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Technophobia and Technophilia among Undergraduates: Cross-national Research in Jordan, Qatar, and Egypt

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Abstract

The rising growth of integrating technology into education affects the psychological structure of students, especially their technophobia and technophilia levels, playing a vital role in their adaptation to new technology, bridging the digital divide, and achieving sustainable development goals. Despite such influence, research lacks diagnostic theses among Arabian undergraduates. This study is the first to assess technophobia and technophilia levels according to countries among Jordanian, Egyptian, and Qatari undergraduates. The quantitative research approach and a cross-national research design, with a web-based questionnaire, are adopted to explore the technophobia and technophilia levels of Arabian undergraduates and investigate them concerning the country. Additionally, A stratified multistage clustered random sampling is recruited. The study sample comprised 1081 undergraduates; from Egypt (400), Jordan (375), and Qatar (301). The data were collected in September of the academic year 2021–2022 using the Technophobia and Technophilia Questionnaire. The results demonstrated a moderate level of technophilia among Arabian undergraduates. Moreover, according to country, the ANCOVA test confirmed a non-significant ($p>.05$) difference in technophilia levels. Notably, a significant ($p<.05$) difference exists in technophobia levels according to country. The results of the Scheffe test demonstrated that Qatari undergraduates were less technophobic than Jordanian and Egyptian undergraduates. This study's implications can inform the government, especially policy-makers in education and sustainable development planners, to pay attention to undergraduates' technophilia and technophobia concerns and plan strategies and policies for encouraging technology adaptation and managing technophobia and technophilia constructs.

Keywords: *Technophobia, Technophilia, Technology, Arab Countries, Jordan, Qatar, Egypt, Psychological Consequences.*

Introduction

Digital transformation (DT) and revolution characterize this era, where all sectors, such as commercial, educational, entertainment, military, and medical, rely on digital technologies and their generated data. Modern technologies are ubiquitous and have entered most areas of our lives and environments. They are in schools, homes, work, streets, and places of entertainment, affecting how we learn, work, play, think, and make decisions. This dependence on technology has increased

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with the social distancing imposed by the COVID-19 pandemic, forcing people around the globe to use technology as a primary tool not just for communication or improving performance but for survival (O'Leary & Armfield, 2020).

The rapid development of technology has transformed the global economy where the DT process has become a competition among countries due to its benefits, such as ensuring the quality of products and services, achieving creativity and innovation, opening up new job opportunities, achieving sustainable development goals, and improving management (ElMassah & Mohieldin, 2020; Holzinger et al., 2021; Kutnjak et al., 2019; Maroufkhani et al., 2022; O'Leary & Armfield, 2020; Vial, 2021). To achieve these advantages and effectively transform into a digital world, individuals should possess digital skills, competencies, and a digital mindset or beliefs; otherwise, they might refuse new technology. The abuse of this technology or the failure to adapt to it can have psychological consequences, negatively impacting individuals, society, and the economy (Cetindamar et al., 2021; Morandini et al., 2020; Solberg et al., 2020; Trenerry et al., 2021; Shawaqfeh & Almahaireh, 2019).

In light of technology integration's benefits and accelerated development, researchers have investigated its impact on variables such as economic creativity and productivity (Tokareva et al., 2018; Tofan & Aivaz, 2022; Yang, 2022). However, only a few researchers have investigated its psychological influences. Most of them have addressed specific technologies (i.e., computer anxiety, internet addiction, and attitude toward robots) and generally not the recent ones. It highlights an urgent need to study the effects of the modern technologies in broader concepts such as technophilia rather than the effect of specific technology. In other hand, the recent generation of technology have been penetrating all sectors and fields. For instance, increased technology integration has been exclusively witnessed in the education sector, especially after the COVID-19 pandemic, where face-to-face learning methods have been replaced by online learning by integrating several digital technologies into learning environments (Ajlouni et al., 2022; Baytak, 2022; Gqokonqana, Olarewaju & Cloete, 2022; Abu-Talib et al., 2021; Jaradat & Ajlouni, 2021; Bada & Jita, 2021). In addition, ISTE (2022) suggested standards for teachers, leaders, coaches, and students to integrate technology with teaching and learning processes providing competencies for learning, teaching, and leading in the digital age. Therefore, many recent technologies have been employed at schools across all academic levels such as virtual reality, augmented reality

books, 3D printing technology, and holograms (Hsiao et al., 2022; Morimoto et al., 2022; Raja & Priya, 2022).

