

ADAPTATION OF THE DIGITAL COMMUNICATION EMPATHY SCALE (DCES) IN INDONESIAN VERSION ON ADOLESCENCE TO EARLY ADULTHOOD

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Abstract: Adaptation of the Digital Communication Empathy Scale (DCES) in Indonesian Version on Adolescence to Early Adulthood. Empathy—derived from the term *Einfühlung*, as the foundation of social life—needs to be reexamined as social interactions shift from adolescence to early adulthood to the digital space. In Indonesia, this period is the most intense time for digital interaction, which has the potential to cause negative impacts. The increase in empathy during adolescence and findings that higher empathy in adolescence predicts higher empathy at age 35 necessitate the measurement of psychological empathy, particularly digital empathy, in adolescence to early adulthood. There is a theoretical possibility that digital empathy may be separate from general empathy. There have been no studies that adapt and translate digital empathy measurement tools such as the Digital Communication Empathy Scale (DCES). This study aims to determine the adaptation process of the DCES in adolescence to early adulthood and the existence of good construct validity and adequate reliability in the DCES. The subjects of this quantitative descriptive study numbered 398 participants in the Exploratory Factor Analysis (EFA) test and 403 participants in the Confirmatory Factor Analysis (CFA) test. Although the DCES demonstrated good construct validity and adequate reliability, further analysis revealed that the adapted version was not entirely equivalent to the original version. Implicitly, this study found that 35 of the 36 items passed the EFA test, and five of the six factors were confirmed in the CFA analysis.

Keywords: Digital Communication Empathy Scale (DCES), Digital Empathy, Measurement Tools Adaptation, Psychometric

Abstrak: Adaptasi Digital Communication Empathy Scale (DCES) Versi Bahasa Indonesia pada Remaja hingga Dewasa Awal. Empati—yang berasal dari istilah *Einfühlung*, sebagai fondasi kehidupan sosial, perlu ditinjau ulang pemahamannya seiring

beralihnya interaksi sosial pada masa remaja hingga dewasa awal ke ruang digital. Di Indonesia, masa ini menjadi masa paling intens berinteraksi secara digital, yang berpotensi menimbulkan dampak negatif. Meningkatnya empati sepanjang masa remaja serta temuan yang menyatakan bahwa empati yang lebih tinggi pada remaja memprediksikan empati yang lebih tinggi juga pada usia 35 tahun; menyebabkan pengukuran psikologis empati, khususnya empati digital pada remaja hingga dewasa awal dibutuhkan. Terdapat kemungkinan teoritis bahwa empati digital mungkin terpisah dari empati umum. Belum ada ditemukan penelitian yang mengadaptasi dan menerjemahkan alat ukur empati digital seperti Digital Communication Empathy Scale (DCES). Penelitian ini bertujuan untuk mengetahui proses adaptasi DCES pada remaja hingga dewasa awal serta adanya validitas konstruk yang baik dan reliabilitas yang memadai pada DCES. Subjek dari penelitian deskriptif kuantitatif ini berjumlah 398 partisipan pada uji Exploratory Factor Analysis (EFA) dan 403 partisipan pada uji Confirmatory Factor Analysis (CFA). Meskipun DCES menunjukkan validitas konstruk dan reliabilitas yang memadai, analisis lebih lanjut mengungkap bahwa versi adaptasinya tidak sepenuhnya setara dengan versi asli. Implikasinya, studi ini menemukan bahwa 35 dari 36-aitem lulus uji EFA, dan lima dari enam faktor terkonfirmasi dalam analisis CFA.

Keywords: Digital Communication Empathy Scale (DCES), Empati Digital, Adaptasi Alat Ukur, Psikometri.

INTRODUCTION (Subtitles 1, Times new roman 12 pt, one column)

Davis (2018) in his book states that empathy itself comes from the term *Einfühlung*, which is the tendency of observers to project themselves into what they observe (usually the physical beauty of an object), which was originally used in German aesthetics. In English, the word “empathy” was translated by Titchener (1909) from the word ‘*Einfühlung*’ coined by Lipps (1903); according to him, observers as agents deliberately try to step outside themselves and “enter” into the experiences of others. As

opposed to Titchener, Kohler (1929) stated that empathy refers more to understanding than to sharing feelings with others. Meanwhile, according to Davis on his own, understanding others can be done by seeing and interpreting the actions, movements, and physical cues of actors.

Empathy plays an important role in human emotional and social interactions, forming the basis for healthy coexistence among humans, mutual understanding, and cooperation (Bošnjaković & Radionov,

2018). As the era progresses, social interactions among adolescence to early adulthood in Indonesia have completely shifted to the digital space, necessitating a review of the understanding of empathy. Digital communication, especially through text messages, social media, and emails, often lacks nonverbal cues—such as tone of voice, body language, and facial expressions—which are essential for accurately conveying emotions (Derks et al., 2008). This can lead to misunderstandings, misinterpretations, and even conflicts between communicators (Shamsie, 2024). Face-to-face empathy experiences may differ when compared to digital contexts (digital empathy). Collins et al. (2024) concluded in their research that there is a theoretical possibility that digital empathy may be separate from general empathy. According to Rachmad (2017), the core concept of digital empathy is that even though technology mediates human interaction, the elements of empathy in humans remain important. The cues-filtered-out theories used by Culnan & Markus (1987) describe a group of theories that suggest that Computer-Mediated Communication (CMC) lacks nonverbal cues, which play an important role in social interaction. Cues-filtered-out theories (including social presence theory, lack of

social context cues hypothesis and media richness theory) were developed in the 1970s and 1980s to convey the idea that communication is not as effective as face-to-face communication when important elements of nonverbal cues are absent (Chew & Ng, 2021). Therefore, in order to measure individual differences in digital empathy, psychological measurements are needed.

