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The impact of technologies in family functioning in different family life cycle stages: A multilevel approach

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Nota Introdutória

A presente dissertação corresponde a um manuscrito em preparação:

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O impacto das tecnologias no funcionamento familiar em diferentes etapas do ciclo de vida da família: Uma abordagem multinível

As tecnologias de informação e comunicação (TIC) transformaram radicalmente a forma como comunicamos e interagimos, influenciando as relações dentro e fora da família e o próprio funcionamento familiar. Estudos revelaram aspetos negativos, positivos e mistos da sua utilização na vida familiar. Contudo, a maioria dos estudos existentes focam-se exclusivamente numa etapa do ciclo de vida familiar, numa única tecnologia, ou em variáveis parciais do funcionamento familiar. Este estudo pretende investigar o impacto das TIC no funcionamento familiar ao longo do ciclo de vida familiar. Especificamente, pretende-se analisar o impacto da utilização e da frequência, semanal e diária, de 13 tecnologias, isoladamente, bem como o impacto do número global de TIC utilizadas, e do número de TIC utilizadas semanal e diariamente. A amostra envolveu 851 indivíduos de 328 famílias portuguesas. Atendendo à estrutura agregada dos dados, procedeu-se a uma análise multinível. Os resultados demonstraram que 56% da variabilidade do funcionamento familiar era partilhada pelos membros da família. A utilização global e de frequência diária de um maior número de TIC mostrou-se significativamente associada a perceções positivas de funcionamento familiar. No entanto, o funcionamento familiar não variou de forma significativa em diferentes etapas do ciclo de vida familiar analisadas: formação do casal, famílias com filhos pequenos e em idade escolar, famílias com filhos adolescentes, famílias com filhos jovens adultos, e famílias com filhos adultos. Espera-se que estes resultados possam contribuir para uma melhor compreensão da relação entre as TIC e o funcionamento das famílias portuguesas, fomentando a investigação e a intervenção nesta área.

Palavras chave: Tecnologias de Informação e Comunicação; Funcionamento Familiar; Ciclo de Vida Familiar.

The impact of technologies in family functioning in different family life cycle stages: A multilevel approach

The information and communication technologies (ICTs) transformed radically the way we communicate and interact, influencing relationships and family functioning. They generated studies that revealed negative, positive and mixed aspects of their use in family life. However, the majority of existing studies focus exclusively on one family life cycle stage, on one only technology, or on partial variables of family functioning. This study intends to analyse the ICTs' impact on family functioning over the family life cycle. Specifically, it aims to analyse the impact of use and frequency of use, weekly and daily, of 13 specific technologies, as well the impact of the global number of ICTs used, and the number of ICTs used weekly and daily. This study had 851 participants of 328 Portuguese families. Due to the data interdependence, a multilevel analysis was proceeded. The results showed that 56% of variance in the ratings of family functioning was shared by family members. The global and daily use of a higher number of ICTs were significantly associated with positive perceptions of family functioning. However, family functioning did not vary significantly across the analyzed family life cycle stages: couple formation, families with young and school-aged children, families with adolescent children, families with young adult children, and families with adult children. We hope that these results can contribute to a better understanding of the relationship between ICTs and family functioning, fostering future research in this area.

Key Words: Information and Communication Technologies, Family Functioning, Family Life Cycle.

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Introduction

Thirty years ago, face to face communication was the most used form of interaction (Blinn-Pike, 2009) and technologies were generally used in work environment (Stafford & Hillyer, 2012). In the 80's, home computers were not crucial to a household but questions started to emerge about the relationship between them and family life (Blinn-Pike, 2009). Through the 90's, the technology environment began to change (Venkatesh, 1996) and ICTs undertook modifications through all the family functioning, from couple relationships to school-related issues (Blinn-Pike, 2009). In the present days, technologies took over the world, transforming it in an information village in which people, from the younger generation called "digital natives" (Facer, 2012) to the elderly ones (Abrantes, Amaro, & Baldi, 2017), are connected to each other in a global network society (Castells, 2010).

As a recent acquisition to families' lives, ICTs' known effects in family functioning across families' development are not coherent. In this investigation, we propose to understand the impact of ICTs in the family functioning of Portuguese families, across different family life cycle stages. Thus, we aim to compose a more complete picture of the impact of these new and transforming tools of interaction and communication in families' lives.

I. Conceptual Framework

1.1. ICTs

ICTs is the term used for "Information and communication technologies", which can be defined by an elaborate and amalgamate range of goods and services that have the purpose to produce, distribute, process and transform information (United Nations Development

Programme [UNDP], 2014). The act of utilizing ICTs is described as using, for example, online social networks, internet forums and email, and encompasses software platforms (e.g., videoconference; email), through hardware platforms, such as computers, smartphones and televisions (Bacigalupe & Lambe, 2011; Stafford & Hillyer, 2012). These two platforms are easily adjustable and interdependent (Bacigalupe & Lambe, 2011), creating the possibility to use several ICTs at once, building an interconnected technological world (Reddi, 2006).

According to the latest Eurostat publication (2017), in 2016, 85% of European Union households (28 countries) and 74% of Portuguese ones, have internet access at home. Fifty nine percent of individuals in European Union (28 countries) and 51% of Portuguese, use mobile devices to access the internet on the move, representing an increase of 30% in the last four years.

The appearance of ICTs caused a remarkable impact in the patterns of interaction and styles of communication (Hussain, 2005), affecting a large variety of relationships in the human daily life and changing the norms and rules of interaction (Aponte, 2009; Bacigalupe & Lambe, 2011; Ruppel, 2015; Stafford & Hillyer, 2012). Nowadays, internet allows the contact to a variety of interaction platforms like social networking services, instant messaging and mobile applications that can be accessed with a shortened cost or even for free, anytime and anywhere (Hussain, Cakir, Ozdemir, & Tahirkheli, 2017), giving the capacity to define when and where the communication happens and providing a vast access to the information (Stafford & Hillyer, 2012). Therefore, new and intertwined patterns of communication are becoming progressively more apparent, leading to the ability to be in permanent virtual contact with others (Stafford & Hillyer, 2012). Thus, in the rapid expansion of this new reality, what has the future in store for families in the next decades?