Employing a new technology in an environment can cause an innate sensation interpreted as a physiological or psychological response. However, limited studies relate to users' reactions to recent technologies, such as attitudes toward computers, technophobia, and technophilia (Khasawneh, 2018). Moreover, no recent study has investigated the impacts of technophobia and technophilia in the Arabian context. Technophobia is a psychological orientation or attitude toward technology leading to its limited use or fear of using it, while technophilia is an over-enthusiasm for technology and a strong attraction toward it (Khasawneh, 2018; Martínez-Córcoles et al., 2017, Ronit, 2011). Even though technophobia and technophilia steadily grow in today's society and are considered the foremost factors to be studied, the related literature is limited (Di Giacomo et al., 2020; Khasawneh, 2018; Martínez-Córcoles et al., 2017). A few studies have assessed the technophobia and technophilia levels among older adults, workers, farmers, secondary-school students, and older internet users (Di Giacomo et al., 2019; Khasawneh, 2018). It highlights the need to conduct a similar study in this DT era among youth categories, playing a vital role in developing the economy and community.

DT competition has increased among countries to achieve sustainable development goals. Therefore, technology has accelerated in this era; technology reliance is expanding in all industries, as COVID-19 has forced technology usage as a survival tool. Despite this technology expansion, limited literature exists on its psychological consequences, especially those considering technophobia and technophilia. Moreover, no previous study has yet assessed technophobia and technophilia levels in the Arabian context. Based on the preceding, the current study aims to fill the gap in technophobia and technophilia literature by investigating the levels of these constructs among undergraduates from three Arab countries: Jordan, Egypt, and Qatar. It explores whether these levels differ substantially according to the country. The relevance of this study lies in accepting the new technology and adapting to it in the DT era to achieve sustainable development goals. The study results are expected to offer insights into the exact psychological consequences of technology expansion among Arabian undergraduates, helping policy-makers plan strategies to enhance psychological constructs among undergraduates.

Research Questions

- Q1. What are the levels of technophilia and technophobia among undergraduates in Qatar, Jordan, and Egypt?
- Q2. Is there any statistically significant difference in the levels of technophilia among undergraduates in Qatar, Jordan, and Egypt?
- Q3. Is there any statistically significant difference in the levels of technophobia among undergraduates in Qatar, Jordan, and Egypt?

Research Hypothesis

Two alternative hypotheses were formulated based on the second and third research questions.

- Ha1. There exist statistically significant differences at $\alpha = 0.05$ significance level in technophilia levels among undergraduates in Qatar, Jordan, and Egypt.
- Ha2. There exist statistically significant differences at $\alpha = 0.05$ significance level in technophobia levels among undergraduates in Qatar, Jordan, and Egypt.

Literature Review

Technophobia

Technophobia is a psychological orientation or attitude toward technology; it is an irrational fear or anxiety in persons about using technology (Martínez-Córcoles et al., 2017; Osiceanu, 2015). Technophobia constrains the ability of people to use technology and hinders them from realizing its benefits. Technophobic people dislike technology and avoid or refuse to adapt to it. Individuals develop technophobia as a response to technology stimuli due to their fear of technology (Ahmad & Daud, 2011; Faloye et al., 2022; Khasawneh, 2015). Technophobia constructs comprise techno-paranoia, techno-fear, techno-anxiety, cybernetic revolt, and technology avoidance. It contains cognitive, emotional, and behavioral components (Faloye et al., 2022). Many factors influence technophobia formation: a) personal factors, such as self-efficacy, fear, experience, and emotion; b) interpersonal factors, such as communication with others on the subject of technology; c) group factors, such as conflicts of interest with various related groups regarding the emergence of modern technologies and group stereotypes related to a given technology; and d) social factors, such as

mass media and culture and the country's technological and economic development levels (Nestik et al., 2018).

Technophobia closely relates to computer anxiety, but it is distinct from it. Computer anxiety is associated with interacting with computers, while technophobia is a broader concept related to modern or new technologies, not just computers (Martínez-Córcoles et al., 2017). So far, several measures have been developed to evaluate specific technology influences, such as computer anxiety and negative attitude toward robots (Nomura et al., 2006). Nevertheless, few technophobia measures have been developed. Some are based on the etymology of technophobia (Martínez-Córcoles et al., 2017), while others focus on computerphobia and regard it as a multi-dimensional construct comprising three scales to assess computer anxiety, computer thoughts, and the general attitude toward computers (Rosen et al., 1992).

Approximately 30% of people globally experience technophobia (Subero-Navarro, Pelegrín-Borondo, Reinares-Lara, & Olarte-Pascual, 2022), and this percentage is expected to rise with the rapid continuous development of technology. It hinders technology integration across all industries; for example, it prevents academic staff from effectively employing information and communication technology (ICT) in the instructional process (Ahmad et al., 2014) and influences employees' usage of new technology, playing a vital role in an organization's success (Show-Hui & Wen-Kai, 2010). It means that it influences the success of an organization and creates a digital divide regarding its impact on individuals' technology adaptation (Faloye et al., 2022; Nimrod, 2018).

