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Original Article

Comparison Digital Internet Addiction Test Bahasa Version and Manual Internet Addiction Test Bahasa Version in Adolescent

Putu Belly Sutrisna[1*], Luh Nyoman Alit Aryani[2], Gede Artawan[3]

[1]Psychiatric Departement of Wangaya Hospital/Udayana University, Denpasar, Bali, Indonesia
[2]Addiction Psychiatric Division of Prof IGNG Ngoerah Hospital/ Udayana University, Denpasar, Bali, Indonesia
[3]Public Health Medical Faculty, Udayana University, Denpasar, Bali, Indonesia

(Correspondence author's email, bellysutrisna@unud.ac.id)

ABSTRACT

Internet Addiction Test (IAT) is the most common internet addiction questionnaire that is used for internet addiction screening. In the digital era and impact of the COVID-19 pandemic that suggests contactless to prevent widespread infection, we tried to develop the Digital Internet Addiction Test in Bahasa version (E-IAT Ina) to measure internet addiction with contactless and real-time usage. Still, it is needed to evaluate the effectiveness of the usual questionnaire using the manual Internet Addiction test in Bahasa version (M IAT). This study aimed to compare the effectiveness of E-IAT Ina with manual IAT Ina (M-IAT Ina). E-IAT Ina was developed with expert systems forward chaining method web-based applicaton which built using HTML, Laravel and Flowbite framework. This is a cross-sectional study, conducted by 93 students ranging from 12-20 years old. Totally 22 participants from junior high school, 32 participants from senior high school, and 39 participants from college students in Denpasar city were collected by Google form using purposive sampling. Each participant fills out M-IAT Ina and E-IAT Ina directly. The effectiveness of the tools for the score test was analyzed with a Paired t-test and the level of internet addiction was analyzed with the Wilcoxon test using SPSS 25 software. There was no significant difference between E-IAT Ina and M-IAT in all stages of adolescence, where adolescents 12-14 years (p=0,101), 15-17 years (p=0,184), and 18-20 years (p=0,142) by scoring. There was also no significant difference in the level of addiction (p= 0.013, p>0.000). Digital Internet Addiction Test in Bahasa version application (E-IAT Ina) could be used to measure internet addiction in adolescents with the same effectiveness as manual Internet Addiction Test Bahasa version (M-IAT Ina) with contactless and real-time usage to prevent the widespread COVID-19 infection in digital mental health care.

Keywords: *Internet Addiction Test, Digital Mental Health Care, Adolescent*

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INTRODUCTION

Internet use in the world is around 3.3 billion or 46,4% of the population with Internet addiction prevalence was 26.5% before the pandemic of COVID 19 [1] and during the pandemic, there was 36.7% [2], an increase of 38,5% in general due to research in China. General Internet Addiction (GIA) is the inability to control internet use despite the negative effects such as negative emotions, negative well-being outcomes, social relationships, and school performances with withdrawal symptoms. This condition decreases important activities in daily life [3]. The other side effects also could come such as cyber-bullying, self-harm, and suicide ideas [1,4–6] and a lot of psychiatric disorders [5]. The key points defined internet addiction as

problematic, compulsive use of the internet and impaired function in various domains such as work, private life, and social function over a prolonged period, and many individuals are not aware of these conditions [7,8]. The effects of these conditions are neurological complications, psychological disturbances, and social problems [5,8].

In Asia, the overall prevalence of general internet addiction (GIA) is rising significantly and has a big variation of up to 84% in South Korea. The prevalence was changed every day and general rates between 1.5 and 8.2% in Europe and the USA [1,8]. The majority of GIA are adolescents and increases in adults [1,4,9,10]. Internet usage is a part of a coping style to reduce stress during the COVID-19 pandemic but over-usage has been crucial in becoming a pathologized GIA [11,12]. Internet Addiction Test (IAT) is one of the questionnaires to screen GIA such as a user's preoccupation with internet use, ability to control internet use, extent or lying about internet use, and continued internet use despite negative consequences[13]. The IAT is a worldwide accepted and validated such as in France, Germany, Norway, Finland, Italy, Greece, Iran, Pakistan, China, Korea, and Indonesia[13,14]. This makes the IAT become first psychometric usage to asses internet addiction globally [13].

