

## Incidence of Smartphones in the development of brain plasticity in children from 0 to 6 years old, in a context of high vulnerability



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### ABSTRACT

The research project presents a complete update for a systematic review regarding the use of smartphones. The development of cerebral plasticity in children aged between 0 and 6 years. This review is composed of three complete categories of content: Intellectual, attitudinal, and behavioral, all definitions are made up of a certain number of Skills, which are expressed in the various systematic versions, including gray literature, which will provide the basis and theoretical foundations and practical ones that allow the deduction of new investigations.

**Keywords:** Smartphones, Brain plasticity, Development, Behavioral skills.

## 1 INTRODUCTION

The Research project presented below essentially aims at a systematic review regarding the use of Smartphones in the development of brain plasticity in children aged between 0 and 6 years.

This review will be made up of three major content categories: Intellectual, Attitudinal, and Behavioral, each of which is made up of a certain number of Skills, which will be expressed according to the different systematic reviews, including gray literature, which will provide a basis and theoretical and practical foundations that would allow the deduction of new research.

Once the literature review and different studies about the aforementioned have been exposed, objectify that the dependence and misuse of the Smartphone in children hurt brain neuroplasticity, which ultimately is the product of the foregoing. expressed in misconduct, low self-esteem, and low cognitive level as appropriate to their age and associated skills.

From the results of this quantitative and qualitative (mixed) analysis, we can classify the level of efficient performance of children according to their age.

As there are no meta-analysis studies that would allow us to reflect a more advanced search with a higher degree of evidence, the current one is limited to conducting a systematic review study.

This research process allows to facilitate and clarifies the myths of parents that the use of Smartphones in their children "makes them more intellectual".



Technological development progresses day by day, with a greater part of the population having access to these technological means, without measuring the consequences of the neuronal brake that occurs in children under 6 years of age in the use of Smartphone cell phones indiscriminately and Discriminately without perceiving the noxa in children, from a highly vulnerable socio-economic context.

## 2 PROBLEM FORMULATION

In recent years, the entry of these devices into the Chilean market has grown steadily, either at home or at school, generating notable changes in people's behavior, thus changing lifestyles or attitudes, for this reason. For this reason, it is important to understand and dimension the true effect that this technological movement has generated. Smartphones influence people's lifestyles by changing their pre-established habits, facilitating communication and information in an agile and practical way. In this way, a technological dependency has been created, transforming traditional channels into more diversified communication channels.

It has r to an investigation of mixed quantitative and qualitative help us to have clearer the influence on Smartphone users more real and truthful manner.

The misuse of Smartphones both at home and in kindergartens and the first educational level in Chile has helped to brake the brain plasticity of children from 0 to 6 years of age, a situation that occurs in highly vulnerable sectors.

The proposal presented in this research project is a formative evaluation that is aimed at improving the quality of education for young people in a vulnerable social context.

The arrival of smartphones in our daily lives has certainly changed our lives and has undoubtedly changed our neural development.

The brain is not a fixed and inert matter, but it is a true central unit of the human being. It is highly plastic, neural connections are developing every day, and brain stimulation triggers the creation of new neural circuits.

This stimulation allows the traditional learning process, and this has allowed human beings to adapt and evolve. Being powerful digital tools stimulators participate, like other elements, in the modification of our brain.

By 2018, estimates predict that a third of the world's population will have a smartphone. This represents at least 2.6 million users worldwide. And for many, the mobile phone has become an indispensable everyday object. To communicate, exchange with others, but also to follow the news or even have fun. On average, users spend at least 4.7 hours a day on their smartphones.



### 3 THEORETICAL FRAMEWORK

The World Health Organization (1982) defines the term neuroplasticity as the ability of cells of the nervous system to regenerate anatomically and functionally, after being subject to pathological environmental or developmental influences, including trauma and disease.

Other authors indicate that neuroplasticity is the potential of the nervous system to modify itself to form nerve connections in response to new information, sensory stimulation, development, dysfunction, or damage. In general, neuroplasticity is usually associated with learning that takes place in childhood, but its definitions go further and have a historical history. There are various biochemical and physiological components behind a neuroplasticity process and this leads to different chemical, genomic, and proteomic biomolecular reactions that require intra and extra-neuronal actions to generate a neuronal response.

