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Digital Well-Being as a New Kind of Adaptation to the New Millennium Needs: A State-of-the-Art Analysis

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Abstract

Since technology has been entering into human beings' everyday life, individuals established a deep relationship with digital technology, thus an embodied link between people and digital instruments has been born. This is particularly evidenced by recent literature about screen time (duration of time spent by the individual in using electronic/digital media like television, smartphone, tablet or computer), it significantly influences different human beings' dimensions: physical, psychological and neurological functions. Impact of digital technology on human beings can be considered as a result of syntonic functioning in order to improve different people's life areas (e.g., work, social or intimate relationship, learning), while the dystonic relationship is evidenced as a result of human addiction to digital technology. The present study aims to provide a cognitive and social psychology perspective on how screen time is changing our existences, defining digital technology as a gift which people should be aware of in terms of positive but even negative consequences in everyday life.

Keywords: adaptation; cognitive function; digital technology; digital well-being; embodiment; functioning; touch screen; well-being.

1. Introduction

The advent of digital technology has revolutionized communication, education, healthcare, entertainment, and various other facets of modern

life. Digital devices have made the world more accessible, allowing us to connect with people globally, access a wealth of information instantaneously, and perform tasks with unprecedented efficiency. Moreover, they have played a pivotal role in addressing societal challenges, such as bridging geographical distances and enabling remote work and education. Digital technology represents the new frontier of human beings and the contribution given by smartphone use in people's ordinary life is a matter of fact (Dienlin & Johannes, 2022). People in world which are actually own a smartphone are about 7.33 billion (Statista, 2023) and confronting this approximal number with the world population (8 billion more or less) [1] is possible to affirm that the entire planet possesses a digital device such a smartphone, tablet etc.

However, the excessive use of digital devices and the consequent increase in screen time have raised concerns about their impact on human well-being. Studies have suggested potential negative effects, including digital addiction (APA, 2022), disrupted sleep patterns (Parent *et al.*, 2016), decreased physical activity (Pérez-Farinós *et al.*, 2017), and adverse effects on mental health (Wood & Scott, 2016), especially among younger generations. Thus, it is imperative to strike a balance between harnessing the benefits of technology and mitigating its potential drawbacks.

Now the point is, technological digital devices have undoubtedly enriched our lives in numerous ways, offering a plethora of opportunities and conveniences, representing what can be defined as a proper gift. Nevertheless, critical consideration regarding screen time and its effects on human well-being remains a crucial need.

Is it possible to foster a mindful approach to screen time? In this way, technological digital devices would continue to serve as a valuable gift to humanity rather than a double-edged sword.

We also may ask: why is it necessary to consider digital device usage in terms of screen time? What are specific human beings' domains influenced by screen time? Understanding the real consequences and role assumed by digital devices in people's structural functioning, can it be useful to depict a mindful approach to screen time?

To point out these questions, terminological premises are required. Relevant discoveries in clinical neuroscience (O'Regan & Noë, 2001), philosophy (Putnam, 1982), clinical psychology (Riva *et al.*, 2016) and phenomenological psychiatry (Galimberti, 2006; De Preester, 2010), are underlining the role assumed by our body in interaction with the world (Arzy *et al.*, 2006) of things and objects. In this sense, embodiment theory

[1] https://www.census.gov/popclock/world

gets a fundamental assumption about the continuum established between the physical nature of human beings and his cognitive abilities to interact with the world (e.g., language) (Fodor, 1983b).

Fodor (1983b) can be considered one of the main authors in the field of embodiment theory. Jerry Fodor's book, *The modularity of mind* (1983b), presents an attempt to create a framework for a theory of the mind. Fodor acknowledges that such a theory must view the mind as a physical entity, rather than simply a collection of cognitive functions that cannot be understood as structural and tangible properties of the mind.