Artificial intelligence (AI) has had a part of significant impact on the healthcare sector during the technologies era. E-health refers to digital or connected health use of information communication technologies (ICTs) in various healthcare activities, patients' populations, healthcare providers, and medical systems [15]. E-health is an application aimed at diagnosing, prevention, and treatment that provides more real-time solutions in modern medicine, real-time personalized interaction between client and physician, resource management, and target treatment strategies which could be applied at multiple levels from prevention, diagnoses, monitoring, and medical research [15].

Expert systems are one of the AI implementations that utilize human expertise to solve problems stored in the computer database. These systems design how human experts make decisions and translate them into rules or algorithms in computer programming [16,17]. There is a need for using expert systems technologies is used as a base for analysis, diagnosis, and recommendations for reducing healthcare costs are called Medical Diagnosis Expert Systems (MDES) [17] and urgent need for AI to develop to prevent the negative impact in internet addiction [18].

Publish research on AI in internet addiction is rather limited [18]. The aim was to compare the effectiveness of the M-IAT Ina with the E-IAT Ina application using AI with expert system forward chaining methods to screen for internet addiction disorder in adolescents. This is the first study on Digital Internet addiction using IAT in Indonesia and we hypnotized that E-IAT Ina has the same effectiveness as the manual IAT in measuring internet addiction.

METHOD

This research consists of 2 steps. The first built the software application. System Analysis to explore and collect therapies needs to build an application that data come from 22 therapists which consists of 3 general practitioners, 9 pediatricians, 10 psychiatrists, and psychologists via a Google form. Then continued with designing systems to build systems using a generic process framework for software engineering (the prototyping paradigm model) encompasses five activities: communication, planning, modeling, construction and deployment, delivery, and feedback that come from system analysis[19]. We build an expert system with a forward chaining method that decisions come from collecting the data from fact and comparing it with the knowledge base from ruled-based. Data collection will get from fact to conclusion using while or if and then rules [16].

Web-based application built with HTML, Laravel framework, Tailwind CSS, and Java scripts. (3) Implementation and comparison system: to implement the IAT-Ina web application which was built after analysis and design system and then compared with M-IAT Ina using the crossectional study. M-IAT Ina consists of 17 questions and 6 answered Likert scale where every answer will be converted into a numeric value (Table 1). Answer Tidak pernah = 0, Jarang = 1, Kadang-kadang = 2, Sering = 3, Sangat sering = 4, Selalu = 5. The total score will be calculated manually and reference to scores 0-20 mean normal usage, 21-42 mean mild addiction which needs to control internet usage, 43-63

mean moderate addiction which makes the problem further function and needs professional to solve these conditions, and 64-85 mean severe addiction which needs professional help and could be combined with medication treatment.

The second step was to implement E-IAT Ina for the user. Participants come from purposive random sampling with a total of 93 Participants 12-20 years old who were recruited by Google form via a link that was shared with their teachers. There were 22 participants from junior high school 12-14 years old (early adolescence), 32 participants from senior high school 15-17 (middle adolescence) years old, and 39 participants from college 18-20 years old (end of adolescence).

All the participants directly filled in two questionnaires. First is M-IAT Ina and then E-IAT Ina. Comparison E-IAT Ina and M-IAT Ina were measured using the Paired t-test to analyze for scoring value as a numeric category and level of internet addiction category using the Wilcoxon test as an ordinal category. The software application to analyze the data was used SPSS 25.0. For the scoring test, the Nomality trial test was within normal distribution using the Shapiro-Wilk test because the sample less than 50.

RESULTS

After analyzing and designing a system using Laravel Framework for programming language which is built in HTML, UI/UX design with tailwind CSS and Flowbite framework. The user could input their name, age, and gender as well as M-IAT Ina for their identity and it is a private test that is only known by the user without database saving. Before doing the test, users could read some information about internet addiction and how they will input the test contactless with the therapist.