The nervous system has extraordinary properties with dynamic modification capacity, a "never-finished product" resulting from the interaction between genetic and environmental factors. Neuroplasticity encompasses all the properties of the brain related to constant changes in its structure and is applied to a large number of phenomena such as neurogenesis in adults, the reorganization of cortical maps, or the synaptic changes associated with memory and habits. For a change to be a manifestation of functional plasticity, it must express an active process of adaptation to the requirements of the environment. In turn Active processes must involve changes in any of these mechanisms: number of synapses, efficacy of synapses, and intrinsic neuronal characteristics.

There are cellular and molecular mechanisms of neuroplasticity phenomena, which are organized around growth plasticity: axonal regeneration, collateralization, synaptogenesis, neurogenesis, and functional plasticity that indicates changes in the efficiency of synaptic transmission.

**Scientists from the University of Zurich (Switzerland) and Freiburg (Germany)**, in a study published in the journal *Current Biology* in December 2014, given the recent obsession with smartphones decided to explore the plasticity of the brain in everyday situations and analyze how the use of the fingers in the handling of cell phones with a touch screen molds it, producing greater brain activity.

Each region of the body has a specific area in the emotional center of the brain, where its information is processed, which is flexible and can change.

The researchers studied the activation of the sensory-motor cortex, which is activated by finger movement. To do this, they performed electroencephalograms that measured the activity of the cortical regions of the brain in 37 right-handed people, 26 of whom were users of touchscreen smartphones and 11 of cell phones with traditional keyboards.



Thanks to the electroencephalogram, they recorded the brain response when smartphone users touched the screen with their thumb, index, and middle fingers to be able to then compare it with that of people who continue to use old traditional keyboard mobiles.

The results suggest that repetitive movements on the surface of touch screens reorganize sensory processing of the hand, with daily updates of brain representations of the fingertips.

The scientists concluded that electrical activity in the brains of smartphone users was increased by touching the tips of the thumb, index, and middle fingers.

They also revealed that the use of touchscreens changes the way the thumbs and brain work together and that the amount of brain cortex activity associated with the thumb and forefinger was directly proportional to the amount of time the smart device. The sensory processing of the cortex in our brain is continually reshaped by personal digital technology. The use of smartphones is the ideal tool to study the daily plasticity of the human brain.

Below we present studies in which reference is made to the beginnings of neuroplasticity, which is associated with behavioral changes, and then detail studies that we have systematically reviewed, integrating some concepts such as neuroplasticity, and academic performance associated with the use of the Smartphone.

The first experimental evidence that neuroplasticity depends on the experience from the work of Rosenzweig and Bennet carried out in the years sixty. These authors observed rats raised in rich environments and found that they developed a thicker cerebral cortex, with more synaptic contacts and a greater number of both dendrites and dendritic spines.

Erismann and Ivo Kohler conducted an experiment in which they established the association between plasticity and behavioral changes. In subjects exposed to lenses that invert the visual fields (seeing everything backward), after days of effort and confusion, they manage to function relatively normally both for dressing, eating or walking, for skiing or riding a bike, and these behavioral changes are paired with transformations in the motor cortex and posterior parietal cortex

### **Checking phones in lectures can cost students half a grade in exams**

**Date: July 28, 2018**

*Source:* Taylor & Francis Group

**Checking conference phones can cost students half a grade on exams Date: July 28, 2018 Source: Taylor & Francis Group**

**background:** Students perform less on end-of-term exams if they are allowed access to an electronic device, such as a phone or tablet, for non-academic purposes at conferences, a new study.

**Objective:** Researchers at Rutgers University in the USA conducted an in-class experiment to assess whether dividing attention between electronic devices and the teacher during class affected students' performance on in-class tests and a test end of term.



**Methods:** 118 cognitive psychology students from Rutgers University participated in the experiment during a period of its course. Laptops, phones, and tablets were banned in half the classes and allowed in the other half. When the devices were allowed, students were asked to record whether they had been used for non-academic purposes during the conference.

**Conclusion:** The study found that having a device did not decrease the scores of the students in the comprehension tests within the master classes, but the lowest scores in the end-of-term exam were at least 5% or half grade. This finding shows for the first time that the primary effect of divided attention in the classroom is long-term retention with fewer goals from a later remembered study task. Furthermore, when they were allowed to use electronic devices in class, performance was also worse for students who did not use devices, as well as for those who did.

