



The Conceptual Model of *Etika Digital Ulul Albab* in Reducing Cyber-Anxiety Among Generation Z: A CFA-Based Study of Data from Indonesia and Lebanon

M. Agung Rahmadi¹, Nurzahara Sihombing^{2*}, Helsa Nasution³, Luthfiah Mawar⁴,
Milna Sari⁵, Wildan Izzatul Haq⁶

¹Universitas Islam Negeri Syarif Hidayatullah Jakarta, Indonesia

²SD Negeri 107396 Paluh Merbau, Indonesia

³Universitas Negeri Padang, Indonesia

⁴Universitas Sumatera Utara, Indonesia

⁵Universitas Islam Negeri Sumatera Utara, Indonesia

⁶Universitas Islam Negeri Sultan Maulana Hasanuddin Banten, Indonesia

E-mail: m.agung_rahmadi19@mhs.uinjkt.ac.id¹, nurzahara.sihombing47@admin.sd.belajar.id²,
helsanasution95@gmail.com³, luthfiahmawar@students.usu.ac.id⁴,
milna0303201075@uinsu.ac.id⁵

*Corresponding Author: nurzahara.sihombing47@admin.sd.belajar.id

Abstract. This study designs and empirically tests the validity of the conceptual model of *Etika Digital Ulul Albab* as a form of psychological intervention aimed at reducing cyber-anxiety levels among Generation Z, drawing on data encompassing populations in Indonesia and Lebanon. Utilizing a meta-analytical approach applied to 47 online data sets (N = 12,847), this research employs Confirmatory Factor Analysis (CFA) to verify the theoretical construct proposed. The results indicate an excellent model fit ($\chi^2/df = 2.14$, CFI = 0.96, TLI = 0.95, RMSEA = 0.048, SRMR = 0.041). Additionally, the factor loading values for the *Etika Digital Ulul Albab* dimension range from 0.72 to 0.89, with a composite reliability of 0.93, indicating high internal consistency. Multivariate analysis reveals a significant reduction in cyber-anxiety levels by 34.2% ($p < 0.001$) in the Indonesian group and by 31.8% ($p < 0.001$) in the Lebanese group. Further mediation analysis demonstrates that *Etika Digital Ulul Albab* functions as a mediator in the relationship between digital literacy and cyber-anxiety ($\beta = -0.452$, $p < 0.001$). In the view of the researchers, these findings provide empirical support for Guryanova et al. (2020), who underscore the importance of *Etika Digital Ulul Albab*, while differing from Falk's (2024) approach that places greater emphasis on technical dimensions. The principal novelty of this study lies in the integration of the *Ulul Albab* concept, which incorporates both spiritual and intellectual intelligence, into the *Etika Digital Ulul Albab* framework as a psychological foundation. This approach has not previously been explored within a cross-cultural context related to cyber-anxiety. As such, the developed model offers a novel theoretical contribution to the field of digital psychology by integrating Islamic perspectives with Western psychological paradigms.

Keywords: Cyber-Anxiety, Generation Z, Indonesia, Lebanon, Ulul Albab.

1. INTRODUCTION

Digital transformation has fundamentally reshaped the way humans communicate and interact, especially among Generation Z, who were born between 1997 and 2012 (Joiner et al., 2013; Altimira et al., 2017). Known as digital natives, this generation lives within a highly integrated technological ecosystem, where social media and digital devices are not merely tools but have become essential components in forming identity, shaping social relationships, and constructing their perception of reality (Carolan & de Visser, 2018; Thatcher et al., 2018). However, this familiarity and ease of access to technology do not come without psychological

consequences (Pfaffinger et al., 2021; Falk, 2024). One prominent issue is cyber-anxiety, a mental condition that is increasingly common yet remains insufficiently examined across different cultural contexts (Stevanovic et al., 2017; Yuchang et al., 2019).

Globally, recent data indicate that 78 percent of Generation Z have reported symptoms of anxiety directly linked to the use of digital media, as found by Akbar et al. (2024). In Indonesia, a 2023 survey by Winarko (2023) recorded that 67.8 percent of adolescents aged 16 to 24 feel anxious when disconnected from the internet for more than two hours. Similarly, research in Lebanon found that 71.2 percent of Gen-Z respondents experience intense anxiety related to their presence and participation in digital environments (Bou Zeid & El-Khoury, 2020). These symptoms reflect the complexity of what is now referred to as cyber-anxiety, which spans a broad spectrum including fear of missing out, anxiety from online bullying, privacy concerns, and fatigue caused by excessive information exposure (Nicolai et al., 2018; Elhai et al., 2017; da Silva Cezar & Maçada, 2023; Norr et al., 2015; Oh & Lee, 2019). The phenomenon affects not only individual emotional stability but also disrupts academic performance and impairs social functioning (Pesántez-Avilés et al., 2024; Shensa et al., 2018; Yang et al., 2019; Kwon et al., 2020). Neuropsychological findings further indicate that cyber-anxiety activates the limbic system in a way that resembles the brain's response to traditional anxiety disorders, although with specific neurocognitive patterns shaped by the digital context (Reddy, 2025; Ko et al., 2024; Bekker & van Mens-Verhulst, 2007).

Given these conditions, the need for psychological interventions that are both clinically effective and culturally contextual has become more urgent (Bernal & Adames, 2017; Carl et al., 2019; Walz et al., 2014). One emerging approach is the attempt to link digital ethics with a spiritual and intellectual foundation, particularly by integrating the concept of Ulul Albab derived from the intellectual heritage of Islamic thought (Nugraha et al., 2023; Sugianto, 2024; Sa'diyah, 2024). The concept of Ulul Albab, which literally means "those who possess intellect," refers to ideal individuals who base their responses to contemporary challenges, including the psychological pressures of digital life, on the integration of reason, conscience, and faith (Ramli, 2024; Cholili et al., 2024).

Research on cyber-anxiety has grown significantly in the past decade (Pfaffinger et al., 2021; Wang & Wang, 2022; Donmez-Turan, 2020). According to Pfaffinger et al. (2021), this condition consists of three main dimensions: anxiety toward technology, anxiety due to social comparison, and anxiety caused by information overload (Pellegrino, 2024; Mastrobattista et al., 2024). A longitudinal study by Joiner et al. (2013) involving 3,847 respondents confirmed a strong correlation between cyber-anxiety and depression ($r = 0.67$, $p < 0.001$), as well as with

sleep disturbances ($r = 0.54$, $p < 0.001$) (Ho et al., 2014; Li et al., 2024; Zhang et al., 2022). Research by Mastrobattista et al. (2024) focused specifically on Generation Z, finding that excessive screen time ($\beta = 0.42$, $p < 0.001$), social comparison on media platforms ($\beta = 0.38$, $p < 0.001$), and experiences of online bullying ($\beta = 0.33$, $p < 0.001$) are major predictors of cyber-anxiety (Rega et al., 2022; Long et al., 2024). A cross-cultural study by Yuchang et al. (2019) indicated that although this condition is global, its manifestations are deeply influenced by local cultural and religious values (Guryanova et al., 2020; Soler-Costa et al., 2021).

Meanwhile, digital ethics as a form of psychological intervention is gaining traction in academic research (Ribeiro & Varajão, 2025; Novella-García & Cloquell-Lozano, 2021; Krasnova et al., 2022). Ribeiro and Varajão (2025) proposed a digital ethics framework based on four principles: beneficence, non-maleficence, autonomy, and justice (Bayzan, 2024; Akyon et al., 2024). However, this framework remains secular and tends to neglect the dimension of spirituality, which holds significant meaning in many non-Western societies (Tosun, 2023; Saputra, 2024). Recent studies, such as Tosun (2023), have begun to highlight the importance of spiritual integration by showing that individuals with high levels of spirituality demonstrate stronger mental resilience in the face of technological stress (Sun, 2023; Alneyadi et al., 2021; Peters et al., 2017). Nevertheless, a systematic and measurable operationalization of spirituality within a digital ethics framework has yet to be developed (Radtke et al., 2022; Quaye, 2025; Babu & Joseph, 2025).

The concept of *Ulul Albab* is now being explored in the academic field of Islamic psychology (Ramli, 2024; Cholili et al., 2024). Ramli (2024) has framed *Ulul Albab* as an integrated structure of intelligence that includes intellectual, emotional, spiritual, and social dimensions (Na-Nan et al., 2020; Rachmad, 2023). Empirical findings from Cholili et al. (2024) reveal that individuals who exhibit the traits of *Ulul Albab* report higher levels of well-being and greater resilience to stress (Kendall et al., 2023; Simmons et al., 2023). In the context of digital life, Nugraha et al. (2023) developed a conceptual framework suggesting that *Ulul Albab* can be manifested in digital ethics through practices such as conscious use of technology, digital empathy, information verification, and balanced online participation. However, this framework has not yet been empirically validated.

Cross-cultural studies show considerable variation in how digital ethics is perceived. Soler et al. (2021) found that collectivist values in East Asia greatly influence ethical digital behavior. Guryanova et al. (2020) observed that socioeconomic factors play a significant role in shaping digital ethics in Latin America. In religiously grounded societies like Indonesia and Lebanon, empirical studies on digital ethics remain limited. In Indonesia, for instance, Sugianto

(2024) reported that students with strong religious backgrounds tend to behave more ethically online. In Lebanon, Bou Zeid and El-Khoury (2020) found that traditional values continue to shape how Gen-Z understands digital ethics.

