

Digital Dependence in The Past Decade: A Systematic Review

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Abstract

Introduction: Digital Dependence is a person's persistent inability to regulate the use of digital devices, on which he or she has become highly dependent. Internet dependence has been described since the mid-1990s, and studies on this topic have intensified since 2010. This type of individual dependence has been the subject of considerable published literature, but in the collective setting of Organizations it is recent, offering the hypothesis that it can also be collective. To review literature on Digital Dependency from 2011 to 2020, considering three perspectives: (a) evolution of the theme during the period; (b) impacts on human behavior; (c) its stage in collective organizational settings.

Method and Materials: Systematic literature review of English language articles, in three databases: PubMed, Web of Science, and PsycInfo, using this article's keywords, refined by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). After analysis of Titles, Abstracts and Contents, 58 articles were selected as fitting those three perspectives.

Results: Of 2,821 manuscripts initially selected, 51 of them displayed evolution, characteristics of digital dependence, and impacts on human behavior in line with the objectives of this study. Seven other articles were added after checking the biographical references of the first 51 articles for other references also meeting our research objectives. Research evolved geographically from three countries (2009-2016) to 17 (2017-2020), with 7 new scales for digital dependence. There were thirteen new revalidations of the Nomophobia Questionnaire (NMP-Q), with an increase from 1,000 to 13,000 volunteers in the two periods. The 58 manuscripts included in this survey confirmed the evolution of digital dependence and its impacts on human behavior.

Conclusions: Geographical evolution, and an increase in the number of scales and of volunteers as well as their different profiles were described. New approaches reinforce evolution, and its impacts on human behavior. This study provides historical insight into Digital Dependence and opens new prospects for research on the differences between nations and people, between genders, between professionals and the need for further research in organizations.

Keywords: digital dependence; digital addiction; internet dependence; digital impacts; digital human behavior; digital addiction in organizations; digital addiction of employees

Introduction

Over the past decade, digital dependence has been studied.

The loss of a digital resource or access, whether by mistake or through some technical-operational defect of the technological structure, can trigger personal and even collective discomfort about reaching goals, characterized by elements of Digital Dependence, such as Nomophobia, which, in short, is the fear of losing access to digital resources [1].

Nomophobia refers to discomfort, anxiety, nervousness or anguish caused by being out of contact with a mobile phone. There is a paucity of literature from India on this emerging mental health condition [2].

Nomophobia is a disorder of the modern world involving symptoms of anxiety and nervousness caused by the lack of access to cell phones, computers and other communication devices [3]. In Brazil, an unpublished In Case Report from 2011 raised the hypothesis of Nomophobia as digital dependence in an individual with panic disorder

with Agoraphobia, presenting cell phone dependence as an attenuator of the disorder [4].

Over the past ten years, attention to digital dependence, and in particular to nomophobic behavior, has grown exponentially with research in countries like Iran, Italy, Spain, Portugal, India, China, Turkey and others, with differentiated approaches, using new measurement scales and analyzing new correlations [5,6,7,8].

It has also been shown that individuals with high Nomophobia scores respond with stress and behavioral disengagement when confronted, providing insights that suggest preventive and interventional measures in the population [9].

Studies also reveal that Nomophobia impacts several areas of life, especially social, professional and academic relationships, due to dependence on the use of smartphones [10].

The presence of Nomophobia has also been reported in the professional field, with impacts on the organizational level [11].

At the end of this decade, a scale was also developed to assess the perception of organizational leaders as to the existence of Digital Dependence in their subordinates [12].

The increasingly intense digital transformations currently underway have a significant influence on people, justifying the continuation of studies such as these. The objective of this study was to review the literature on Digital Dependence (DD) in the past ten years, from three perspectives: (a) the evolution of DD; (b) impacts on human behavior; and (c) DD in organizational environments.

Method and Materials

This review was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).

We used the PubMed, Web of Science, and PsycInfo, databases, in the English language, from January 2011 to December 2020, for searches done from March to September 2021, of articles on Literature Review, Meta-analyses and Randomized Controlled Trial. The ten-year period was chosen because a preliminary evaluation for this study identified a more significant volume of articles in the past decade.

We searched the 3 databases mentioned above using the keywords for this article, and found 2821 articles, which were then submitted to a PRISMA analysis by titles to assess alignment with our research objectives, leaving 160 articles. After analyzing the abstracts of these 160 articles, 106 were

selected for reading, and 54 were excluded. After reading these articles, 51 were selected to support this study in terms of the literature reviewed (Figure 1). We analyzed the references of these 51 articles for other citations we had not found in our electronic search of the databases, totaling 1785 references. Based on their titles, 109 titles that might enrich this article were selected. After reading the abstracts of these 109, 7 were left with useful points to be included in this review. These were added to the 51 articles originally selected, totaling 58 articles, and they are listed in the last 7 positions (52 to 58) in Table 4. These 58 citations are shown in the Bibliographical References and quoted throughout this article. The study was carried out at the Delete Laboratory - Digital Detox and Conscious Use of Technologies, at the Institute of Psychiatry (IPUB) of the Federal University of Rio de Janeiro (UFRJ), which treats and guides individuals with evidence of excessive use of technologies who face impairments in their personal, professional, social and academic lives.

Since this is a literature reviewed, there was no contact with other persons to conduct the research, which was limited to the three databases mentioned above.

Inclusion Criteria

Literature review articles, meta-analyses and cross-sectional research related to experiences with DD individually and in collective environments, aligned with this article's keywords during the period 2011 to 2020 and that featured the evolution of digital dependence, and impacts on human behavior and on the collective perspective in an organizational setting.

Exclusion Criteria

Articles outside the period chosen for the study (2011-2020), articles only available in languages other than English, articles with small sample or that did not fit the objectives described in the Abstract.

Statistical Method

Since this is a literature review, the entire study worked with the descriptive relevance of the citations aligned with the research objectives.

Results

Using the seven keywords to search the three databases, this meta-analysis initially found 2,821 articles distributed according to Table 2, during the decade defined for the research. Table 1, below, presents the quantitative data for each database and keywords in a consolidated form for all 51 articles selected.

Data Base Kew words	Pub Med	Web of Science	Psych Info	Total
1. Digital dependence	0	1	0	1
2. Digital Addiction	4	4	3	11
3. Internet Dependence	7	20	0	27
4. Digital Impacts	4	0	1	5
5. Digital Human Behavior	2	0	2	4
6. Digital Addiction Organizations	2	1	0	3
7. Digital Addiction of Employees	0	0	0	0
Totals	19	26	6	51

Table 1: Selected articles, by database x keywords

This consolidation is the result of PRISMA's screening of the 2,821 articles.

Internet dependence appeared in 27 of the articles (48% of those selected), which is reasonable because the discussion on digital dependence began in the mid-1990s in the U.S., with studies on Internet dependence. The

second keyword with the highest number of selected articles was Digital Addiction, with 11 articles (22%).