1.2. Families and ICTs

According to Minuchin and Fishman (1981), family is a natural group that develops forms of interaction as time goes by but is also a permanent transforming system that adapts itself to the different stage of its development, to assure the psychosocial growth of its members. Due to the relationship's richness, the complexity of this structure and as a system that moves through time, the family has different properties from the others. For instance, family only incorporates new members by birth, adoption or commitment and only lets them leave by death (Carter & McGoldrick, 2005), which disables to think about families with the same instruments developed to study isolated individuals (Gameiro, 1992).

Lanigan (2009) defines family functioning as a family process that nurtures individual and family development, meeting its basic needs, making decisions, establishing rules and achieving goals. In order to evaluate family functioning, three different dimensions can be considered: 1) family communication, referring the family communicative patterns; 2) family resources, describing the strengths and capacities that the family possess to adapt to new circumstances and to manage the difficulties from the daily life; and 3) family difficulties, reporting the existing fragilities present in each family (Stratton et al., 2014).

The introduction and integration of ICTs in the household is a complex process that Silverstone and Hirsch (1992) entitled as Domestication Theory. Thus, new and unfamiliar technologies are brought to the domestic area, under the control of its members, feelings as excitation and threat are raised (Blinn-Pike, 2009; Haddon, 2006; Mesch, 2006a). This process implies a two-way interaction, the incorporation of ICT in the household, becoming more acceptable and familiar, and conversion, where the family members have attitudes that signalize their use (Carvalho, Francisco, & Relvas, 2015; Haddon,

2006).

Based on Domestication Theory, Hertlein (2012) created the Multitheoretical Model. This model integrates three mutually interdependent theories: (1) the family ecology perspective, that focus on how the environment (presence of interactive technologies) changes the family relationships (changes to the structure and to the process); (2) the structural-functional perspective, that focuses on the changes to the structure (the redefinition of rules, boundaries and roles) (Johnson, 1971); and (3) the interaction-constructionist perspective, that spotlights on the changes to the process (the reconstruction of communication, behavior, gestures and rituals) (Berger & Kellner, 1970; Hertlein, 2012).

ICTs have the potential to influence family functioning, processes, communication, roles, and relationships (Lanigan, 2009). Several authors have focused on the negative influence of emerging technologies on families (Bacigalupe, Camara, & Buffardi, 2014). Hussain et al. (2017) states that people have become dependent of this technologies for initiating and maintaining communication interactions, leading this to a perception of loss of family control on virtual interactions due to the multi communication and perpetual connectivity (Mesch, 2006b; Stafford & Hillyer, 2012; Stern & Messer, 2009). Relationship problems arise when the use of modern technologies is excessive and inappropriate, causing isolation, family disintegration, anti-socialization and mistrust (Hussain et al., 2017; Nie, 2001; Watt & White, 1999; Williams & Merten, 2011).

Nevertheless, the same technologies that can create the risk to allow strange people to communicate inappropriately with children, can provide a way to parents to control them (Aponte, 2009). Many positive aspects of technologies transformations in family functioning have been pointed out and several authors declare that online communication is related to the increased social connection and well-being of the population (Valkenburg & Peter, 2009). The more time families use

ICTs together, the higher level of cohesion, adaptability and communication between them (Lanigan, 2009). The management of family activities in real time through these new technologies, as mobile devices, (Hertlein, 2012; Lanigan, 2009; Stern & Messer, 2009; Watt & White, 1999), provides time and space for the maintenance of family relations (Aponte, 2009; Bacigalupe & Lambe, 2011; Lanigan, 2009; Stafford & Hillyer, 2012; Stern & Messer, 2009).

Emerging technologies have an undoubtedly positive impact in transnational families (Bacigalupe & Lambe, 2011), because they brought new globalized communication patterns in real time, at a low cost (Lanigan 2009, Stern & Messer, 2009). Providing a sense of closeness to physically distant relatives by the exchange of messages, photos and all kinds of information (Bacigalupe & Lambe, 2011; Baldassar, Nedelcu, Merla, & Wilding, 2016; Mesch, 2006b; Khvorostianov, 2016) as well as emotional support, sustaining intimacy and providing a sense of being virtually present (Aponte, 2009; Bacigalupe & Lambe, 2011; Baldassar et al., 2016; Stafford & Hillyer, 2012; Stern & Messer, 2009). In addition, they can also provide a bridge for intergenerational communication, bringing the older and the younger generations closer and keeping them in touch (Abrantes, Amaro, & Baldi, 2017; Strom & Strom, 2015).

1.3. Family Life Cycle

Based on the systemic perspective, to better understand the concept of family development and constant evolution, a predictable sequence of transformations in the family organization was defined: the family life cycle (Carter & McGoldrick, 2005; Relvas, 1996). This conceptualization, firstly introduced by Hill and Rogers (1964), considers two developmental interfaces: individual/family group and family/sociocultural environment, in which family members perform specific developmental tasks according to different goals that each

stage of the family life poses them (Relvas, 1996).

Different categorizations of these stages have been proposed and redefined by several authors. For instance, Minuchin and Fishman (1982) defined four stages of the family life cycle: couple formation, families with young children, families with school-age or adolescent children, and families with grown children; Carter and McGoldrick (2005) added two more stages: single young adults and families in later life; and Relvas (1996) defined five stages of the family life cycle, transforming the third stage suggested by Minuchin and Fishman in two different stages: families with school-aged children and families with adolescent children.

Although, it is important to state that in the last years big changes aroused in the family life cycle patterns, much of that explained by the decrease of the birth rate, the increase of life expectancy, the change of the feminine role and the increase of the divorce rates and remarriages. Thus, it is important not to stereotype, imposing classifications of "normality" that limit our view of the human life (Carter & McGoldrick, 2005).

1.4. The Portuguese Case

Since the democratization process in Portugal and its integration into the European Union, the Portuguese family system has been redefined, in its structure and functioning (Guerreiro, 2014). Families with only one child are the most common configuration (Cunha, 2007; Delgado & Wall, 2014). In addition, the duration of higher education, the instability in the job field and the rise in marrying age, led to Portuguese mothers to have their first child when they are over 30 years old (Guerreiro, 2014). Moreover, after the 2008 crisis, the younger population faced a higher level of unemployment (26.1% in people between 15 and 24 years old and 11.5% in people between 25 and 34 years old) (Statistics National Institute [INE], 2017) and consequently,

a large number of emerging adults (47% of children between 18 and 34 years old), faced the need to come back to their parents' home, creating situations of dependence and troubled family dynamics (Guerreiro, 2014).