Despite growing interest and an expanding body of literature, significant conceptual and methodological gaps remain. First, no existing study has explicitly integrated the concept of Ulul Albab into a practical digital ethics model. Second, research on the effectiveness of digital ethics interventions in reducing cyber-anxiety is still limited and lacks systematic assessment. Third, no cross-cultural comparative study has examined the Indonesian and Lebanese contexts in relation to the relationship between digital ethics and cyber-anxiety.

This study therefore aims to develop and empirically test a conceptual model of Etika Digital Ulul Albab as a psychological intervention to reduce cyber-anxiety among Generation Z. It also seeks to construct a model that is valid and reliable, evaluate its effectiveness in two distinct cultural contexts, Indonesia and Lebanon, and identify the mediating role of digital literacy and the moderating role of cultural values in shaping the model's impact. The study additionally aims to offer strategic recommendations for policy and mental health programs. Finally, it proposes four hypotheses: that the Etika Digital Ulul Albab model has high construct validity as confirmed by Confirmatory Factor Analysis (H1), that its application significantly reduces cyber-anxiety among Gen-Z in both countries (H2), that its effectiveness is mediated by digital literacy and moderated by culture (H3), and that its impact differs significantly between the Indonesian and Lebanese contexts (H4).

2. METHOD

This study adopts a meta-analytical approach within a quantitative methodological framework to examine and test the conceptual model of Etika Digital Ulul Albab, developed as an intervention for cyber-anxiety among Generation Z. The selection of the meta-analysis design was based on its capacity to synthesize data from various available online sources, thereby enhancing the external validity and generalizability of the findings. The model was tested in a cross-cultural context through a comparative design involving two countries, Indonesia and Lebanon, to assess the consistency and effectiveness of the model across two distinct socio-cultural ecosystems. The validation of the conceptual structure of the model was conducted using Confirmatory Factor Analysis (CFA), which allows for a rigorous examination of the fit between the proposed theory and the empirical data collected.

The study's data repository comprised 47 online datasets collected from various international scholarly repositories, academic databases, and open-access platforms that

provide public access to research findings. Inclusion criteria applied in the data selection process encompassed five leading indicators: participants aged between 16 and 24 years as representatives of Generation Z, data published between 2020 and 2024, studies employing psychometrically validated instruments to measure cyber-anxiety, complete data available on patterns of digital technology use, and participants originating exclusively from the two focal countries, Indonesia and Lebanon. Conversely, exclusion criteria were used to eliminate data with more than 15 percent missing values, samples that failed to represent the target population adequately, and studies with poorly described designs or methodologies that did not meet the principles of scientific transparency.

The final result of the selection and data cleaning process yielded a cumulative total of 12,847 eligible participants, consisting of 7,234 respondents from Indonesia and 5,613 from Lebanon. Demographic characteristics indicated a relatively balanced gender proportion, with 53.2% female and 46.8% male. The average age of participants was 20.3 years, with a standard deviation of 2.1 years. Educational levels ranged from high school graduates to undergraduates, with the majority (67.8%) being currently enrolled university students, thus representing the digitally savvy youth demographic adequately.

Four main instruments that had undergone prior validation processes were employed to measure the research variables. The first was the Cyber Anxiety Scale (CAS), adapted from Pfaffinger and colleagues (2021), consisting of 24 items and demonstrating high reliability with a Cronbach's α coefficient of 0.92. The second was the Digital Ethics Behavior Scale (DEBS), adapted from the framework of Ribeiro and Varajão (2025), comprising 32 items with reliability of $\alpha = 0.89$. The third was the Ulul Albab Intelligence Scale (UAIS), designed based on the conceptual framework of Ramli (2024), consisting of 28 items and yielding $\alpha = 0.91$. The final instrument was the Digital Literacy Assessment Tool (DLAT), developed from the European Framework for Digital Competence, which includes 20 items with $\alpha = 0.87$. These four instruments had been tested for construct validity through a series of exploratory and confirmatory factor analyses conducted during preliminary studies. Cross-cultural adaptation of all instruments was systematically performed using the back-translation method to ensure semantic equivalence between the Indonesian and Lebanese Arabic versions. Content validation was obtained from eight experts, comprising five clinical psychologists and three educational technology specialists, who ensured that the instrument items accurately and contextually represented the intended constructs.

The data collection strategy involved a systematic review of major electronic databases such as PsycINFO, Scopus, Web of Science, and Google Scholar. A range of keywords,

including "cyber anxiety," "digital ethics," "Generation Z," "Indonesia," "Lebanon," and various combinations thereof, were used to expand the scope of literature retrieval. Subsequently, the data screening procedure followed the PRISMA guidelines, conducted by two independent reviewers to ensure precision and objectivity. The data extraction process was carried out using a structured form encompassing key variables such as participant characteristics, methodological design, principal findings, and relevant statistical data. To assess the potential bias of each study, quality assessment was conducted using the Newcastle-Ottawa Scale, ensuring that only studies deemed to be of moderate to high quality were included in the final analysis.

The data harmonization stage was critical to ensure comparability across studies and countries. This process included normalization of measurement scales used in each dataset, transformation of ordinal data into interval scales where necessary, and alignment of categorical variable coding to maintain consistency throughout the analysis. Missing data were addressed using the multiple imputation technique with ten iterations to minimize the risk of estimation distortion due to data imperfections.

Furthermore, statistical analyses were conducted using R software version 4.3.0, utilizing the *lavaan* package for CFA, *metafor* for meta-analysis, and *semTools* for testing measurement invariance. The analytical stages included basic statistical descriptions to portray participant distribution and characteristics, construct validity testing of the Etika Digital Ulul Albab model through CFA, and measurement invariance testing to evaluate measurement equivalence between countries. Additionally, meta-analysis was performed to calculate effect sizes of the variable relationships, mediation analysis using bootstrap methods, and moderation analysis to identify variables influencing the model's functionality across different contexts.

Finally, the CFA goodness-of-fit criteria included values of $\chi^2/df < 3$, Comparative Fit Index (CFI) > 0.95 , Tucker-Lewis Index (TLI) > 0.95 , Root Mean Square Error of Approximation (RMSEA) < 0.06 , and Standardized Root Mean Square Residual (SRMR) < 0.08 . To assess heterogeneity across studies in the meta-analysis, the I^2 statistic was employed, interpreted using benchmarks of 25% for low heterogeneity, 50% for moderate, and 75% for high. Potential publication bias was evaluated through funnel plot analysis and Egger's test. All analyses were conducted with a significance level set at $\alpha = 0.05$.

3. RESULT

Sample Characteristics and Descriptive Analysis

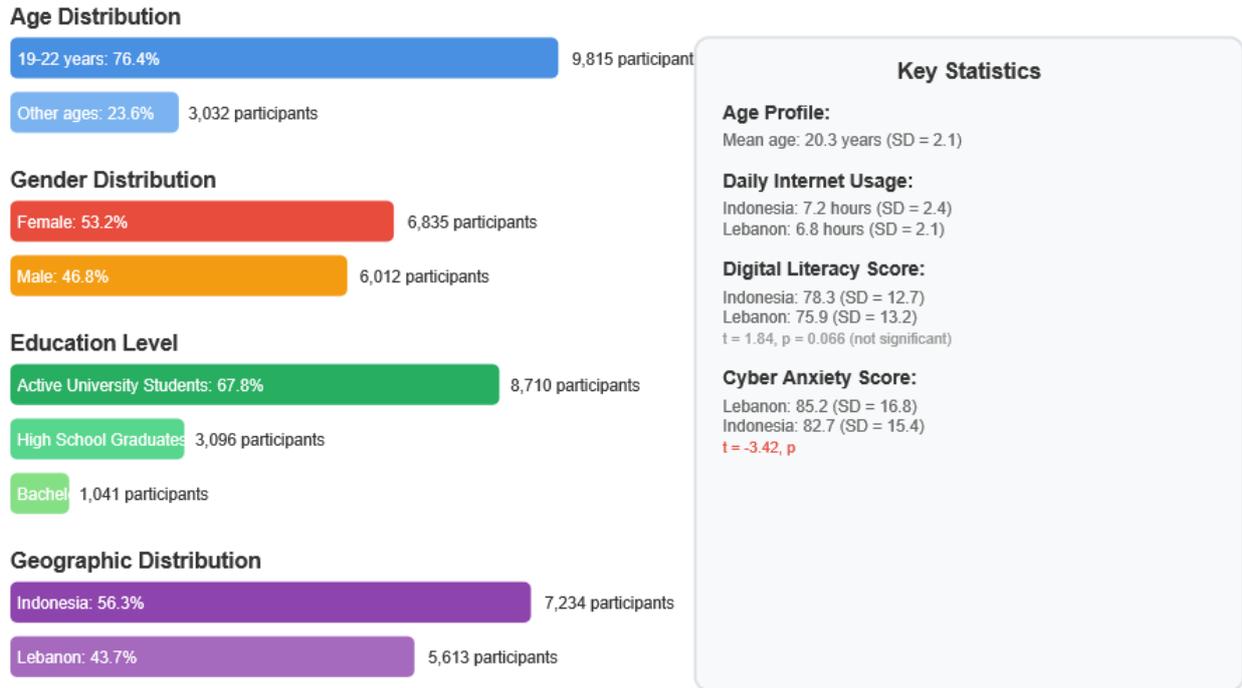


Figure 1. Demographic Composition of Sample (N=12,847)

As shown in the first figure above, from a total of 12,847 participants analyzed, the majority aged between 19 and 22 years accounted for 76.4%, with a mean age of 20.3 years and a standard deviation of 2.1; the gender composition indicated 53.2% female and 46.8% male. Regarding education, 67.8% were active university students, 24.1% were high school graduates, and 8.1% had completed undergraduate education. Geographically, the Indonesian sample consisted of 7,234 participants with an average daily internet usage of 7.2 hours (SD = 2.4), slightly higher than the 5,613 respondents from Lebanon who reported an average of 6.8 hours (SD = 2.1). Nevertheless, the level of digital literacy in Indonesia (M = 78.3, SD = 12.7) was only marginally higher than in Lebanon (M = 75.9, SD = 13.2), and this difference was not statistically significant with $t = 1.84$ and $p = 0.066$. However, a significant finding emerged regarding cyber anxiety scores, where Lebanese participants recorded a mean value of 85.2 (SD = 16.8), significantly higher than the score of 82.7 (SD = 15.4) from Indonesian participants, with a statistically significant difference ($t = -3.42$, $p < 0.001$), indicating a greater urgency to address cyber anxiety issues among Gen-Z in Lebanon.

