

## Excessive Smartphone Use, Discontinuity of Self and Developmental Impact

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### ABSTRACT

The present article aims to understand excessive smartphone use (ESU) in the backdrop of continuity of self and possible impact in the process of cognitive and psychosocial development. Literature indicates that over use of smartphone has various physical and cognitive along with psycho-social effects which can cause acute or chronic difficulties throughout development. The cognitive impact of ESU can facilitate gap in experience of self-continuity and the changes in behavior, feelings and thought can be observed in an individual. The article shall explain the cognitive impact in detail and elaborate on developmental consequences as a result of discontinuity in self.

**Keywords:** *Self-Continuity, Self-Knowledge, Cognitive and Psycho-Social Development, Smartphone*

### Self in a space-time continuum

Russell (1956) in his work on modern physics indicated that the world consists of events not of material substances-that we perceive events, not substances, and that a material object is roughly 'all that happens in a certain track in space-time'. Events are 'entities of structures occupying a region of space-time which is small in all four dimensions' and 'bits of matter are portions of the structure to which we find it convenient to give separate attention'. Self, in this entity, is experienced as a spatially constrained entity and temporally extended continuum, and self-related operations can unfold across a wide range of hierarchically structured processing stages from basic perception to complex social cognition (Jianqiao Ge et al., 2023). Each event occupies a small part of space and their occupancy is both unique and exclusive. Experience of self can be called as continuous experience of series of event happening at space-time continuum in certain context, tied to the idea of existence. Our sense of self is apparently not stuck in the present, but can rather flexibly travel to the deep past and far future through abilities such as mental time travel. We often observe ourselves in episodic memories as our own doppelgangers, a feeling profoundly unlike our present selves experienced from a first-person perspective. All these complexities encourage us to develop unified concepts to encompass various spatiotemporal aspects of self (Zhou et al., 2014).

James (1890) introduced a distinction between two intertwined aspects of the self, the self as subject and the self as an object. The self as a subject or "I" is the psychological process that

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is responsible for self-awareness and self-knowledge; many writers have called this entity the "self-as-knower" to distinguish it from the "self-as-known." James contrasted the "self-as-knower" (the I-self) with the "self-as-known" (the Me-self). Many uses of "self" refer to perceptions, thoughts, and feelings about one self the various answers that a person might give to questions such as "Who am I?" and "What am I like?" Thus, when we speak of a "fragmented sense of self," we presumably mean that an individual's beliefs about him or herself do not form a coherent whole. The presenting Self varies depending on the people with whom one interacts, such as parents, romantic partner, child, friend, or employer, and depending on what role one assumes, such as child, parent, colleague or lover (Yager & Gitlin, 2005).

### ***Excessive Smartphone Use***

Excessive smartphone use (ESU) is proposed by some researchers to be a form of psychological or behavioral dependence on cell phones, closely related to other forms of digital media overuse such as social media addiction or internet addiction disorder (Panova et al., 218). The increase in smartphone uses parallels increasing concerns regarding the potential negative impact on a range of outcomes in areas such as mental health, performance at work or school and interpersonal relationships.

Neuro-anatomical associations of self-continuity related to smartphone has recently been documented. In particular, consideration of self-relevant versus other-relevant information elicits activation in medial prefrontal regions, extending from the medial prefrontal cortex (MPFC) to the rostral anterior cingulate cortex (rACC) (Kelley et al. 2002, Northoff et al. 2006). Information pertaining to the past, present, and future selves increase activation among various subregions within those medial prefrontal regions.

ESU results in neural deactivation in the dorsolateral prefrontal cortex (DLPFC) and dorsal anterior cingulate cortex (dACC) (Ji-Won Chun et al., 2017) along with reduction in Gray Matter Volume (GMV) of right lateral Orbito Frontal Cortex (OFC) (Lee et al., 2019).

### **Memory and sense of personal identity**

Memory is at the heart of the way most people think about personal identity. Philosophers like Hume acknowledges the force of memorial experience in giving the impression of identity across time. Hence, we find Hume saying, 'As memory alone acquaints us with the continuance and extent of this succession of perceptions, 'tis to be considered, upon that account chiefly, as the source of personal identity' (Hume 1739/2000, p. 168; Baxter 2008). Semantic memory contains propositions expressing facts about the self. Episodic memory records events as having been experienced at a particular point in space and time. (Tulving, 1983; Cermak 1984)