Main findings

Regarding the three perspectives adopted here (digital dependence evolution, impacts on human behavior, and organizational digital dependence) to evaluate the theme in the past 10 years, our results highlighted the following points.

Regarding the three perspectives adopted here (digital dependence evolution, impacts on human behavior, and organizational digital dependence) to evaluate the theme in the past 10 years, our results highlighted that the geographic expansion was evident in the presence of new countries that are studying this phenomenon and contributing to an increase in research and manuscripts. New approaches have generated new digital dependence measurement scales, while revalidating existing scales such as the Nomophobia Questionnaire (NMP-Q). Surveyed samples (2017-2019) add up 13,000 volunteers. Compared to 2009-2016, with 1,100 volunteers, there was an average monthly growth of 4,000%. The number of articles inserted for the period 2017-2019 was 23, which was 77% of the total number of articles inserted (30) in less time than the 2009-2016 period.

A survey of 612 students showed a significant relationship between smartphone addiction and Nomophobia as an element of digital dependence. They may have the same characteristics, as long as they are associated with problematic cell phone use.¹³ Similar results on the relationship between smartphone use and Nomophobia were found in a survey of 409 students in Malaysia [14].

In the regarding Impacts on individual human behavior a considerable number of researchers suggest that most intensive users of virtual devices develop dysfunctional symptoms that can have severe effects on functional and social areas of life [15].

To assess and identify Internet gaming disorder, for example, the Diagnostic and Statistical Manual of Mental Disorder, in its fifth version (DSM-5) suggests 9 indicators. When an individual is found to have five of them, he/she can be diagnosed with Internet Gaming Disorder within a period of twelve months. The nine items are: (1) Preoccupation with gaming; (2) Withdrawal symptoms when gaming is taken away; (3) Tolerance; (4) Unsuccessful attempts to control or reduce participation in games; (5) Loss of interest in real life; (6) Excessive use of video games despite being aware of the problems they can cause; (7) Has deceived family members, therapists or others regarding the amount of gaming; (8) Use of internet games to escape or mitigate negative moods; (9) Has jeopardized or lost a significant relationship or job, because of participation in games.

The psychological disorder known as "Internet Addiction" is a recent development, which has emerged with the dramatic increase in internet use worldwide. In a survey of over 57 middle school students (13 to 18 years old) in Korea, significant associations were observed between internet addiction and school level, parental education, and alcohol use [16].

Another study examined factors related to Internet Addiction in elementary school students in Taiwan, where 1,045 children diagnosed with depression were heavy users of this technology. Results showed that time and frequency of Internet use accounted for 39.2% of the variance in Internet Addiction [17].

Problematic Internet Use (PIU) is also a major problem among Chinese adolescents. Little is known about associations of PIU with physical and

psychological health, warranting investigation into its prevalence and testing its relationship with psychosomatic symptoms and life satisfaction among adolescents in China [18].

Evidence supports growing calls for the prevention of excessive smartphone and social media use, and has shown how this distraction affects academic and work performance and productivity [19].

With gaming disorder now included in the World Health Organization's (WHO) International Code of Diseases (ICD-11), it is becoming increasingly valuable as an indicator of how this finding impacts general and functional health [20].

Visual symptoms related to excessive screen use due to Internet Addiction have been reported in the literature on the subject [20].

The inclusion of gaming disorder in the ICD-11 by the WHO was a significant step forward in the understanding of digital addiction [21]

Childhood myopia, heart rhythm, sleep and depression disorders, and more recently "Addiction" and uncontrolled central brain functions initiated by lack of exploration and outdoor light have been identified as real risks [22].

There is a significant relationship between the Nomophobia Questionnaire (NMP-Q) score, Beck's Depression Inventory (BDI), Beck's Anxiety Inventory (BAI) and Short Form 36 (SF-36) Score. Positive for the first three and negative for SF-36, in a survey using these four scales [2].

Nomophobia is an emerging behavioral problem which merits attention. Increasing awareness is needed of the harmful effects of smartphone addiction. In a survey of 451 students, 303 displayed average Nomophobia rates [23].

Four dimensions of Nomophobia have been highlighted as components of digital dependence: not being able to communicate, losing connectedness, not being able to access information, and giving up convenience, in a survey of 141 students who demonstrated at least two of these dimensions [24].

The increased use of new technologies and virtual communication means that personal computers, tablets and mobile phones cause changes in daily habits and individual behaviors.³

In the Digital Dependence in organizational settings, similar habits are observed in organizations and should also be dealt with by Psychology and Psychiatry. When companies require employees to be available at any time and place, this imposes a need to care their health and well-being [11].

Information and communication technologies can change the way we form relationships and socialize with those around us, with both positive and negative effects, depending on how we use or abuse it [25].

Such shifts also have impacts on relationships in organizational environments, by transforming organizational culture in significant ways.

To promote greater awareness about digital influence in the collective environment of business organizations and institutions in general, the Delete Laboratory on Digital Detox and Conscious Use of Technologies developed a tool called the "Scale to Assess Leaders' Perceptions about their Workers' Digital Addiction" (the EPLDDE scale) to evaluate leaders' perceptions of the presence of digital addiction among the people they lead [12].

Using the keywords to query the three databases with the PRISMA method, we consolidate our electronic search in the following map.

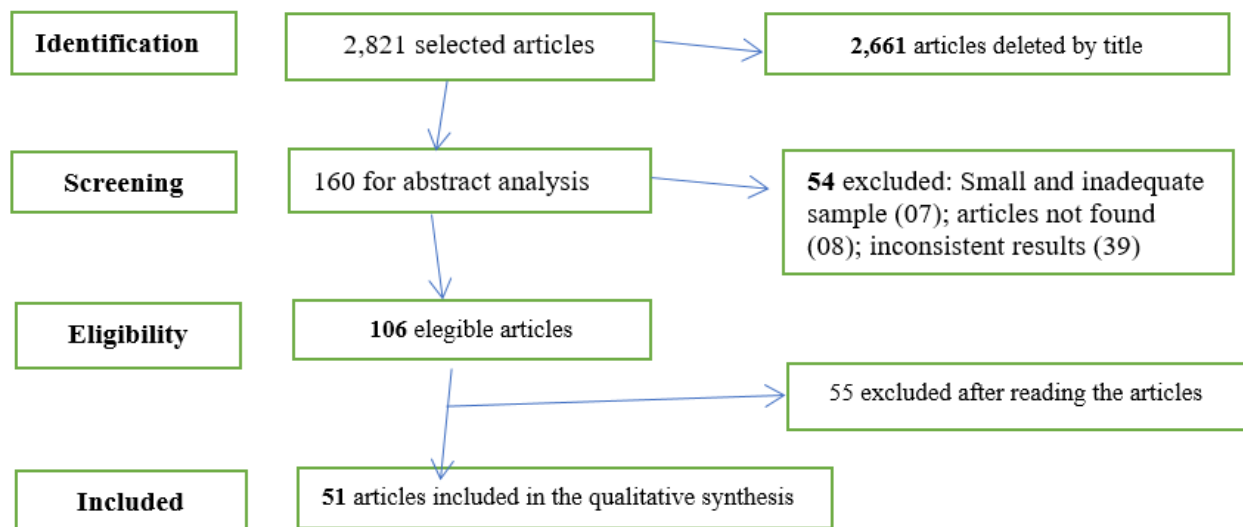


Figure 1: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

Quantitative distribution of the queried articles (2011-2020) in the 3 academic bases and debugging until inserted articles (tables 2 and 3).

