tecnologías de la información específicas se asocia positivamente con la posesión de actitudes favorables para ellos y con diferentes componentes del bienestar psicológico eudaimónico. El uso de correos electrónicos está positivamente relacionado con un mayor bienestar eudaimónico global, un mayor sentido de crecimiento personal, la presencia de numerosos proyectos de vida y relaciones sociales satisfactorias. El uso de sistemas predominantemente icónicos como Instagram aparece, en cambio, vinculado a una menor autonomía percibida.
Palabras clave: adultos emergentes, tecnologías de la información, bienestar eudaimónico, Tecnología Positiva.

Tecnologías digital e bienestar psicológico em adultos emergentes
Referindo-se aos pressupostos teóricos da Tecnologia Positiva, o estudo examinou as atitudes em relação às TIC, o uso de tecnologias específicas e sua relação com o bem-estar psicológico eudemônico (PWB) em adultos emergentes. 193 adultos emergentes (idade média 21.61, DP = 2.99; faixa 19-30; feminina 85 masculina 108 participaram da pesquisa. O uso de tecnologias de informação específicas está positivamente associado à posse de atitudes

[1] PhD. in Psychological Science. Adjunct professor at Universitá di Bologna, Italia. Postal Address: Via Zamboni, 33, 40126 Bologna BO, Italia. Email: manuela.zambianchi@unibo.it https://orcid.org/0000-0003-4937-1462

https://doi.org/10.18800/psico.202301.006

favoráveis a eles e a diferentes componentes do bem-estar psicológico eudaimônico. O uso de e-mails está positivamente ligado a um maior bem-estar global eudaimônico, um maior senso de crescimento pessoal, a presença de inúmeros projetos de vida e relações sociais satisfatórias. O uso de sistemas predominantemente icônicos, como o Instagram, aparece ligado a uma menor autonomia percebida.
Palavras-chave: adultos emergentes, tecnologias de informação, bem-estar eudaimônico, tecnologia positiva.

Technologies numériques et bien-être psychologique chez les adultes émergents
Se rèfèrant aux hypothèses thèoriques de la technologie positive, l'ètude a examine les attitudes à l'egard des TIC, l'utilisation de technologies spècifiques et leur relation avec le bien-ètre psychologique eudaimonique. 193 adultes èmergents (âge moyen 21.61 DS = 2.99; plage 19-30; femme 85, homme 108) ont participè à la recherché. l'utilisation de technologies de l'information spècifiques est associée positivement à la possession d'attitudes qui leur sont favorables, et a différentes composantes du bien-être psychologique eudaimonique. l'utilisation des emails est liée positivement à un plus grand bien-être global, à un plus grand sens du développement personnel, à la présence de nombreux projets de vie et à des relations satisfaisantes. l'utilisation de systèmes à prédominance iconique tels qu'Instagram apparaît plutôt liée a une autonomie perçue plus faible.
Mots-clés: adultes émergents, technologies de l'information, bien-être eudaimonique, technologie positive.

The spread of information technology (ICTs) has led to a radical change in the way in which everyday life is structured in practically every age of life, but, in particular, the younger generations are those in which this change is most marked. Young people are in fact defined as "digital natives" because they were born and raised in a highly digitalized society and therefore without having known this society without the internet. The younger generations in fact spend much more time than adults or older people in using these technologies (Chan, 2014; Rideut et al., 2010) raising many questions about the relationship between their use and psychological and psychosocial functioning.

The emerging adulthood represents a phase of life identified twenty years ago by Arnett (2000, 2014), which intervenes between adolescence and the age of a young adult. It is characterized by the tendency to postpone the fundamental choices that characterize adulthood such as marriage or stable cohabitation, the acquisition of a stable job and the stable commitment towards activities and institutions in favor of greater experimentation and consequent precariousness of the choices made. In them the feeling of "being between" two different phases of life prevails: no longer adolescents, but not yet fully adults, thus being able to have ample freedom and autonomy of choice. This phase of life appears today as one of the most utilizing information technologies.