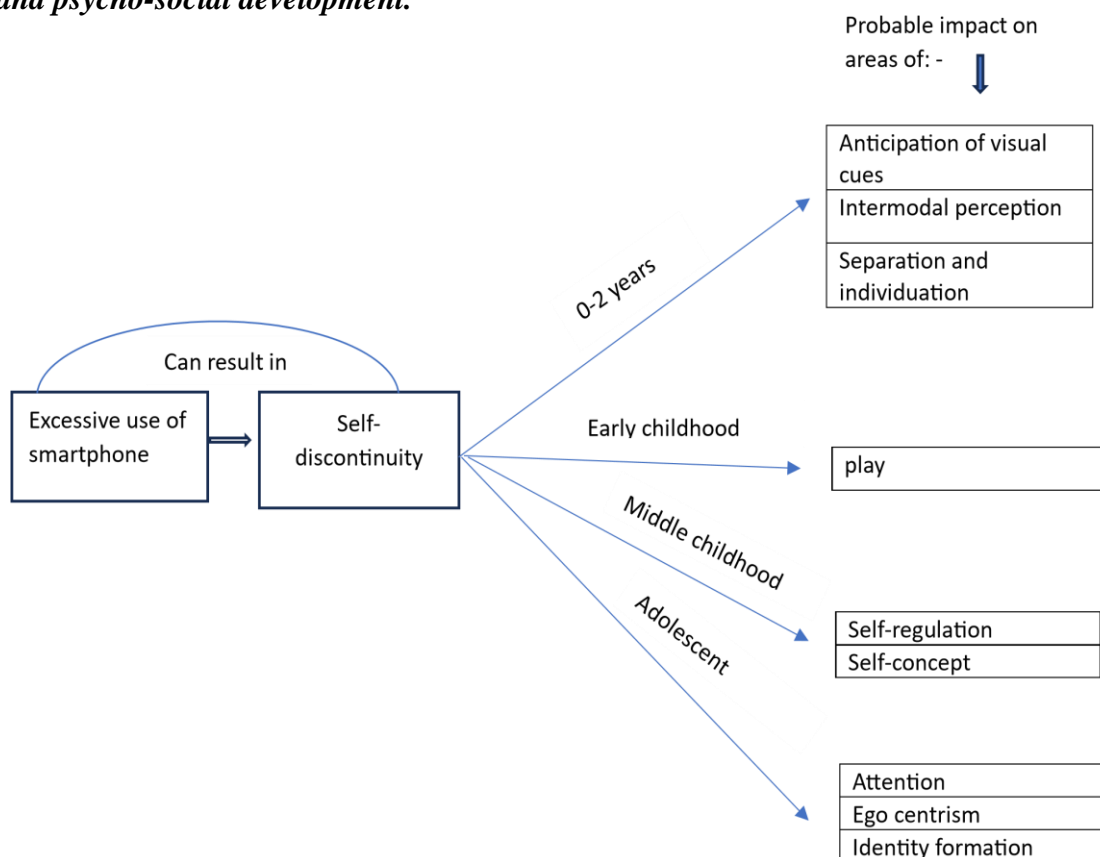
### **Excessive use of smartphones and cognitive impairment**

The use of smartphone has increased in last decade which has negative effect on human health (Kim et al., 2018) and children who are exposed to it exhibit decreased motor skills, working memory and attention and concentration (Deniz et al., 2017). It has also impact on memories of personally experienced events (Henkel, 2013). In keeping with the notion that humans are generally "cognitive misers" (Kahneman, 2011), some authors posited that the tendency to rely on simple heuristics and mental shortcuts extends to the habitual use of internet search engines as a substitute for deep cognitive analysis causing digital amnesia which refrain us from learning new skills (Kaspersky Lab, 2015).

**ESU and discontinuity in self**

As discussed above continuity of self is the continuous experience of series of event happening at space-time continuum in certain context, memory is at the heart of the personal identity which maintains sense of real self and continuity by allowing to access flexibly in past and future. We present below a theoretical understanding of impact of excessive smartphone use in early development due to self-discontinuity.

*Figure 1 showing the effect of excessive use of smartphone on different areas of cognitive and psycho-social development.*



**Birth to 36 months**

Early long-term exposure of smartphone to infants at symbiotic (2-6 months) phase may lead to difficulty in development of mentally charged mental image of the primary caregiver and later it may impact separation and individuation phase (6-24months) where infant begin to develop separate sense of self.

By one year of age infants anticipate the location that portrays numerical (Canfield & smith, 1996). Their anticipation suggests infants think about what they see (engages in cognition) rather than simply register what they see automatically (engages in perception). For e.g., scanning of interest visual pattern and contours infant may be forming rudimentary generalization: or rules, about what they see, such as where to look to see another friendly smile. At this point the exposure of smartphone to infant may learn to response on stimulus he is receiving through it rather than stimulus from outside real world. ESU exposure can also affect intermodal perception which is crucial for perceptual development as this variety of stimulation of the senses assists infants in selectively attending to and making sense of their world. These perceptual skills continue to grow through out infancy and exposure of long-term smart phone can cause difficulty in infant to selectively attend stimulus and

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develop perceptual skills and may also be one of factor for virtual autism in children (Morrill, T. B., 2009).