Bases	Found	Withdrawn by Title	For Abstract Analysis	Withdrawn by Abstract	Eligible	Withdrawn after reading	Included for final Analysis
PubMed	2012	1957	55	22	33	14	19
PsycInfo	425	395	30	07	23	17	06
Web of Science	384	309	75	25	50	24	26
Total	2821	2661	160	54	106	55	51

Table 2: Quantitative distribution of articles searched per data-base using PRISMA

Bases	Included	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
PubMed	19	01	04	06	05	0	0	02	01	0	0
PsycInfo	06	0	0	01	01	02	01	0	01	0	0
Web of Science	26	02	08	04	01	03	02	04	01	0	01
Total	51	03	12	11	07	05	03	06	03	0	01

Table 3: Quantitative distribution of selected articles per year

Of the following 58 articles, 51 were selected by PRISMA and 7 others from references in those 51 articles. Articles 1 to 19 are PubMed. Articles 20 to 25 are from PsycInfo and articles 26 to 51 from the Web of Science.

Finally, articles 52 to 58 are the 7 articles extracted from the 1,785 references in the other 51 selected articles.

Article/Year/Location/Data Base	Objective	Method	Sample/SDF	Evolution	Impacts	DD Orgs
PubMed						

1. Burr C, Taddeo M, Floridi I, 2020 USA PubMed	Discuss digital well-being, focus on the ethical implications for individuals and society	Thematic literature review	Not specified	Yes, because it introduces a new topic in the digital discussion	Yes, because dealing with well-being directly involves human behavior	Yes, because well-being is an important issue in organizational processes.
2. Hoek RJA 2017 Holland PubMed	Assess employees for attention at work and any stressful situations.	Application of the Stress Prevention at Work protocol, and assess outcomes	Not specified	Yes, because it expands the discussion of digital use, in this case in the workplace.	Yes, because it is about developing work activities using digital media	Yes, because it is about digital use at work
3. Tereshchenko S, Kasparov E, 2019 PubMed	Review the literature and available knowledge on biological risk factors for Internet Addiction in adolescents	Literature review	69 articles as the final selection for the study.	Yes, because it makes a connection between biological risks and Internet Addiction (IA)	Yes, because it discusses risks to humans	Not applicable
4. Elyasi, F et al, 2018. Irán PubMed	Translate and Validate NMP-Q (Nomophobia Questionnaire)	English to Persian, EFA, Varimax Rotation	425 students (Medical Science) Male=187 Female=238	Yes, because it expands knowledge to a country with another language	Yes, the use of NMP-Q gains breadth and helps understand digital dependence in human behavior	Not applicable
5. Davishi, M et al, 2019. Iran PubMed	Investigate dimensions from Nomophobia (NF)	Cros-cutting study with NMP-Questionnaire.	100 students (Medical Sciences).	Yes, because it introduces 4 new dimensions of NF	Yes, because the dimensions discussed (Anger, Discomfort, Anxiety, Insecurity) relate strongly to human behavior.	Not applicable
6. Bragazzi, NL et al, 2019 Italy PubMed	Explore coping styles in nomophobic subjects.	Transversal Study with youth with NMP-Q. Correlational Analysis with Brief COPE Questionnaire	403 individuals	Yes, because it brings new perspectives on NF reactions	Yes, because the dimensions discussed relate to human behavior (Stress Denial Self-blame Self-distraction Venting Use of emotional instrumental support)	Yes, because these aspects of human behavior are relevant in organizational environments.
7. Gutiérrez-Puertas, L 2019. Spain/ Portugal PubMed	Comparative NF levels between Almería and Bragança Nursing students	Comparative study using NMP-Q	258 individuals: 130 (Spain.) and 128 (Port.) Male= 49 Female= 209	Yes, because it compares the behavior of students from 2 countries.	Yes, because it discusses social impacts in human relationships	Not applicable

8.Al-Balhan, E.M et al (2018). Kwait PubMed	Develop and Validate NMP-Q Arabic Version	Translate to NMP-Q Arabic and application.	451 students Male= 280 Female= 171	Yes, because it creates a new version in another culture (NMP-Q Arabic version)	Yes, because it reaches more people regarding digital human behavior.	Not applicable
9.Basu, S et al, 2018. India PubMed	Develop and Validate MP Dependency Scale and assess the burden and factors associated with Mobile Phone (MP) addiction – like behavior	Quiz Application - Mobile Phone Addiction Scale - MPAS	388 students. Male=233 Female=155 AA=21	Yes, because it is a new scale about NF	Yes	Not applicable
10.Aguilera-Manrique, G, 2018 Spain PubMed	Analyze relationship between NF and Distraction associated with student use of SF during clinical practice	Cross-sectional study. NMP-Q adapted to Spain and questionnaire. Use of SF associated with restrictive work policy.	304 Nursing students Male=82 Female=222 IM = 22.7	NF treatment with restrictions on use of SF at work.	Yes, because restrictions on digital use impact human behavior	In professional performance, distraction is very important to assess organizational results.
11.Olivencia-Carrión, Ma et al, 2018. Spain PubMed	Study the relationship between temperament, personality and NF	QANIP - Questionnaire Application and Temperament and TCI-R Character Inventory Revised Questionnaire	968 interviews Male=182 Female=785 IM= 23,19	Yes, because it is a new study on NC x Temperament	Yes, because temperament and personality have to do with human behavior.	Not applicable
12.Csibi, S, 2018 United Kingdom, Romania and Hungary PubMed	Validate Hungarian version of the Smartphone Application Dependency Scale-SABAS to track dependency risk.	Used SABAS, NMP-Q and BSSS - Brief Sensation Searched Scale and Health PHQ - 9 Questionnaire.	240 individuals Male=155 Female=85 IM= 25,4	Yes, because it expands the use of another NF scale.	Yes, because it enhances research on DD	Not applicable
13.Gentile AD et al, 2017 USA PubMed	Analyze the topic based on current status emphasizing etiology and treatment.	Literature Review	Not specified	Yes, because it opens up new ways of researching DD	Yes, because the treatment of DD falls within the context of human behavior	Not applicable
14.Argumosa-Vilar, L et al, 2017 Spain PubMed	Demonstrate 4 Elements of Nomophobia	MPIQ Online Application	242 students Male=111 Female=131	Yes, because it brings a new vision: Correlation between NF and psychological variables	Yes, because it deals with important aspects of human behavior (Self esteem Extroversion Consciousness Emotional stability) produced by NF	Not applicable

