**fNIRS study on emotional recognition task in individuals with addiction to short-form videos**

**Abstract**

Short-form video addiction has negative consequences on users’ mental health, such as emotion regulation. However the question whether people with addiction to short-form video recognize differently specific emotion remains unclear.

The Emotional Recognition Task is a computer-generated paradigm for assessing information processing bias between positive and negative facial expressions. In our study, we will focus on investigating the differences in recognition performance between people with addiction to short-form videos and non-addicted group using fNIRS. In the task, emotional facial expressions are gradually morphed between two emotions in four levels of intensity (40%, 60%, 80%, and 100%). A total of 10 Chinese university students aged from 18-25 will participate in our study.

**Background**

Short-form video apps enable users to capture memorable moments and create short-form videos that last from a few seconds to a few minutes. With the popularity of short-form video applications, the public starts to concern about the risk of excessive use. The excessive use of short-form video apps can be considered a state in which people spend substantial time using these apps despite experiencing negative consequences.

Internet addiction can be described as “a disorder in which an individual’s inability to control his or her use of the Internet causes marked distress and/or functional impairment and that furthermore creates psychological, social, school and/or work difficulties”. Short-form video app addiction is a subcategory of Internet addiction.

Studies have affirmed that addiction may have negative consequences on users’ well-being, such as mental health problems, attention difficulties, and poor interpersonal quality. However, the effects on emotion of addiction to the short-form video app has yet to be investigated.

The emotional recognition Go/NoGo task is a good method of studying the influence of the short-form videos on emotional processing of people.The Emotional Recognition Go/ NoGo task is a modified version of the Probability Go/NoGo task(Hare et al., 2005). It is a cognitive task designed to assess information processing bias between different facial expressions. In this task, participants must respond to a particular emotional facial expression (neutral, sad, happy and so on) (Go trials) and not respond (NoGo trials) to another emotional facial expression.Reaction times(RT) will be recorded for further calculations to get emotional bias scores.

The emotional Go/No-Go task involves activation in several brain regions. Also for each condition of the emotional recognition Go/NoGo task, their activities will be different.

**Brain activations are primarily in frontal, temporal, and occipital brain regions, in addition to limbic and motor areas(Brown et al,2016).**

**The amygdala and cingulate cortex, motor cortex, cerebellum, inferior frontal gyrus, right caudate nucleus and ventral striatum(Hare et al.,2005).**

All conditions activated left primary sensory and motor cortices, and inferior parietal cortex, particularly in the left hemisphere. In addition, the three no-go conditions selectively recruited premotor cortex, ACC, DLPFC, and basal ganglia. Regions activated by both nonemotional and emotional inhibition were DLPFC, premotor cortex, ACC, Broca’s area, dorsal striatum, and thalamus.Specific for the emotion task, activation was observed in left inferior PPC, and the posterior inferior frontal and anterior insular cortices.During the go conditions, responding to sad faces recruited left subgenual cingulate cortex when compared with responding to happy faces. During the nogo conditions, inhibiting for sad faces, but not happy faces, preferentially activated a region of pregenual ACC that was more dorsal than that observed for the go condition(Shafritz et al.,2006).

PCG, ACG, anterior SMG, posterior SMG, anterior MTG, posterior MTG,SFG, FP are related to emotional face expression recognition(Arato et al.,2023).

Internet addiction has been found to be related to deficits in emotional recognition, as indicated by many studies. Individuals with problematic internet use (PIU) and excessive smartphone use (ESU) show impairments in recognizing emotional face expressions (EFE)(Arato et al.,2023). Specific internet addiction, such as addiction to games and social networks, has been found to be associated with impaired inhibitory control and social anxiety, which may affect emotion recognition(Dieter et al.,2017). Additionally, internet-addicted urban left-behind children have been found to have differences in facial expression recognition, with a processing mode characterized by earlier gaze acceleration and uniform extraction of information in pictures (Ge et al.,2017). Also, they showed a preference for negative emotions in facial expression recognition (Ge et al.,2014).Though several research have been done on Internet addiction, there haven’t been researches on the influence of short-form videos on emotion recognition with the popularity of short-form videos these years.

**Idea**

The study aims to investigate whether people with addiction to short-form video differ from non-addicted individuals in terms of emotion recognition and how people with short-form video addiction differ from non-addicted individuals in terms of emotion recognition.

**Experimental design**

QUEATIONAIRE

The Mobile Phone Addiction Index (MPAI) ([Huang et al., 2014](https://www.frontiersin.org/articles/10.3389/fpsyg.2022.894121/full#B18)) is a widely used instrument to measure mobile phone addiction. In view of the short video addiction as a part of Internet addiction, the short video addiction scale for college students is compiled based on MPAI.

This scale contains 17 items and 4 subscales: Inability to Control Craving, Anxiety and Feeling Lost, Withdrawal and Escape, and Productivity Loss. Each item of the MPAI was rated on a 5-point Likert scale (with 1 = not at all and 5 = always). A higher MPAI score reflects greater levels of addiction. ([Huang et al., 2014](https://www.frontiersin.org/articles/10.3389/fpsyg.2022.894121/full#B18)).