This generation, which has been defined as "the Millennials" (Howe & Strauss, 2004), is the first generation that incorporates numerous communicative technologies (e.g. Facebook, WhatsApp, Twitter) into their lives; it is indeed recognized as the major consumer of electronic media and mobile technology. more recent data indicate that young Italians aged 20 to 25 and 26 to 34 are the largest users of information technology with percentages ranging from 91% to 93%, with 98% of them having sent messages and a 60% who phoned on the Internet. Moreover, they appear the age groups that mostly use PC,

tablet, and mobile phone (ISTAT, 2018). This age of life is recognized as one in which the use of information technology is more pervasive and stronger (ample freedom of lifestyle and personal autonomy due to the age of majority). Lenhart et al. (2010) highlighted that in 2010, 93% of adults between 18-29 years of age owned a cell phone. The Pew Research Center (2018) confirms the media trend, with young people 18-29 years old having the highest percentage for utilizing Facebook (91%); Instagram (64%), Twitter (40%).

This characteristic requests studies aimed at examining the effects these technologies may have on their development and well-being. The individuals, especially the youngest generations, tend to use more diverse channels to maintain relationships with people who are emotionally close to them (*media multiplexity*, Haythornthwaite, 2005). Wrzus et al., (2013) found a consistent pattern of findings where the size of people's social networks generally increases during early adulthood and reaches a peak from the mid-20s to early 30s.

The use of ICTs and psychological well-being. The Positive Technology perspective

Studies on the relationship between the use of information technology (ICTs) and psychological well-being have made theoretical reference to two theoretical frameworks. The first, supported by Jackson, Zhao et al., (2008) refers to two different perspectives, called respectively the "utopian" perspective and the "dystopian" perspective. The dystopian perspective argues that the longer the time spent by young people surfing the Internet, the less time will be used to build vital and concrete relationships such as reading and speaking face to face with family and friends, while running at the same time as expose yourself to harmful content online. The "utopian" perspective, on the other hand, maintains that the Internet offers young people the opportunity to express themselves and communicate with others in new ways while encouraging the development of those technological skills necessary for employment in 21st century society. These two different perspectives have led to three specific and distinct hypotheses on the relationship

between the use of ICTs and psychological well-being, respectively defined as: the hypothesis of social augmentation, the hypothesis of social displacement, and hypothesis of social compensation (Bessiére et al., 2008). In agreement also with the dystopian perspective, the hypothesis of social displacement maintains that the interactions that take place online (virtual) replace the concrete interactions, leading over time to negative effects on psychological well-being. On the contrary, and congruent with the "utopian" perspective (Jackson, Zhao et al., 2008) the hypothesis of social increase holds that the use of ICTs has a positive impact on psychological well-being as it leads to an increase in opportunities to increase social resources and social networks by providing additional places for interaction and social exchange, and for this reason promoting well-being. the hypothesis of social compensation finally suggests that these positive effects are even stronger for those people who are more socially isolated and lack access to social resources that are important for their psychological well-being.

Research conducted on juvenile and adult populations seems to support all three hypotheses; some research has shown that the relationship between well-being and ICTs is very specific and nuanced, linked to the use of specific technologies (Shaw & Gant, 2002; Coleman, Hale, Gibson, 2015).

Many studies on the impact of ICTs on the juvenile population have been conducted focusing on the negative implications for psychological functioning such as depressive symptoms, anxiety, or risk behaviors such as bullying, anxiety, neglecting to analyze more deeply the potential role of the same for the promotion of well-being. Morgan & Cotten (2003) found that the use of Internet for email, and instant messaging was associated with decreased depression among college students. La Toya et al., (2015) in a study on the impact of ICTs usage on children found that it varies depending on the type of ICTs used. Ellison et al., (2007) found that the use of social networks and instant messages was related to greater social capital and satisfaction. Fergus & Zimmermann (2005) evidenced that increased level of family connectedness appears to play a protective role among young adults,

strengthening their resilience. The perception of being connected through these technologies can support the positive development of young people (Lin & Lu, 2011)