15. James C et al, 2017 USA PubMed	Understand the known impacts and research gaps in these areas to support the use of media that contribute positively to 13-18-year-olds	Literature Review	Not specified	Yes, because it brings a diverse view of DD, seeking the appropriate use of digital media.	Yes, because the proper use of the media interferes with human behavior.	Not applicable
16. King et al, 2014 Brazil PubMed	Describe MP use and investigate emotional changes	Questionnaire on MP use comparing Panic and Agoraphobia patients	120 volunteers Male=28 Female=92	Yes, because the comparison of Panic with Agoraphobia and NF is a new approach.	Yes, because Panic and Agoraphobia are inherent themes of human behavior	Not applicable
17. King et al, 2010 Brazil PubMed	Verify SF Impacts on Panic Disorder	Case Report with 1 patient with panic disorder plus Agoraphobia and NF	1 patient	Yes, because it is the first Study on NF in Brazil	Yes, because it found mobile as patient safety impacting their behavior.	Not applicable
18. Brand M, Young KS, Laier C, 2014 USA PubMed	Summarize key views and findings about Internet addiction with a focus on the link between control processes and the symptoms of Internet addiction	Review of Narrative Literature	Not specified	Yes, because it updates important aspects of DD and discusses control processes vs. Internet addictions	Yes, because it deals with issues inherent to human behavior.	Not applicable
19. Kuss DJ, 2013 Hungria PubMed	Review current perspectives on Internet gaming addiction	Literature Review	N=4374 video-games players	Yes, because it updates perspectives on DD and generates new studies	Yes, because there is consistent evidence of behavioral changes from video game addiction.	Not applicable
PsycInfo						
20. Jianling & Chang, 2018 China PsycInfo	Validate NMP-Q in China	Applied NMP-Q	966 users of SF	Yes, because results corroborate previous validations in Spain, Italy and Iran.	Yes, because it impacts behavior directly.	Not applicable.
21. Anshari et al, 2016 Brunei PsycInfo	Investigate behavior and impact on SF use, including gender differentiation	Application of specific questionnaire with 6 sections and 31 questions	589 volunteers Male=312 Female=277	Yes, because gender is statistically significant in relation to the use of SF, consequently of NF.	Yes, because half of volunteers cannot live without SF. Women use more social networks.	Not applicable

22.Arpari, I et al, 2017 Turkey PsycInfo	Investigate effects of mindfulness mediation in the relationship between genders, bonds and NF	Applied the Experiences in Close Relationships Scale, NF Questionnaire and Mindful Attention Awareness Scale - MAAS	450 volunteers Male=131 Female=319 IM= 21,94	Yes, because it shows new NF Correlations with Gender, Mindfulness, and Bonds.	Yes, because it discusses aspects of behavior such as the impact of mindfulness on NF	Not applicable
23.Yldirim, C & Correia, AP, 2015) USA PsycInfo	Validate use of the NMP-Q	Exploratory qualitative research, semi-structured interviews and application NMP-Q Questionnaire	301 young adults	Yes, because it investigates different nomophobic features, comparing men and women.	Yes, because women are more susceptible to NF	Not applicable
24.King, ALS et al, 2013 Brazil PsycInfo	Studying NF as an auxiliary behavior in identifying anxiety	Application of Nomophobia Rating Scales, Medication	1 patient	Yes, because it observes nomophobia as a sign of another mental disorder.	Yes, because habit changes may reveal mental disorders.	Not applicable
25. Andreassen CS et al, 2016 Norway	To study the relationship between addictive use of social networks and video games and the symptoms of psychiatric disorders.	Cross-sectional study examining demographic variables, symptoms of TDAH, TOC, x RS and Videogames and depression	N=23533 adults (16-88 years old)	Yes, because it discusses the relationship of symptoms and gaps about the use of digital resources.	Yes, because the variables discussed are inherent to human behavior.	Not applicable
Web of Science						
26.Arpari et al, 2019 Turkey Web of Science	Investigate impact of individual mindfulness difficulties in NF	Applied the NF Questionnaire and Mindful Attention Awareness Scale - MAAS	491 students Male=152 Female=339 AA= 22,08	Yes, because it studies mindfulness as NF therapy by statistical correlation	In absence of Mindfulness technique, NF is manifested by dependence on SF	NF can be attenuated with mindfulness
27.Fitz, N et al, 2019 India Web of Science	Test about batching notifications could improve psychological well-being	Online application with own application.	237 volunteers Male=192 Female=45 AA=30,3	Yes, because shows human reactions to digital communications	Yes, because digital communications impact HB	Not applicable
28.Coskun, S & Muslu, GK, 2019 Turkey Web of Science	Define problematic use of mobile phones (PMPU) and Fear of Missing Out (FoMO) among adolescents.	Applied Scale for problematic mobile phone use – PU and Fear of Missing Out Scale – FoMOS)	1630 students Male=724 Female=896	Yes, because 2 new scales broaden findings about NF	Yes, because students with the highest PMPU scores and FoMO have lower motivation / performance	Not applicable

29. Rosales-Huamani, JA, 2019 Peru Web of Science	Identify new symptoms through increased use of SF	Applied Test of Mobile Phone Dependence – TMD Brief	461 students Male=97 Female=364	Yes, because it is one more scale to study NF	Yes, because it analyses Anxiety, compulsion to use SF and feeling of panic.	Not applicable
30. Bartwal & Nath, B (2019) India Web of Science	Identify NF levels in medical students	Applied NMP-Q	451 students Male=171 Female=280 IM=20,7	Yes, because it explores aspects of Nomophobia in medical students	Volunteers with SF dependence: 78 volunteers: NF severe; 303: average; 70: lightweight impacting activities	Not applicable
31. Adawi, M et al, 2019 Italy Web of Science	Identify NF levels	Applied NMP-Q and Brief Symptom Inventory - BSI	N=403 volunteers Male=160 Female=243 IM=27,91	Yes, because it shows new behavioral relationships with NF	Yes, because being without SF Contact Causes Irritability and Anxiety, Attention Deficit, Negative Social Impacts, at Work and in Academic Life	Not applicable
32. Gonçalves, LL et al, 2019 Brazil Web of Science	Validates a scale to assess organizational leaders' perception of their employees' digital dependence.	Evaluate the semantics, breadth and consistency of items until final formatting of instrument after cross-sectional application.	N=312 volunteers, from a federal state-owned company	Yes, because it extends DD studies to the organizational collective	Yes, because it concerns people at work and their use of digital technology	Yes, because it specifically deals with validating a scale for assessing Organizational DD applicable to organizations.
33. Yasan, AK & Yildirim, S., 2018 Turkey Web of Science	Investigate student with NF considering 4 aspects	Applied Turkish Nomophobia Questionnaire	146 students Male=55 Female=91	Yes, because it shows NF's New Approach: Analyze Not Being Able to Communicate, Lost Connectivity, Not Accessing Information, and Convenient Dropout	Yes, because it shows strong correlation between NF and Internet use. Lack of digital communication interferes with HB	Not applicable
34. Yildiz, D, 2018 Turkey Web of Science	Investigate predictors of NF and SF dependence among adolescents	Applied NMP-Q and Turkish NF Questionnaire.	612 students IM between 12 and 18.	Yes, because it correlates demographic variables and academic performance	Yes, there is a significant relationship between SF addiction and NF.	Not applicable
35. Oliveira, TS et al, 2018 Brazil Web of Science	NF in the environmental organization	Case Report	Report without sample	Yes, because is a Collective treatment of NF	Yes, because Nomophobic dependent behaviors	Yes, because talk about organizational collective impacts