**Relationship among smartphone usage, addiction, academic performance and the moderating role of gender: A study of higher education students in India**

Author links open overlay panel [Jogendra Kumar Nayak](#) **Relationship between smartphone use, addiction, academic achievement and the moderating role of gender: a study of higher education students in India** Author links open the Jogendra overlay panel **Kumar Nayak**

**Background:** Smartphones have penetrated people's lives at a faster rate in recent times in India. They are used for various purposes in addition to speaking and sending messages such as live chat, searching for information, mobile banking and entertainment, etc. Smartphone discussions have taken over personal discussions and individual interactions between people. Usage has become so high that it has become an addiction in many cases.

**Objective:** In this study, smartphone addiction to student academic performance was measured and the effect of gender and relationship status on smartphone use and addiction was also verified. Smartphone usage was measured with the help of the amount of time spent on the phone and the monthly bill.

**Methods:** A questionnaire was developed and administered to 429 higher education students in India to verify addiction, the effect on performance, and the use of smartphones, along with the main uses of a smartphone and the demographic profile of the respondents.

**Conclusion:** The results show that the use is more in the case of women than male students. However, the effect on performance is severe for male students. In addition to behavioral changes, female students were found to have little effect on smartphone addiction, unlike male students who were found to neglect work, feel anxious, and lose control of themselves. However, the effect on performance is severe for male students.

**Cell phone addiction that hurts academic achievement is "an increasingly realistic possibility" Date: August 28, 2014, source: Baylor University**



**Background:** Female college students spend an average of 10 hours a day on their cell phones, while male college students spend nearly eight hours, according to a study of cell phone activity. "As cell phone functions increase, addictions to this seemingly indispensable piece of technology become an increasingly realistic possibility," the researchers noted.

**Objective:** The study notes that roughly 60 percent of college students admit they may be addicted to their cell phone, with some indicating they flail when out of sight, said Roberts, lead author of the article "The Invisible Addiction: Cellphone Activities and Addiction ". Between male and female college students."

**Methods:** The study, based on an online survey of 164 college students, examined 24 cell phone activities and found that the time spent on 11 of those activities differed significantly between the sexes. Some features, including Pinterest and Instagram, are significantly associated with mobile phone addiction.

**Conclusion:** Of the main activities, the respondents reported that they spent most of the time sending text messages (an average of 94.6 minutes a day), then sending emails (48.5 minutes), checking Facebook (38.6 minutes), browsing the Internet (34.4 minutes) and listening to your iPods (26.9 minutes).

Men send the same number of emails but spend less time on each one. "That may suggest that they are sending shorter, more utilitarian messages than their female counterparts," Roberts.

Women spend more time on their cell phones. While that finding is somewhat contrary to the traditional view that men are more committed to technology, "women may be more inclined to use cell phones for social reasons such as text messages or emails to build relationships and have conversations deeper. " Obsessive or excessive use of cell phones can also cause conflicts inside and outside the classroom: with teachers, employers, and families. And "some people use a cell phone to avoid an awkward situation. They can pretend to attend, text message, or check their phones," Roberts.

#### 4 CONCLUSIONS

The present study and systematic bibliographic review, in addition to gray literature texts, allow us to demonstrate and objectify that smartphone dependence and misuse in children negatively affect brain neuroplasticity, which ultimately is the product of This expressed in misconduct, low self-esteem, low cognitive level as appropriate to their age and associated skills.

As we also demonstrated in our review, we indicate that the excessive use of Smartphones closely influences the development of neuronal plasticity in children from 0 to 6 years of age, where according to neurodevelopmental anatomy-physiology studies indicate that it is the period where the greatest amount of modifications in the form of the brain turns and grooves occur, which ultimately translate into intellectual, attitudinal and behavioral forms.



The study also affirms that those who use smartphones are qualified as "intuitive thinkers", that is, they trust their instincts when making a decision. However, for scientists, people with higher intelligence are those who are more analytical and less intuitive. They consider that from the history of humanity, **people tend to avoid spending energy to solve a problem**, and "everything seems to indicate that it seems likely that people will increasingly use their smartphones."

Finally, the present study leaves open the possibility of mixed observational and/or experimental research.





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