DCES needs to be developed because the internet is already widely used and growing rapidly, and digital communication has become widespread. Human communication can be carried out easily through the internet, which allows almost all humans in any part of the world to communicate quickly regardless of distance and time (Asari et al., 2023). We Are Social & Meltwater (2025) reported that there are 212 million internet users in Indonesia in 2025 who spend an average of around 7 hours and 22 minutes per day online, with 98.8% of digital communication usage for social networking, 98.4% for chatting and messaging, and 93.5% for email.

Unlike internet users, there are 143 million social media users worldwide in 2025 who spend an average of around 3 hours and 8 minutes online. The percentage of reasons for primary use in digital communication is as follows: 60.5% stay connected with friends

and family, 29.5% share and discuss opinions with others, 28.2% work or research related to relationships, and 28.1% make new contacts (We Are Social & Meltwater, 2025). Through the expansion of digital communication, the phenomenon of empathy in the context of digital communication has also become more prevalent because communication between people can be done easily and quickly.

There are so many psychological instruments for measuring empathy that have been developed, one of which is the Basic Empathy Scale (BES) developed by Jolliffe & Farrington. BES is one of the most popular empathy scales that has been adapted and translated into various languages. When it was developed, there were 40 items measuring affective and cognitive empathy. However, after the data was reduced using exploratory factor analysis (EFA), 20 items were obtained, consisting of 9 items from the cognitive scale and 11 items from the affective scale (Jolliffe & Farrington, 2006). The following are some studies that adapted and translated the BES, such as Heynen et al. (2016) into German, Anastácio et al. (2016) into Portuguese, Villadangos et al. (2016) into Spanish, You et al. (2018) into Korean, Chen et al. (2021) into Chinese, Loureto et al. (2022) into Brazilian, Chokri et al. (2024)

into Arabic, etc. When it was first designed, the BES measurement tool had two factors. However, after being developed and translated by several researchers above, all research results found the same factors, except for Chokri et al. (2024). Their research results found three factors, namely emotional contagion, cognitive empathy, and emotional disconnection.

Meanwhile, there is another measurement tool that was developed earlier and is almost as popular as the BES, namely the Interpersonal Reactivity Index (IRI) developed by Davis (1980). Based on Keaton (2017) assessment, the IRI has sufficient evidence of psychometric validity, consisting of four subscales, namely perspective taking, empathic concern, personal distress, and fantasy. In its initial design, the IRI had 50 items, but after undergoing two rounds of testing, 28 items were obtained, with each subscale consisting of 7 items. In addition, the Toronto Empathy Questionnaire (TEQ) by Spreng et al. (2009) is also a popular and widely used measurement tool that has 16 items.

As explained earlier, the popularity of the BES measurement tool developed by Jolliffe & Farrington (2006) has led to many researchers in Indonesia adapting, translating, adopting, and/or modifying it

(Humbaina & Rizkyanti, 2020; Ifthiharfi et al., 2024; Margaretha et al., 2024; Mujahidah & Listiyandini, 2018; Rachmawati & Listiyandini, 2020; Rizkyanti et al., 2021; Salsabila & Nurwianti, 2024; Syafira et al., 2022; Syifa & Rizkyanti, 2022). Similar to BES, several researchers in Indonesia have also adapted, translated, adopted, and/or modified measurement tools such as IRI by Davis (1980) and TEQ by Spreng et al. (2009) in measuring empathy (Ali & Salamah, 2021; Karundeng et al., 2023; Mallian & Soetikno, 2022; Raykhamna et al., 2018; Tahrir et al., 2021). Thus, it can be concluded that the BES measurement tool developed by Jolliffe & Farrington (2006) is the most widely used measurement tool for measuring empathy in Indonesia.

The large number of studies that adapt, translate, adopt, and/or modify the BES does not make this measurement tool free from shortcomings. The BES completely lacks items related to the context of digital communication. In this modern era, the ability to instantly share thoughts, feelings, and behaviors with the entire society through digital channels can occur in seconds and often without the empathetic social filters that accompany traditional communication (Terry & Cain, 2016). Therefore, to solve this

problem, several researchers have modified the BES measurement tool.

For example, Carrier et al. (2015) developed and modified the BES measurement tool and named it the Virtual Empathy Scale, which is used to test the relationship between internet use and empathy. Through their research, they found 10 out of 11 items on the affective empathy factor and 9 items on the cognitive empathy factor. In addition to Carrier et al., Marín-López et al. (2019) also developed and adapted the BES measurement tool in their research and named it the Online Empathy Questionnaire, which is used to measure empathy when interacting through electronic devices. However, this measurement tool was not published.

The Digital Communication Empathy Scale (DCES) and Virtual Empathy Scale are similar in that they test the relationship between internet use and empathy, but the Virtual Empathy Scale consists of only two aspects, namely cognitive and affective. In addition, the items on the scale are more related to video games (Carrier et al., 2015). In contrast, the DCES consists of six dimensions, namely digital emotion match (DEM), digital perceived empathy accuracy (DPEAcc), digital perspective taking (DPT), digital sympathy (DS), digital personal distress (DPD), and digital empathic anger

(DEAng), which combine several constructs to provide a comprehensive indication in assessing Digital Empathy. The scale itself is more related to digital communication (Collins et al., 2024).