36.Parasuraman, S et al, 2017 Malaysian Web of Science	Study mobile phone addiction behavior and awareness on electromagnetic radiation.	Multivariate NF according to 8 variables.	409 students Male=198 Female=211 IM= 22,88	Yes, because it shows more correlation with NF and with a new perspective.	Yes, because volunteers have wrist and hand pain. Students develop dependence on SF	Not applicable
37.Trom, D, 2016 USA Web of Science	Classifying NF as an SF Addiction Disorder	Literature Review on PsycInfo and Google Scholar	117 manuscripts studied	Yes, because NF has correlation with Smartphones Addiction. Proposed inclusion in DSM – Diagnostic and Statistical Manual of Mental Disorder.	Symptoms as anxiety, depression and low self-esteem confirm NF as DD. The compulsive use of SF causes significant impairment of social, physical and cognitive functions.	Not applicable
38.Shin, L, 2014 Korea and USA Web of Science	Investigate Internet dependent usage severity and factors involved	Compares students in 2 countries.	597 volunteers 283 USA 314 Korea >18 years Mobile Internet Usage Index - MIUI	Yes, because it compares culturally different countries	Yes, because unemployed and young students are more susceptible to digital addiction. Korean women are more dependent than American women.	Not applicable
39.Chu ML, Lee YH, 2013 Taiwan Web of Science	Explore factors related to Internet addiction among students	Data collection with the Internet Addiction Questionnaire Scale - IAS	N=1045 volunteers	Yes, because it boosts the topic in the educational context	Yes, because Internet Addiction is correlated with human behavior	Not applicable
40. Cao H, Sun Y, Wan Y, Hao J, Tao F., 2011, China Web of Science	Investigate the prevalence of PIU and test the relationship between PIU and psychosomatic symptoms and life satisfaction among adolescents in China.	A cross-sectional study	N=17599 volunteers	Yes, because it discusses PIU x psycho-somatic symptoms.	Yes, because both themes correlate with human behavior.	Not applicable
41.Heo J et al, 2014 Korea Web of Science.	Identify the association of factors with Internet addiction.	Dual Regression	N=57.857 high school students (13-18 yrs)	Yes, because it broadens the discussion with new intervening factors	Yes, because it deals with variables related to human behavior	Not applicable
42.Sung M. et al, 2014 Korea Web of Science	Assessing psychiatric symptoms in adolescents using the Internet Addiction Scale (IAS)	Multi-regression to assess the association of factors with 8 psychiatric problems.	N=1722 individuals from 13-15 years old.	Yes, because it introduces Psychiatry into the debate on adolescent DD	Yes, because they are strongly behavior-related issues.	Not applicable

43.Zhang H. et al, 2015 China Web of Science	Investigating the relationship between PIU, temperament and frustration	Application of specific autonomous questionnaire	N=660 Chinese high school students	Yes, because it is a geographical evolution, with two new variables	Yes, because temperament and frustration are intrinsic to human behavior.	Not applicable
44.Macur M. et al, 2016 Slovenia Web of Science	Studying the prevalence of problematic Internet use among adolescents	Application of specific questionnaires to identify problematic Internet use	N=6029 individuals	Yes, it is an evolution because it goes deeper into aspects about Internet with teenagers	Yes, because it explicitly involves aspects of adolescent behavior.	Not applicable
45.Reyes MES et al, 2018 Philippines Web of Science	Explore the relationship between FoMO and PIU among Filipinos.	Test battery with 3 measurement scales	N=1060 Filipinos	Yes, because it goes deeper into discussing 2 important DD topics	Yes, because FoMO and PIU are typically human behavior issues	Not applicable
46.Chao C-M et al, 2020 Taiwan Web of Science	Investigate the relationship between inappropriate physical and mental health as a factor facilitating PIU and examine the moderating effect of community	Empirical cross-sectional survey with self-reporting questionnaires	N=5211 students in Taiwan	Yes, because it extends to other countries, strengthening studies on mental health and effects of the Internet as a PIU	Yes, because they are themes explicitly related to behavior.	Not applicable
47.Pontes HM et al, 2014 Portugal Web of Science	Validation of the Internet Addiction Test - IAT in Portuguese	Applying the IAT to adapt to Portugal	N=593 Portuguese citizens	Yes, because it is an alternative for Internet addiction assessment.	Yes, Internet Addiction is entirely a part of human behavior.	Not applicable
48.Pontes HM et al, 2015 China Web of Science	Review the concept of prevalence, neural processes and treatment implications	Literature review	N=123 manuscripts	Yes, because it discusses new DD variables	Yes, because it shows important aspects of DD behavior.	Not applicable
49.Sharma M 2019 India Web of Science	Assess the relationship of nomophobia with depression, anxiety and quality of life in adolescents	Application of the NMP-Q, BDI, BAI and SF-36 questionnaire	N=1,386 students aged 14 to 17	Yes, because it correlates Nomophobia with DD and quality of life	Yes, because it addresses 3 elements of human behavior.	Not applicable
50. King et al, 2020 Brazil Web of Science	Identify consequences of using smartphones while performing professional tasks.	Literature Review	N=14 selected articles.	Yes, because it deals with digital use in the professional environment	Yes, because it impacts the work behavior of health professionals.	Yes, because it is about digital use in health care work environments.