1.5. ICTs and Family Functioning across the Family Life Cycle

As mentioned, families at each stage of development go through different processes of change and adaptation, so the new element of the households, the technologies, have distinct effects and bring different issues to them (Watt & White, 1999).

In the stage of couple formation, the two individuals must redefine their limits, manage the communication and differentiate themselves of their origin families (Relvas, 1996). Thus, ICTs can provide a connection to two physically distant people and a possibility to engage in a relationship (Watt & White, 1999). These relationships can be initiate through social media and chat rooms (Hertlein & Ancheta, 2014) and couples can use video chat, text messaging, and videoconference to facilitate intimacy in long distance relationships (Neustaedter & Greenberg, 2012). Campbell (2015) stated that couples with more positive communication patterns will use ICTs for engaging, increasing connections and growing intimacy with their partners. Oppositely, couples who have more negative communication patterns are more likely to perceive ICT as a platform for ineffectively engaging with their partner, which can reduce their relational intimacy.

In families with young children, members must reorganize themselves, struggling with questions of power, authority and limits (Relvas, 1996). These families are more likely to use and have a variety of technologies and have parents with more favorable attitudes towards the internet, than families without children (Allen & Rainie, 2002). In the school-aged stage of family life cycle, parents use technologies to

monitor their children and make family plans, primarily through text messages and adding more ICTs as their children develop (Devitt & Roker, 2009; Lenhart, Madden, Smith, Purcell, Zickuhr, & Rainie, 2011; Rudi, Dworkin, Walker, & Doty, 2014). Families in this stage must deal with a relationship with a new system: the school (Relvas, 1996), accepting it as a complement of the educative role portrayed by the family. Therefore, home-school communication, in this particular stage, is very important (Rogers, 2003) and digital information exchanges are replacing traditional forms of communication between these two systems, providing organizational and communication efficacy (Heath, Maghrabi, & Carr, 2015).

In the families with adolescent children, the family, more than ever, has the mission to socialize and individualize its elements (Relvas, 1996). The developmental tasks required by this stage are negotiating the power and the autonomy between the parents and the children, dealing with conflicts and opening the family system to the exterior (Relvas, 1996), so communication during this stage can be a challenge (Rudi et al., 2014). Empirical studies reported that the pattern of ICTs use in these families varies between e-mail (Padilla-Walker, Coyne, & Fraser, 2012), social networking sites (SNSs) (Huisman, Catapano, & Edwards, 2012), videogames (Cardoso, Espanha, & Lapa, 2008; Ferguson, 2013), cellphones (Padilla-Walker et al. 2012; Wajcman, Rose, Brown, & Bittman, 2010), and the internet, allowing an understanding of how individuals form their identity and autonomy and create close relationships with peers (Borca, Bina, Keller, Gilbert, & Begotti, 2015). The frequency of internet use by the younger elements of these families is negatively associated with family time (Mesch, 2003), visible in situations in which children are isolated in their rooms connecting with friends, instead of spending time with their families, pointing out a change from a “street culture” to a “room culture” (Bacigalupe, 2011; Cardoso et al., 2008; Mesch, 2006a). Likewise, it is also related to lower perception of relational quality with their parents

(Mesch, 2003) and positively associated with family conflicts (Mesch, 2006a), especially regarding disagreement about time spent using the internet (Huisman et al. 2012), the purpose (Mesch 2006a), rules, and the risks associated with its use (Borca et al. 2015; Sasson & Mesch, 2014). ICTs can also change family patterns of interaction in this family life cycle stage when the adolescent has the role of the expert of technologies, creating discomfort in adults and ultimately fostering conflicts (Kiesler, Zdaniuk, Lundmark, & Kraut, 2000; Mesch, 2006a). Thus, the higher number of ICTs used seems to be associated with a better level of family functioning, especially regarding fewer difficulties overwhelming by the families and better family communication, although the problematic situations related to ICTs use seem to be associated with a worse level of family functioning in this specific stage of the family life (Carvalho, Francisco, & Relvas, 2017).

Families with adult children, are characterized as fundamentally intergenerational (Carter & McGoldrick, 2005; Relvas, 1996). When children leave parents' home, the adoption of different forms of communications technology by families will depend of their desire to maintain contact and the need to improve their communication practices (Bonner, 2009). Empirical research addresses a high frequency of ICTs use among emerging adults (Coyne, Padilla-Walker, & Howard, 2013) and linked to specific spheres of their lives, especially in romantic relationships (Rappleyea, Taylor, & Fang, 2014) and in family communication (Ramsey, Gentzler, Morey, Oberhauser, & Westerman, 2013). Young adults, contact their parents through mobile phones, usually share recent experiences, complain, ask for advice and fulfil family roles (Chen & Katz, 2009). Thus, they spend more time using the media, performing activities as surfing the internet, listening to music (Coyne et al., 2013), using short message services (SMS), and cellphones (Ramsey et al. 2013). Besides the higher number of ICTs been related to a better level of family functioning in this family life stage, it is also associated with a wide range of problems according to

its use (Carvalho et al., 2017). In this family life cycle stage, parents can become grandparents, and in a globalized world the odds of grandparents and grandchildren live far away from each other are very high (Ivan & Hebblethwaite, 2016), so ICTs enables the maintaining of intergenerational relationships as well building relationships with their grandchildren (Ivan & Hebblethwaite, 2016).

1.6. Gaps in the investigation

Despite the increase in the empirical studies in the last decade addressing the relationship between ICTs and family functioning (Carvalho et al., 2015), which illustrates the prominence that technologies currently have in the daily family life, results of body of research are somewhat inconsistent, specially regarding the preponderance of mixed, negative or positive effects that ICTs have on families functioning. Essentially, the previous literature focused on the effects of specific technologies, as computers or the cellphone, examined partial variables of family functioning, as communication or conflict, and were limited to particular stages of the family life cycle, as couples or families with adolescent children.