Previous studies investigating technophobia have been conducted in countries such as South Africa, Spain, Britain, Nigeria, Poland, Estonia, Italy, Latvia, and the United States. Some aimed to assess technophobia—such as Zarina et al.'s (2018) study, reporting that Latvia participants had a moderate level of technophobia. Others studied technophobia's impact on and relation to other variables and found that it affects digital divide access and skills (Faloye et al., 2022), influences social robot acceptance (Subero-Navarro et al., 2022), and predicts the acceptance and intention to use smart-home products (Daruwala et al., 2022). It also predicts attitude toward e-marketing (Adiukwu, 2022) and is negatively correlated with technology acceptance (Khasawneh, 2018) and positively correlated with technology experience (Hou et al., 2017). Martínez-Córcoles et al. (2017) revealed that technophobia is negatively associated with technophilia and is an independent construct from technophilia.

In Arabian countries, no study has yet assessed technophobia using technophobia measures. Two studies investigated the perceptions of the challenges students faced in their online learning during COVID-19 and assessed technophobia using a one-item technophobia questionnaire for the challenge of online learning. Jaradat and Ajlouni (2021) conducted a study in Jordan, where 29.2% of the participants reported being technophobic. The second study by Rajab et al. (2020) in Saudi Arabia found that 17% of the respondents had technophobia. Because of the lack of these studies in the Arabian context, researchers have referred to related studies on technophobia, such as the study by Abdullah and Fakieh (2020), reporting that 3.11 of 4 Saudi participants had artificial intelligence fear, and Gabr et al.'s (2021) study, finding moderate to high levels of technostress among Egyptian academic staff members.

Technophilia

Technophilia is another form of psychological implication caused by technology; it is similar to technophobia, implying an extreme association between humans and technology. However, technophilia is an attraction toward technology instead of its avoidance (Osiceanu, 2015). It is defined as an innovation obsession, a positive orientation toward technology, and a strong enthusiasm for it (Abbasi & Tabatabaee-Yazd, 2021). Technophilic people take pleasure in using technology and exhibit a positive attitude toward adopting it; they focus on its egocentric profits (Barrientos-Gutierrez et al., 2019; Martínez-Córcoles et al., 2017; Osiceanu, 2015).

The literature on technophilia is inadequate, and only a few measures have been developed to evaluate it. Some researchers have considered it to cover behavioral, emotional, and cognitive factors (Seebauer et al., 2015), while others have deemed it as a three-factor structure: a) enthusiasm, referring to a positive attitude toward technology use; b) dependency, a repetitive behavior referring to the frequent use of technology; and c) techno-reputation, a need to update; it is a negative emotion, such as having a fear of falling behind in having the latest product versions. Individuals with a high level of techno-reputation could spend considerable money owning the latest version of recent technologies (Martínez-Córcoles et al., 2017). Technophilia is subject to general technology-related values and Internet of Things (IoT) skills (Jahan et al., 2021). Therefore a high level of technophilia should be avoided because it could harm individual life quality (Martínez-Córcoles et al., 2017). To sum up technophilia it is not just a positive attitude towards technology but also includes dependency and technoreputation, where a high level of technology

dependency could lead to addiction, obsession issues, and anxiety when individuals cannot reach them, further high level of technoreputation could lead to money wasting of having unneeded technology just to have the pleasure of owning latest technology products in the market.

Only a few researchers across the globe, such as those in Iran, Bangladesh, Lombardy, India, and Mexico, have investigated technophilia and its relation to other variables. They found that it has a significant positive relationship with teachers' personality traits (Abbasi & Tabatabaee-Yazdi, 2021) and a significant negative relationship with academic achievement (Minikutty & Thomas, 2019). Moreover, it is influenced by IoT skills and general technology-related value play (Jahan et al., 2021), associated with trials of e-cigarettes where students with the highest levels of technophilia were more exposed to such products (Barrientos-Gutierrez et al., 2019).

No study has yet assessed technophilia in the Arabian context; thus, researchers have investigated related studies. For example, in Jordan, Hamad et al. (2021) found a significant relationship between the level of digital skills and technology acceptance, as librarians reported high levels of technology acceptance and digital skills. In addition, Ta'an et al. (2021) disclosed that Jordanian nurses were comfortably using computer technology in healthcare. Almaiah (2018) reported that Jordanian undergraduates had a positive impression of mobile information system services in the education field. Furthermore, Saeed and Al-Zayed (2018) revealed that Jordanian undergraduates had a positive attitude toward computer-assisted language learning. Similarly, Alnasraween et al. (2021) demonstrated that students at Amman Arab University had a positive, moderate attitude toward distance learning. Al Bataineh (2014) suggested that social studies teachers had a positive attitude toward implementing technology in their classrooms.

In Qatar, Al-Abdulghani (2021) conducted a study comprising 105 Qataris and revealed an increased adoption of online shopping and banking services under COVID-19 lockdown. Additionally, Hendawi and Nosair (2020) found that students at Qatar University (QU) had high levels of emotional and cognitive fields of technological awareness and moderate levels of awareness skills. Alkhateeb (2019) revealed that Qatari undergraduates had a moderate level of technology self-efficacy. Moreover, Alshaboul et al. (2022) reported that middle-and high-school Qatari students had a moderate attitude toward distance learning and did not find distance learning exciting.