51.Odaci H et al, 2016 Web of Science	Investigate the relationship between Internet addiction and college students.	Collection with 3 instruments: (a) Internet Dependence Questionnaire - IDQ; (b) Offer Self-Image Questionnaire -OSIQ; (c) Personal Data Form - PDF	N=623 students F=454 M=169	Yes, because it uses new scales to go deeper into DD studies.	Yes, because DD is part of the context of human behavior.	Not applicable
Articles referenced by the first 51 articles						
52. Thouvala et al, 2020 United Kingdom	Evaluate distraction caused by intensive use of smartphones having an impact on human behavior	Test applied with distraction measures	N=143 students in the UK.	Yes, because it deals with a little-explored DD correlation.	Yes, because distraction was identified with the tests performed.	Not applicable
53.Mylona I et al, 2020 Grecia	Conduct a narrative review on the negative effects of Internet Addiction to games	Narrative review	N=246 initial articles, with 12 aligned to the theme at the end	Yes, because it intensifies the debate about DD in the field of electronic games.	Yes, because it deals with the impact of games on behavior.	Not applicable
54.Dresp-Langley, B, 2020 França	Provide information about the multiple risks of overexposure to digital environments	Exploratory review	Not specified	Yes, because it brings a discussion about risks in all digital environments	Yes, because people are part of the digital environment and the risks they incur impact them directly.	Not applicable
55.Balhara YPS et al, 2020 Southeast Asia	Review the existence of studies on problematic Internet use	Literature Review in PubMed and Scholar One databases	N=549 initial studies with 38 final studies	Yes, because it reviews the PIU theme	Yes, because problematic Internet use is a human behavior issue.	Not applicable
56.Gokcearslam et al, 2016 Turkey	Research the use of smartphones by college students	Online research gathering data on the role of the use of smartphones, self-regulation, general self-efficacy and cyberloafing in universities	N=598 volunteers F=423 M=175	Yes, because it broadens discussion of smartphone use in the university environment	Yes, because smartphones today are vital elements of human behavior.	Not applicable
57.Shunyu Li, 2020 China	Study negative life events and Internet Addiction among adolescents and young adults	Meta-analysis in Chinese and English databases	N=85 articles N=86833 Chinese adolescents and young adults	Yes, because it has consistent samples of both articles and volunteers	Yes, because it deals with Internet Addiction in students' lives	Not applicable

58.Becirovic, Pajevic, 2020 Croatia	Analyze the Internet addiction behavior of children and adolescents during the pandemic	Analysis of data available in the literature in databases and textbooks.	Not specified	Yes, because it deals with the addiction in the context of the pandemic	Yes, because it is about the use of the Internet in the pandemic	Not applicable
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Table 4: Selected Articles - Legend: AA= Average Age; BAI= Beck's Anxiety Inventory; BDI=Beck's Depression Inventory; BSI= Brief Symptom Inventory DD = Digital Dependence; EFA = Exploratory Factorial Analysis; FA = Factorial Analysis; FoMOS = Fear of Missing Out Scale; HB=Human Behavior; HBI = Human Behavior Impact; IAS= Internet Addiction Scale; IAT= Internet Addiction Test; IDQ= Internet Dependence Questionnaire MAAS=Mindful Attention Awareness Scale; MIUI= Mobile Internet Usage Index; MP = Mobile Phone; MPAS= Mobile Phone Addiction Scale; NF = Nomophobia; NMP-Q = Nomophobia Questionnaire; OSIQ= Offer Self-image Questionnaire; PDF= Personal Data Form; PMPU= Problematic Use of Mobile Phones; SDF = Socio-Demographic Functions; SF=Smartphone; SF-36= Short Form 36

Discussion

The key-words Internet Dependence (27 selected articles) and Digital Addiction (11 selected articles) are referential for research on Digital Dependence. On the other hand, the keywords Digital Impacts (5) and Digital Human Behavior (4) have fewer articles selected because they are consequences of the first two. They can be considered dependent variables and, for this reason, appear less frequently in this type of query. The growth of research on Digital Dependence may change this picture.

In even fewer numbers, there are findings related to the keywords Organizational Digital Addiction and Digital Addiction of Employees, since there is still less research on collective settings, where this dependency belongs.

In terms of perspectives on the Evolution of Digital Dependence in the past decade the production of studies and manuscripts evolved between 2009 and 2019, divided in two blocks: 2011 to 2015 and 2016 to 2020 (5 years). In the first period, articles produced in the USA, UK and Brazil prevail, while in the latter period (2016-2020) other countries emerged, such as Italy, Spain, Portugal, Kuwait, India, Iran, Romania, China, Turkey, Hungary, Peru, Sweden, Israel, and Hong Kong, with this geographic evolution revealing greater interest in contents about digital dependence.

Specifically in Turkey, one of the countries with one of the highest growth rates of Internet users in the world, 16 to 24-year-olds account for 73% of Internet use [26].

This expansion also includes comparative studies between students from different countries, such as Spain and Portugal, aiming to identify specificities between them⁸, similar to what we see for students in the United Kingdom, Romania and Hungary [27].

We find a similar situation comparing the severe use of mobile Internet by Americans and Koreans, with geographic expansion, but different dependent behaviors in each²⁸, in addition to significant differences between male and female outcomes, which also appeared in research in Brunei [29].

In Iran, the Yldirim & Correia Nomophobia Questionnaire - NMP-Q (2015)³¹ was translated and validated³⁰, with high reliability (Cronbach's Alpha = 0.983) corroborating results in Spain⁸, Italy⁹ and India [32].

In the Philippines, a study with 1,060 individuals demonstrated the relationship between Fear of Missing Out (FoMO), Social Media Use (SMU) and Problematic Internet Use (PIU) among Filipinos, showing a significant relationship of FoMO with SMU and PIU [33].

In Croatia, expanding the list of countries studying digital dependence, a Literature Review focused on childhood and adolescence discussed and demonstrated important aspects of how this type of addiction relates to gambling disorders, Internet Addiction Disorder, Internet Gambling Disorder and Sex Addiction [34].

Regarding the number of articles, for the 51 articles selected in table 3, we find a substantial increase from the first to the second half of the decade, as 38 of the 51 (74%) were published from 2011 to 2016, while only 13 (26%) has been published in the first half of the decade, a growth of nearly 200%. From 2011 to 2015 there were 0.22 articles per month, while from 2016 to 2020 there were 0.63 articles per month, on average.

Research into Internet Addiction (IA) has grown rapidly over the past decade. The topic has generated a great deal of debate, particularly on how to define IA conceptually, as well as many methodological limitations. Relevant issues include definition and characterization, incidence and prevalence rates, associated neuronal process and implications for treatment prevention and patient-specific considerations. It is necessary to discuss a definition for IA [35].

In Slovenia, a survey using the Problematic Internet Use Questionnaire Short-Form (PIU - SF6), with N=6,029 individuals, aiming to identify problematic Internet use, found high time of use and mistakes due to attention spans [36].

Another important scale, the Social Networking Time Use Scale – SONTUS, was used in the Philippines to assess the relationship between time of use and problematic internet use, PIU and FoMO, and also confirmed this correlation [33].

During the period of this study there was a significant increase in revalidations of scales, in India²³ and Iran³⁰, where the Nomophobia Questionnaire - NMP-Q³¹ was found suitable to their respective cultures, enhancing the evolution of the theme and of the scales themselves.

The NMP-Q questionnaire was applied and revalidated in China with 966 smartphones users³⁷ and was also revalidated with comparable results in Spain⁶ and Italy [38].

Other validated scales have confirmed the expansion of Digital Dependence, such as Scale for Problematic Mobile Phone Use (PU), which measures overuse of mobile phones, the correlation between mobile phone and mental variables and possibilities of negative effects of prolonged mobile phone use, in addition to the Fear of Missing Out Scale (FoMOS) [39].