In this experimental design, we will investigate attention allocation and emotion regulation abilities in participants under different emotional conditions. We will have a total of 10 participants, consisting of 5 individuals with short video addiction and 5 non-addicted individuals.

Participants will be informed about the target emotions, which include happiness, sadness, and neutrality. They will be instructed to press a button only when the target emotion is present. The task will consist of six blocks, each presenting a series of facial expressions:

Positive target (press button when seeing happy faces) / Negative distraction (do not press button when seeing sad faces)

Positive target / Neutral distraction

Neutral target / Positive distraction

Neutral target / Negative distraction

Negative target / Positive distraction

Negative target / Neutral distraction.

We will use the updated Chinese Facial Affective Picture System with a total of 60 images for each neutral, positive, and negative facial expression. The experimental procedure will progress as follows:

Presentation of a plus sign interface for 1 second.

Presentation of facial expressions.

Participant presses the button.

Record and calculate the reaction time (RT) for all "hits" in each of the six conditions.

Emotion bias scores will be calculated by subtracting the RT in the sad target/happy interference condition from the RT in the happy target/sad interference condition. We will also use functional near-infrared spectroscopy (fNIRS) to record participants' brain responses.

This experimental design aims to explore how participants with short video addiction differ from non-addicted individuals in terms of attention allocation and emotion regulation. By examining their behavioral responses and neural activation patterns, we hope to gain a better understanding of the impact of addiction on emotional processing and cognitive control.While conducting the Emotional Recognition Go/NoGo task, cerebral hemodynamic changes in the subjects will be measured using an fNIRS device.For each condition above, the functional connectivity will be calculated from the raw fNIRS data. And the difference of emotional bias scores and functional connectivity in each condition between short-form-video-addicted subjects and non-addicted subjects will be calculated to show the influence of short-form videos on emotion recognition.

**Potential implications**

The study will contribute to understanding the effect of addiction to short-form videos on emotional processing. It provides insights into the underlying mechanisms of emotional processing. It helps us understand how emotions are regulated and processed in individuals with addiction to short-form videos.

Researchers can develop targeted interventions that aim to regulate emotions and to improve social interactions. It helps us decode nonverbal cues, such as facial expressions, leading to better communication and empathetic understanding between individuals. Overall, the research has significant implications for public mental health.

**Reference**

Akos, Arato., Szilvia, Anett, Nagy., Gábor, Perlaki., Gergely, Orsi., Anna, Szente., Gréta, Kis-Jakab., Eszter, Áfra., Husamalddin, Ali, Mohhamad, Alhour., Norbert, Kovács., József, Janszky., Gergely, Darnai. (2023). Emotional face expression recognition in problematic Internet use and excessive smartphone use: task-based fMRI study. Dental science reports, doi: 10.1038/s41598-022-27172-0

Brown, B. K., Murrell, J., Karne, H., & Anand, A. (2017). The effects of DAT1 genotype on fMRI activation in an emotional go/no-go task. *Brain imaging and behavior*, *11*(1), 185–193. <https://doi.org/10.1007/s11682-016-9516-7>

Hare, T. A., Tottenham, N., Davidson, M. C., Glover, G. H., & Casey, B. J. (2005). Contributions of amygdala and striatal activity in emotion regulation. *Biological psychiatry*, *57*(6), 624–632. <https://doi.org/10.1016/j.biopsych.2004.12.038>

Huang H., Niu L., Zhou C., Wu H. (2014). Reliability and validity of mobile phone addiction index for Chinese college students. Chin. J. Clin. Psychol. 22 835–838. 10.16128/j.cnki.1005-3611.2014.05.062

Julia, Dieter., Sabine, Hoffmann., Daniela, Mier., Iris, Reinhard., Martin, Beutel., Sabine, Vollstädt-Klein., Falk, Kiefer., Karl, Mann., Tagrid, Leménager. (2017). The role of emotional inhibitory control in specific internet addiction - an fMRI study.. Behavioural Brain Research, doi: 10.1016/J.BBR.2017.01.046

Pınar, Ünal-Aydın., Kuzeymen, Balıkçı., İpek, Sönmez., Orkun, Aydın. (2020). Associations between emotion recognition and social networking site addiction.. Psychiatry Research-neuroimaging, doi: 10.1016/J.PSYCHRES.2019.112673

Shafritz, K. M., Collins, S. H., & Blumberg, H. P. (2006). The interaction of emotional and cognitive neural systems in emotionally guided response inhibition. *NeuroImage*, *31*(1), 468–475. <https://doi.org/10.1016/j.neuroimage.2005.11.053>

Ying, Ge., Xiaofang, Zhong., Wenbo, Luo. (2017). Recognition of Facial Expressions by Urban Internet-Addicted Left-Behind Children in China.. Psychological Reports, doi: 10.1177/0033294117697083

Ying, Ge., Jinfu, Zhang., Yuanyan, Hu. (2014). Study of Implicit Preferences in Facial Expression Recognition of Urban Internet-Addicted Left-Behind Children in China. Journal of Health Education Research & Development, doi: 10.4172/2332-0893.1000117