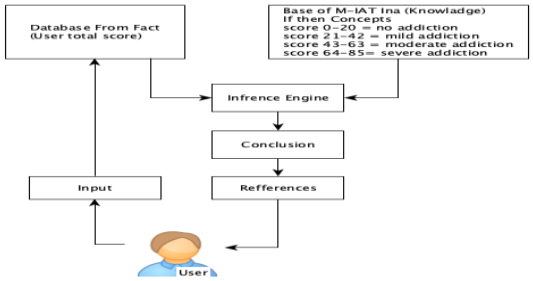

Figure 1. E-IAT Ina Design Concept

The web application form consists of 17 questions according same as the M-IAT Ina that had been validated [14]. Data input from the user becomes fact data that got from all the questions with 5 multiple choices answers using the Likert scale from Tidak pernah = 0, Jarang = 1, Kadang-kadang = 2, Sering = 3, Sangat sering = 4, Selalu = 5. The answer will bring numeric values and will be the sum to become the total score.

The expert system uses the forward chaining method, whereas 17 items answered from the M-IAT Ina question automatically will be calculated to become the total score as a determined level of addiction. Total score as a part of conditions or signs of internet behavior and effect that user feel. All of the signs and conditions will convert to a score and will be a reference to a certain level of internet addiction. The level of addiction is classified according to M-IAT Ina as a base of knowledge. From M-IAT Ina, score test from 0-20 means no addiction, 21-42 means mild addiction, 43-63 means moderate addiction, and 64-85 means severe addiction. The total score will reference the level of internet addiction. The test result from this application is downloadable and free to access (Figure 1).

Table 1. Characteristics of Participants

Item	N (%) Total = 93	Group M-IAT Ina Mean±SD	E-IAT Ina Mean±SD
Age, years			
12-14	22(23.4)	19.9±6.8	19.3±7.4
15-17	32(34)	19.4±6.5	18.5±5.3
18-20	39(41.5)	22.8±9.4	21.41±9.5
Gender			
Male	25(26.9)	20.2±6.6	20.4±7.6
Female	68(73.1)	21.2±8.5	19.74±7.9

The summaries of the participants' characteristics, after analyzing and designing the systems of E-IAT Ina, were then implemented on 93 adolescents 12-20 years old for trial and compared with M-IAT-Ina. The male participants represented 25% of the population. The age 12-14 years old of participants represent 22%, 15-17 years old represent 32% and 18-20 represent 39% (Table 1).

Comparison measurement levels of addiction for M-IAT Ina were no addiction 51(54.8%), mild addiction 41(44.1%), and Moderate addiction 1(1.1%), and for E-IAT Ina was no Addiction 59(63.4%), mild addiction 34(36.6%) and no one suffering moderate addiction. There was no significant result for M-IAT Ina and E-IAT Ina analyzed using the Wilcoxon Test with a p-value of 0.013 (p> 0.001) which means there was no different result for assessment levels of internet addiction for both tools (Table 2).

Table 2. Comparison Measurement Level of Internet Addiction M-IAT Ina and E-IAT Ina

Level of Internet Addiction	Group		p-value
	M-IAT Ina	E-IAT Ina	
No addiction	51(54.8)	59(63.4)	0.013
Mild	41(44.1)	34(36.6)	
Moderate	1(1.1)	0(0)	
Total	93(100)	93(100)	

Wilcoxon test sig p < 0.000

Comparations according to total score using the Paired t-test analyzed between M-IAT Ina and E-IAT Ina also no significant result for every age of adolescence. Foreach early adolescent 12-14 years old p=0.101 with 95 accuracy, middle adolescent 15-17 years old p=0.184 with accuracy 90% and late adolescent 18-20 years old p=0.142 with 72% accuracy. This system has 85% accuracy compared with M-IAT Ina (p<0.05). These results mean that M-IAT Ina and E-IAT Ina had the same result for scoring internet addiction issues (Table 3).