A study⁴⁰ in 2017 also identified the relationship between mindfulness and Nomophobia, with a different scale: the Nomophobia Questionnaire – NF, also used in the USA with analogous results [24].

Symptoms such as anxiety, compulsion, and anxiety and panic were identified⁴¹ with the Test of Mobile Phone Dependence (TMD Brief), confirming these symptoms of dependence in Nomophobia. This has also been confirmed in Iran, for anxiety, using the NMP-Q [5].

In Spain, a study with the Mobile Phone Involvement Questionnaire (NMPIQ), which found a correlation between self-esteem, extroversion and awareness with emotional stability related to Nomophobia, innovated in treating Nomophobia related to psychological and not only demographic variables [10].

A study using the Smartphones Applications Based on Addiction Scale - SABAS, concluded that severity, anxiety and stress of depression are associated with problematic use of smartphones²⁷. The same review also indicated the Smartphone Addiction Scale - Short Version - SAS - SV for the evaluation of Nomophobia [27].

In India, the Mobile Phone Addiction Scale (MPAS) was produced and validated by 388 medical students [32].

Besides the validation of new scales, others already in use were revalidated in other languages, such as the NMP-Q [8].

Along the same lines, a psychometric evaluation of the Arabic version of the NF Questionnaire (NF) was developed in a pilot study at Kuwait University.⁴² This expansion also took place in 12 other countries between 2017 and 2019.

In Brazil, in 2020, the Delete Laboratory Book of Scales presented fifteen statistically validated scales published in specialized journals, to assess various forms of digital dependence such as dependence on social networks, on electronic games, on organizations and several others [43].

This expansion also took place in 12 other countries between 2017 and 2019.

In Portugal, a study with 593 Portuguese students adapted the Internet Addiction Test - IAT via translation-back-translation to local socio-demographic variables [44].

d) Sample Profiles / Target Audience

The increase in the use of digital devices also brought a geographic expansion of digital dependence, along with the need to adapt measuring tools to understand Nomophobia as an element of this dependence. New tools were created for new audiences such as doctors, nurses, students, employees and organizational leaders, among others.

We also observe that from 2017-2019 the number of volunteers exceeded 13,000 versus just over 1,000 from 2009-2016. This significant increase of participants in Nomophobia research is a strong element of evolution.

During the past decade, research on "addictive technological behaviors" has grown substantially. Research has also demonstrated a strong association between the addictive use of technology and comorbid psychiatric disorders. Cross-sectional research with 23,533 individuals (16-88 years old) examining demographic variables, confirmed that the relationship between attention-deficit disorder (ADHD), obsessive-compulsive disorder (OCD), anxiety and depression could explain variance in the addictive use of two types of modern on-line technologies: social networking sites (women) and video games (men) [45].

Recent studies and reports from international organizations show that Internet users comprise 42.3% of the world population, with consistent growth. Turkey has the fastest growing number of users, ranking 18th in the world, with 16-24-year-olds as the fastest growing segment (73%). Internet use among young people in Turkey and elsewhere on the planet has been studied to interpret its causes and consequences [26].

e) DD between the sexes

Between 2017 and 2019 interest in assessing prevalence by sex rose consistently. Before this period no one discussed results by sexes.

Nomophobia, as digital dependence, was investigated among students in Iran, to identify feelings of anger, discomfort, anxiety and insecurity in the correlation of this phenomenon with age, sexes, educational level and duration of smartphone use. Women feel less anger and, consequently, less discomfort than men when deprived of digital access [5].

Sex was also found to be statistically significant in smartphone use, in a survey of 589 participants. Women make greater use of social networks, messaging and cell phones, with more marked misuse than men [29].

Researchers have also identified a greater impact on women of the relationship between mindfulness and Nomophobia [40].

The results confirm that women are more susceptible to digital dependence, particularly Nomophobia, than men [31].

The US and Korea also stand out for a greater dependence of women than men [28].

These differences between male and female reactions and outcomes provide a new perspective for Nomophobia analysis, as an element of digital dependence.

From the Perspective of Impacts on Human Behavior

a) In professional activities

The use of mobile phones during other activities at work may compromise job performance, due to the deviation of attention away from the task at hand.

A survey of nursing students in Spain using smartphones during internship activities revealed a statistically positive relationship between Nomophobia and smartphone-associated distraction [6].

There is also a concern that digital addiction expressed as Nomophobia can reveal problems in organizations related to the demand for employees to be available at all times, wherever they may be [11].

b) social commitment

Articles address Nomophobia as a Digital Dependency, as a modern age phobia, introduced into our lives as a product of interaction between people and mobile information and communication technologies, especially smartphones [31].

Nomophobia is an emerging social behavioral problem that merits attention because of the varying degrees of severity of impairments caused by cell phone dependence [23].

It is classified as a disorder in which compulsive smartphone use causes significant impairment of social, physical and cognitive functions [46].

Nomophobia affects different areas, especially social, professional and academic relationships, due to dependence on smartphone use [10].

Studies on smartphone well-being surveyed in our research show anxiety and FoMO (Fear of Missing Out) when participants receive no notifications, affecting their social behavior, while those receiving them regularly feel more productive and satisfied [47].

Addiction to electronic games on the Internet shares similarities with other addictions, including substance dependence, at molecular, neurocircuitry, and behavioral levels. These similarities include dopaminergic and neuronal activity changes in brain morphometry, as well as impaired impulse control, behavioral inhibition, and overall cognitive functioning. As psychiatrists seek to understand mental disorders through underlying physiological diseases, this provides further incentive to continue research into the neurobiological underpinnings of mental health problems, including Internet gaming addiction [48].

About the relationship with primary disorders, the relationship between anxiety and stress of depression has been demonstrated in a systematic review, which concluded that there is a relationship with Nomophobia [27].

Digital dependence, and particularly Nomophobia, is a feeling of discomfort or anxiety experienced by individuals when unable to use cell phones or use their facilities [3].

People with panic disorder showed significant increases in anxiety, tachycardia, respiratory changes, tremors, sweating, panic, fear and depression, relative to the absence of their cell phones [1].

Using the TDM Brief Test of Mobile Phone Dependence, 461 students confirmed the following symptoms related to Nomophobia: (a) anxiety; (b) compulsive use of smartphones; (c) feelings of anxiety and panic [41].

Increased anxiety along with irritability when not in contact with the digital device were identified as symptoms that characterize Nomophobia as technological dependence [38].

There is a significant relationship between depression and anxiety. It is an emerging mental health condition, especially in male adolescents [2].

However, an inverse relationship between depression and excessive smartphone use is also possible. In this case, the emptiness of depression might be partially or temporarily overcome by digital distractions [27].

Due to its amplitude and relationship with anxiety, depression and low self-esteem, Nomophobia as smartphone dependence became a candidate for inclusion in the DSM - Diagnostic and Statistical Manual of Mental Disorder [46].