II. Aim of the present study

Attempting to fill in these gaps, this study intends to shed light on the interplay between ICTs and the family functioning across different stages of family life cycle. More specifically, we aimed to examine if family members' perceptions of family functioning were affected by their patterns of use of ICTs, assessed in the following ways: a) the use of specific technologies (e.g., using the smartphone or the Internet), b) the global number of technologies that they used, c) the global number used weekly, and d) the global number used on a daily basis. In addition, we aimed to test the hypothesis that the relationship between

family functioning and ICTs use could be different according to the family life cycle stages.

III. Method

3.1. Participants

Participants were 851 subjects, within 328 families, distributed by five stages of the family life cycle: 1) couple formation (*n* = 50, within 25 families), 2) families with small and school-aged children (*n* = 66, within 33 families), 3) families with adolescent children (*n* = 183, within 62 families), 4) families with young adult children (*n* = 454, within 161 families), and 5) families with adult children (*n* = 98, within 47 families).

Within the couple formation' stage (*n* = 25 families), participants' age range was between 22 and 70 years old (*M* = 34.54; *SD* = 11.18). The majority were full time employed *(n* = 37, 74%), had a high socio-economic level (*n* = 38, 76%) and had a higher education, equivalent to a degree or master's degree (*n* = 36, 72%).

In the following stage, families with small and school-aged children stage, participants 'age range was between 28 and 44 years old (*M* = 36.23; *SD* = 3.73). In regard to sociodemographic data, subjects were full time employed (*n* = 55, 83%), had a high socio-economic level (*n* = 40, 61%), had a higher education (*n* = 42, 64%) and were married (*n* = 56, 85%).

In the stage of families with adolescent children stage, both parental figures (*n* = 109) and children (*n* = 74) participated. Parental figures were, predominantly, between 36 and 53 years old (*n* = 97, 89%). Concerning sociodemographic information, there was a preponderance of participants full time employed (*n* = 79, 73%), with a non-higher education (*n* = 65, 60%) and married (*n* = 84, 77%). Children's age range was between 12 and 17 years old. The majority

were students (*n* = 70, 95%) and attended the 9th grade (*n* = 47, 64%).

Participants within the stage of families with young adult children were parental figures (*n* = 289) and children from 18 to 30 years old (*n* = 165). Parental figures in this stage were, predominantly, between 48 and 59 years old (*n* = 181, 63%) (*M* = 53.97; *SD* = 6.46). With respect to the professional situation, 68% were full time employed (*n* = 197), regarding the educational level, 74% had a non-higher education (*n* = 214) and concerning the marital status, 91% were married (*n* = 262). Most children were between 18 and 23 years old (*n* = 96, 58%) (*M* = 21.02; *SD* = 3.66). There was a preponderance of students (*n* = 121, 73%), with a non-higher education (*n* = 83, 50%) and single respondents (*n* = 162, 98%).

Finally, in the families with adult children stage, participants were predominantly parental figures (*n* = 92, 94%), most of them between 66 and 77 years old (*n* = 66, 72%) (*M* = 69.78; *SD* = 6.24). In relation to professional situation and educational level, these were in majority retired (*n* = 75, 82%) and attended the 4th grade (*n* = 50, 54%). As to the marital status, all these subjects were married.

3.2. Procedure

The present study was integrated in a wider research project (Carvalho, Francisco, Bacigalupe, & Relvas, 2018). Data were collected using both face-to-face (*n* = 720) and online (*n* = 128) protocol administration strategies, within a snowball method (Vogt, 1999). The face-to-face protocol was distributed by the research team to their professional and social network across the Portuguese territory and the online protocol was diffused through a link of a web platform, shared in several institutional web pages. Respondents completed consent forms and responded to the protocol. For each family was created a code, common to all of its members, which allowed the future data aggregation.

Inclusion criteria for this study included: being 12 years old or older, holding Portuguese nationality, and having at least two members of the nuclear family participating in the study.

3.3. Instruments

3.3.1. Sociodemographic Questionnaire

This study had a designed self-report questionnaire to collect participants' sociodemographic data (e.g., sex, age, marital status, educational level) and family characteristics (e.g., composition of the nuclear family).

3.3.2. Information and Communication Technologies Use Questionnaire (QUTIC; Carvalho, Francisco, Bacigalupe, & Relvas, 2018)

Based on ETEF, an instrument which assesses how family clinicians perceived the impact of ICTs in the clinical context (Bacigalupe et al., 2014), QUTIC is currently being adapted to the general Portuguese population (Questionário de Utilização das Tecnologias de Informação e da Comunicação [QUTIC]; Carvalho, Francisco, Bacigalupe, & Relvas, 2018). Globally, this instrument is composed of six questionnaires, to explore (1) which ICTs, among a list of 13 possible technologies (e.g., smartphone, internet, social media), individuals use; (2) in which frequency are they used (e.g., once a week, 30 to 60 minutes a day, more than 12 hours a day); (3) with which purpose (e.g., social/entertainment, communication), and (4) in which context (e.g., work, home, mobility). It has a (5) Family Technology Adoption Impact Scale (FTAIS) that aims to evaluate the perception of the ICT's impact in the family; and a questionnaire that analyses (6) the problematic situations that individuals experience in

the family context according to ICTs use. In this study, we used the information participants provided in the first and second questionnaires.

3.3.3. *SCORE-15* (Stratton et al., 2014; Portuguese version Vilaça, Sousa, Stratton & Relvas, 2015)

This study used the Portuguese version of the SCORE-15 (Vilaça et al., 2015). This self-report questionnaire provides a global score of the family functioning, throughout 15 items distributed in three dimensions: (1) family resources (e.g., "We're good at finding new ways to deal with difficulties"), (2) family communication (e.g., "In my family we don't tell the truth to each other"), and (3) family difficulties (e.g., "We feel it is difficult to face daily problems"). Participants responded on a 5-point Likert scale ranging from 1 (*describes us very well*) to 5 (*describes us not at all*). Higher scores correspond to greater difficulties in the family. In the Portuguese validation studies (Vilaça et al., 2015), it demonstrated a good internal consistency for the global score ($\alpha = .84$), which was also verified for the present study ($\alpha = .90$).