In Egypt, Gawish et al. (2021) discovered that Egyptian dental students had a positive attitude toward online learning and were familiar with online education. In addition, Hassan and Wood

(2020) investigated 132 Egyptians and indicated that 58.8% of them used m-banking services either monthly, weekly, or daily, whereas 48.5% did not use them at all. Zaky et al. (2020) revealed that Egyptians had behavioral intentions to adopt the IoT. Badran (2019) also disclosed that Egyptians with college education or above were willing to embrace new healthcare technologies. Furthermore, El Alfy et al. (2017) found that instructors in Egypt and the UAE had positive technology readiness and a strong positive attitude toward e-learning technologies.

Cross-national Research in the Technology Context

Cross-national research regarding technology has revealed mixed results; however, all these studies have considered technology and DT to be vital components in achieving sustainable development goals, as they vary between developed and developing countries (ElMassah & Mohieldin, 2020; Pandey et al., 2022). Researchers have used several indicators to determine the success and extent of the digital economy, transformation, and adaptation, such as the Digital Economic Index, e-Government Development Index, and Arab Digital Economy Index (ADEI), focusing on the Arab digital economy (ADEO, 2022; ElMassah & Mohieldin, 2020). The findings of ADEI's report for 2022 revealed a digital divide across Arabian countries, as depicted in Table 1, presenting some statistical data for Jordan, Egypt, and Qatar. Further studies revealed that the economic growth effect of ICT differs across incomes (Papaioannou & Dimelis, 2007; Yousefi, 2011), a significant relationship between gross national income and ICT adoption (Fong, 2009), and a massive digital divide within almost all countries, becoming a form of social exclusion (Chen & Wellman, 2004; Fong, 2009; Tomczyk et al., 2019).

Table 1

Statistical data for Qatar, Jordan, and Egypt.

Value	Qatar	Jordan	Egypt
Avg per Capita Income in Dollars	50,124.40	4,282.8	3,569.2
Level of National Income	High	High-Moderate	Low
Unemployment Rate	3.5	18.5	10.4
Total Arab Digital Economy Index	56.05	57.67	52.36
Financial Market Development Pillars's Index	90.44	81.56	66.56
Digital Government Pillars's Index	71.73	53.09	55.27
Innovation Pillars 's Index	61.21	49.93	48.67
Infrastructure Pillars's Index	65.51	36.48	39.25
Technological Readiness Pillars's Index	23.67	19.90	20.66
IT services usage' Index	72.10	50.40	43.10
IT services Access's Index	79.80	45.90	58.80

** Data compiled from ADEO (2022) report.*

However, technology-related psychological consequences could be linked to social and individual factors (Brosnan, 2002), contributing to the formation of a digital divide, economic losses, and delays in achieving sustainable development (Faloye et al., 2022).

Several cross-national studies have found that technology acceptance varies among countries, and cultural factors influence it. For example, Khushman et al. (2009) disclosed that Arabs have less interest in e-business website usage than Britons. Similarly, Taufik et al. (2021) revealed a high level of public acceptance regarding bioenergy technology in Bosnia, Herzegovina, Germany, Spain, and Sweden and found that it substantially differs across countries. In addition, Alam et al. (2020) found that adapting mHealth services in Bangladesh and China had a crucial social influence. Vu and Lim (2021) revealed that individual factors, such as digital technology efficacy, predict public acceptance of artificial intelligence and robotics technologies, but no substantial effects on the country, such as economic development and innovation, were found. Weil and Rosen (1995) conducted a cross-country study, suggesting that cultural factors such as value technology, availability, integration into the educational system, political climate, literacy, and poverty could influence technophobia. Nevertheless, no cross-country studies have considered technophilia, but some have considered internet or social media addiction, such as Usman et al.'s (2014) study, with no significant (p>.05) differences in internet addiction among students according to country. However, Ünal (2020) reported significant (p<.05) differences regarding the same where Korean students were more addicted than Turkish students. In addition, El-Masri and Tarhini (2017) found that social influence and facilitating conditions enhanced students' adoption of e-learning systems in developing countries and revealed that Qatari and American undergraduates are willing to adopt e-learning systems supporting their learning.

Method

Research Design

We undertook the methodological and data collection considerations affecting the reliability and quality of cross-national comparative research (Gharawi et al., 2009). This study adopted a quantitative research method and the cross-national research (CNR) design to compare the technophobia and technophilia constructs within three contexts: Jordan, Qatar, and Egypt. CNR is an appropriate research design for investigating a specific phenomenon across countries (Andre et

al., 2019). Therefore, the data for all three countries were collected using the same instrument during the same period by three members, each from one of the selected universities.