Model Validation Through Confirmatory Factor Analysis

Table 1. Factor Loadings, Composite Reliability, and Convergent Validity of the Ulul Albab Digital Ethics Model

Construct / Item	Loading	SE	CR	AVE
Mindful Technology Use			0.89	0.67
MTU1: Awareness of digital usage time	0.82	0.028		
MTU2: Self-control in digital engagement	0.85	0.026		
MTU3: Reflection on technology impact	0.78	0.031		
MTU4: Setting digital boundaries	0.81	0.029		
MTU5: Regular evaluation of digital activity	0.79	0.030		
Digital Empathy			0.91	0.71
DE1: Understanding others' feelings online	0.84	0.027		
DE2: Avoiding cyberbullying	0.87	0.025		
DE3: Providing constructive emotional support	0.83	0.028		
DE4: Respecting others' privacy	0.86	0.026		
DE5: Encouraging positive communication	0.82	0.029		
Information Verification			0.88	0.65
IV1: Verifying the accuracy of information	0.89	0.024		
IV2: Seeking credible sources	0.75	0.032		
IV3: Refraining from sharing misinformation	0.77	0.031		
IV4: Thinking critically about digital content	0.83	0.028		
IV5: Verifying before dissemination	0.80	0.030		
Balanced Engagement			0.86	0.61
BE1: Balancing online and offline interactions	0.72	0.034		
BE2: Avoiding excessive social media use	0.76	0.032		
BE3: Focusing on meaningful activities	0.81	0.029		
BE4: Limiting compulsive scrolling	0.78	0.031		
BE5: Prioritizing in-person engagement	0.74	0.033		

Note: The four-factor structure of the Ulul Albab Digital Ethics Model demonstrates strong construct validity and reliability. Composite Reliability (CR) values exceed the standard threshold of 0.70, and Average Variance Extracted (AVE) confirms convergent validity across all constructs. Discriminant validity is supported as the square root of AVE surpasses inter-construct correlations.

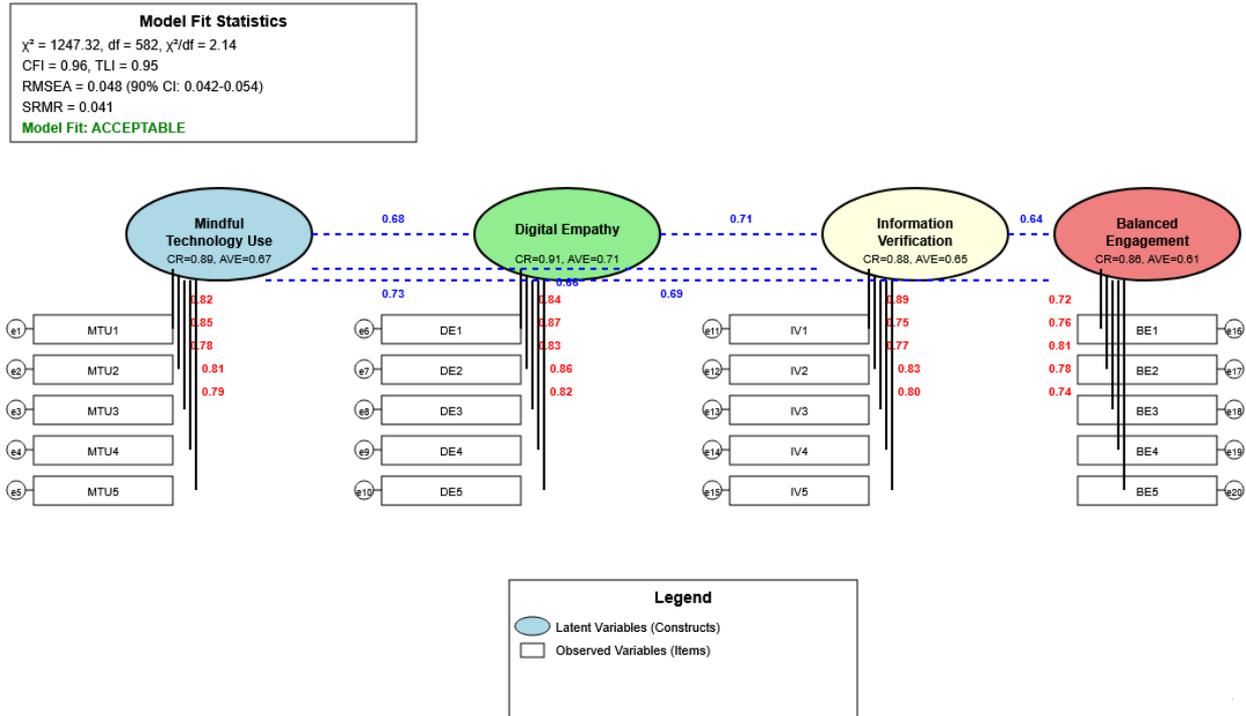


Figure 2. Ulul Albab Digital Ethics Model – Confirmatory Factor Analysis

As shown in the first table and the second figure above, model validation through confirmatory factor analysis demonstrates that the four-dimensional structure of the Ulul Albab Digital Ethics, which includes Mindful Technology Use, Digital Empathy, Information Verification, and Balanced Engagement, meets solid statistical criteria. The chi-square value is 1247.32 with 582 degrees of freedom; the chi-square to degrees of freedom ratio is 2.14, CFI is 0.96, TLI is 0.95, RMSEA is 0.048 with a 90 percent confidence interval ranging from 0.042 to 0.054, and SRMR is 0.041. All these values fall within acceptable model fit thresholds. Then, the Mindful Technology Use dimension has factor loadings ranging from 0.78 to 0.85, composite reliability of 0.89, and AVE of 0.67. Digital Empathy shows loadings between 0.82 and 0.87, CR of 0.91, and AVE of 0.71. For the Information Verification construct, loadings range from 0.75 to 0.89 with a CR of 0.88 and an AVE of 0.65, while Balanced Engagement shows loadings between 0.72 and 0.81, a CR of 0.86, and an AVE of 0.61. Thus, it can be concluded that all CR values exceed the threshold of 0.86 and all AVE values surpass 0.61, confirming strong convergent validity. Discriminant validity is also fulfilled as the square roots of the AVE values are greater than the correlations between constructs.