3.4. Data Analysis

For the statistical analysis of the data we used the Statistical Package for the Social Sciences (SPSS, 23.0) program. Firstly, missing data were found across the items of the QUTIC ranging from 2.0 to 4.7%, and across the items of SCORE-15, ranging from 1.5 to 2.7%. Despite the reduced amount of missing data (i.e., less than 5%), we tested for the missing data missing completely at random (MCAR)' mechanism, as this information is deemed more important than the amount of missing data (Tabachnick & Fidell, 2007). Using the IBM SPSS MVA (Missing Values Analysis) module, we ran an omnibus test that evaluates the null hypothesis that missing data are MCAR: Little's MCAR test. We verified that this hypothesis was not confirmed, x^2

(387) = 498.14, $p < .001$).

According to the literature (Acock, 2005; Young & Johnson, 2013), traditional approaches for handling missing values, such as listwise deletion, pairwise deletion, or mean substitution, are not recommend under the MCAR violation, as their usage might lead to bias in results. Therefore, in this study, we used multiple imputation for handling missing data, as it is one of the best contemporary techniques (Young & Johnson, 2013), allowing to incorporate the missing data uncertainty. In short, multiple imputation at first provides a pattern analysis of the missing data and then it allows pooling of the parameter estimates to obtain an improved one, through imputation of *m* separate data sets (Acock, 2005). Following specific recommendations on the topic (Bodner, 2008; Graham, Olchowski, & Gilreach, 2007; Grund et al., 2016), underlining that it is better to impute from 20 to 100 datasets, we imputed 20 separated datasets.

The statistical analyses of the current study were then conducted using SPSS Mixed. We computed a serious of multilevel linear regression models due the interdependence of family data, considering the association both among family levels and family processes (Lanz, Scabini, Tagliabue, & Morgano, 2015). The variables included across these models were as follows: as the dependent variable, the family members' individual perception of the family functioning; as control variables, sex, age, and family position (individuals that have attained the couple formation stage of the family life cycle, mostly parental figures vs. those who have not, mostly children); as potential explanatory variables within level I, the use of 13 different ICTs, according to the first questionnaire of QUTIC (landline phone, mobile phone, smartphone, desktop computer, laptop, tablet, eBooks, videogames, email, social networks, videoconference, personal web page or blog, internet), the frequency of use of each ICTs, according to the second questionnaire of QUTIC, the global number of ICTs used, and the global number of ICTs used weekly (subjects that responded

between 1 and 4 on the second questionnaire of QUTIC), and daily (subjects that responded between 5 and 11 on the second questionnaire of QUTIC); and, lastly, as explanatory variable within level II, the stage of the family life cycle.

Importantly, we considered five stages of the family life cycle: couple formation, including couples who lived together and did not have children; family with small and school-aged children, including families in which the oldest child is not over 12 years old; family with adolescent children, including families in which the oldest child is not over 18 years old; family with young adult children, including families in which the oldest child is not over 30 years old; and family with adult children, including families in which their oldest child is over 30 years old. Although we intended to follow Relvas's (1996) conceptualization of the family life cycle, we readapted it for empirical reasons (e.g., reduced number of participants within the second and third stages proposed in this theoretical proposal).

IV. Results

4.1. Preliminary and descriptive results

Figure 1 depicts the use and frequency of use (weekly and daily) of each specific ICT by participant family members. The mobile phone (n = 672) and the internet (n = 610) were the ICTs used by a greater number of participants, whereas EBooks revealed to be used by the lowest number of participants (n = 64). The email was the ICT most used on a weekly basis (n = 243) and the mobile phone was the ICT most used on a daily basis (n = 478).

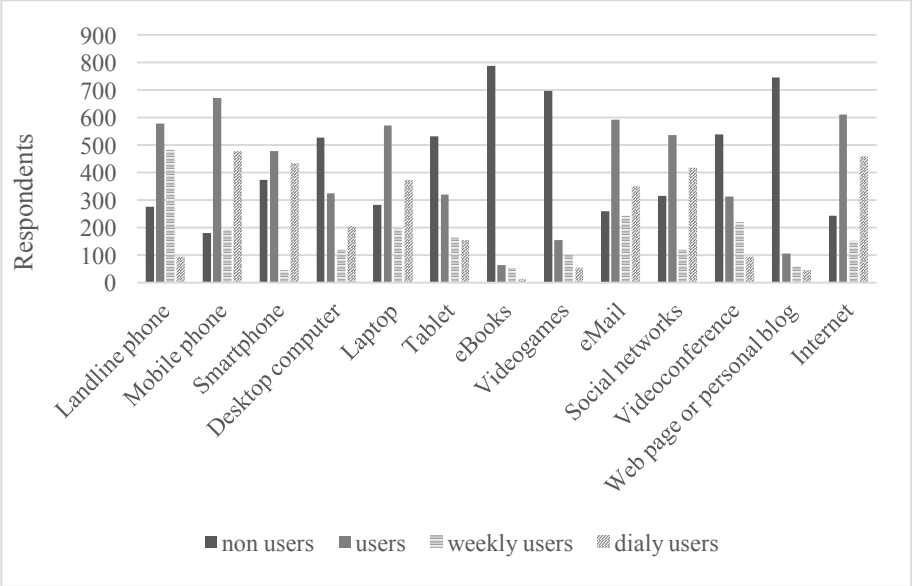

Figure 1. Usage and frequency of usage of each specific ICT by participant family members.

The means of the number of ICTs used globally, weekly, and daily per stage of the family life cycle are presented in Figure 2. The couple formation stage is the family life cycle stage in which participants used more ICTs ($M_{global\ use}$ = 8.87). Families with adolescent children used more ICTs per week ($M_{weekly\ use}$ = 3.31) and families in the couple formation stage used more ICTs per day ($M_{daily\ use}$ = 5.76). Contrarily to the last depicted family stage, in all of the others stages, the number of ICTs used daily is higher than the ones used weekly.