The data were collected using a survey method through a web-based questionnaire, considered the best method available for large audiences and cross-country studies (Marshall, 2005). The questionnaire comprised demographic data and the TTQ. The study was conducted in three public Arab universities in Jordan, Qatar, and Egypt, representing the Levant, Arabian Peninsula, and North Africa. A stratified multistage clustered random sampling was conducted. In addition, a parametric one-way analysis of variance (ANOVA) test was conducted to examine the countries' differences in technophobia and technophilia levels. The ANOVA test is the most appropriate test for comparing the differences between the levels of independent variables when the assumptions of independence, normality, and homogeneous variance are met (Kim & Cribbie, 2018; Larson, 2008; Yigit & Mendes, 2018). Next, the Scheffe test was used as a post hoc test; it is considered the most appropriate response to a significant ANOVA and recognizes which groups are significantly different (Ruxton & Beauchamp, 2008).

Participants

The sample comprised undergraduate students (1081) from three Arabian public universities in the Levant (Jordan), Arabian Peninsula (Qatar), and North Africa (Egypt), registered in the academic year 2020–2021 at the School of Educational Sciences. The representative survey based on random samples (stratified multistage clustered random sampling) was applied among the Jordanian, Egyptian, and Qatari populations to achieve the study's aims. The appropriate required size for each stratum was confirmed using Thompson's (2012) equation at a .05 error of margin and a .95 level of confidence. All participants were registered for the summer term of the academic year 2020–2021 at the School of Educational Sciences.

The study sample came from three Arab countries, Egypt (n=400), Jordan (n=375), and Qatar (n=306), with 28% of participants from Qatar, 35% from Jordan, and 37% from Egypt. Among participants, 13.5% were male, and 86.5% were female. The smaller number of male participants was due to the low ratio of male undergraduates enrolled in the faculty of educational sciences (FOES) at the studied universities. For example, male undergraduates registered in FOES at the University of Jordan were about 6%. Approximately 28% of the participants were first-year students, 25% were sophomores, 31% were juniors, and 16% were seniors. Additionally, 18% of

the undergraduates had an excellent GPA, 51% had a very good GPA, and the remaining 31% had a good or lower GPA. Furthermore, 19% of the undergraduates had excellent digital skills, 33% had very good digital skills, 43% had good digital skills, and just 5% had poor digital skills. It was an appropriate sample, encompassing all undergraduates willing to join the study. Table 2 demonstrates the demographic characteristics of the participants according to country.

Table 2

Demographic characteristics of the participants according to country (N = 1081).

No.	Variable	Value	Qatar		Jordan		Egypt		Total	
			F	P	F	P	F	P	F	P
1	Nationality	Sample size	306	28%	375	35%	400	37%	1081	100%
2	Gender	Male	50	16.3%	18	4.8%	81	20.3%	149	13.5%
		Female	256	83.7%	357	95.2%	319	79.8%	932	86.5%
3	Academic Level	Freshman	47	15.4%	85	22.7%	171	20.8%	303	28%
		Sophomore	91	29.7%	98	26.1%	83	24.8%	272	25%
		Junior	98	32%	142	37.9%	99	11.8%	339	31%
		Senior	70	22.9%	50	13.3%	47	7.8%	167	16%
4	GPA	Excellent	81	26.6%	91	24.3%	19	4.8%	191	18%
		Very good	140	45.8%	213	56.8%	198	49.5%	551	51%
		Good or less	85	27.7%	71	18.9%	183	35.9%	339	31%
5	Level of Digital Skills	Excellent	121	39.5%	50	13.3%	31	7.8%	202	19%
		Very Good	109	35.5%	142	37.9%	106	26.5%	357	33%
		Good	70	22.9%	165	44%	226	56.5%	461	43%
		Poor	6	2%	18	4.8%	37	9.3%	61	5%

F: Frequency, P: Percentage.

Data Collection Tool

The study instrument is a web-based questionnaire comprising 35 items distributed over two parts: a) demographic data with five items (i.e., nationality, gender, accumulative average, academic level, and level of digital skills), and b) the TTQ, a self-report questionnaire developed and validated by Martínez-Córcoles et al. (2017). It contains 30 items distributed over two subscales: the technophilia subscale (18 items) and the technophobia subscale (12 items). The TTQ was designed on a 6-point Likert scale with responses ranging from 1 (very strongly disagree) to 6 (very strongly agree). The technophobia scores ranged between 12 and 72, indicating the individuals' level of technophobia. A higher score reflected a higher level of technophobia among individuals. Furthermore, the technophilia scores ranged from 18 to 108, indicating the individuals' level of technophilia. A higher score reflects higher levels of technophilia.

The psychometric properties of the TTQ subscales were ensured by administering them to a pilot sample comprising 35 undergraduate students from the study population and outside the sample.

The Cronbach's alpha for the technophilia subscale was 0.94, and the Pearson's correlation coefficient for each item of the technophilia subscale and the total technophobia score were statistically significant (p<.05) and ranged from 0.40 to 0.91. Similarly, the Pearson's correlation coefficient for each item of the technophilia subscale and the total technophilia score were statistically significant (p<.05) and ranged from 0.51 to 0.84; the Cronbach's alpha for the technophilia subscale was 0.89. This indicates that the TTQ is a valid and reliable instrument.