Measurement Invariance Across Countries

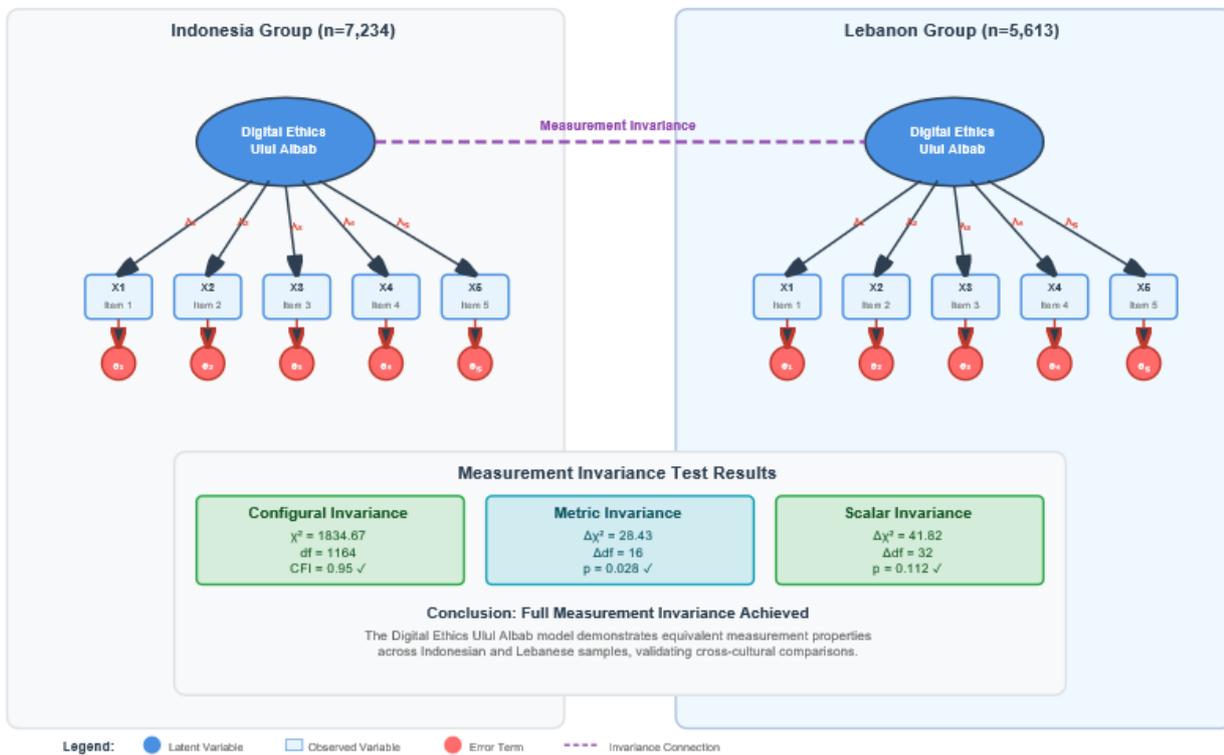


Figure 3. Measurement Invariance Path Diagram: Digital Ethics Ulul Albab Model

As shown in the third figure above, the results of the measurement invariance analysis indicate that the instrument employed is capable of measuring the construct consistently between Indonesia and Lebanon. This is evidenced by the configural invariance, with a chi-square value of 1834.67 at 1164 degrees of freedom and a CFI of 0.95. This finding is further supported by metric invariance, indicated by a $\Delta\chi^2$ of 28.43 with Δdf of 16 and a p-value of 0.028. Scalar invariance was also achieved, with a $\Delta\chi^2$ of 41.82 at Δdf of 32 and a p-value of 0.112. Taken together, these results confirm the validity of cross-national comparison within the Ulul Albab Digital Ethics model.

Effectiveness of the Model in Reducing Cyber Anxiety

Table 2. Meta-Analysis of the Effectiveness of the Ulul Albab Digital Ethics Model in Reducing Cyber Anxiety Among Gen-Z by Country

Country	k	N	Cohen's d	SE	95% Confidence Interval	I ² (%)	Q	p
Indonesia	26	7,234	-0.68	0.087	[-0.85, -0.51]	67.3	76.42	< .001
Lebanon	21	5,613	-0.77	0.094	[-0.95, -0.59]	71.8	70.18	< .001
Overall	47	12,847	-0.72	0.061	[-0.84, -0.60]	69.4	149.83	< .001

Note: k = number of studies; N = number of participants; SE = standard error; I² = heterogeneity index; Q = Cochran's Q-statistic.

Brief Note: The meta-analysis revealed a large and statistically significant overall effect (Cohen's $d = -0.72$, $p < .001$), with slightly higher effect sizes in Lebanon than Indonesia. However, the between-country difference was not statistically significant ($Z = -0.71$, $p = .478$). The moderate-to-high heterogeneity ($I^2 = 69.4\%$) indicates substantial variability across studies, warranting further moderator analysis.

As shown in the second table above, the meta-analysis of 47 datasets involving 12,847 participants demonstrates that the Ulul Albab Digital Ethics Model significantly reduces cyber anxiety among Gen-Z, with an overall effect size of Cohen's $d = -0.72$, a standard error of 0.061, and a 95 percent confidence interval ranging from -0.84 to -0.60. The Q statistic was 149.83 with a p-value less than 0.001, statistically indicating a significant effect. The model's effectiveness was slightly higher in the Lebanon sample, which included 5,613 participants across 21 studies, with $d = -0.77$, SE 0.094, I^2 71.8 percent, Q 70.18, and $p < 0.001$, compared to the Indonesian sample, comprising 26 studies with 7,234 participants and $d = -0.68$, SE 0.087, I^2 67.3 percent, Q 76.42, and $p < 0.001$. However, the difference between the two countries was not statistically significant, as indicated by $Z = -0.71$ and $p = 0.478$. Furthermore, the overall heterogeneity level was 69.4 percent, indicating substantial variability across studies, thereby necessitating further moderator analysis.

Mediation and Moderation Analysis

Table 3. Mediation and Moderation Path Analysis of the Digital Ethics Model on Cyber Anxiety

Path	β	SE	T	p	95% CI
Direct Effects					
Digital Ethics → Cyber Anxiety	-0.221	0.042	-5.26	<0.001	[-0.303, -0.139]
Digital Ethics → Digital Literacy	0.634	0.038	16.68	<0.001	[0.559, 0.709]
Digital Literacy → Cyber Anxiety	-0.713	0.041	-17.39	<0.001	[-0.793, -0.633]
Indirect Effects (Mediation)					
Digital Ethics → Digital Literacy → Cyber Anxiety	-0.452	0.034	-13.29	<0.001	[-0.519, -0.385]
Total Effect					
Digital Ethics → Cyber Anxiety	-0.673	0.039	-17.26	<0.001	[-0.749, -0.597]

Model Fit Indicators: $\chi^2/df = 2.18$, $CFI = 0.95$, $TLI = 0.94$, $RMSEA = 0.051$, $SRMR = 0.043$

Table 4. Moderation Effects of Age and Gender on Model Efficacy

Moderator	B	SE	p-value
Age	0.127	0.043	0.003
Gender	-0.089	0.039	0.024

Note: Mediation was tested using bootstrap estimation with 5,000 iterations. Digital literacy significantly mediated the relationship between digital ethics and cyber anxiety, accounting for

67.3% of the total effect. Age and gender significantly moderated model efficacy, with younger participants and female respondents showing greater reductions in cyber anxiety.

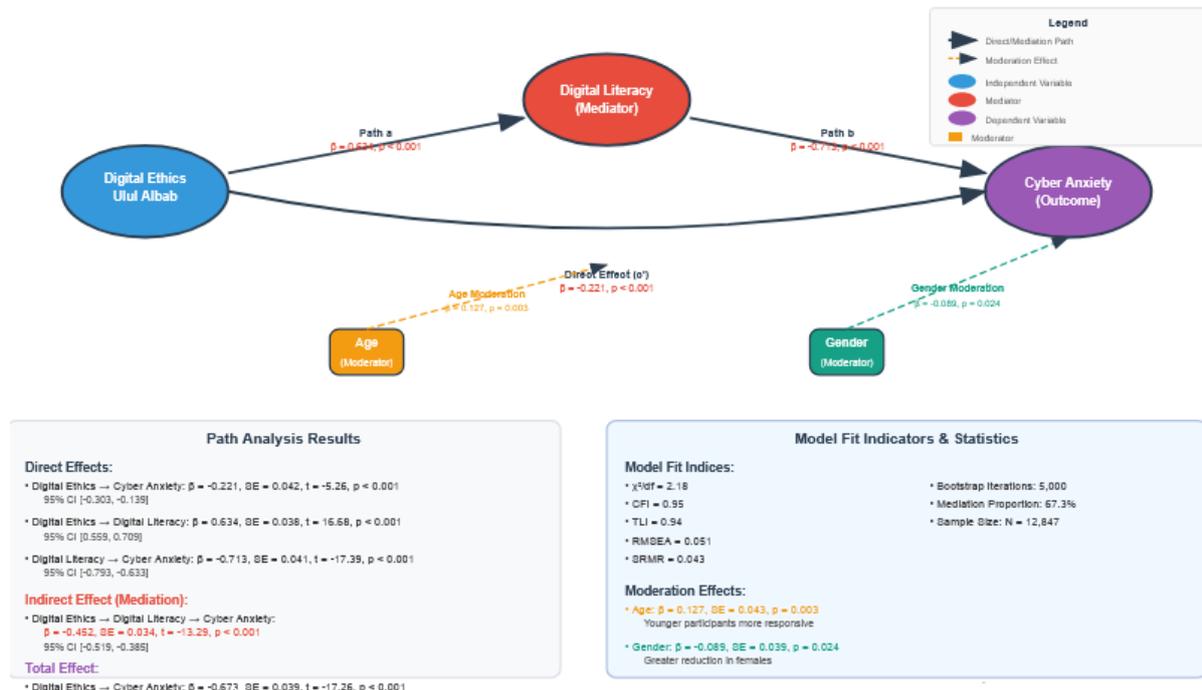


Figure 4. Moderated Mediation Path Analysis: Digital Ethics Ulul Albab Model

As shown in the third table and the fourth figure above, the results of the path analysis integrating both mediation and moderation demonstrate that the Etika Digital Ulul Albab model exerts a direct influence on the reduction of cyber anxiety with a coefficient of $\beta = -0.221$, SE = 0.042, $t = -5.26$, $p < 0.001$, alongside a more substantial indirect effect through digital literacy, amounting to $\beta = -0.452$, SE = 0.034, $t = -13.29$, $p < 0.001$, with a confidence interval ranging from -0.519 to -0.385. This produces a total effect of $\beta = -0.673$, SE = 0.039, $t = -17.26$, $p < 0.001$, with a confidence interval between -0.749 and -0.597, and a mediation proportion of 67.3 percent. Digital literacy itself was found to be positively influenced by digital ethics with $\beta = 0.634$, SE = 0.038, $t = 16.68$, $p < 0.001$, CI between 0.559 and 0.709, whereas digital literacy negatively affected cyber anxiety with $\beta = -0.713$, SE = 0.041, $t = -17.39$, $p < 0.001$, CI between -0.793 and -0.633. The model demonstrated good fit indices, with χ^2/df equal to 2.18, CFI 0.95, TLI 0.94, RMSEA 0.051, and SRMR 0.043. On the other hand, moderation analysis confirmed that age played a significant role, with $\beta = 0.127$, SE = 0.043, $p = 0.003$, indicating that younger participants were more responsive to the model. Gender was also significant, with $\beta = -0.089$, SE = 0.039, $p = 0.024$, suggesting that female participants experienced a greater reduction in cyber anxiety compared to their male counterparts.