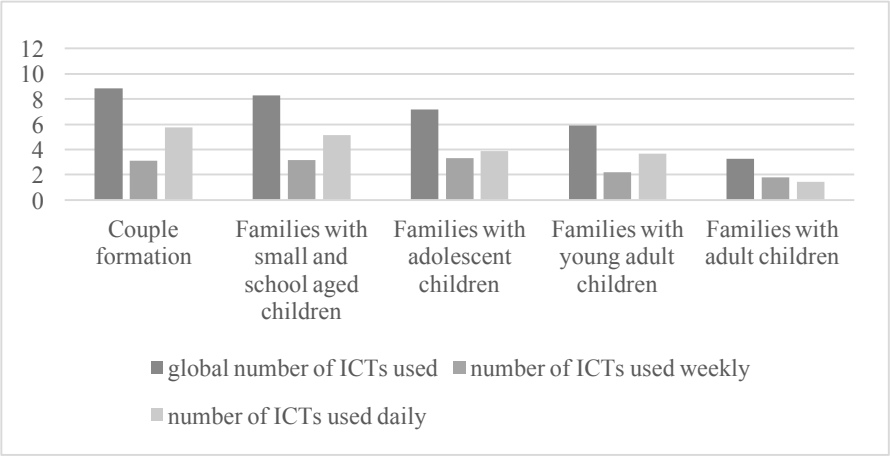

Figure 2. Frequency of the number of ICTs used per stage of the family life cycle.

The means of reports of family functioning by stages of the family life cycle are showed in Figure 3. Participants from families with adult children reported more negative perceptions of the family functioning (M = 2.19) and participants from families with small and school-aged children reported more positive perceptions of the family functioning (M = 1.83).

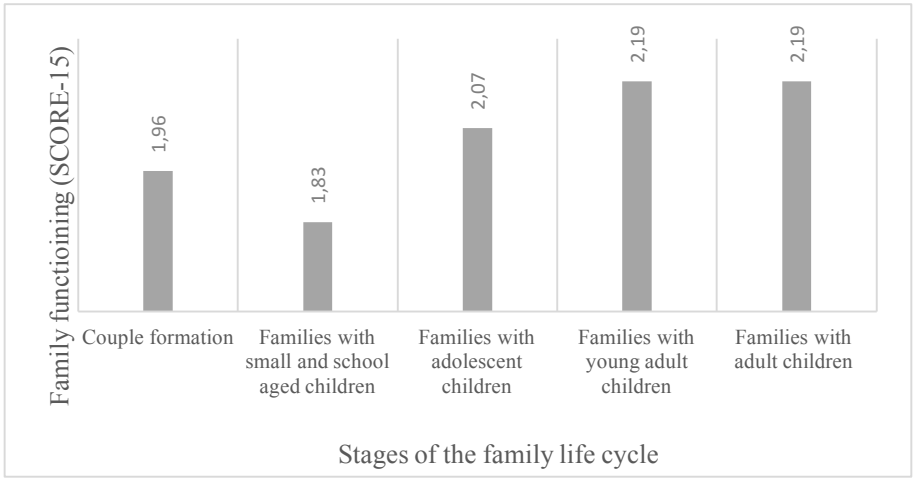

Figure 3. Family functioning by stages of the family life cycle.

4.2. Effects of ICTs use on Family Functioning

Initially, we computed a single intercept model for the family

functioning (see Table 1, Model 0), with the aim to estimate the intraclass correlation (ICC), which describes how much of the total variance of this variable is explained by the grouping structure (i.e., family-level; Hox, 2002). The results indicated that between-family variation was estimated as 50.93 and within-family variation was estimated as 39.30. Therefore, the ICC was 56% (50.93/90.23), representing the amount of shared variance in the ratings of family functioning by family members.

In the subsequent model, we estimated the fixed effects of the control variables (see Table 1, Model 1), sex, age, and family position (individuals that have attained the couple formation stage of the family life cycle, mostly parental figures vs. those who have not, mostly children). Only age was found to be significantly associated with family functioning ($\beta = .09$, $p = .012$), suggesting that poor levels in this variable were reported by older individuals.

To investigate the impact of ICTs' use on family functioning, we ran three models. Firstly, we estimated the fixed effects regression coefficients of the use of each ICTs considered in this study. None of these variables were found to be significantly associated with family functioning. When we estimated the effect of the total number of ICTs (instead of the use of specific ones; see Table 1, Model 2), a significant association between this variable and family functioning was found. Specifically, it was verified that the higher the number of ICTs globally used, more positive perceptions of family functioning were reported ($\beta = -.40$, $p = .001$). We continued our analyses, by exploring whether there was a significant variation in the number of ICTs globally used and family functioning slopes across family groups/stages. However, this variance component had not reached statistical significance ($p = .654$). An explanatory variable at the family level was then added to the previous model: the family life cycle stage. The results of this model continued to show a significant association among family functioning and the global number of ICTs used, but not among family functioning

and the stage of the family life cycle.

To investigate the impact of ICTs' frequency of use on family functioning, we estimated three new models. Firstly, we computed the fixed effects regression coefficients of each ICTs' frequency of use (see Table 1, Model 3). None of these variables were found to be significantly associated with family functioning, apart from the internet use ($\beta = -1.31$, $p = .021$). Then, we estimated the effects of the global number of ICTs used daily and weekly (see Table 1, Model 4). It was verified that the global number of ICTs used weekly by family members is not significantly associated with family functioning. Otherwise, the higher the global number of ICTs used daily, more positive perceptions of family functioning were reported ($\beta = -.44$, $p = .001$). In each of these two last models, the slopes between ICTs use and family functioning did not reach statistical significance ($.085 < p < .213$), suggesting that the relationships between daily/weekly use of ICTs with family functioning does not vary across families. Lastly, the results did not show a significant association among family functioning and the explanatory variable at the family level, family life cycle stage, when this one was added to the model.

Because the stage of the family life cycle was not a significant predictor in any of the models estimated, the interactions between the stage of the family life cycle and ICTs related variables were not computed. Furthermore, within an exploratory aim, two additional models were investigated with two potential explanatory variables at the family level. The first one aimed to analyze the impact of the mean of the global number of ICTs used within a family (see Table 1, Model 5), whereas the second aimed to analyze the impact of the family variability (i.e., standard deviation; see Table 1, Model 6) in the global use of the ICTs. The results showed that the higher the mean of ICTs globally used by the family, more positive perceptions of family functioning were reported ($\beta = -.91$, $p = .001$). It was also verified that the higher the divergences of the number of ICTs globally used within

the family, more negative perceptions of family functioning were reported ($\beta = .87$, $p = .091$). Once again, the slopes between ICTs' related variables and family functioning were not significant in both models ($.097 < p < .325$) and the results did not show a significant association between family functioning and the family life cycle, when this potential explanatory variable was added to the referred model.