The DCES is a multidimensional measurement tool with 36 items used to measure empathy in a digital context, particularly digital communication. This measurement tool was developed and adapted from various empathy measurement tools because existing empathy measurement tools often cover aspects that refer to face-to-face interactions and may not fully capture the experience of empathy in digital communication (digital empathy). Based on the results of research by Collins et al. (2024), it was found that the six dimensions of DCES provide a fairly good assessment of digital empathy, and the total score shows satisfactory internal consistency.

According to the development and adaptation of DCES from various measurement tools; (1) the DEM dimension was developed and adapted from the AMES-A and BES-A subscales; (2) the DPEAcc dimension was developed and adapted from the AMES-C, BES-C, and ACME-C subscales; (3) the DPT dimension was developed and adapted from the IRI-PT subscale; (4) the DS dimension was developed and adapted from the IRI-EC

and AMES-S subscales; (5) the DPD dimension was developed and adapted from the IRI-PD subscale; and (6) the DEAng dimension was developed and adapted from the TEAS subscale. To understand the aforementioned subscales, the following section will explain the origin of each subscale. Jolliffe & Farrington (2006) in their research developed the Basic Empathy Scale (BES) which refers to the definition of empathy according to D. Cohen & Strayer (1996); whereby empathy is understanding and sharing in the emotional state or context of others. The BES itself consists of two dimensions, namely affective empathy (BES-A) and cognitive empathy (BES-C).

Subsequently, Vossen et al. (2015) in their research developing the Adolescent Measure of Empathy and Sympathy (AMES) divided the measuring instrument into three dimensions, namely cognitive empathy (AMES-C), affective empathy (AMES-A), and sympathy (AMES-S). In developing their measurement tool, Vossen et al. referred to Hogan (1969) definition of cognitive empathy, which states that empathy refers only to actions that build on the mental state of others; Mehrabian & Epstein (1972) definition of affective empathy, which states that empathy is an emotional response to the emotions felt by others; and sympathy by

Clark (2010), which is defined as something that plays a major role in human relationships by expressing concern or sorrow about unpleasant events in a person's life. Then, Vachon & Lynam (2016) in their research developed the Affective and Cognitive Measure of Empathy (ACME), stating that ACME has three dimensions, namely cognitive empathy (ACME-C), affective resonance, and affective dissonance. Vachon & Lynam, in developing their measurement tool, refer to the definition of cognitive empathy conceptualized by Ickes (1993), namely empathy as the degree of conformity between the conclusions drawn by the recipient and the actual thoughts or feelings of the person being targeted; as well as affective resonance and dissonance conceptualized by Batson (2009), which states that imagining ourselves in another person's situation and reading their internal state from our own state gives rise to empathy, explaining how we as humans can know what other people are thinking and feeling.

Then, Davis (2018) developed the Interpersonal Reactivity Index (IRI) in his research, which consists of four dimensions, namely the fantasy scale (IRI-FS), perspective-taking scale (IRI-PT), empathic concern scale (IRI-EC), and personal distress

scale (IRI-PD). According to Davis, empathy is a set of constructs related to an individual's response to the experiences of other individuals. To conclude the explanation of the origin of the subscales, Vitaglione & Barnett (2003), in their research developing the Trait Empathic Anger Scale (TEAS), stated that the TEAS has one aspect that adopts the empathic concern subscale from the IRI. Vitaglione & Barnett define empathy as an emotional reaction that stems from concern for the well-being of others.

According to Santrock (2019) developmental theory, his book states that adolescence ranges from ages 13-17, emerging adulthood or what is commonly known as the transition from adolescence to adulthood ranges from ages 18-25, and early adulthood lasts until age 39. Based on the results of a survey conducted by Asosiasi Penyedia Layanan Internet Indonesia, Indonesia's internet penetration rate is dominated by Generation Z and Millennials, with a contribution percentage of 34.40% and 30.62%, respectively; both age groups range from 12 to 43 years old (APJII, 2024). According to the data above, the 13-43 age group—which can be categorized as adolescence to early adulthood—interacts most intensely digitally. Intense digital interaction can have negative effects, such as a tendency to

experience stress, lower levels of happiness and life satisfaction, anxiety, and conflicts between certain groups (Fajriah & Ningsih, 2024). Additionally, findings from research by Uzefovsky & Knafo-Noam (2017) show that empathy increases throughout adolescence and that higher empathy in adolescents predicts higher empathy at age 35. Therefore, based on the above data, the researchers decided to use Indonesian internet users aged 13-39 years (adolescence to early adulthood) as their subject population.

Although there have been many studies in Indonesia that adapt and translate empathy measurement tools such as BES, IRI, TEQ, etc., there have been no studies that adapt and translate digital empathy measurement tools such as DCES. The main objective of this study is to adapt and translate the digital empathy measurement tool developed by Collins et al. into Indonesian. In addition, this study also aims to test the dimensional structure, validity, and reliability of the DCES. This study is expected to contribute to the development of digital empathy psychological measurement in Indonesia. Therefore, the results of this study will benefit future researchers, respondents, and internet users (especially social media users).

RESEARCH METHODS

This study is a quantitative descriptive study that uses a survey method by distributing questionnaires created on Google Forms. The variable identified in this study is digital empathy shown by individual internet users, which is measured using the Digital Communication Empathy Scale (DCES). Digital empathy is the ability or experience of empathy that occurs in a digital context, in which individuals respond to, understand, and feel the emotions or experiences of others through digital media such as text messages, email, social media, or other online platforms. The DCES consists of six dimensions, and the following are the definitions of each dimension (Collins et al., 2024):

(1) Digital Emotion Match (DEM);

DEM is an emotion experienced by a person in accordance with the emotions of others when communicating digitally, which is obtained by observing and capturing the emotions of others.