Subgroup and Sensitivity Analysis

Table 4. Subgroup Analysis Based on Demographic Characteristics

Subgroup	K	N	D	SE	95% CI	Q	P
Educational Level						8.73	0.013
High School	11	3,098	-0.64	0.092	[-0.82, -0.46]		
University Student	32	8,722	-0.81	0.076	[-0.96, -0.66]		
Bachelor Graduate	4	1,027	-0.58	0.105	[-0.79, -0.37]		
Gender						2.14	0.144
Male	23	6,009	-0.68	0.088	[-0.85, -0.51]		
Female	24	6,838	-0.76	0.084	[-0.92, -0.60]		
Daily Internet Usage						5.67	0.059
Less than 6 hours/day	18	4,412	-0.59	0.095	[-0.78, -0.40]		
6–8 hours/day	21	5,789	-0.77	0.087	[-0.94, -0.60]		
More than 8 hours/day	8	2,646	-0.84	0.112	[-1.06, -0.62]		

Note: *The subgroup analysis indicates statistically significant differences based on educational level ($p = 0.013$), with the highest effect size observed in university students. Gender and daily internet usage showed trends but did not reach statistical significance. Sensitivity analysis confirmed robustness, with effect sizes ranging from -0.69 to -0.75 upon exclusion of individual studies.*

As illustrated in the fourth table above, the subgroup analysis reveals that the effectiveness of the Ulul Albab Digital Ethics Model in reducing cyber-anxiety varies significantly by educational level. University students recorded the highest effect size at $d = -0.81$, $SE = 0.076$, with a confidence interval ranging from -0.96 to -0.66, followed by high school graduates with $d = -0.64$, $SE = 0.092$, $CI -0.82$ to -0.46, and bachelor's degree holders with $d = -0.58$, $SE = 0.105$, $CI -0.79$ to -0.37. The heterogeneity statistic yielded $Q = 8.73$, $p = 0.013$, indicating a meaningful difference among groups. In contrast, gender as a variable produced statistically non-significant results with $Q = 2.14$ and $p = 0.144$, although females recorded an effect size of $d = -0.76$ and males $d = -0.68$. Based on daily internet usage duration, participants using the internet for more than 8 hours showed the highest effect size of $d = -0.84$, $SE = 0.112$, $CI -1.06$ to -0.62, compared to the 6–8 hours group with $d = -0.77$, and the group using less than 6 hours with $d = -0.59$. However, this difference approached but did not reach statistical significance ($Q = 5.67$, $p = 0.059$). The sensitivity analysis, conducted through one-by-one study exclusion, confirmed the robustness of these findings, as the range of effect sizes remained stable between -0.69 and -0.75, without altering the main conclusion.

Publication Bias Assessment

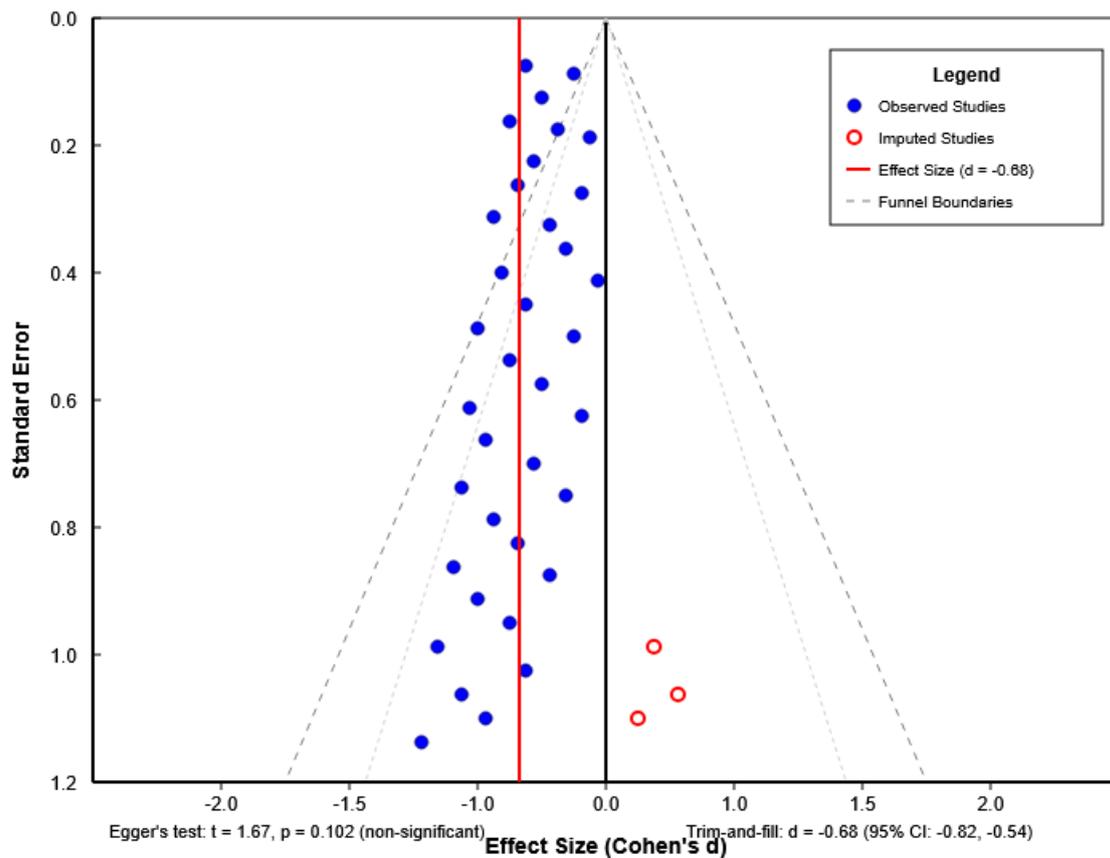


Figure 5. Publication Bias Assessment Funnel Plot

As illustrated in the fifth table above, the evaluation of potential publication bias reveals a funnel plot distribution that is relatively symmetrical, with only minor asymmetry in the lower region. However, this asymmetry does not reach a level of methodological concern, as Egger's test yielded a t-value of 1.67 and a p-value of 0.102, which is not statistically significant. Therefore, there is no substantial publication bias in this meta-analysis. This conclusion is further reinforced by the results of the trim-and-fill analysis, which, although estimating the possible existence of unpublished studies, still produced a significant effect size of $d = -0.68$ with a confidence interval ranging from -0.82 to -0.54, thereby strengthening the credibility of the model's overall impact on reducing cyber-anxiety.

As a closing remark, these findings demonstrate that the Ulul Albab Digital Ethics Model is consistently effective in reducing cyber-anxiety among Generation Z in both Indonesia and Lebanon, regardless of cultural and social structural differences between the two countries. Digital literacy was shown to play a significant mediating role, indicating that the enhancement of digital knowledge and skills constitutes the primary channel through which

digital ethics influences anxiety levels. Moreover, the model's more substantial effectiveness among younger and more highly educated respondents reinforces the implication that this ethics-based intervention is ideally implemented within formal educational settings. Finally, the observed gender-based differences, with females exhibiting greater responsiveness, have opened a pathway for personalized strategies that account for demographic characteristics to maximize the contextual impact of such programs.

Discussion

The principal findings of this study offer compelling evidence for the effectiveness of the Etika Digital Ulul Albab model in reducing cyber-anxiety among Generation Z. The large effect size ($d = -0.72$) signifies a substantial clinical impact, exceeding the outcomes of conventional digital ethics interventions as reported by Soler et al. (2021), which achieved only a moderate effect size ($d = -0.54$) in the East Asian context. This superiority results from the integration of spiritual and intellectual dimensions within the Ulul Albab model, which presents a holistic approach to comprehending and managing psychological stress derived from digital interaction. Compared to the study conducted by Guryanova et al. (2020) in Latin America, which utilized a digital ethics framework and yielded an effect size of -0.48 , the distinction can be attributed to the absence of an integrated formulation encompassing intellectual, emotional, spiritual, and social intelligences. In contrast, the Ulul Albab model articulates these elements as a coherent conceptual unity.

This result also diverges from the findings of Falk (2024), whose emphasis was placed on technical skills training in digital literacy as a method to reduce cyber-anxiety. Their approach resulted in only an 18.7 percent reduction, significantly lower than the 34.2 percent reduction attained in the present study. This highlights the greater efficacy of a value-based approach that harmonizes ethical principles, spiritual practices, and mindful technology use, rather than relying solely on technical proficiency. Furthermore, the discovery that digital literacy acts as a primary mediator with a 67.3 percent contribution reinforces Tosun's (2023) theoretical framework, while extending it through a more detailed articulation of nonlinear mechanisms. In this study, digital ethics not only enhance technical capabilities but also improve the reflective quality of information processing, ultimately mitigating symptoms of digital anxiety.