Table 1.

Summary of Multilevel Regression Models: Randomic Component

	Model 0	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Between-family variation (level II)	50.93 (5.34)***	50.79 (5.30)***	47.86 (5.15)***	47.61 (5.24)***	47.65 (5.14)***	44.85 (4.91)***	53.20 (6.70)***
Within-family variation (level I)	39.30 (2.53)***	38.12 (2.46)***	38.38 (2.50)***	38.24 (2.53)***	38.47 (2.51)***	38.30 (2.48)***	41.56 (2.95)***

Note. * $p < .05$; ** $p < .01$; *** $p < .001$ (one-tailed).

V. Discussion

Proliferated worldwide in the 21st century, technologies are a recent acquisition to families' lives. The novelty of ICTs created a lack of consensus about their positive and negative effects in the contemporary family dynamics and an unawareness about how families deal with them, across their development. In the present study, we proposed to understand the impact of ICTs in the family functioning of Portuguese families, across different family life cycle stages: couples in formation, families with young and school-aged children, families with adolescent children, families with young adult children and families with adult children.

A first conclusion derived from our results is a possible digital divide (Brandtzaeg & Karahasanovic, 2011) between the "digital natives" and the elderly generation. According to our preliminary results, with increasing age, in later family life stages, the ICTs use is scarcer. Besides, across family life cycle stages, the higher the age of respondents, the poorer the perception of family functioning.

The earlier stages of the family life cycle, as the couple formation and the families with small and school-aged children, seem to reflect the changing world in which we live in. In agreement with our descriptive results, families in these two stages reported a higher number of ICTs use, a higher frequency of use and also more positive perceptions of family functioning. To the couples in formation, ICTs may provide a connection to two distant people (Watt & White, 1999) in a daily frequency. In a busy and demanding professional world in which men and women have little time to spent together, ICTs may give the possibility to couples to reinforce their bond and facilitate intimacy, through text messages, social media or videoconference (Campbell, 2015; Hertlein & Ancheta, 2014; Neustaedter & Greenberg, 2012).

According to the literature, families with small and school-aged children are more likely to use numerous technologies (Allen & Rainie, 2002). Technologies can help to make family plans and coordinate those activities (e.g. one parent is working late and can send a text message to the other parent to pick up their children from school) and monitor the children (Dias & Brito, 2016; Ponte, Simões, Batista, Jorge & Castro, 2017), adding different ICTs to their lives (e.g. cellphone, internet, social networks) as they grow (Devitt & Roker, 2009; Lenhart et al., 2011; Rudi et al., 2014). Given the parents younger age in this family stage, they may have more knowledge regarding ICTs and thereby, use them with their children in a more properly and conscious way. As a relationship with a new system, the school, is formed, a good home-school communication is needed (Rogers, 2003). The traditional forms of communication, as letters, are being replaced with faster and more dynamic forms, as emails, school websites or text messages, providing communication efficacy between these two systems (Heath et al., 2015). These families' ICTs use could facilitate their communication and provide more resources, contributing to a better adaptability to the frequent and new challenges this stage faces.

According to our descriptive graphics, it seems that families with adolescent children reported amidst perceptions of the family functioning and ICTs use comparatively to the family groups studied. This stage requires a negotiation of the power and autonomy between parents and children (Relvas, 1996), so communication can be a challenge (Rudi et al., 2014). On one side, ICTs can afford a way to the younger ones to form their identity and create closer and newer relationships with their peers (Borca et al., 2015), through cellphone or social networks, providing a virtual place where they can express who they are and what they feel (Bacigalupe & Camara, 2011). On the other side, if in a family there is an adolescent with the expert role, using more ICTs with a higher frequency, it can create discomfort in parents and generate family conflicts (Kiesler et al., 2000; Mesch, 2006a).

Besides, other difficulties may arise as a result of problematic situations in this stage, concerning to ICTs use as the time spent by adolescents in the internet or the purpose of its use (Borca et al., 2015; Carvalho et al., 2017; Huisman et al., 2012; Mesch, 2006a). Nonetheless, and in agreement with literature, even though these problematic situations during this period, the higher number of ICTs used is positively associated with a better level of family functioning (Carvalho et al., 2017).

Families with young adult and adult children, the latest stages of the family life cycle, expressed the distance between the older generations and technologies. In accordance with our preliminary results, these are the stages with poorer level of perception of family functioning. This perception may be explained not only by the older age of these stages' respondents, as, in this study, the older the age was related to a worse level of family functioning. But also, may be justified by their scarcer ICTs use (globally, weekly and daily), showed by our preliminary results, as a higher number of ICTs used was related to a better level of family functioning. Other possible reason for these poorer perceptions of family functioning could be the specific characteristics of the Portuguese population, as the younger population braced a higher level of unemployment after 2008 crisis and numerous young adults faced the need to come back to their parents' home (Guerreiro, 2014). This situation may conduct to redefinitions in the family dynamics and can reflect different patterns of ICTs use in the same house. Once our results showed that the more divergence of ICTs use within families, more negative perceptions of family functioning, this may contribute to better understand some problematic situations concerning to ICTs use posed to these families and also the sense of being overwhelmed by difficulties (Carvalho et al., 2017).