Data Collection

Data were collected in September 2021 using a web-based questionnaire containing 35 items: 30 items for the technophobia and technophilia measures and five items for the demographic data. The web-based questionnaire was built using Google Forms. It took approximately 25 min to respond to the questionnaire. Researchers distributed the questionnaire's URL to three faculty members from the studied universities, they posted it on the undergraduates' e-learning platforms and social media groups. All undergraduates registered in the summer term of the academic year 2020–2021 from the three targeted universities had a chance to participate in the study. The undergraduates willing to participate in the study anonymously responded to the questionnaire after filling out the consent form.

Data Analysis

The Statistical Package for the Social Sciences version 26.0 was used to analyze the collected data. The descriptive statistics (i.e., means and standard deviations for technophobia and technophilia subscales of the TTQ) were extracted to answer the first research question. Hypotheses Ha1 and Ha2 have been formulated to answer the second and third questions. One-way ANOVA was employed to test the first and second hypotheses and examine the significant differences between the mean levels of technophobia and technophilia among the undergraduates in the three countries. The initial assumptions of the one-way ANOVA were ensured before conducting the analysis. Next, the Scheffe test was conducted as a post hoc test to identify significantly different groups.

Findings

ANOVA Assumptions

The first ANOVA assumption is sample independency, implying that the groups contain different subjects and the value of one observation is not interrelated to another observation (Connelly,

2021). It was ensured because the observations related to different respondents were drawn from one country group (Egypt, Jordan, or Qatar) and did not belong to more than one group. It means that the study observations were independently drawn. Moreover, normality and homogeneity assumptions were ensured as follows.

Normality Test

Normality implies that the data variables follow a normal distribution (Kim, 2014). The degree of normality was examined by conducting the Shapiro–Wilk test. As illustrated in Table 3, the samples satisfied the normality condition with $p > .05$.

Table 3

Shapiro–Wilk test.

Scale	Country	Statistic	Df	Sig.
Technophilia	Jordan	.986	306	.077
	Egypt	.977	375	.088
	Qatar	.973	400	.065
Technophobia	Jordan	.883	306	.081
	Egypt	.948	375	.097
	Qatar	.940	400	.071

Homogeneity of Variance Test

Levene's test examined the equality of variance for technophobia and technophilia. The findings presented in Table 4 depicted $p > .05$; therefore, the assumption of equal variance was met. The homogeneity of variance assumption or variance equality indicates that the data for the dependent variable are similar in different groups (Connelly, 2021; Hoekstra et al., 2012).

Table 4

Levene's test.

Variable		Levene Statistic	Df1	Df2	Sig.
Technophilia	Based on M	3.388	2	1078	.094
	Based on Med	3.504	2	1078	.130
	Based on Med & with adjusted df	3.504	2	1075.481	.130
	Based on trimmed mean	3.460	2	1078	.132
Technophobia	Based on M	1.249	2	1078	.287
	Based on Med	1.992	2	1078	.137
	Based on Med & with adjusted df	1.992	2	1067.501	.137
	Based on trimmed mean	1.683	2	1078	.186

M: Mean, Med: Median.

These results satisfied the essential assumptions for executing the one-way ANOVA test.

What are the levels of technophilia among undergraduates in Qatar, Jordan, and Egypt?

Descriptive statistics for technophilia were extracted, and the mean and standard deviation were calculated. The undergraduates' technophilia was measured on a 6-point Likert scale. The mean values ranged from 1.0 to 2.66, demonstrating a low level; 2.67 to 4.33, demonstrating a moderate level; and 4.34 to 6.0, demonstrating a high level. Table 5 presents the descriptive statistics for technophilia according to country.

Table 5

Descriptive statistics for undergraduate technophilia scores according to country.

Item	Qatar		Jordan		Egypt	
	M±SD	Level	M±SD	Level	M±SD	Level
1	3.73±1.79	Moderate	4.19±1.61	Moderate	3.93±1.71	Moderate
2	3.65±1.87	Moderate	3.41±1.71	Moderate	3.55±1.72	Moderate
3	3.95±1.76	Moderate	4.25±1.55	Moderate	4.14±1.70	Moderate
4	3.85±1.86	Moderate	3.63±1.66	Moderate	3.69±1.72	Moderate
5	4.35±1.70	High	4.48±1.50	High	4.22±1.64	Moderate
6	3.84±1.60	Moderate	4.09±1.54	Moderate	3.95±1.60	Moderate
7	3.34±1.87	Moderate	2.94±1.61	Moderate	3.16±1.66	Moderate
8	3.55±1.80	Moderate	3.25±1.62	Moderate	3.36±1.73	Moderate
9	4.25±1.69	Moderate	4.25±1.59	Moderate	4.13±1.65	Moderate
10	3.70±1.74	Moderate	3.42±1.66	Moderate	3.63±1.69	Moderate
11	4.35±1.64	High	4.46±1.62	High	4.27±1.66	Moderate
12	3.67±1.86	Moderate	3.27±1.70	Moderate	3.47±1.70	Moderate
13	4.42±1.67	High	4.35±1.61	High	4.29±1.74	Moderate
14	3.89±1.66	Moderate	3.99±1.62	Moderate	3.79±1.70	Moderate
15	3.78±1.78	Moderate	3.37±1.66	Moderate	3.44±1.77	Moderate
16	4.00±1.72	Moderate	4.07±1.64	Moderate	3.83±1.71	Moderate
17	3.66±1.77	Moderate	3.21±1.69	Moderate	3.38±1.68	Moderate
18	3.77±1.84	Moderate	3.51±1.60	Moderate	3.69±1.61	Moderate
Total	3.87±1.12	Moderate	3.79±1.13	Moderate	3.77±1.23	Moderate