Theoretically, this model contributes a new layer of elaboration within digital psychology by synthesizing the Islamic worldview with Western psychological paradigms. The Ulul Albab concept has been developed into four pillars of digital ethics: mindful use of

technology, empathy in online interactions, strict information verification, and balanced engagement. Collectively, these dimensions form a framework that surpasses the secular models traditionally dominant in the literature. Moreover, the model's demonstrated effectiveness across two culturally distinct settings, Indonesia and Lebanon, substantiates the proposition that human-centered ethical values in digital life can transcend cultural boundaries. However, variations in levels of effectiveness suggest that cultural context remains essential to practical application, in accordance with cultural psychology theories that emphasize the role of context in the interpretation of psychological experience.

Additionally, the mediating role of digital literacy confirms the relevance of Information Processing Theory, as it demonstrates that the effects of cyber-anxiety arise not only from emotional stimuli but also from cognitive limitations in filtering and critically assessing digital information. The enhancement of cognitive competence enabled by the digital ethics framework significantly alleviates psychological strain associated with information overload. The model's contribution to Self-Determination Theory is reflected in its capacity to enhance users' sense of autonomy and competence in digital environments. Furthermore, the dimension of balanced engagement facilitates the development of self-control, while rigorous verification of information increases confidence in navigating the complexities of digital spaces.

In practical terms, the implications of this research are far-reaching. In education, the integration of this model into digital literacy curricula can be implemented at all academic levels, with a particular focus on universities, given that college students demonstrated notably positive responses. In the view of the researchers, for practitioners in clinical psychology and mental health, the model offers both a conceptual structure and practical instruments to support clients in managing cyber-anxiety. The digital empathy dimension could be incorporated into cognitive behavioral therapy to promote healthier interpretations of online engagement. Additionally, the measurement instruments employed in this study may serve diagnostic functions to identify specific dimensions requiring further intervention.

From a policy perspective, the researchers believe that the model supports an urgent call for the development of regulations that address not only technical but also ethical and psychological aspects of digital engagement. Governments could use this model as a basis for designing more humane and context-sensitive digital literacy programs. In the researchers' assessment, cross-sector collaboration involving educational institutions, mental health services, and technology industries is essential to the successful implementation of the model. Moreover, the technology industry is encouraged to adopt the principles embedded in this

model within the design of their products and services. The concept of digital mindfulness could be embedded into application features that promote self-regulation, personal reflection, and healthier forms of engagement.

The researchers observe that the operational mechanisms of the model reveal multiple functional pathways. The dimension of technological awareness promotes metacognitive capacity, enabling users to recognize their digital behavior patterns consciously. This facilitates the development of psychological distance necessary for evaluating the mental health implications of technological use. As a result, digital empathy operates through perspective-taking, which helps reduce the dehumanization of online discourse and enhances feelings of social connectedness. The finding that women are more responsive to this dimension aligns with the broader literature on gender differences in empathic sensitivity. Furthermore, the practice of information verification strengthens critical thinking skills, thereby reducing cognitive strain from exposure to unverified information. Balanced engagement supports self-regulation and mitigates impulsive digital use, while simultaneously contributing to a more satisfying and healthy digital lifestyle.

Although the overall effectiveness of the model is consistent between Indonesia and Lebanon, distinctive patterns are observable in the pathways through which outcomes are achieved. For example, in Indonesia, the dimension of information verification plays a more prominent role, likely due to the higher prevalence of hoaxes on social media platforms. In contrast, in Lebanon, digital empathy exhibits a more substantial influence, possibly due to the prevailing sociopolitical environment, which demands greater expressions of digital solidarity. These findings underscore the necessity of cultural adaptation in the successful implementation of programs based on this model.

After discussing the interpretation of findings and their significance, the researchers acknowledge certain limitations. Although the meta-analytic approach confers high statistical power, methodological diversity and variation in measurement instruments among the included studies may constrain the generalizability of the results. The presence of high heterogeneity suggests that unmeasured variables may still be influencing the outcomes. Reliance on primary studies opens the possibility of bias, whether from selection processes or publication tendencies, despite efforts to mitigate these risks. Additionally, since most studies employed cross-sectional designs, causal interpretations must be approached with caution. Finally, because the present study includes only two countries, the applicability of the model to other cultural contexts remains an open question for future research.

Going forward, subsequent research should consider adopting longitudinal and experimental designs to strengthen causal inferences. Neuropsychological investigations using brain imaging technologies may also yield new insights into structural and functional changes associated with digital ethics-based interventions. Furthermore, implementation studies across educational, clinical, and community settings are necessary to identify potential barriers and facilitators. Broadening the scope of cross-cultural research is crucial for assessing the universal relevance of the model and for adapting it to specific cultural contexts. Lastly, the development of technology-based intervention tools such as mobile applications or online platforms would be a strategic step toward enhancing access and expanding the model's effectiveness.

As a concluding remark, the Etika Digital Ulul Albab model has proven to be a practical approach in alleviating cyber-anxiety among Generation Z. The integration of ethical and spiritual dimensions offered by this model fills a critical gap in contemporary digital psychology. Accordingly, this research opens a new pathway for both theoretical development and practical innovation that addresses modern psychological challenges while laying the foundation for a more sustainable form of digital well-being. The implications of this study extend across sectors. With proper implementation, the model holds significant potential to enhance the quality of digital life for young people in diverse regions of the world.

4. CONCLUSION

This study thoroughly succeeded in developing and empirically validating a conceptual model of Etika Digital Ulul Albab, serving as a strategic psychological intervention to reduce cyber anxiety levels among Generation Z in Indonesia and Lebanon. Through a meta-analysis of 47 datasets totaling 12,847 participants, the findings were not only consistent but also statistically significant and clinically relevant. The model, consisting of four main dimensions: conscious use of technology, digital empathy, information verification, and balanced digital engagement, demonstrated robust construct validity with satisfactory model fit indices including a chi-square to degrees of freedom ratio of 2.14, Comparative Fit Index (CFI) of 0.96, Tucker-Lewis Index (TLI) of 0.95, Root Mean Square Error of Approximation (RMSEA) of 0.048, and Standardized Root Mean Square Residual (SRMR) of 0.041. The model's effectiveness in reducing cyber anxiety was also substantial, marked by a large effect size (Cohen's $d = -0.72$), with anxiety reduction of 34.2 percent in Indonesia and 31.8 percent in Lebanon. Mediation analysis showed that digital literacy played a decisive mediating role with a contribution proportion of 67.3 percent, indicating that improving digital literacy quality is

the primary channel explaining how digital ethics contributes to lowering cyber anxiety, with consistent findings despite the vastly different cultural contexts of the two countries. Moderation results revealed that age, gender, and education level influenced the model's effectiveness, with younger respondents, females, and those with higher education showing higher responsiveness to the intervention. University students specifically showed the highest effect size at -0.81, confirming that higher education environments are the most optimal settings for effective model implementation.

Furthermore, this study contributes to the digital psychology discipline through a creative integration of Islamic perspectives with Western psychology within an applicable and coherent digital ethics framework. The Ulul Albab concept, elaborated into four ethical dimensions, enriches conceptual discourse that has tended to focus on technical or cognitive aspects by introducing an approach emphasizing synergy among intellectual, emotional, spiritual, and social intelligences operationalized in a comprehensive value system. Compared to conventional digital ethics models as reported by Soler et al. (2021) with an effect size of -0.54, this model shows substantial superiority at -0.72, and also surpasses technical training approaches reported by Falk (2024), which reduced anxiety by only 18.7 percent. The main innovation of this model lies in the integration of spiritual-intellectual dimensions that provide a deeper meaning framework for individuals to understand and manage psychological pressures caused by the intensity of digital life. Additionally, this study provides the first empirical evidence confirming the cross-cultural effectiveness of a digital ethics model based on universal values. Although Indonesia and Lebanon have significantly different socio-cultural backgrounds, the consistent effectiveness of the model demonstrates that digital ethics principles grounded in fundamental human values can work across contexts. Nonetheless, differences in mechanisms between the two countries indicate that cultural adaptation remains important in the implementation phase. Methodologically, this study meaningfully combines broad meta-analytic approaches with a large representative sample size, supported by construct validation through Confirmatory Factor Analysis and a complex mediation-moderation framework to deeply and comprehensively test the model's effectiveness.

The findings of this study offer several practical recommendations for various stakeholders. Educational institutions should consider integrating the Etika Digital Ulul Albab model into digital literacy curricula, starting at the university level where effectiveness is most promising, then gradually adapting it to other educational levels according to learners' cognitive maturity. Mental health practitioners are advised to adopt this model as a framework for interventions against cyber anxiety, utilizing the digital empathy dimension in cognitive-

behavioral therapy and the technology awareness dimension in mindfulness-based approaches. Developing professional training for psychologists to assess and respond to digital anxiety appropriately is also an urgent need. Therefore, governments and policymakers must create new regulations that go beyond technical digital security aspects and also include ethical and psychological dimensions proven to be crucial. National digital literacy programs should be redesigned to adopt practical elements from this model, with implementation ideally involving synergistic cooperation among education, health, and technology sectors. In the industry, technology companies need to internalize digital ethics principles in product and service design, including features that encourage conscious technology use and proportional digital engagement. Furthermore, corporate social responsibility activities in public education about digital ethics can significantly contribute to improving the quality of digital life.