In a broad overview, the cellphone and the internet were the most used ICTs, globally and daily, in all of family stages. These two technologies could be used together, as one can access the internet

through cellphone at a restricted space or in mobility, responding in a faster way to the contemporary needs. The cellphone is a familiar ICTs to the older population, but the new interaction web platforms (e. g. social networks, mobile applications) of this technology are spreading, being more common to the younger population. These ICTs can be accessed anywhere at any time, being almost inexpensive (Hussain et al., 2017), providing the possibility to individuals to define when and where they want to communicate (Stafford & Hillyer, 2012) and to manage daily activities in real time (Hertlein, 2012; Lanigan, 2009; Stern & Messer, 2009; Watt & White, 1999). The email and the videoconference were, in the preliminary results of this investigation, the most used ICTs per week. The less frequent usage of these technologies could come from their occasional but regular use for professional reasons (e. g. emailing coworkers, having work meetings through videoconference) and for contacting with distant relatives, as videoconference can provide a sense of them being virtually present (Aponte, 2009; Bacigalupe & Lambe, 2011; Baldassar et al., 2016; Stafford & Hillyer, 2012; Stern & Messer, 2009).

Globally, the higher number of ICTs used and the higher number of ICTs used daily, the more positive perceptions of family functioning were reported. As previously stated, technologies simplify the management of daily family activities (Hertlein, 2012; Lanigan, 2009; Stern & Messer, 2009; Watt & White, 1999), avoiding stressful situations for families, and therefore, making these families feel less difficulties. Providing different tools, ICTs increased the various ways which is possible to communicate (e.g., multiplexity, multicommunication, perpetual connectivity; Stafford & Hillyer, 2012; Stern & Messer, 2009), giving the possibility to improve family communication on a daily basis. The need for harmonization relatively to ICT' use within the families is clear. The higher the mean of number of ICT used by families, more positive perceptions of family functioning, and otherwise, the higher the divergence of ICTs use

within the families, more negative perceptions of family functioning. As referred in literature, the more the families manage ICTs together and in similar ways, the higher level of cohesion, adaptability and communication between them (Lanigan, 2009). Contrarily, the more the difference in utilization of some family members relatively to ICTs, creating a digital divide between the older and younger generation (Brandtzaeg & Karahasanovic, 2011), the higher is the possibility that it can generate difficult situations to the families, like problems related to the purpose of use (Carvalho et al., 2017) or the role of expert of the younger members, that detain the power in that area (Kiesler et al., 2000; Mesch, 2006a).

Contrarily to what literature suggests (Gora, 2009; Mesch, 2006b; Watt & White, 1999), the family life cycle stage, when added to our several multilevel linear regression models, did not show a significant association with family functioning, in any of them. Empirical factors of this investigation could be a possible justification for these results. The gap in our sample is evident, as the number of respondents is much wider in some family life cycle stages (e.g. families with young adult children) than in others (e.g. couple formation). Furthermore, the prominent heterogeneity within each family life stage could be a problem to our analysis. We had respondents with the same age placed in the couple formation family life cycle stage and in families with adult children. Thus, our family life stages are not as much restrict as they could be and are in need for a better specification, for future research.

VI. Conclusions

The broad study of this contemporary area in the Portuguese families is unprecedented. The gathering of information about how ICTs impact the family functioning on different family life cycle stages,

that have distinct compositions and challenges, has never been done before. It opens the door to really understand how technologies are used and perceived within families, and hopefully it will create motion to construe new strategies to deal with technologies in the clinical context and provide further aspects to pursue much needed investigation on this subject.

Nevertheless, this study has some limitations. Although we had a large sample of families, not all of its members responded to the protocol (e.g., children under 12 years old), the number of respondents was not similar in each family stage, and we had a much higher number of parental figures respondents in all of the family stages. We also did not consider other variables measured by QUTIC (Carvalho et al., 2018), like the context and purpose of ICT use. These limitations prevent us to get a more clear, complete and trustworthy image of Portuguese families and their relation to technologies. Even so, it is the first study regarding ICTs to look up on the Portuguese families as a whole, across different family life cycle stages, to take into account the diversity of existing technologies and to evaluate overall family functioning.

As to upcoming studies and investigations, it is needed an assembling of a more consistent families' image. Regarding the lack of a complete picture of families in our study, different methodologies can be adopted (e.g., qualitative and mixed methods; Gora, 2015), using other approaches to collect data, like interviews at their personal home, which may increase the chance to have more respondents in each family and would provide a deeper insight about the role of technologies in the families' life. With the purpose to understand the complexity of ICTs use, future studies must include a scope regarding the context where technologies are used and the purpose of that utilization. That comprehensiveness could generate differentiated patterns of use (Brandtzaeg & Karahasanovic, 2011) and provide a better insight concerning the impact of that usage and family functioning. To

scrutinize that impact, future research could evaluate separately several dimensions of family functioning (e.g., family resources, family communication and family difficulties). Longitudinal studies with these families could also help to understand if the associations between family functioning and ICTs use change as families go through the life cycle, and to know if, for example, the parents of young and school age children will have different tools to deal with the typical challenges of the adolescent developmental stage, regarding technologies use. Based upon our results in the families with young adult and adult children, the divergence of ICTs use within each family life cycle stage could be analyzed, as we would know if the variability of technologies use, within that family stage, between parental figures and children, is a possible explanation for a worse perception of family functioning.

Concerning clinical practice, this study provides more information about family functioning of the twenty first century families and their relationship with ICTs. First, it seems important to rearrange the narrative about ICTs, primarily in the older generation, and transform the negative and risky perception about technologies use to a positive and integrative one**.** If the older generation possess more information about technologies, they can make wiser decisions about their and their children use. Regarding the family life cycle stages, parental figures in the first stages, as in couples in formation and families with young and school-aged children, grew up in a world with technologies, so that can help to shape the digital experience of their children and their family in a healthier way (Ponte et al., 2017). Thus, it appears to be crucial to raise awareness in parents of older children to be more connected with them in the virtual world, so they have the chance to share a different and new reality with their offspring, and that could consequently improve their perception of family functioning. At the same time, it seems essential that parents have the household control, so that they can renegotiate limits and progressively providing their children with more autonomy, to prevent problems and conflicts

about ICTs use.

There is a tendency to place emphasis in the danger of the objects, as we do, for example, with chemical substances or technologies. However, we fail to acknowledge that the problem is not within the substance or, in this particular case, the cellphone or the internet, but it is in the use we make of it. It is important and needed that we try to maximize the benefits of ICTs and minimize its risks. Regardless of the family life cycle stage and the specific challenges they encounter, each family, with their ability to reorganize themselves and utilize their resources, will need to find their own balance regarding technologies and family functioning.

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