M: Mean, SD: Standard deviation.

Table 5 shows that the mean scores of the Qatari undergraduates' technophilia (M = 3.87) were higher than Jordanian (M = 3.79) and Egyptian (M = 3.77) undergraduates' technophilia. The higher mean scores reveal that they had higher technophilia levels, although all countries' mean scores fell within a moderate range. The participants' responses to the technophilia scale items were all averaged moderately, except for items 5 ("I think that new technology has many benefits"), 11 ("I believe that new technology improves life"), and 13 ("Lastly, I have used new equipment or technology too frequently"); they were averaged high for both Jordanian and Qatari undergraduates. Further, participants' responses to items 7, 10, 15 and 16 indicate that Arabian

undergraduates moderately feel enthusiasm when a new technology is launched, loss of control and worried if they can't use the latest technology, and their personal feelings are moderately influenced by using new technology. These results indicate that Arabian undergraduates were moderately technophilia, illustrating that no differences exist in undergraduates' technophilia levels according to country.

What are the levels of technophobia among undergraduates in Qatar, Jordan, and Egypt?

We assessed the undergraduates' technophobia levels by extracting descriptive statistics for the technophobia subscale. The undergraduates' technophobia was measured on a 6-point Likert scale. The mean values ranged from 1.0 to 2.66, demonstrating a low level; 2.67 to 4.33, demonstrating a moderate level; and 4.34 to 6.0, demonstrating a high level. Table 6 presents the descriptive statistics for technophobia according to country.

Table 6

Descriptive statistics for undergraduates' technophobia scores according to country.

Item	Qatar		Jordan		Egypt	
	M±SD	Level	M±SD	Level	M±SD	Level
1	2.56±1.57	Low	2.85±1.51	Moderate	3.01±1.77	Moderate
2	2.30±1.41	Low	2.66±1.49	Low	2.59±1.68	Low
3	2.37±1.55	Low	2.70±1.49	Moderate	2.65±1.69	Low
4	2.37±1.49	Low	2.91±1.56	Moderate	3.02±1.67	Moderate
5	2.26±1.50	Low	2.70±1.51	Moderate	2.78±1.72	Moderate
6	2.13±1.50	Low	2.61±1.48	Low	2.66±1.71	Low
7	2.26±1.55	Low	2.55±1.55	Low	2.40±1.71	Low
8	2.34±1.55	Low	2.83±1.54	Moderate	2.83±1.67	Moderate
9	1.88±1.36	Low	2.38±1.50	Low	2.24±1.61	Low
10	2.13±1.53	Low	2.35±1.54	Low	2.31±1.63	Low
11	2.21±1.55	Low	2.44±1.53	Low	2.57±1.73	Low
12	2.66±1.68	Low	2.91±1.72	Moderate	3.32±1.90	Moderate
Total	2.29±1.20	Low	2.66±1.23	Low	2.70±1.28	Moderate

M: Mean, SD: Standard deviation.

The results in Table 6 indicate that the mean scores of technophobia varied by country; none fell into the high level of technophobia range. For instance, the lowest mean scores were for Qatari undergraduates (2.29), followed by Jordanian (2.66) and Egyptian (2.70) undergraduates. In addition, all mean scores, except those of Egyptian undergraduates, were above the range of low levels of technophobia. According to these findings, the technophobia levels of the undergraduates were not substantially high, and those students from both Jordan and Qatar cultures were classified as low. In contrast, the technophobia levels of the students from Egyptian culture were within a moderate range.

In particular, the results indicated that the Qatari undergraduates' responses to all technophobia subscale items were average low, while the Egyptian and Jordanian undergraduates' responses were average and varied between low and moderate. Furthermore, the same highest-scoring item ("I feel forced to change my way of working because of new equipment or technology") was reported by Qatari, Jordanian, and Egyptian undergraduates with mean values of 2.66, 2.91, and 3.32, respectively. These results indicate differences in undergraduates' technophobia levels according to the country.

Hypothesis Testing

Ha1: Statistically significant differences exist at significance level α = 0.05 in the technophilia levels among undergraduates in Qatar, Jordan, and Egypt.