A new theoretical approach was developed by Riva et al., (2012), which combines the theoretical perspectives of Positive Psychology (Peterson & Seligman, 2004) with the use of ICTs, and has been called "Positive Technology", which aims to identify the processes and strategies that allow to increase or promote the well-being of individuals, groups, and communities through the use of information technology. There are three components of well-being that the approach to Positive Technology takes into consideration: hedonic well-being, eudaimonic well-being and the social and interpersonal level of well-being. The hedonic dimension of the model involves the use of ICTs to increase the experience of positive emotions; the eudaimonic dimension concerns the use of ICTs in order to promote commitment (the engaged life) and self-empowerment, while the social and interpersonal dimension assesses the possibilities of promoting social integration and connection among individuals, groups and communities. In particular, the eudaimonic level of well-being consists of investigating how much and through which processes the ICTs can be used to support the individual in achieving experiences that favor the actualization of talents and active involvement. The eudaimonic conception of well-being derives from the Greek philosopher Aristotle (384-322 BCE) who in his book "Nicomachean Ethics" argued that happiness is determined by the possibility for the individual to be able to realize his own talents and abilities for the benefit not only of himself, but also of the evolution of society. This theoretical position has been reworked by Ryff (1989), Ryff & Singer (2008) who have proposed a model of eudaimonic well-being (PWB) that includes six dimensions: Self-acceptance, Autonomy, Personal Growth, Environment Management; Life Projects, Positive Relations with Others.

Rogers (2006) suggests the definition of "proactive people" applied to the use of ICTs, and it has to be understood as "technologies that are designed not to do things for people, but to involve them more

actively in what they are already doing" (p. 406), concept perhaps close to the hypothesis of the social increase elaborated by Bessiere et al. (2008) and to the "engaged life" of the Positive Technology perspective about the eudaimonic well-being. Research conducted on elderly people (Zambianchi & Carelli, 2016) confirmed that the use of information technology promotes eudaimonic well-being (PWB, Ryff & Singer, 2008) and social well-being (SWB, Keyes, 1998). Media effects research moreover has been focused on the hedonic perspective on well-being, and only recently has taken into consideration the effects of media use on eudaimonic well-being (Reinecke & Eden, 2017).

Since few studies have deepened the role of ICTs in psychological-eudaimonic well-being (PWB) in younger generations, a better understanding of this issue can be of interest for a deeper knowledge of the impact of ICTs on theirs positive functioning.

Objectives of the study

Considering the relevance for the later ages of emerging adult life (Hallam et al., 2013; Hawkins et al.,2009) and the pervasiveness of ICTs in the lives of the younger generations, the study had as a general objective the evaluation of attitudes towards information technologies and their concrete and specific use and their link with eudaimonic psychological well-being (PWB) in emerging adults.

The specific objectives are the following:

- Evaluation of young people's attitudes towards information technology at a general level.
- Evaluation of the use of specific ICTs technologies: Skype, e-mail, WhatsApp, Facebook, Instagram, Twitter. They have been chosen because they are considered among the most widespread and well known at the population level.
- Evaluation of the level of eudaimonic well-being (PWB) and its relationship with attitudes towards ICTs at a general level and with the use of specific technologies.

- Evaluation of the influence of two structural variables, age and gender, on attitudes towards ICTs and PWB.

Methodology

Participants

A sample of 193 emerging adults, (mean age = 21.61, *SD* = 2.99; range 19-30; female 85 (44%), male 108; (56%) participated in the study. They were recruited at the University of Bologna and in Companies of North Italy. For the sub-sample of undergraduate, the recruitment occurred during their lessons, after having been authorized by their professors to present the research project, while the sub-sample of working emerging adults were recruited in the workplace through contacting the management. After being briefly informed of the objectives of the study and the anonymity of the questionnaires they gave their consent and filled in the following self-report measures.