(2) Digital Perceived Empathic Accuracy (DPEAcc);

DPEAcc is accurately interpreting other people's feelings when communicating digitally and using this to form an impression of that person's abilities.

- (3) Digital Persepective-Taking (DPT);
DPT is someone who imagines other people's perspectives by trying to understand others sincerely when communicating digitally.
- (4) Digital Sympathy (DS);
DS is the understanding of concern and sorrow for others when communicating digitally as the basis for a person's emotional reaction.
- (5) Digital Personal Distress (DPD); dan
DPD is a person's response to acknowledging the suffering of others during digital communication caused by unpleasant emotional reactions (such as anxiety and discomfort).
- (6) Digital Empathic Anger (DEAng).
DEAng is a feeling of anger experienced by someone who has been victimized during digital communication.

Each dimension of DCES has 6 items. Later, the measurement tool will be adapted from English into Indonesian using the cross-cultural self-report measurement adaptation guide by Beaton et al. (2000). This guide is divided into six stages, namely Stage I: Forward Translation, Stage II: Translation Synthesis, Stage III: Backward Translation, Stage IV: Expert Committee, Stage V: Preliminary Version Testing, and Stage VI: Submission of Documentation to the

Developer or Coordination Committee for Adaptation Process Assessment.

The sampling technique used is non-probability sampling with type of purposive sampling, in which sample members are selected from the population based on specific considerations (Sugiyono, 2013). The considerations for selecting sample members from the population are based on the following criteria: (1) Internet users in Indonesia aged 13-39 years and (2) Use email or messaging on social media or other digital platforms. Using the Lemeshow et al. (1990) sample calculation formula with a population proportion ($P = 0.5$) and distance ($d = 0.05$), a sample size of 384 was obtained for each factor analysis test (Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA)).

The scale used is a Likert scale with the following details: 1 = Strongly disagree, 2 = Disagree, 3 = Slightly disagree, 4 = Slightly agree, 5 = Agree, dan 6 = Strongly agree. In accordance with the original version, before entering the main section of the questionnaire, participants were asked to fill in their personal details, including their name/initials, age, gender, geographical location, highest level of education, main occupation, and annual income range. Each section containing statements in the

questionnaire begins with instructions for filling it out and answer options. The following are the instructions for filling it out, translated from the original version (Collins et al., 2024):

The following statements are about the things you read or see from other people online. This includes anything from another user in emails or text messages, on social media, or on any other digital platform. It could be on a phone, computer, or portable device. Please indicate how much you agree or disagree with each statement by selecting the corresponding option.

This study will use two types of validity, content validity and construct validity. As a basis for the DCES validation process, in testing content validity, the researcher will use Aiken's V formula (Aiken, 1985). The following are the criteria for content validity (Tajuddin et al., 2025):

- (1) $V \geq 0.80$ indicates high content validity (strong content validity),
- (2) V between 0.70 and 0.79 indicates moderate content validity (acceptable, may require minor revision), and
- (3) $V < 0.70$ may indicate low content validity (revised or removed).

Each item from the DCES will be assessed for relevance, clarity, and degree of importance on a scale of 1 to 4 by three expert

reviewers. To determine the construct validity of the DCES, a CFA test will be conducted. However, before conducting the CFA test, the researcher will first conduct an EFA test. The EFA and CFA analyses were performed using Jeffreys' Amazing Statistics Program (JASP) software, while Cronbach's alpha values from EFA were calculated using IBM SPSS Statistics version 27 for Windows software.

The varimax rotation method is used in EFA analysis to obtain a good overview of the technical details of various versions of varimax rotation (Kurniawan & Utami, 2022). Before conducting EFA analysis, researchers must know the Kaiser-Meyer-Olkin Test (KMO) Measure of Sampling Adequacy value to determine the suitability of the data for factor analysis and the Barlett's Test of Sphericity value to determine whether factor analysis is feasible for the data set. The KMO value ranges from 0 to 1. The following are the criteria for the KMO value (Shrestha, 2021):

- (1) KMO value between 0.80 – 1.00 indicates that the sample used is adequate,
- (2) KMO value between 0.70 – 0.79 indicates that the sample is middling,

- (3) KMO value between 0.60 – 0.69 indicates that the sample used is mediocre,
- (4) KMO value < 0.60 indicates that the sample is not adequate and must be revised, and
- (5) KMO value < 0.50 indicates that the sample is not suitable for analysis.

Meanwhile, a Bartlett's Test value < 0.05 indicates that factor analysis may be feasible. When the KMO and Bartlett's Test values have been met, EFA testing can proceed. In the EFA test, the factor loading value shows the relationship between each item and the underlying factor. Items with a factor loading value > 0.40 indicate that the item represents that factor (Shrestha, 2021).

