

# Pengembangan Kuesioner Diagnostik Adiksi Internet bagi Remaja: Studi Konektivitas Fungsional Otak melalui fMRI BOLD, Prevalensi, Penelusuran faktor Risiko dan Proteksi = Development of Kuesioner Diagnostik Adiksi Internet for Adolescents: Brain Functional Connectivity through fMRI BOLD, Study of Prevalence, Risk Factors, and Protective Factors

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## Abstrak

Adiksi Internet (AI) merupakan masalah kesehatan jiwa yang sering terjadi pada remaja yang dapat menimbulkan konsekuensi negatif berupa dampak fisik, psikologi, dan sosial. Diagnosis dan tata laksana yang tepat diperlukan untuk intervensi segera tetapi kuesioner skrining AI bagi remaja di Indonesia sampai saat ini belum ada. Tujuan penelitian ini adalah mengembangkan kuesioner AI (KDAI) yang andal dan sah bagi remaja Indonesia, memperoleh gambaran konektivitas fungsional otak pada remaja dengan AI, mendapatkan prevalensi AI, faktor risiko dan proteksi. Domain dan butir pernyataan KDAI dikembangkan dari kepustakaan, *focus group discussion* (FGD) remaja, dan *level of agreement* para pakar melalui teknik Delphi. Uji reliabilitas dan validitas KDAI mengikutsertakan 643 subjek yang dipilih secara acak dari 4 SMP dan 5 SMA di Jakarta. Data diambil pada bulan Juli 2018–Juli 2019. Uji validitas konstruk KDAI menggunakan *exploratory analysis factor* (EFA) dan *confirmatory analysis factor* (CFA). Penentuan titik potong KDAI melalui metode *receiver operating characteristics* (ROC) yang dibandingkan dengan *internet addiction test* (IAT) versi Indonesia. Pemeriksaan *rs-fMRI BOLD* dilakukan pada 60 subjek untuk mendapatkan validitas prediktif KDAI dan gambaran konektivitas fungsional otak pada remaja dengan AI dan tidak AI. Faktor risiko dan proteksi AI dianalisis dengan uji regresi logistik multivariat. Kuesioner diagnostik adiksi internet terdiri atas 7 domain dan 44 butir pernyataan dengan validitas isi dan konstruk yang baik. Nilai reliabilitas KDAI 0,942 dengan nilai titik potong 108 (sensitivitas 91,8% dan spesifisitas 77,8%). Terdapat korelasi positif antara skor KDAI dengan konektivitas fungsional *lateral prefrontal cortex* kiri dan *lateral parietal* kanan pada kelompok adiksi ( $p = 0,018$ ;  $r = 0,437$ ). Korelasi negatif juga didapatkan antara skor KDAI dengan konektivitas fungsional *lateral prefrontal cortex* kiri dan *lateral parietal* kanan pada kelompok adiksi ( $p = 0,049$ ;  $r = -0,375$ ). Diperoleh prevalensi AI 31,4% dengan faktor risiko berupa durasi penggunaan internet > 20 jam / minggu ( $p < 0,001$ ; *OR* = 2,889) dan masalah perilaku ( $p < 0,001$ ; *OR* = 2,539). Faktor risiko lainnya adalah tujuan penggunaan internet untuk media sosial dan permainan daring ( $p = 0,005$ ; *OR* = 1,826), masalah emosi ( $p = 0,001$ ; *OR* = 1,918), usia awitan penggunaan internet 8 tahun ( $p = 0,008$ ; *OR* = 1,821), dan masalah perilaku prososial ( $p = 0,008$ ; *OR* = 1,758). Faktor proteksi AI adalah pola asuh *non-exposure* ( $p = 0,012$ ; *OR* = 0,518). Reliabilitas dan validitas KDAI baik untuk digunakan sebagai alat skrining AI pada remaja di Indonesia. Skor KDAI dapat menggambarkan perbedaan konektivitas fungsional otak pada remaja AI dan tidak AI. Durasi penggunaan internet dan masalah perilaku menjadi faktor risiko utama, sedangkan pola asuh *non-exposure*

menjadi faktor proteksi AI. Pencegahan AI dapat dilakukan dengan deteksi dini dan intervensi faktor risiko serta proteksi.

**Kata kunci:** adiksi internet, KDAI, remaja, konektivitas fungsional, faktor risiko

Internet addiction (IA) is a common mental health problem in adolescents alongside the rapid rise of digital technology that results in negative physical, psychological, and social consequences. IA screening in adolescence is required to provide accurate diagnosis and treatment, however, to date an IA screening questionnaire for Indonesian adolescents does not exist. The purpose of this study is to develop a valid and reliable IA questionnaire for Indonesian adolescents titled *Kuesioner Diagnosis Adiksi Internet – KDAI*, evaluate brain functional connectivity in adolescents with IA, and find the prevalence of IA along with its risk and protective factors. The domains and items in KDAI were developed from literatures, adolescent focus group discussions (FGD), and level of agreements of experts through the Delphi technique. The reliability and validity testing of KDAI involved randomly selected adolescents from 9 schools (4 junior high schools and 5 high schools) in Jakarta. Data collection was done from July 2018–July 2019. Exploratory analysis factor (EFA) and confirmatory analysis factor (CFA) was performed to find the construct validity. The cut-off for KDAI was determined through the receiver operating characteristic (ROC) method using the Indonesian version of the internet addiction test (IAT) as a comparison. Rs-fMRI examinations were performed on 60 subjects to attain predictive validity of KDAI and evaluate brain functional connectivity in adolescents with internet addiction. The risk and protective factors of IA were assessed using a multivariate logistic regression test. The KDAI is comprised of 7 domains and 44 statement items with good content and construct validity. The reliability score of KDAI is 0.942. The cut-off for KDAI is 108 (sensitivity 91.8 and % specificity 77.8%). A positive correlation was found in non-addiction group ( $p = 0.018$ ;  $r = 0.437$ ). In contrast, a negative correlation between KDAI score with the functional connectivity of the left LPFC and right LP in the addiction group ( $p = 0.049$ ;  $r = -0.375$ ) was found. The prevalence of IA among adolescents in Jakarta is 31.4%. Risk factors associated with IA include duration of internet use  $> 20$  hours/week ( $p < 0.001$ ; *OR* = 2.889), conduct disorders ( $p < 0.001$ ; *OR* = 2.539), purpose of internet use for social media and playing online games ( $p = 0.005$ ; *OR* = 1.826), emotional problems ( $p = 0.001$ ; *OR* = 1.918), onset of internet use 8 years old ( $p = 0.008$ ; *OR* = 1.821), and prosocial problems ( $p = 0.008$ ; *OR* = 1.758). The protective factor of IA was found to be a non-exposure parenting style ( $p = 0.012$ ; *OR* = 0.518). The good reliability and validity properties of KDAI functions it as an IA screening tool for adolescents in Indonesia. KDAI scores were able to portray changes in brain functional connectivity in the IA group. The duration of internet use and conduct disorders are the main risk factors for IA and a non-exposure parenting style is a protective factor. Prevention programs for IA can be implemented by focusing on early detection and providing intervention to risk and protective factors.

**Keywords:** Internet addiction, KDAI, adolescents, functional connectivity