Measurement

Psychological Well-being Questionnaire (PWB) (Ryff & Keyes, 1995; Ruini et al., 2003). This self-report instrument contains 48 items that evaluated six dimensions: *Autonomy* (the capacity to evaluate oneself by personal standards and acquire a strong sense of independence, e.g. "I have confidence in my opinions, even if they are contrary to the general consensus") α = .57; *Environmental Mastery* (the individual's ability to choose or create environments suitable to her/his qualities, e.g. "In general, I feel I am in charge of my situation in which I live"), α = .65; *Positive Relations with Others* (the ability to construct warm, trusting interpersonal relationships, e.g. "People would describe me as a giving person, willing to share my time with others"), α = .80; *Purpose in Life* (have a clear comprehension of life purpose, a sense of directedness and intentionality, e.g. "Some people wonder aimlessly through life, but I am not one of them"), α = .49; *Personal Growth* (the individual's

perception of being a growing and expanding person, e.g. "I think it is important to have new experiences that challenge how you think about yourself and the world"), α = .71; *Self-Acceptance* (the possession of a positive attitude toward the self and the acceptance of good and bad qualities, e.g. "I like most aspects of my personality"), α = .82. The α coefficient for the overall psychological wellbeing score is .82. The score may range from 1 to 6 (1= is not my case; 6 = is exactly so).

Attitudes toward Technologies Questionnaire, (ATTQ). The ATTQ (Zambianchi & Carelli, 2013) involves six items aimed to examine the attitudes toward ICTs (e.g. "to be able to utilize computer technologies is very useful, you can learn about places, people, news"; "Computer technologies can improve the lives of young people"; "I am interested to know and try out the new computer technologies that will be proposed in the future"). Ratings are made on a five point Likert Scale (1= not at all; 5 = very much). An exploratory factor analysis yielded a one-factor solution with Eigenvalue = 3.43. Subsequent Confirmatory Factor Analyses (CFAs) indicated good fit across the sample as judged from values for several goodness-of-fit indexes (e.g. *RMSEA* (Steiger-Lind): = .06; *RMS*= .01). The internal consistency of the scale was high, with Cronbach's α = .84.

Use of digital technologies. A final series of six questions evaluated the use of specific digital technologies: e-mail; Skype; Twitter; Facebook; Instagram; WhatsApp. Each question provided a dichotomous answer (Yes, I use it; No, I don't use it).

Statistical analyses

First, the descriptive statistics of the variables included in the search were calculated (means and standard deviations; frequencies for dichotomous answer items). Subsequently two Pearson correlation matrices evaluated the correlations between attitudes towards ICTs and eudaimonic psychological well-being and the correlations between attitudes towards information technologies and their specific use, respectively.

Four multivariate models (Manova and subsequent Univariate Anova) have explored the presence of differences based on gender for attitudes towards ICTs, eudaimonic well-being and differences based on the use or not of specific technologies for eudaimonic well-being. The influence of age, placed as a continuous variable, on attitudes towards ICTs and PWB was evaluated through linear and multiple regression models.

Results

Attitudes towards ICTs, the use of specific ICTs and the psychological well-being of young people

Regarding specific ITC technologies, young people use WhatsApp almost universally (98%), while other technologies appear to be used to a lesser extent: Skype: 13%; Twitter: 10%; e-mail: 60%; Facebook: 79%. Instagram: 55%.

Young people have a positive attitude towards ICTs in general, while psychological-eudaimonic well-being appears to be high on positive relationships with others and personal growth, and a medium-high score on PWB globally. (see table 1)

Table 1

Descriptive statistics of the study variables

Variabile	M	DS	skewness	kurtosis
Self-acceptance	4.11	.84	-.68	1.10
Autonomy	4.03	.64	-.38	.58
Environmental Mastery	4.17	.63	-.42	1.26
Purpose in Life	4.02	.61	-.19	-.30
Personal Growth	4.58	.70	-.26	-.14
Positive Relationships with Others	4.65	.84	.98	1.45
Overall PWB	4.26	.53	-.62	1.04
Attitudes towards ICTs	3.67	.79	-.43	-.28

Correlations between attitudes towards ICTs and the size of the PWB

Attitudes towards ICTs appear to be positively correlated with life purposes and autonomy, where value approximates statistical significance. (see table 2)

Table 2

Correlations between attitudes towards ICTs and psychological eudaimonic well-being (PWB)

Variable	Self-acceptance	Auto-nomy	Environmen-tal mastery	Purpose in Life	Personal Growth	Positive relations	Overall PWB
ATTQ	.007	.12+	- .01	.17**	.06	.05	.06

+= p<.09; **p<.01

Correlations between attitudes towards ICTs in general and the use of specific technologies.