In CFA testing, the first thing to do is to test the exact fit. If using a simultaneous estimation method such as Maximum Likelihood (ML), the chi-square value with degrees of freedom (*df*) and p value must be reported. Researchers must continue to perform local fit tests, whether the model obtained fits or does not fit (most likely to occur in large samples) in the exact-fit test. If the model is found not to fit, it is temporarily rejected (Kline, 2016). The following are the fit index criteria in the CFA test (Bentler & Bonett, 1980; Browne & Cudeck, 1992; Hox, 2021; Hu & Bentler, 1999; Kline, 2016; Putra et al., 2021):

Table 1. Table 1. Fit Index Criteria in CFA Testing

Index	Criteria	Information
Absolute Fit Indices		
Chi-square (p value)	≥ 0.05	Acceptable Fit
	< 0.05	Reject Fit
Root means square error of approximation (RMSEA)	≤ 0.05	Close Fit
	≤ 0.08	Reasonable Fit
Standardized root means square residual (SRMR)	≤ 0.08	Acceptable Fit
Incremental Fit Indices		
Tucker-Lewis Index (TLI)	≥ 0.90	
Comparative Fit Index (CFI)	≥ 0.90	
Parsimony Fit Indices		
Parsimony Normed Fit Index (PNFI)	0.60-0.90	

The reliability of DCES will use Cronbach's alpha (α) coefficient formula, which is one of the popular consistency formulas (Azwar, 2012). The following is a consistency level guide for determining reliability by L. Cohen et al. (2007):

- (1) A value of $\alpha \geq 0.90$ indicates very highly reliable,
- (2) A value of α between 0.80 – 0.90 indicates highly reliable,
- (3) A value of α between 0.70 – 0.79 indicates reliable,
- (4) A value of α between 0.60 – 0.69 indicates marginally/minimally reliable, and
- (5) A value of $\alpha \leq 0.60$ indicates low reliable, which is unacceptable.

To identify items that should be removed when they have a factor loading < 0.40 , an item discrimination test is conducted by looking at the item-rest correlation value. Items with an item-rest correlation value < 0.30 are considered to have low or unsatisfactory discrimination power (Azwar, 2012). R-Squared (R^2), often known as the coefficient of determination, is generally most often used to measure the predictive accuracy of a regression model. Not only can it be used in regression models, R^2 can also be used in all models to determine whether a model is good or not. Its value ranges from 0

to 1, where the closer the value is to 1, the better. An R^2 value > 0.75 is categorized as strong, 0.50 as moderate, and < 0.25 as poor (Hair JR. et al., 2010).

RESULTS AND DISCUSSION

RESULTS

The total number of subjects in this study was 801 participants from the initial target of 768 participants. There were 398 participants (339 women and 59 men) who contributed to the Exploratory Factor Analysis (EFA) testing stage and 403 participants (278 women and 125 men) who contributed to the Confirmatory Factor Analysis (CFA) testing stage. However, 2 participants in the CFA testing stage were removed because the first participant stated that they were unwilling to be a respondent and the second participant filled out the questionnaire twice.

In the EFA preliminary version testing, the research participants were predominantly aged 18-25 years (emerging adulthood) (80.90%), followed by those aged 26-39 years (early adulthood) (15.58%), and finally those aged 13-17 years (adolescence) (3.52%). Participants were identified as coming from the geographical regions of Java (44.47%), followed by Sumatra (28.89%), Kalimantan (9.55%), Sulawesi (7.54%), Nusa Tenggara (6.78%), Maluku (1.51%), and Papua (1.26%). In general, the

highest level of education attained by participants was senior high school/vocational high school/equivalent (59.55%), the most common main occupation was high school student/university student (52.26%), and the majority had an annual income range of 0–60 million IDR (90.20%).

Similar to the EFA testing, in the CFA preliminary version testing, participants were predominantly aged 18-25 years (emerging adulthood) (61.10%), followed by those aged 26-39 years (early adulthood) (25.19%), and finally those aged 13-17 years (adolescence) (13.72%). Participants were identified as coming from the geographical regions of Sumatra (43.64%), followed by Java (31.92%), Sulawesi (9.73%), Kalimantan (7.48%), Nusa Tenggara (4.49%), Maluku (1.75%), and Papua (1%). In general, the highest level of education attained by participants was a bachelor's degree (44.64%), the most common main occupation was high school student/university student (43.39%), and the majority had an annual income range of 0–60 million IDR (69.58%).

Before entering the measurement tool adaptation stage, the researchers obtained permission from the owners of the measurement tools to adapt them into

Indonesian. Based on the cross-cultural self-report measurement adaptation guidelines by Beaton et al., in stage I, the forward translation of the measurement tools from English into Indonesian was carried out by three translators. The first translator was an academic (lecturer) in Psychology at Universitas Negeri Padang who had proficient English language skills, as evidenced by an IELTS band score of 7. The other two translators were sworn translators from the Unit Pelaksana Teknis (UPT) Bahasa of the Universitas Andalas (UNAND). The selection criteria for the three translators were in accordance with the criteria in the adaptation guidelines.

Based on the EFA test results, the main factor loadings range from 0.250 to 0.673. There are four items with factor loadings below 0.40, that are item number 3 with 0.344, item number 5 with 0.361, item number 6 with 0.250, and item number 21 with 0.345; these items are considered for revision or to be removed. To determine which items should be considered for revision and to remove, an analysis of the total item correlation scores was conducted to examine the level of discrimination. The results showed that items 3, 6, and 21 should be considered for revision. Meanwhile, item number 5 on the DPEAcc subscale, which states, “Saya

merasa tidak nyaman ketika orang-orang di dunia maya membicarakan kesulitan hidup mereka," must be removed because its item-rest correlation value is 0.259 or < 0.30 ; it can be said that this item has low and unsatisfactory discrimination power. As a result, only 35 items can be used in the research.

Then, after revising and removing items, the researchers created and distributed the questionnaire again to proceed towards CFA testing to examine the validity of the DCES construct. The CFA results revealed that there was inequality between the researcher's adapted version and the original version. At this testing stage, one factor was removed, that is the sixth factor (Digital Emotion Match/DEM). This factor was removed

because, when the items were entered, the results section displayed the message "The model is not admissible," so the researchers sorted and entered the items in that factor into several other factors according to the second highest value of factor loadings in the EFA test. For example, item number 10 was included in the first factor (Digital Perceived Empathic Accuracy/DPEAcc), item number 31 was included in the fifth factor (Digital Personal Distress/DPD), and item number 35 was included in the third factor (Digital Sympathy/DS).