With gaming disorder included in the upcoming version of the World Health Organization (WHO) classification of diseases (ICD-21), it is becoming especially important to have a clear idea of the impact of this discovery on general health and overall function [20].

In Taiwan, 5,211 adolescents participated in a cross-sectional survey with results indicating that cyberbullying, Internet pornography, Internet fraud, and community bonds have positively significant effects on problematic Internet use. Parental Internet attitude and behavior were found to significantly moderate the relationship between inappropriate physical and mental health, community bonds and PIU [49].

Problematic Internet Use (PIU) among students has become a significant mental health concern. There are risk factors associated with PIU that deserve further research to better consolidate this perspective [50].

In Korea, 1,722 individuals between the ages of 13 and 15 participated in a survey to assess factors of the Internet Addiction Scale and its association with psychiatric symptoms (8 psychological problems), in which the researchers observed that the overall IAS was significantly associated with Somatic, Immature, Thought, Attention, Delinquent and Aggressive behaviors.

About the transformation of interpersonal relationships, the transformation of individuals through digital practices and the manifestation of Nomophobia also alters interpersonal relationships.

Digital technologies can change the way we form relationships, with positive and negative effects, depending on how we use or abuse them.

Cooperation significantly reduces nomophobic levels, with a demonstrable relationship between nomophobia and personality [51].

Late childhood and adolescence are an especially vulnerable and at-risk period for the onset of behavioral addiction. The prevalence of behavioral addiction in adolescence is very high and some of its forms (mainly internet-related addictions) become more prominent with excessive time spent online [34].

Concerning well-being of individuals, young people's well-being, their social connectedness, and personality traits are at the center of concerns about impacts of digital life. A complex interplay of individual factors, types of engagement with digital media, and experiences in media contexts all inform outcomes related to well-being, social connectedness, empathy, and narcissism. Negative consequences must be investigated, and positive outcomes of digital media use must be capitalized on, especially given its increasing presence in people's lives [52].

In a survey of 660 Chinese high school students, Problematic Internet Use (PIU) was found to have a negative relationship with effortful control and a positive relationship with feelings of search and anger/frustration [53].

The sudden appearance and spread of Internet Addiction in the adolescent population, in association with the rapid escalation of Internet content being consumed and the broad availability of smartphones and tablets with internet access, poses a new challenge for classical addictology and demands urgent solutions. The rapid appearance and development of Internet Addiction in adolescents is associated with a rapid increase in the

spectrum of Internet contents, along with universal availability of mobile access to the Internet [54].

Neuropsychological and neuroimaging research on excessive and addictive Internet use is a rapidly growing scientific field that has revealed interesting results. Their scientific and clinical contribution helps understand the neurobiological basis of Internet addiction. Results converge towards an understanding that addictive Internet use is linked to functional brain changes involving parts of the prefrontal cortex, accompanied by changes in other cortical regions such as the temporal and subcortical regions, for example the ventral striatum. These results, together with others from neuropsychological studies, suggest that prefrontal control processes are reduced in individuals addicted to Internet use and may be related to patients' loss of control over this use [55].

The evolution of DD raises concerns over digital well-being related to the impact of these technologies on what it means for humans to live a good life in an information society [56].

Our individual and social well-being is now intimately connected with the state of our information environment and the digital technologies that mediate our interaction with it. This demands solutions for urgent ethical issues about impacts on our well-being [55].

An exploratory revolution focused on critical elements in recent literature shows an unequivocal trend toward excessive increases in time spent online at home, especially by children and young people. It puts their physical and psychosocial development, as well as their overall health, at risk in the short and long term [22].

Negative events in people's lives have shown a positive correlation with Internet Addiction (IA) and, although moderate, this correlation occurs in all geographic regions, genders, and levels of social development [57,58].

In the organizational environments, to minimize effects of stress at work, digital platforms and collaborative learning networks are being developed to manage stress at work. This is a positive application [59].

However, the improper use of digital devices in organizations can cause harm to employees' physical and mental well-being.

Collective environments begin to exhibit the symptoms of dependencies that compromise people's quality of life. The construction of a duly validated scale called "Scale to assess leader's perceptions about employees' digital addiction" (EPLDDE) has contributed to studies on organizational functions, especially quality of life [12].

On the world stage, unlimited Internet access by smartphones has influenced social, cultural and economic relations, making the world faster and more efficient. Health professionals must be concerned about caring for the majority of their patients' use of smartphones in the process. Inappropriate use of these devices at work may have severe impacts not only in the user's own life but also on a community's health. Is necessary to observe how these professionals' fit smartphones into their worktime [21].

People's "digital well-being" is the term used to refer to the impact of digital technologies on what it means to live a life that is good for a human being in various domains across three broad themes: positive computing, personalized human-computer interaction, and self-determination [56].

The digital well-being approach to these themes encompasses the workplace.

There are many studies showing high levels of Nomophobia in healthcare professionals who use their smartphones regularly during their clinical internship. This suggests a need for policies to restrict such use, to avoid compromising their performance and their own well-being [6].

Individuals with high Nomophobia scores respond with stress and behavioral disengagement when confronted. Knowing how subjects with Nomophobia react provides insights and a focus for preventive and interventional measures in the population [9].

Limitations

The novelty of the subject, which seeks to show impacts on human behavior of digital technologies used without awareness, is one of this study's limitations, but it must be unveiled for the betterment of human behavior and of the social, physical, and mental implications for digital technology users, individually and collectively.

In a world undergoing more and more digital transformation, the uninformed use of these technologies can be harmful to people. The enormity of the task of minimizing such effects can be a limitation when it comes to arousing interest in general.

Because it is a relatively new subject, collective Digital Dependence is emerging as an issue demanding further discussed.

Conclusions

Our results show a geographical evolution of Digital Dependence, evolving significantly from 3 countries (2009-2016) to 17 countries (2017-2019) with consistent results, with an increase of about 20 times more articles between the two periods, a substantial increase of 7 new scales and 13 validations of NMP-Q in several countries (Table 3). New sample profiles and analyses of differences between men and women drew attention to the need to assess this difference in nomophobic behaviors between the two sexes. The study demonstrates that Digital Dependence is present in the collective settings of organizations. All the articles reviewed here report impacts of Nomophobia on professional and social activities, as well as significant relationships with primary psychological disorders that redesign interpersonal relationships. These results confirm the achievement of our research objectives.

Digital Dependence in the collective environments of organizations, on the other hand, requires further research to identify digital dependence scenarios and create mechanisms that can improve the use of digital technology in organizations.

Author Participation

Gonçalves prepared the literature review and wrote the article; Nardi supervised and guided the preparation of the text; King supervised the literature review and the final form of the text. All authors contributed and approved the final version.

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Conflict of Interest

All of the authors declare that they have no conflicts of interest.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Data Availability Statement (DAS)

These is a literature review. The authors confirm that the data supporting the findings of this study are available within the article in every table (4) and Figure (1) into the article.

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