The possession of positive attitudes towards information technology is positively correlated to the use of the same, with the exception of WhatsApp, whose relationship is not significant. (see table 3)

Table 3

Correlations between attitudes towards ICTs and use of specific technologies

Variable	Skype	Facebook	Twitter	Email	Wathsapp	Instagram
ATTQ	.19**	.15*	.15*	.19**	.05	.27***

*p<.05; **p<.01; ***p<.001

Differences for gender on attitudes towards ICTs and psychological-eudaimonic well-being (PWB)

A Manova model examined differences in attitudes, with gender as a gathering variable. The results indicate the presence of statistically significant differences (*Wilks' Lambda* = .90; F (6.193) = 3.36 p <.01.

Two items indicate significant differences between males and females, both in favor of males. The first item is related to interest towards the new information technologies of the future (M = 3.93, DS = 1.03; F = 3.50, DS = 1.09), the second concerns instead the preference given to online operations rather than through more traditional channels such as going to the counter, filling in a paper form (M = 3.70, DS = 1.17, F = 3.24, DS = 1.31).

The use of individual specific technologies is linked to the presence of an attitude favorable to them: Skype: "Yes, I use it": M = 4.07; "No, I don't use it": M = 3.62 F (1.197) = 7.7; p <.01; Facebook: "Yes, I use it": M = 3.74; "No, I don't use it": M = 3.44, F (1.197) = 4.91, p <.05; Twitter: "Yes, I use it" : M = 4.05; "No, I don't use it": M = 3.64 F = (1.197) = 4.90, p <.05; email: "Yes, I use it": M = 3.80; "No, I don't use it": M = 3.49 F (1.197) = 7.84; p <.01; Instagram: "Yes, I use it" : M = 3.88 ; "No, I don't use it": M = 3.44; F (1.197) = 16.52; p <.001.

A Manova model has verified the presence of differences based on the use of specific technologies for global eudaimonic well-being and its components. The results indicate the presence of significant differences for two technologies, Instagram, and emails. The use of e-mail affects eudaimonic well-being, albeit with values that in some cases approach statistical significance (*Wilks' Lambda* = .05; F (6, 175) = 1.36; p <.23. Three are the *PWB* components that at the Anova univariate present values close to significance: life purposes (F = 3.46; p <.06): "Yes, I use it": M = 4.10, "No, I don't use it": M = 3.92; personal growth (F = 3.32; p <.06): "Yes, I use it": M = 4.66, "No, I don't use it": M = 4.46; positive relations with others (F = 5.27; p <.05): "Yes, I use it": M = 4.78, No, I don't use it: M = 4.49; global *PWB* (F = 2.73; p <.10): "Yes, I use it": M = 4.32, "No, I don't use it": M = 4.18.

Even the use of Instagram, although it is not statistically significant as a global value (*Wilk's Lambda* = .96; F (6.175) = 1.07; p <.37), it highlighted, to subsequent Univariate Anova, a tendency to significance for the dimension of autonomy (F = 2.82; p <.09), where those who use it, however, have a lower level of perceived autonomy (M = 3.95) than those who do not (M = 4.12).

Influence of age on attitudes towards ICTs on a general level and on psychological-eudaimonic well-being.

A linear regression model where age has been placed as an independent continuous variable has shown an increase in positive attitudes towards ICTs with increasing age (*Beta* = .162; p <.02).

A multiple regression model showed a significant effect of age on the component of *PWB* life purposes (*Beta* = .248; *Adj. R2* = .05; p <.001), where they increase with increasing age.

Discussion

The research analyzed the impact of ICTs on eudaimonic well-being in emerging adults, a generation that is defined as the maximum user of them in developed countries, including Italy (ISTAT, 2018). The results seem to confirm the hypothesis that had been set, but at the same time highlight the differentiated influence on the PWB of the specific technologies / applications, validating both the hypothesis of social augmentation and the hypothesis of social displacement (Bessiere et al., 2008).