In the CFA testing, researchers used Maximum Likelihood (ML) as the estimation method. Based on the CFA test results, DCES has a fairly good model fit. This can be seen in the following table:

Table 2. Fit Model Results from DCES CFA Testing

Index	Value	Criteria	Information
Chi-square	$\leq 0,001$	$\geq 0,05$	Reject Fit
Root Mean Square Error of Approximation (RMSEA)	0,071	$\leq 0,08$	Reasonable Fit
Reasonable Fit Standardized root means square residual (SRMR)	0,044	$\leq 0,05$	Acceptable Fit
Tucker-Lewis Index (TLI)	0,892	$\geq 0,90$	Poor Fit
Comparative Fit Index (CFI)	0,901	$\geq 0,90$	Good Fit

Index	Value	Criteria	Information
Parsimony Normed Fit Index (PNFI)	0,791	0,60-0,90	Fit

Based on the table above, for the measurement of absolute fit indices DCES, it was found that the model fit of chi-square (p value) was rejected because its value is < 0.05 , which is ≤ 0.001 . This could be due to the large sample size ($N = 401$) used, resulting in the exact-fit hypothesis being rejected. However, when looking at the model fit of RMSEA, the model fit was accepted because the value is ≤ 0.08 , it is 0.071, which indicates that the RMSEA fit model is categorized as a reasonable fit. Apart from chi-square and RMSEA, the model fit of SRMR is also accepted with a value ≤ 0.05 , which is 0.044; this model fit is useful for comparing the fit between existing models.

The next step in the research was to measure the incremental fit indices of DCES, which showed that TLI had a poor model fit with a value of < 0.90 , that is 0.892, and is considered not to meet the existing criteria. This could be because TLI is more sensitive to model complexity. CFI itself had a good model fit because the value is ≥ 0.90 , which is 0.901. This indicates an

improvement in fit from the multi-item construct specification. Although the TLI model fit was poor with a value of 0.892 and the CFI was good with a value of 0.901, the difference in values was not significant, resulting in a parsimonious model.

Meanwhile, for the measurement of parsimony fit indices DCES, PNFI has a fit model. This model was added to support a model that is not too complicated. The R-square (R^2) values in the CFA test results range from 0.352 to 0.742, which is categorized as moderate. Thus, even though the chi-square (p value) is rejected and TLI has a poor model fit, the model fit of RMSEA, SRMR, and CFI is good, so it can be concluded that the model is likely to be acceptable.

The factor loadings in the CFA test results were also > 0.40 , that is, ranging from 0.593 to 0.862. This indicates that the items represent each factor. The following table shows the reliability of each factor:

Table 3. Reliability of CFA DCES Test Results

Factors	Reliability (Cronbach's alpha)
Digital Perceived Empathic Accuracy	0.939
Digital Persepective-Taking	0.898
Digital Sympathy	0.890
Digital Empathic Anger	0.832
Digital Personal Distress	0.885
Total	0.974

As shown in the table above, of the six factors, the Digital Perceived Empathic Accuracy factor has a very high reliability level because its value is > 0.90 , while the other factors have a high reliability level because their values are in the range of $0.80 - 0.90$. It can be concluded that the construct reliability is at a very high level with a value of 0.974 , $\alpha > 0.90$.

As the closing, to determine whether the items selected from the CFA test can be used in future research, the total item correlation scores were analyzed again to see the level of discrimination. Based on the item-rest correlation values, the discrimination power of the items ranged from 0.534 to 0.809 . Overall, it can be said

that all items have satisfactory discrimination power because their values are > 0.30 , so that the remaining 35 items, after undergoing EFA and CFA tests, can be used in future research.

Discussion

As explained in the introduction, the main objective of this study is to determine the process of adapting DCES in adolescents to early adults from English to Indonesian. In addition, this study also aims to determine the validity of the construct and adequacy of reliability in DCES that has been adapted into Indonesian. In the process of adapting the DCES, the removal of item number 5 on the Digital Personal Distress (DPD) factor from the original version and the deletion of

one of the factors/sub-scales of Digital Emotion Match (DEM) caused the measuring instrument to be unequal to the original version in its adaptation. The researchers assume that this may be due to the omission of stage II of Beaton et al.'s adaptation guidelines, namely translation synthesis, and only adapting the DCES in terms of language (not adapting it in terms of culture). This is supported by Beaton et al. (2000) in their study, which states that a poor adaptation process can result in a measurement tool that is not equivalent to the original version.

The low or unsatisfactory discrimination power of item number 5, which caused the item to be removed, occurred because the item was unable to distinguish between individuals or groups of individuals who had the attribute to be measured and those who did not (Azwar, 2012). This is evidenced by the distribution of respondents' answers, where 174 respondents chose the 1-3 scale range (with details of scale 1 = 28 respondents, scale 2 = 67 respondents, and scale 3 = 79 respondents) and 224 respondents chose the 4-6 scale range (with details of scale 4 = 79 respondents, scale 5 = 92 respondents, and scale 6 = 53 respondents). Meanwhile, when compared to the distribution of

respondents' answers on item number 35 with the highest discrimination power in the EFA test, which was 0.680, 76 respondents chose scale 1-3 (with details of scale 1 = 5 respondents, scale 2 = 28 respondents, and scale 3 = 43 respondents) and 322 respondents chose scales 4-6 (with details of scale 4 = 126 respondents, scale 5 = 117 respondents, and scale 6 = 79 respondents). Based on the comparison of the distribution of respondents' answer choices above, it can be said that the low or unsatisfactory discrimination.