Fodor's *Modularity* (1983b) can be regarded as a taxonomy of mental processes. To overcome the inherent limitations of psychological research, it is most advantageous to conceptualize the cognitive components of the mind as modular. These cognitive modules connect to the various outputs of sensory transduction and conduct various computations on them. The outcome of these computations implies that sensory outputs are transformed into a format that the remainder of the mind can process, thereby enhancing the comprehensibility of this type of input. The natural progression of the current theory is associated with a particular approach to cognitive psychology known as Embodied Cognition. Lakoff and Johnson (1987; 1999) have demonstrated how our entire spectrum of physical and emotional experiences can form the foundation of our Embodied Cognition. Psychologists often assert that intricate cognitive processes like language and comprehension can be viewed as the outcomes of "interactions" among various reservoirs of cultural knowledge. They are in the process of developing a model that represents these interactive processes, utilizing formalisms such as production systems (Anderson, 1983) and parallel distributed processing schemes.

A new research approach has been developing in recent years, exemplified by Social Cognition (Salvatore *et al.*, 2018; Salvatore *et al.*, 2022). It is rooted in a theoretical model of the human mind based on human knowledge, which may be biologically organized as input systems (Scarr, 1985). The relationship between the body and technology is particularly evident in the works of Riva and colleagues (Parsons, Gaggioli, & Riva, 2017). According to neuroscience (Moseley *et al.*, 2012; Gallace *et al.*, 2014), the body matrix represents the self in relation to space and plays a crucial role in maintaining the integrity of the body, both at the homeostatic and psychological levels. It supervises the cognitive and physiological resources necessary to protect the body and the space around it. Research shows that the body matrix can be altered through the use of virtual reality technology (Riva *et al.*, 2016; Parsons, Gaggioli, & Riva, 2017), leading to the emergence of a new research field called Embodied Medicine.

After this premise, it is reasonable to think that human-machine relation is a point of interest in literature and in our contemporary world. To better clarify the focus, when discussing digital technology, this contribution specifically addresses the issue of portable digital devices. Aim of the present paper is to offer some thoughts and reflections, by the cognitive and social psychology perspective, on how screen time is changing our way to be in the world, underlining the fact that digital technology could be considered as a gift which people should be aware of in terms of positive but even negative consequences in everyday people functioning.

2. People functioning as a terminological fact

In Cognitive Psychology, one of the most important things to evaluate is about how people do work, how they get in touch with the world, and what is their functioning in their different living areas.

When psychologists use "function" as a term, it means any organism activity which is useful to preserve individual life and species conservation (Galimberti, 2010). Processes and behavior which are unfavorable are indicated as "dysfunction". Despite this general definition, the term "function" assumes a specific means in relation with the framework model which is considered for.

In fact, "function" can be considered as a mathematical term to define correspondence between two variables, but it can even be applied to Ego-Psychology in order to define the *autonomous function of Ego* (Hartmann, 1936). This kind of function can be better understood as simple and independent activity (e.g., to breath, to walk, to talk) which are emancipated by instinctive reflexes. These activities that can be considered a part of the *autonomous function of Ego* are even known as habits and capacity, primarily linked to biological-instinctual links, which tend to function autonomously (Allport, 1955).

This epistemological background must not be considered as an abstracted notion. In fact, recent psychiatrists and clinical psychologists, still refer to people functioning in order to define a mental disease.

A mental disorder (APA, 2022) is a syndrome characterized by a clinically significant alteration in an individual's cognition, emotion regulation, or behavior, reflecting a dysfunction in the psychological, biological, or developmental processes underlying mental functioning. Mental disorders are usually associated with a significant level of distress or disability in social, occupational or other important areas. This definition contains an element of tautology (a mental disorder is what is "clinically significant"),

a very difficult element to detect in the current state of knowledge (that there is a "dysfunction in the processes underlying mental functioning") and a common element in a variety of mental health problems (causing significant distress or disability).

In short, to summarize the concept of mental functioning, it is a theoretical structure characterized by different cognitive processes that allows people to interact with different life areas (e.g., occupational or other important areas).

Giving this brief overview of what functioning means from a cognitive perspective, it is possible to introduce other perspectives on people's functioning and well-being taking account of digital technology influence.

3. Embodied Cognition: a new way of considering people presence in world

Embodied Cognition (EC) is a research area that centers on cognitive science, incorporating bodily functions as a critical component of cognition (Shapiro, 2007). EC posits that our perception of reality is influenced by the interactions among our mind, body, and environment.