The study revealed gender differences with regards to attitudes and beliefs about ICTs, where males claim to be more interested than females in trying out new technologies that the market will offer in the future, and even more available (or able?) to use them for handling practices in daily life such as sending documents, processing online payments. This seems to indicate that even in young Italian Millennials several differences persist, perhaps due to different educational models, that encourage different involvement in information technology, despite the fact that they are practically "grown" with them. An in-depth analysis of the gender differences at an earlier age, such as adolescence, could be interesting given the strong link between attitudes towards ICTs and the use of specific technologies. Encouraging even in females a more favorable attitude towards the use of useful applications for everyday life (e.g. in health, education, bureaucracy) could

contribute to the digitalization of society, also in view of the profound changes taking place, which will make digital skills necessary, almost for the whole population.

Possessing positive attitudes towards ICTs at general level is positively associated to a higher level of autonomy and purpose in life, two components of PWB, confirming the relevance of this digital technologies for eudaimonic well-being, as expected from the Positive Technology Theory (Riva et al., 2012).

The relationship that emerged between *PWB*, attitudes towards ICTs and the use of specific application-devices is complex and in line with the results emerged in previous studies. The use of emails favors the general well-being and several of its components, while the use of technologies such as Instagram tends to reduce the perceived autonomy, a eudaimonic dimension that declines in the difficulty to sustain one's own idea or opinion even if it is contrary to that of others, to resist social pressure to comply with ideas with which we do not agree. Perhaps an explanation of these results can come from the consideration of the specificity of these two different technologies and from the conceptual definition of well-being as eudaimonia.

The conception of well-being as eudaimonia refers to the development of talents and individual potentialities, as the Aristotelian philosophy indicated with the term "eu-daimon", (or "*true-self*", Ryff & Singer, 2008), thus placing life planning at the center, the sense of growth, openness to the new and actualization of one's resources. To achieve these goals there is a need for a strategic-complex thought, planning skills and interpersonal dialogue aimed at building friendships, but also working or sharing interests, ideas. The activity planning, the sharing of ideas sees in the email a privileged tool, which associates the speed of reception of all the digital media with the need for careful reflection and accurate planning of the speech, able to favor personal development and the social relations. The presence of greater eudaimonic well-being in the components of personal growth and life projects strongly supports this hypothetical explanation. Emails in fact require time and reflection because they are based on written verbal thought, and not on images like

digital systems such as Instagram and Facebook, based on the sharing of images and brief comments to them. The sociologist De Kerkhove (1993) argues that the brain is an ecosystem in constant interaction with technology and culture. The use of a specific medium would affect people's minds on a dual level: physiological, modifying neural connections; psychological, in terms of its cognitive organization (*brainframe*). Very probably the latter satisfy other dimensions of well-being, perhaps more of a hedonic type, being centered on the activation of more emotional and temporally oriented to the here and now, as suggested also by the Positive Technology theory (Riva et al., 2012). The risk contained in these "visual" and emotional technologies is represented by the lower perceived autonomy, as can be seen from the results of this small research. Uploading to your Instagram profile or any other devices with a predominantly visual-iconic dimension of images or photos can certainly be effective in social sharing, but at the same time expose the person to criticism or even to future situations of negative social visibility, if they contain elements able to expose to negative evaluations or judgments. The emerging adult represents that phase of life in which self-experimentation prevails in the various areas of functioning such as the couple's relationship, work, studies, friendships; the presence on the most social networks of personal images can, over time, lead to consequences that are not always positive, and above all expose the person to evaluations capable of influencing new future adult roles.

Study limits and future perspectives

The study has some important limitations, which must be taken into account. First of all, the sample that is not too large does not allow us to draw inferences for the population of emerging adults. Moreover, the indices of psychometric goodness of some dimensions such as purposes in life send an interpretative prudence. A further limitation is given by the lack of information about the amount of daily time devoted to the use of information technology, which does not allow to distinguish an effective use but well defined and constructive by the real "Internet addiction".

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Recibido: 2020-05-15
Revisado: 2022-05-13
Aceptado: 2022-10-23