Before the DEM factor was removed in the CFA test, the EFA test results showed that the factor consisted of three items, namely items 10, 31, and 35. As in the original version, these three items were also included in the DEM factor group. Item number 10 states, "Ketika seseorang di dunia maya mengatakan bahwa mereka merasa jijik, saya juga merasa jijik"; item number 31 states, "Saat orang-orang di dunia maya nampaknya marah, saya mulai merasakan kemarahan yang sama"; and item number 35 states, "Saya biasanya merasa sedih ketika orang lain yang di dunia maya merasa sedih". When linked to the importance of adapting not only to the target language version but also to the target culture version, it can be seen from the three

items above that, in addition to describing digital emotion match in the original version, these items also describe digital emotion contagion. In terms of terminology, emotion match and emotion contagion are both defined as the adjustment of the subject's emotional state to the object (Collins et al., 2024; de Waal, 2008).

Emotional contagion occurs when the emotions felt by one person become more similar to those of another as a result of exposure to those emotions. The emotional content of common situations that occur in digital spaces can play a role in emotion contagion. The relationship between the type of emotion and the level of contagion may depend on the situation, platform, and specific culture (Goldenberg & Gross, 2020). Therefore, the possibility that the DEM factor was removed because the model was not acceptable occurred because cultural adaptation was not included in this study.

In addition, apart from the omission of cultural adaptation in this study, the removal of DEM may also be due to the fact that a person's emotions can be identified directly through facial expressions and conversation. As technology develops, people tend to express their emotions

through text on social media posts (Saputri et al., 2018). Meuthia et al. (2023) in their research in Indonesia stated that increased exposure to social media for communication can also provide access to conditions that encourage empathy. Not only that, their research results also show that the high frequency of social media use during the academic period is statistically significantly positively correlated with sympathy. This reveals that emotions are not only integrated by Indonesians into the DEM dimension, but can also be integrated into other dimensions such as the Digital Empathic Accuracy (DPEAcc) and Digital Sympathy (DS) dimensions.

In contrast to the original version, the DEM model was not accepted in the CFA testing, resulting in DCES having only five factors in this study, namely Digital Perceived Accuracy (DPEAcc), Digital Perspective-Taking (DPT), Digital Sympathy (DS), Digital Empathic Anger (DEAng), and Digital Personal Distress (DPD). This is similar to the study conducted by Gebril & Brown (2014), which found that the Teacher's Conceptions of Assessment (TCoA) inventory from the New Zealand model, which initially had four main factors, after CFA testing, it was found that there was one factor model that was not

accepted, leaving only three factors, namely Improvement, Irrelevance, and School Accountability. Furthermore, to resolve this issue, the model was modified by incorporating the items in the Student Accountability factor into the Improvement factor. Similarly, in this study, the researchers resolved the issue of the model not being accepted by incorporating each of the three items in the DEM factor into several factors, namely the DPEAcc, DS, and DPD factors.

After knowing the DCES adaptation process, to find out whether DCES has good construct validity, this study used exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) approaches. In the EFA stage, the method commonly used to maintain all factors is with eigenvalues > 1.00 or by using a scree plot (Knekta et al., 2019). Based on this procedure, six factors were generated, with only two factors having eigenvalues > 1.00 (DPEAcc = 12.342; DPT = 1.553); while the other four factors had eigenvalues < 1.00 (DS = 0.900; DEAng = 0.698; DPD = 0.656; DEM = 0.496). The first factor (DPEAcc) explained 0.343 of the variance, the second factor (DPT) explains 0.386 of the variance, the third factor (DS) explains 0.411 of the variance, the fourth factor

(DEAng) explains 0.430 of the variance, the fifth factor (DPD) explains 0.449 of the variance, and the sixth factor (DEM) explains 0.462 of the variance in DCES.

A two-factor solution was also shown to be more appropriate for the data, as can be seen from the scree plot of the results of the test on the rotated factors. However, the researchers did not perform a second factor analysis by limiting the number of factors according to the scree plot. Then, CFA testing can be continued after conducting a discrimination power test on the four items with factor loadings < 0.40 by looking at the item-rest correlation values to select items that can be revised or removed; the result is 35 items divided into six factors. With Structural Equation Modeling (SEM) analysis on the CFA test results, the model fit can be seen through several global fit statistics such as chi-square, RMSEA, SRMR, TLI, CFI, PNFI, and R^2 because this analysis cannot be directly shown with only one fit statistic (Kline, 2016).

Although the chi-square model fit (p value) in this study was rejected because it was < 0.05 , the use of the model fit is recommended when the sample size is not large or $N < 200$ (Azwar, 2022). The sample size in the CFA test in this study was 401, so researchers could know the

validity of the DCES through other model fits. The Model fit of RMSEA is reasonable, SRMR is acceptable, TLI is poor, CFI is good, and PNFI is fit in this study, allowing the model to be accepted. This is in line with the original version by Collins et al. (2024), which states that the TLI model fit is poor because it does not meet the specified criteria, indicating that there is room for improvement in the model. Improvements in the model are needed, especially in the DEM factor because the model is not accepted. In conclusion, the four model fits (RMSEA, SRMR, CFI, and PNFI) indicate that the model fit is acceptable in data that confirms the factor structure proposed by EFA.