This relationship can be summed-up into self-other schemata, as an organizational meaning system at the highest level of abstraction (Salvatore *et al.*, 2023). These schemata, which help people to interpret world and so function and guarantee their presence in world, is based on the psychoanalytic view of the self as endowed with an inner world consisting of primitive and unconscious patterns of embodied meaning emerging from the generalization of the early relational experiences with caregivers (Klein, 1967; Bowlby, 1969; Stern, 1999) and shaping the experience of the object (i.e., the global class of what is other-from-the-self). This new concept contrasts with that of scientific literature that concerns reality shaped by our mind, because the mind manipulates the body through abstract symbols (e.g., modules) (Fodor, 1983a; Shapiro, 2007).

EC cannot be considered as a predictive theory but it gives to new technological devices (e.g., virtual reality – VR) researchers an opportunity to revisit a neglected concept about how people consider to be in presence in a physical context.

The literature provides evidence for two types of experimental support for EC: behavioral and neurological.

- Neurological evidence and findings are based on the assumption that objects and movements that activate the same neuronal systems are "linked" by the brain (Keysers & Gazzola, 2009). In this sense the cogni-

tive representation of the object is intrinsically linked to the way the subject uses its body to manipulate the object. They are not two separate symbols pieced together by the mind for action, but are bound together in the same schemata (Rizzolatti & Gentilicci, 1988).

- The behavioral examples are more straightforward and demonstrate a clear link between either sensory perception and cognitive perception or motor action and cognitive perception (Williams & Bargh, 2008). In an unrelated study, finding shows that sitting upright influences how people are feeling pride in an achievement. A second study found that contraction of the forehead muscles influenced subjects' perceptions of how hard they worked on a task (Stepper & Strack, 1993). There is also a demonstrated link between body movements and improved problem-solving performance (Thomas & Lleras, 2009).

Previous examples reveal the extent to which the body, mind, cognitive, and emotional states are all involved. In short, mental schemata of environmental objects via the way in which we manipulate them (Rizzolatti & Gentilucci, 1988) and encode our own bodily movements and perceive others' movements using the same set of neurons (Keysers & Gazzola, 2009). Behaviorally, our body positioning and use impacts our social observations (Williams & Bargh, 2008), feedback acceptance and task performance recall (Stepper & Strack, 1993), and improves performance on cognitive tasks (Thomas & Lleras, 2009).

Additionally, we now have a framework that can be used to guide psycho-physiological instrument-based research on presence in the world. For example, it may be possible to use functional near infrared spectroscopy (fNIRS) and electroencephalography (EEG) (Hirshfield *et al.*, 2009) to measure users' engagement, mental workload, and response inhibitions in virtual environments to see if the affordances are working as intended.

Psycho-social embodiment directly affects self-presence and social presence, and may serve as a moderating variable for physical presence. As has just been seen, the brain creates multiple multisensory simulations to predict: (a) upcoming sensory events both inside and outside the body, and (b) the best action to deal with the impending sensory events.

Moseley *et al.* (2012) suggested that simulations, such as avatar experience, are integrated with sensory data in the "body matrix" which is a superstructure multisensory representation of the body and physical space. Specifically, the contents of the body matrix are defined by top-down predictive signals, integrating the multisensory (e.g., motor and visceromotor) simulations of causes and perceived sensory events. The different simulations are then ranked and included in the body matrix according to their relevance for the intentions of the self (selective attention). At the same

time, the content and the priority of the different simulations are corrected by bottom-up prediction errors that signal mismatches between predicted and actual contents of sensory events (Riva, 2017).

Based on the ideas of Embodied Cognition, we argued that afforded embodiment is an appropriate framework for exploring avatar functionality and presence (Costa *et al.*, 2013).