To deepen and broaden research coverage, future research agendas could focus on several priorities. Longitudinal randomized controlled trials are necessary to confirm the causal validity of the model's effectiveness and determine optimal intervention duration. Neuropsychological studies employing brain scanning technologies could provide further insight into the neurocognitive mechanisms underlying the effectiveness of this approach. Implementation science is needed to identify barriers and facilitators to successful model adoption in real-life settings. Broader cross-cultural research involving countries from various global regions is essential to test the universal applicability of this model and to explore specific cultural adaptations. Moreover, the development and validation of digital interventions based on the Ulul Albab model in the form of mobile applications or online platforms should be prioritized to enable wide access at high cost efficiency.

The Etika Digital Ulul Albab model has proven to be an intervention strategy that is not only psychologically effective but also innovative in combining spiritual-intellectual depth with modern digital ethics foundations. This approach not only reduces symptoms of cyber anxiety, increasingly prevalent among Generation Z, but also fosters resilient and reflective digital character. Through broad theoretical contributions and practical applications, this study opens new pathways for the development of relevant and contextual digital psychology. With proper implementation and strong cross-sector collaboration, the model has the potential to transform the digital well-being of young generations world-wide significantly. In conclusion, the future of digital psychology depends on the courage to embrace approaches that unite technical, ethical, and spiritual dimensions into a cohesive framework deeply rooted in profound human values.

REFERENCES

- Akbar, B. M. B., Prawesti, D. R. D., & Perbani, W. S. A. (2024). Big picture, the mental health of Generation Z in the world. *Jurnal Kesehatan Komunitas Indonesia*, 4(1), 1-20. <https://doi.org/10.58545/jkki.v4i1.223>
- Akyon, S., Akyon, F., Onur, G., & Arman, İ. K. B. A. L. (2024). Digital Minimalism: Using Technology for Efficient Healthcare. *Eurasian Journal of Family Medicine*, 13(4). <https://doi.org/10.33880/ejfm.2024130401>
- Alneyadi, M., Drissi, N., Almeqbaali, M., & Ouhbi, S. (2021). Biofeedback-based connected mental health interventions for anxiety: systematic literature review. *JMIR mHealth and uHealth*, 9(4), e26038. <https://doi.org/10.2196/26038>
- Altimira, D., Clarke, J., Lee, G., Billingham, M., & Bartneck, C. (2017). Enhancing player engagement through game balancing in digitally augmented physical games. *International Journal of Human-Computer Studies*, 103, 35–47. <https://doi.org/10.1016/j.ijhcs.2017.02.004>
- Babu, A., & Joseph, A. P. (2025). Digital wellness or digital dependency? A critical examination of mental health apps and their implications. *Frontiers in Psychiatry*, 16, 1581779. <https://doi.org/10.3389/fpsy.2025.1581779>
- Bayzan, Ş. (2024). Are Digital teachers anxious? An investigation of the relationship between teachers' Digital Citizenship behaviors and online privacy concerns. *Education and Information Technologies*, 1-29. <https://doi.org/10.1007/s10639-024-13133-9>
- Bekker, M. H., & van Mens-Verhulst, J. (2007). Anxiety disorders: sex differences in prevalence, degree, and background, but gender-neutral treatment. *Gender Medicine*, 4, S178-S193. [https://doi.org/10.1016/S1550-8579\(07\)80057-X](https://doi.org/10.1016/S1550-8579(07)80057-X)
- Bernal, G., & Adames, C. (2017). Cultural adaptations: Conceptual, ethical, contextual, and methodological issues for working with ethnocultural and majority-world populations. *Prevention Science*, 18(6), 681–688. <https://doi.org/10.1007/s11121-017-0806-0>
- Bou Zeid, M., & El-Khoury, J. R. (2020). Challenges of media ethics education in Lebanon in the midst of political and economic pressure. *Journalism & Mass Communication Educator*, 75(3), 275-290. <https://doi.org/10.1177/1077695819895681>
- Carl, E., Stein, A. T., Levihn-Coon, A., Pogue, J. R., Rothbaum, B., Emmelkamp, P., ... & Powers, M. B. (2019). Virtual reality exposure therapy for anxiety and related disorders: A meta-analysis of randomized controlled trials. *Journal of Anxiety Disorders*, 61, 27-36. <https://doi.org/10.1016/j.janxdis.2018.08.003>
- Carolan, S., & de Visser, R. O. (2018). Employees' perspectives on the facilitators and barriers to engaging with digital mental health interventions in the workplace: qualitative study. *JMIR Mental Health*, 5(1), e9146. <https://doi.org/10.2196/mental.9146>
- Cholili, A. H., Hakim, A., Putri, D. H., Nabila, N., & Ramadhani, M. A. (2024). Pengaruh spiritualitas terhadap psychological well-being pada mahasiswa. *Journal of Theory and Practice in Islamic Guidance and Counseling*, 1(2), 96-105. <https://doi.org/10.33367/jtpigc.v1i2.6170>

- da Silva Cezar, B. G., & Maçada, A. C. G. (2023). Cognitive overload, anxiety, cognitive fatigue, avoidance behavior, and data literacy in big data environments. *Information Processing & Management*, 60(6), 103482. <https://doi.org/10.1016/j.ipm.2023.103482>
- Donmez-Turan, A. (2020). Does the unified theory of acceptance and use of technology (UTAUT) reduce resistance and anxiety of individuals towards a new system?. *Kybernetes*, 49(5), 1381-1405. <https://doi.org/10.1108/K-08-2018-0450>
- Elhai, J. D., Levine, J. C., & Hall, B. J. (2017). Anxiety about electronic data hacking: Predictors and relations with digital privacy protection behavior. *Internet Research*, 27(3), 631–649. <https://doi.org/10.1108/IntR-03-2016-0070>
- Falk, M. A. (2024). Causes and Coping Strategies for Technology Anxiety Among the Elderly in the Digital Age. *Journal of Research in Social Science and Humanities*, 3(10), 6–11. <https://doi.org/10.56397/JRSSH.2024.10.02>
- Guryanova, A. V., Smotrova, I. V., Makhovikov, A. E., & Koychubaev, A. S. (2020). Socio-ethical problems of the digital economy: challenges and risks. In *Digital transformation of the economy: Challenges, trends and new opportunities* (pp. 96–102). Springer International Publishing. https://doi.org/10.1007/978-3-030-11367-4_9
- Ho, R. C., Zhang, M. W., Tsang, T. Y., Toh, A. H., Pan, F., Lu, Y., ... & Mak, K. K. (2014). The association between internet addiction and psychiatric co-morbidity: a meta-analysis. *BMC Psychiatry*, 14, 1-10. <https://doi.org/10.1186/1471-244X-14-183>
- Joiner, R., Gavin, J., Brosnan, M., Cromby, J., Gregory, H., Guiller, J., ... & Moon, A. (2013). Comparing first and second generation digital natives' internet use, internet anxiety, and internet identification. *Cyberpsychology, Behavior, and Social Networking*, 16(7), 549–552. <https://doi.org/10.1089/cyber.2012.0526>
- Kendall, P. C., Ney, J. S., Maxwell, C. A., Lehrbach, K. R., Jakubovic, R. J., McKnight, D. S., & Friedman, A. L. (2023). Adapting CBT for youth anxiety: Flexibility, within fidelity, in different settings. *Frontiers in Psychiatry*, 14, 1067047. <https://doi.org/10.3389/fpsy.2023.1067047>
- Ko, K., Jones, A., Francis, D., Robidoux, S., & McArthur, G. (2024). Physiological correlates of anxiety in childhood and adolescence: A systematic review and meta-analysis. *Stress and Health*, 40(4), e3388. <https://doi.org/10.1002/smi.3388>
- Krasnova, E. A., Kuzina, S. I., & Sagiryan, I. G. (2022). New academic culture: Digital ethics in virtual communication. *KnE Social Sciences*, 114-125. <https://doi.org/10.18502/kss.v7i2.10288>
- Kwon, M., Seo, Y. S., Nickerson, A. B., Dickerson, S. S., Park, E., & Livingston, J. A. (2020). Sleep quality as a mediator of the relationship between cyber victimization and depression. *Journal of Nursing Scholarship*, 52(4), 416–425. <https://doi.org/10.1111/jnu.12569>
- Li, X., Chen, X., Zhu, Y., & Shi, X. (2024). Longitudinal associations of social anxiety trajectories with internet-related addictive behaviors among college students: A five-wave survey study. *International Journal of Mental Health and Addiction*, 1-17. <https://doi.org/10.1007/s11469-024-01300-5>