Table 3. Comparison Measurement Score of M-IAT Ina and E-IAT Ina

Age, years	N	M-IAT Ina and E-IAT Ina		Paired t-test
		Match	Miss	
12-14	22	21	1	0.101
15-17	32	30	2	0.184
18-20	39	28	11	0.142
Total	93	79	14	

Paired t-test sig p<0.05

DISCUSSION

During and after post-pandemic COVID-19 most adolescents and young adults use internet technology because the need for gambling, viewing pornography, gaming, shopping, social interaction, and interpersonal communication may lead to elevated internet addiction [12,20]. The inability to control the negative impact of internet use has determined internet addiction among adolescents using the usual tool IAT in the Bahasa version (M-IAT Ina). This study compared M-IAT Ina with a digital Internet Addiction Test in Bahasa version (E-IAT Ina) which was built with artificial intelligence using an expert system forward chaining method. E-IAT Ina is designed to screen for internet addiction problems [18,21,22] with a base of knowledge that comes from an expert with predictive inference [16,21].

Artificial intelligence (AI) is one of the revolutionary digital technologies in mental health care that could be used for screening or early detection of mental health problems like internet addiction [21,23–26]. These system concepts are often used in other healthcare fields such as oncology, radiology, dermatology, and others [18]. Internet addiction could be controlled using digital well-being apps [12].

Our results showed that screening internet addiction using the manual IAT Ina had the same effective results according to both score and level of internet addiction compared with the E-IAT Ina. The screening revealed a prevalence of internet addiction. Population, with 34% mild addiction and 41% Using M-IAT Ina.

Implementing Web-based mental health screening in general practice could increase the identification of symptoms and signs of mental illness, especially in the internet addiction field [27]. When people use these tools and know about their mental health conditions, hopefully, they engage to access mental health services to take early intervention which could give a better outcome. Digital innovations in mental health could be built to improve internet addiction care in the digital era as prevention and evaluation treatment [26]. Early detection of

internet addiction could prevent negative outcomes that are detected with E-IAT Ina technology [20] that could be used for long-term measurement and real-time results [28,29].

We agree that the internet become a value and daily need for all people to do any activities, work, business, and communication in modern living [5,30]. Internet addiction become an increasing case in the community due to the pandemic and post-pandemic COVID-19 era. However uncontrollable internet use called internet addiction causes a negative impact in many areas of life [5,7]. Young developed a definition for internet addiction as a maladaptive pattern of internet use that causes distress or impairment of daily life that consists of minimum 5 of 8 criteria from (1) excessive mental effort with the Internet, (2) the need for longer time online, (3) repeated attempts to decrease Internet use, (4) withdrawal symptoms when decreasing Internet use, (5) issues in time management, (6) environmental distress (family, friends, school, and work), (7) lying about time spent online, and (8) mood modification through Internet use [31].

Adapting Diagnostic and Statistical Manual IV (DSM IV) criteria for substance dependence and pathology gambling modification Young developed the Internet Addiction test (IAT) modification of the previous 8-item scale [31]. The criteria include lack of control, neglecting daily life, relationship and alternative recreation activities, behavioral and cognitive salience, negative consequences, mood disturbance, and deception. The self-report scale consists of 20 items and becomes 17 items after validating in the Bahasa version (IAT-Ina) with Cronbach's alpha of 0,851 [14]. Guidelines suggest that no more than 2 hours per day of recreational internet use including television, computer, and phones [30].

This study shows that M-IAT Ina was equal to E-IAT Ina built with a web-based application using an expert system forward chaining method. In the future AI technology may be possible to define mental disorders more objectively than DSM 5 classification as an approach for clinical practice [23,26].

Our limitation of this research is most of the participants were female (73,1%), that may not be generalizable in the adolescent populations. Future research should be considered to control design by gender with a large population and multicentre study.

CONCLUSION

Digital Internet addiction test in Bahasa version E-IAT Ina was depeloved with expert system forward chaining method web-based aplplication using HTML, Laravel and Flowbite framework. There was the same effectiveness between the E-IAT Ina compared with the manual Internet Addiction Test in the Bahasa version (M-IAT Ina). E-IAT Ina is a part of modern mental health care contributors that could be implemented in digital mental health care practice with contactless, real-time and preventing widespread COVID-19 infection.

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CONFLICTS OF INTEREST

There is no conflict of interest for this study.

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