4. A psychosocial perspective on the relation human-digital device

Social Exchange Theory (SET) is a foundational framework in Social Psychology (Worchel *et al.*, 1983) that deals with interpersonal interactions encompassing behavior, affection, products, and communication (Homans, 1961; Blau, 1968). SET conceptualizes interpersonal interactions somewhat akin to economic exchanges: individuals choose to participate in these exchanges only if their anticipated "rewards" from them outweigh their "costs" or, at the very least, meet their expectations and surpass alternative investments (Homans, 1961; Kelley & Thibaut, 1985). Consequently, SET regards interpersonal interaction as a rational process involving a series of cost-benefit analyses. This psychological perspective, rooted in the concept of reciprocity and cost-benefit analysis, posits that individuals engage in social interactions and relationships with the expectation of receiving rewards and minimizing costs. When applied to the realm of digital technology, it becomes evident that users often form relationships with their devices based on a similar set of principles. People invest time, attention, and personal data into their digital interactions with the expectation of receiving rewards such as information, entertainment, convenience, or social connection. However, there are also costs involved, including potential privacy concerns, time spent in front of screens, and the risk of addiction. By using the SET, researchers can explore how these cost-benefit calculations shape the ways in which individuals interact with and rely on digital devices, shedding light on the evolving dynamics of this pivotal human-technology relationship in the modern digital age.

An interesting kind of perspective on SET theory has been developed by Gefen and colleagues (1998). They interpreted SET as a framework theory for Technological Acceptance Model that suggests how the perceived usefulness (PU) of technological devices and the perceived ease of use (PEOU) of an information system (IS) are major determinants of its use (Gefen & Keil, 1998). This study implies that a constructive social

exchange may be a crucial factor affecting successful digital device implementation, and should, therefore, become an important extension of the Technological Acceptance Model (TAM). Moreover, the TAM overlooks the social exchange element of software development and how this social context influences users' perceptions.

Another important psychosocial paradigm that is worth mentioning in order to better contextualize the relationship between human beings and digital devices is the Use & Gratification Theory (U&G) (Cantril, 1942). During the 1950s and 1960s researchers operationalized many social and psychological variables which were assumed to be precursors of different patterns of gratification due to consumption (Wimmer & Dominick, 1994). At the light of new technologies industry mass production, there has been an alteration to exposure patterns of many media consumers (Finn, 1997). Many researchers have applied U&G Theory to a wide range of newly popularized media technologies (Ruggero, 2014). In a study made by Camilleri and colleagues (2021) finding shows that individuals' perceived usefulness and ease of use of online streaming services were significant antecedents of their intentions to use the mentioned technologies. Moreover, this study suggests that the research participants sought emotional gratifications from online streaming technologies, as they allowed them to distract themselves into a better mood and to relax in their leisure time. Evidently, they were using them to satisfy their needs for information and entertainment.

To conclude this psychosocial overview, it is essential to mention the Computer as Social Actors paradigm. This paradigm argues that people react mindlessly to media agents and, therefore, communicate with them similarly to how they would interact with another human. This implies that human users have a pre-existing mental model of how they would communicate with another human in a similar situation (Nass & Moon, 2000). These mental models for interacting with others are referred to as social scripts (Honeycutt & Bryan, 2011; Schank & Abelson, 2013).

At the light of presented evidence, it is possible to understand how digital technology is penetrating people's ordinary lives. However, thanks to social psychology, the theoretical framework is able to explain the reciprocity between human and digital devices. Digital technology is now identified as a gift made by the same human being's existence and it is actually changing the way people's presence in the world is considered.

5. Consequences of screen time

Kind of consequences linked to screen time can be summed up into 4 possible consequences which are physical, neurological, psychological and social adverse consequences. Here are some literature examples.