As explained in the research results section, although the TLI model fit is poor with a value of 0.892 and the CFI is good with a value of 0.901, the small difference between the TLI and CFI values has an impact on the parsimonious model. This is because the exclusion of parsimony fit indices (such as RMSEA, TLI) does not improve the model fit compared to the baseline solution where parameters are estimated freely across all groups (Brown, 2015). When compared to the original version, there are significant contextual differences in the magnitude of the factor

loadings. For example, in the researcher's adapted version, items numbered: (1) 1, 11, 14, 20, 29, and 34 have lower factor loadings (0.51–0.67) compared to the original version (0.70–0.80); (2) 6, 9, 15, 24, 27, and 33 have lower factor loadings (0.25–0.56) compared to the original version (0.71–0.89); (3) 2, 7, 16, 29, 25, and 32 have lower factor loadings (0.40–0.53) compared to the original version (0.81–0.84); (4) 3, 8, 18, 21, 28, and 36 have lower factor loadings (0.34–0.57) compared to the original version (0.66–0.85); (5) 5, 12, 17, 22, 26, and 30 have lower factor loadings (0.36–0.64) compared to the original version (0.39–0.81); and (6) 4, 10, 13, 23, 31, and 35 have lower factor loadings (0.40–0.59) compared to the original version (0.64–0.83). These findings indicate that the level of digital empathy in the context of communication in Indonesia tends to be lower than in the country that developed the original version.

In answering the final objective of the study, namely to know whether DCES has adequate reliability, the researcher used the alpha (α) reliability formula. In the EFA test, the Cronbach's alpha (α) value of DCES was 0.945, indicating that the DCES construct is very highly reliable. For each factor, the α value of the DPEAcc and DPT

factors was 0.860 and 0.825, indicating that both factors were highly reliable, while the DS, DEAng, DPD, and DEM factors were 0.772, 0.780, 0.789, and 0.724, indicating that the remaining four factors were reliable. Meanwhile, in the CFA test, the α value of DCES was 0.974, indicating that the DCES construct is very highly reliable too. The factors themselves, the α value of the DPEAcc factor was 0.939, indicating that this factor is very highly reliable, while the DPT, DS, DEAng, and DPD factors were 0.898, 0.890, 0.832, and 0.885, indicating that these factors are highly reliable.

The difference in reliability by comparing α values (Cronbach's alpha) found that the reliability (0.83–0.94) of the researcher's adapted version was not significantly different from the reliability (0.86–0.94) of the original version. This suggests that the DCES construct is also reliable in measuring digital empathy in the context of communication in Indonesia. Overall, it can be said that the reliability of the DCES construct from the factor analysis test results is very high. As stated by Collins et al. (2024) regarding the reliability of the original version, the reliability of the DCES construct in this study is acceptable and adequate because it is very high.

The practical application of this measurement tool includes: (1) Educational Diagnosis: this measurement tool can be integrated into digital welfare programs in schools and universities to identify students and/or university students who have low levels of digital empathy and are at risk of becoming perpetrators of cyberbullying or having difficulty building healthy social relationships online. (2) Content and Campaign Development: non-governmental organizations (NGOs) and policymakers can use this measurement tool to evaluate the effectiveness of social media campaigns designed to promote empathy and reduce hate speech, and (3) Selection and Training: in the professional world, especially for positions that require digital community management (such as social media managers and online customer service representatives), DCES can be used as an assessment tool and a basis for developing measurable digital empathy training modules. Conceptually, further research is very important so that this measurement tool can be used to measure more comprehensively the improvement of digital communication health in Indonesia. Although the DCES demonstrated good construct validity and adequate reliability, further analysis revealed that the adapted

version was not entirely equivalent to the original version. Implicitly, this study found that 35 of the 36 items passed the EFA test, and five of the six factors were confirmed in the CFA analysis.

CONCLUSION AND SUGGESTIONS

Conclusion

- (1) The adaptation process in this study had several limitations, as it did not apply stage II (translation synthesis) of the guidelines and only performed linguistic adaptation without cultural adaptation. This limitation needs to be considered as one of the factors affecting the equivalence of the measurement tool with the original version. The study findings, in which only 35 items survived in EFA and five factors were confirmed in CFA, reflect this dynamic;
- (2) Good construct validity can be seen through the results of Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) tests. Based on the EFA test results, the eigenvalue > 1.00 and the scree plot also indicate that a two-factor solution is more appropriate for the data. All retained items have factor loadings ≥ 0.40 and item-rest correlations ≥ 0.30 .

In the CFA test, although the chi-square model fit (p value) was rejected and the Tucker-Lewis Index (TLI) was poor, the four model fits (RMSEA, SRMR, CFI, and PNFI) showed that the model fit was acceptable for the data, confirming the factor structure proposed by EFA; and

- (3) The reliability of the EFA and CFA tests of the DCES construct in this study is in line with the original version; the reliability is acceptable and adequate because it is at a very high level.

Suggestion

Based on the researchers' experiences during the adaptation study, here are some suggestions for future researchers developing DCES for future research purposes:

- (1) Consider each item for modification and adaptation to Indonesian culture, as the removal of the Digital Emotion Match (DEM) factor may be due to researchers not including adaptations for the target culture;
- (2) Exploring the use of other statistical software such as R, MPlus, and others because Jeffreys' Amazing Statistics Program (JASP) has limitations in calculating Composite Reliability (CR)

when determining internal consistency and complexity in analyzing Structural Equation Modeling (SEM) to obtain more comprehensive CFA test results; and

- (3) Attempting to conduct EFA testing again based on the two-factor solution

from the scree plot or factors with eigenvalues > 1.00 , Digital Perceived Empathic Accuracy (DPEAcc) and Digital Perspective-Taking (DPT).

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