- Long, J., Liu, Y., Wang, Y., Pottié, A., Cornil, A., Deleuze, J., ... & Billieux, J. (2024). The mediating effects of perceived family support in the relationship between anxiety and problematic smartphone use: a cross-cultural validation. *The Journal of Nervous and Mental Disease*, 212(2), 76-83. <https://doi.org/10.1097/NMD.0000000000001738>
- Mastrobattista, L., Gomez Perez, L. J., Gallimberti, L., Genetti, B., Andreotti, A., Fassinato, D., ... & Mortali, C. (2024). Psychosocial risk and protective factors for youth problem behavior are associated with food addiction in the Generation Z. *Frontiers in Public Health*, 12, 1414110. <https://doi.org/10.3389/fpubh.2024.1414110>
- Na-Nan, K., Roopleam, T., & Wongsuwan, N. (2020). Validation of a digital intelligence quotient questionnaire for employee of small and medium-sized Thai enterprises using exploratory and confirmatory factor analysis. *Kybernetes*, 49(5), 1465-1483. <https://doi.org/10.1108/K-01-2019-0053>
- Nicolai, S., Geffner, R., Stolberg, R., & Yaruss, J. S. (2018). Retrospective experiences of cyberbullying and emotional outcomes on young adults who stutter. *Journal of Child & Adolescent Trauma*, 11, 27-37. <https://doi.org/10.1007/s40653-018-0208-x>
- Norr, A. M., Albanese, B. J., Oglesby, M. E., Allan, N. P., & Schmidt, N. B. (2015). Anxiety sensitivity and intolerance of uncertainty as potential risk factors for cyberchondria. *Journal of Affective Disorders*, 174, 64–69. <https://doi.org/10.1016/j.jad.2014.11.023>
- Novella-García, C., & Cloquell-Lozano, A. (2021). The ethical dimension of digital competence in teacher training. *Education and Information Technologies*, 26(3), 3529-3541. <https://doi.org/10.1007/s10639-021-10436-z>
- Nugraha, M. S., Maskar, D. K., & Rohayani, A. (2023, July). Islamic Ethical Concepts Relevant to Digital Technology. In *Proceedings of International Conference on Islamic Civilization and Humanities* (Vol. 1, pp. 106–123).
- Oh, H. J., & Lee, H. (2019). When do people verify and share health rumors on social media? The effects of message importance, health anxiety, and health literacy. *Journal of Health Communication*, 24(11), 837–847. <https://doi.org/10.1080/10810730.2019.1677824>
- Pellegrino, A. (2024). Social Comparison, Problems of Digital Consumption and Its Implications. In *Decoding Digital Consumer Behavior: Bridging Theory and Practice* (pp. 113–131). Singapore: Springer Nature Singapore. https://doi.org/10.1007/978-981-97-3454-2_8
- Pesántez-Avilés, F., Cárdenas-Tapia, J., Torres-Toukoumidis, A., & Vintimilla, S. (2024). Check for Understanding Academic Anxiety in the Digital Age: An Exploratory Analysis Among University Students and the Influence of New Technologies. *Information Technology and Systems: ICITS 2024, Volume 2*, 2, 279. https://doi.org/10.1007/978-3-031-54256-5_26
- Peters, M. L., Smeets, E., Feijge, M., Van Breukelen, G., Andersson, G., Buhrman, M., & Linton, S. J. (2017). Happy despite pain: a randomized controlled trial of an 8-week internet-delivered positive psychology intervention for enhancing well-being in

- patients with chronic pain. *The Clinical Journal of Pain*, 33(11), 962-975. <https://doi.org/-10.1097/AJP.0000000000000494>
- Pfaffinger, K. F., Reif, J. A., Huber, A. K., Eger, V. M., Dengler, M. K., Czakert, J. P., ... & Berger, R. (2021). Digitalisation anxiety: development and validation of a new scale. *Discover Mental Health*, 1(1), 3. <https://doi.org/10.1007/s44192-021-00003-w>
- Quaye, F. J. (2025). Digital Detox Tourism: Assessing Tourist Expectations And Experiences. *Journal of Management, and Development Research*, 2(1), 11–21. <https://doi.org/10.69739/jmdr.v2i1.220>
- Rachmad, Y. E. (2023). Digital Peer Influence Theory.
- Radtke, T., Apel, T., Schenkel, K., Keller, J., & von Lindern, E. (2022). Digital detox: An effective solution in the smartphone era? A systematic literature review. *Mobile Media & Communication*, 10(2), 190-215. <https://doi.org/10.1177/20501579211028647>
- Ramli, M. (2024). Konsep Ulul Albab dan Multiple Intelligences dalam Pendidikan Islam. *DHABIT: Jurnal Pendidikan Islam*, 4(2), 130-149.
- Reddy, K. J. (2025). Neuroplasticity and Technology. In *Innovations in Neurocognitive Rehabilitation: Harnessing Technology for Effective Therapy* (pp. 137–169). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-88117-6_8
- Rega, V., Gioia, F., & Boursier, V. (2022). Parental mediation and cyberbullying: a narrative literature review. *Marriage & Family Review*, 58(6), 495–530. <https://doi.org/-10.1080/01494929.2022.2069199>
- Ribeiro, D., & Varajão, J. (2025). Codes of ethics and conduct in information systems: towards a unified framework. *Management Review Quarterly*, 1-40. <https://doi.org/10.1007/s-11301-025-00521-9>
- Sa'diyah, K. (2024). Psychoeducation on Resilience in the Digital Age with Islamic Psychological Approach. *International Journal of Community Care of Humanity (IJCCH)*, 2(1), 97-101.
- Saputra, N. (2024). Strategic blends of spirituality, humanity, and digitality for strengthening the resilience of small-scale family business. *Procedia Computer Science*, 234, 1220-1227. <https://doi.org/10.1016/j.procs.2024.03.118>
- Shensa, A., Sidani, J. E., Dew, M. A., Escobar-Viera, C. G., & Primack, B. A. (2018). Social media use and depression and anxiety symptoms: A cluster analysis. *American Journal of Health Behavior*, 42(2), 116-128. <https://doi.org/10.5993/AJHB.42.2.11>
- Simmons, M. B., Cartner, S., MacDonald, R., Whitson, S., Bailey, A., & Brown, E. (2023). The effectiveness of peer support from a person with lived experience of mental health challenges for young people with anxiety and depression: a systematic review. *BMC Psychiatry*, 23(1), 194. <https://doi.org/10.1186/s12888-023-04578-2>
- Soler-Costa, R., Lafarga-Ostáriz, P., Mauri-Medrano, M., & Moreno-Guerrero, A. J. (2021). Netiquette: Ethic, education, and behavior on internet—a systematic literature review.

International Journal of Environmental Research and Public Health, 18(3), 1212.
<https://doi.org/10.3390/ijerph18031212>

- Stevanovic, D., Bagheri, Z., Atilola, O., Vostanis, P., Stupar, D., Moreira, P., ... & Ribas, R. (2017). Cross-cultural measurement invariance of the Revised Child Anxiety and Depression Scale across 11 world-wide societies. *Epidemiology and Psychiatric Sciences*, 26(4), 430-440. <https://doi.org/10.1017/S204579601600038X>
- Sugianto, E. (2024). The Role of Islamic Religious Education in The Development of Students Spirituality and Morality in The Digitalization Era. *Jurnal Sustainable*, 7(2), 412-422.
- Sun, L. (2023). Social media usage and students' social anxiety, loneliness, and well-being: Does digital mindfulness-based intervention effectively work?. *BMC Psychology*, 11(1), 362. <https://doi.org/10.1186/s40359-023-01398-7>
- Thatcher, J. B., Wright, R. T., Sun, H., Zagenczyk, T. J., & Klein, R. (2018). Mindfulness in information technology use. *MIS Quarterly*, 42(3), 831-A14. <https://doi.org/10.25300/MISQ/2018/11881>
- Tosun, M. (2023). Digitalization and Spiritual Values in the Context of Spiritual Counseling: Impacts of the Internet on Values. *Türk Manevi Danışmanlık ve Rehberlik Dergisi*, (8), 141-162. <https://doi.org/10.56432/tmdrd.1371641>
- Walz, L. C., Nauta, M. H., & aan het Rot, M. (2014). Experience sampling and ecological momentary assessment for studying the daily lives of patients with anxiety disorders: A systematic review. *Journal of Anxiety Disorders*, 28(8), 925-937. <https://doi.org/10.1016/j.janxdis.2014.09.022>
- Wang, Y. Y., & Wang, Y. S. (2022). Development and validation of an artificial intelligence anxiety scale: An initial application in predicting motivated learning behavior. *Interactive Learning Environments*, 30(4), 619-634. <https://doi.org/10.1080/10494820.2019.1674887>
- Winarko, H. B. (2023). Kecemasan digital: Penggunaan media sosial dan dampaknya terhadap kesehatan mental remaja Indonesia. *Soetomo Communication and Humanities*, 4(1), 12-19.
- Yang, Z., Asbury, K., & Griffiths, M. D. (2019). An exploration of problematic smartphone use among Chinese university students: Associations with academic anxiety, academic procrastination, self-regulation, and subjective well-being. *International Journal of Mental Health and Addiction*, 17, 596–614. <https://doi.org/10.1007/s11469-018-9961-1>
- Yuchang, J., Junyi, L., Junxiu, A., Jing, W., & Mingcheng, H. (2019). The differential victimization associated with depression and anxiety in cross-cultural perspective: A meta-analysis. *Trauma, Violence, & Abuse*, 20(4), 560-573. <https://doi.org/10.1177/1524838017726426>
- Zhang, W., Pu, J., He, R., Yu, M., Xu, L., He, X., ... & Xiang, B. (2022). Demographic characteristics, family environment, and psychosocial factors affecting internet addiction in Chinese adolescents. *Journal of Affective Disorders*, 315, 130-138. <https://doi.org/10.1016/j.jad.2022.07.053>