- *Social and psychological consequences* – The association between digital media and sleep duration and quality relates to infancy through adolescence (Parent *et al.*, 2016). Novel findings suggest an inverse association between sleep duration and subsequent screen time. A longitudinal study of 4-8-year-olds found that short sleep time can promote a following-day fatigue, thus leading to more screen viewing sedentary behavior. Depression represents a growing public health concern and is a prevalent disease among adolescents. Findings have linked overall screen time to depression and suicidal behavior among adolescents (Wood & Scott, 2019).
- *Physical consequences* – The relation between screen time and obesity can be explained by reduced sleep and physical inactivity and by exposure to advertising which negatively affects youth's dietary choices (Chahal *et al.*, 2013; Mihrshahi *et al.*, 2017). A survey among children aged 9-10 associated three hours screen time or more to obesity (Nightingale *et al.*, 2017). Among types of digital media, bedroom TV viewing was more associated with obese children and adolescents (Mihrshahi *et al.*, 2017; Pérez-Farinós *et al.*, 2017) and with forming a cardiometabolic risk (Staiano *et al.*, 2013). Higher levels of sympathetic arousal were found in young adults (Hsieh & Hsiao, 2019) and among school-aged children with Internet addictive behavior to smartphone use. Considerable computer screen viewing can lead to eye fatigue, blurred vision, eye dryness, headaches, and discomfort. Such symptoms can be a result of glare, poor lighting or improper viewing setting (Akinbinu & Mashalla, 2014).
- *Neurological consequences* – Li *et al.* (2019) found a relation between depressive symptoms and overall screen time among children in the age range of 5-18 who were using digital media for over two hours per day. Gaming related rewards were found to increase striatal dopamine release (Weiss *et al.*, 2011), resulting in an induced feeling of pleasure. As a result, the user is inclined to adopt a craving behavior aimed at experiencing repeating short-term pleasures (Christensen, 2017). Considering what has been mentioned above, it is now possible to define what wellbeing means for people who coexist with digital technology.

Well-being is a subcategory of mental health. Mental health is generally considered to consist of two parts: negative and positive mental health. Negative mental health includes subclinical negative mental health, such as

stress or negative affect, and psychopathology, such as depression or schizophrenia.

After explaining consequences of screen time on different dimensions of human beings it is possible to explain what implication digital technology has on well-being and if it is possible to consider the well-being taking account of digital device usage.

Positive mental health is a synonym for well-being; it comprises hedonic well-being and eudaimonic well-being. Whereas hedonic well-being is affective, focusing on emotions, pleasure, or need satisfaction, eudaimonic well-being is cognitive, addressing meaning, self-esteem, or fulfillment.

Tring to apply this definition to digital usage, it is possible to find that Google developed a new conceptual idea of what digital well-being means.

Digital Well-being© is a Google toolkit product created by many experts which recommends self-awareness and reflection as an essential step in creating a balance with technology (Google, 2023). Google Teams created Android's Digital Well-being tools to give people greater insight into how they use their smartphones thanks to different features such as flip to "Shhh", "Wind Down", and "App Timers" which aim to help people maintain focus, disconnect, and be more mindful of their whole family's tech habits (Google, 2023).

To conclude, in accordance with the objective of the present paper which aims to give reflections, by the cognitive and social psychology perspective, on how screen time is changing our way to be in the world, at the light of mentioned and analyzed literature in present work, the relation between human and technological devices is an indisputable fact at the point that this link must now be focused on embodiment framework theory. This embodied relation is particularly evident by the use of virtual reality (VR) technology which is able to modify people's sense of presence in space and time. VR related to the embodiment framework makes considerable questions on how technology is deeply changing people's way to interact with ourselves, others and, in general, the physical world. Digital technology has got in touch with human beings' adaptive functioning, giving people an opportunity to improve their everyday life. This opportunity must be considered as a gift, however, more research is needed to really understand the reciprocity established between human beings and digital technology.

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Riassunto

Da quando la tecnologia è entrata nella vita quotidiana degli esseri umani, gli individui hanno stabilito un rapporto profondo con la tecnologia digitale, è nato così un legame incarnato tra persone e strumenti digitali. Ciò è particolarmente evidenziato dalla recente letteratura sullo screen time (durata del tempo trascorso dall'individuo nell'utilizzo di media elettronici/digitali come televisori, smartphone, tablet o computer), che influenza in modo significativo diverse dimensioni dell'essere umano: funzioni fisiche, psicologiche e neurologiche. L'impatto della tecnologia digitale sugli esseri umani può essere considerato come il risultato di un funzionamento sintonico volto a migliorare diversi ambiti della vita delle persone (ad esempio, lavoro, relazioni sociali o intime, apprendimento), mentre la relazione distonica è evidenziata come risultato della dipendenza umana da tecnologia digitale. Il presente studio si propone di fornire una prospettiva di psicologia cognitiva e sociale su come il tempo trascorso davanti allo

schermo sta cambiando le nostre esistenze, definendo la tecnologia digitale come un dono di cui le persone dovrebbero essere consapevoli in termini di conseguenze positive ma anche negative nella vita di tutti i giorni.

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