### ***Early Childhood 2-6 years***

Play has been considered an important aspect in social development of a child during early childhood. Mildred Parten (1932) have proposed different types of play emerges in a developmental sequences as unoccupied play, solitary play, onlooker play, parallel play, associative play and cooperative play. According to psychoanalytic theory, play allows a child to use fantasy to gain satisfaction for wishes and desire which are impossible for them to fulfill due to limitations in their abilities and life situations. High level of solitary play and unoccupied play during the preschool years have been found as a marker for social fear and shyness, and are associated with social incompetence and internalizing problems as reported by Ooi and colleagues in 2017. With ESU at current scenario smartphone might create a gap between the interaction of child between his/her real environment which may lead to developmental issues. Many altruistic and prosocial behavior emerge during early childhood when they interact with other children which can be affected due to spending much time in solitary activities such as spending time on mobile.

### ***Middle Childhood 6-12 years***

Piaget's idea about how children's cognitions develop have profoundly influenced the way children are educated, particularly during the primary school years (Elkind, 1994). Central to this influence is piaget's constructivist philosophy- the assumption that that children develop their own concepts through active engagement with the environment. During middle childhood, this involves children being presented with concrete situations where they actively experiment, manipulating objects and material and observing outcomes. Use of smartphone at this phase can impact the process of learning (Mendoza et al, 2018).

Middle childhood is a period when children are increasingly involved outside the home, and have a great capacity for independence and self-direction. From the beginning of school, they are exposed to many different people, particularly to children of the same age and at the same developmental level as themselves, who are known as peers. The peer group provides an outlet for expressions of individuality away from the watchful eyes of adults. So, children's behavior with their peers might be quite different from their behavior in class or at home with their parents and siblings. One of the most important psychosocial tasks during this period of development is self-regulation of behavior. peers are not forgiving or as tolerant as family members, so in order to gain acceptance from their peer group, children must learn to control the strong emotions and impulses that typify early childhood, such as aggression, crying and a lack of tolerance.

In learning self-regulation, children also begin to form a better idea of themselves and who they are, separate from their parents and other family members. They also develop an understanding of their own values. Hence, middle childhood is an important time for the development of self-concept, a sense of self that is separate from others. Excessive smartphone can impact on development of self-concept. Ha et al., (2008) have reported negative association between ESU and self-esteem.

### ***Adolescent 12-18 years***

Lee et al.,2015 has reported that there is significant impact of smartphone use on sustained attention. Similarly, it may also cause digital amnesia that is relying less on the mind, builds fewer neuron connections in the brain, stagnating development (Kaspersky Lab, 2015)

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Elkind (1978) labelled teenage self-absorption as adolescent egocentrism. Adolescent may believe that they are destined for fame and fortune by virtue of what they consider to be unparalleled combination of personal charm and talent. Excessive use of smartphone can exacerbate the unrealistic ambitions and to inevitable failures that may plunge adolescents into depths of despair and can delay the identity formation. As well, when combined with sensation-seeking, the personal fable may give rise to belief of invincibility and, thus, risk-taking behaviors, such as unprotected sex, experimentation with drugs and dangerous driving (Greene et al., 2000).

Adolescent is marked by critical phase of identity development with questions like ‘who am I’, ‘where do I belong to?’ this then sets the direction for future personal growth and self-development, which is a requirement for future relationship. Everchanging personal perspectives and social demands simultaneously involving alternative roles can pose difficulty in identity formation. ESU can become one of the reasons for the delay in identity development as there are lots of information available on internet that can lead to confusion in adolescent. Smartphone use can also be responsible for discontinuity in self as it may not allow adolescent’s mind to travel in past memories related to self, due to which there is no crisis and no commitment leading to diffused identity (Morrill, 2009).

### SUMMARY/CONCLUSION

Self as a subject is called as the psychological process that is responsible for self-awareness and self-knowledge. Each moment of time we are aware of who we are and we can freely access our past and future, being connected to our real environment and with others, with the help of our cognitive processes. Memory is the seat of self-related information. The ESU has been found to have impact on our cognitive functions affecting experience of self-continuity and resulting as changes in behavior, feelings and thought in an individual. ESU can have adverse impact on the critical cognitive and psychosocial development phases as discussed above. Limiting the exposure of Smartphone and enhancing the connection with his/her real environment is needed to prevent various physiological and mental health issues in children and adolescents.

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