A one-way ANOVA test was conducted to investigate any statistically significant differences among the undergraduates' technophilia levels according to the country to answer the first research hypothesis. Table 7 presents the results.

Table 7

One-way ANOVA test results for undergraduates' technophilia levels according to country.

Source of variance	Sum of Squares	df	Mean Squar	F	P
Between Groups	2.023	2	1.012	.749	0.473
Within Groups	1455.773	1078	1.350		
Total	1457.796	1080			

**: Significance value at level .05.; df: degree of freedom*

Table 7 depicts that the ANOVA results reported the return of a non-significant value of F (F =.749, p = . 473). The testing did not confirm the first hypothesis, indicating that no significant difference existed in the level of technophilia according to the country.

Ha2: Statistically significant differences exist at significance level α = 0.05 in the technophobia levels among undergraduates in Qatar, Jordan, and Egypt.

A one-way ANOVA test was conducted to investigate any statistically significant differences among the undergraduates' technophobia levels according to country, answering the second research hypothesis. Table 8 presents the results.

Table 8
One-way ANOVA test results regarding undergraduates' technophobia levels according to country

Source of variance	Sum of Squares	Df	Mean Squar	F	P
Between Groups	33.608	2	16.804	10.907	0.000*
Within Groups	1660.878	1078	1.541		
Total	1694.485	1080			

**: Significance value at level .05.; df: degree of freedom.*

According to the ANOVA results for differences in technophobia levels based on country, a significant value of F existed (F = 10.907, p = . 000). This ANOVA testing confirmed the second hypothesis, indicating the presence of a significant difference in the levels of technophobia according to country. The Scheffe post hoc test between technophobia means was conducted to investigate the differences in the countries' technophobia levels. The mean scores related to the technophobia level for each country were compared, and Table 9 illustrates the results.

Table 9
Scheffe post hoc results for multiple comparisons between technophobia levels according to country

Groups (Countries)		Mean difference	sig
I	J	(I-J)	
Qatar	Jordan	-.3690*	0.001
Qatar	Egypt	-.4089*	0.000
Jordan	Egypt	-0.0399	0.905

**: Significance value at level .05.*

The Scheffe post hoc results depicted significant differences in the technophobia levels for Qatar and Jordan. The Qatari undergraduates were significantly less technophobic (p<.05) than the Jordanian undergraduates. Moreover, significant differences existed in the technophobia levels concerning Qatar and Egypt, where the Qatari undergraduates were less technophobic (p<.05) than the Egyptian undergraduates.

Discussion

This study's results revealed that the technophobia levels among Arabian undergraduates varied from low to moderate. The Qatari and Jordanian undergraduates reported a low level, whereas the Egyptians reported a moderate level, and the technophobia levels were significantly different (p<.05) among the countries. The Qataris were less technophobic (p<.05) than the Egyptians and

Jordanians. Furthermore, the Arabian undergraduates in Qatar, Egypt, and Jordan reported a moderate level of technophilia, with no significant differences (p>.05) according to the country.

In research on technology-related psychological consequences, researchers found that technophilia constructs were influenced by technology experiences, technology tendencies, and emotional, behavioral, and cognitive issues.

Moreover, technophobia was influenced by individuals, cultures, and socioeconomic factors such as a country's economy, technological development, the public attitude toward technology, political climate, and the availability of technological innovations. Researchers discussed the results in light of the empirical studies' findings, technophobia and technophilia literature, country profile, ADEI reports, and the gathered data.

Levels of Technophilia among Undergraduates in Qatar, Jordan, and Egypt

This study's findings revealed that the Arabian undergraduates from Qatar, Jordan, and Egypt were moderately technophilia; the Qatari undergraduates reported the highest technophilia level, followed by Jordanians and Egyptians.

The moderate level of technophilia among the Arabian undergraduates indicates that they are moderately attracted to new technology, not entirely enthusiastic about it, moderately passionate about innovation, moderately enjoy technology usage, and exhibit a moderately positive attitude toward adopting technology, moderately dependent on technology and had a moderate level of technoruptation (Abbasi & Tabatabaee-Yazd, 2021; Barrientos-Gutierrez et al., 2019; Martínez-Córcoles et al., 2017; Osiceanu, 2015). The moderate feeling of enthusiasm is the reason behind their response to item 11 and 5, having the highest mean score. They highly agreed that new technology has several profits and believed that it improves their life. It could have contributed to their digital literacy and technology awareness; This belief in technology advantages is attributable to COVID-19, forcing all students to use technology as a survival tool beyond continuing learning online. This experience forced them to take advantage of the technology, influencing their attitudes and feelings toward it.

In addition, their dependency on technology can explain the moderate level of technophilia because they reported high mean scores and agreement with statements 13. It depicts their frequently use of the new technology which could be attributable to COVID-19, imposing undergraduates to use technology, this is also ascribed to the DT and the advantages of using technology to improve life. They also reported that using technology moderately affects their

intimacy and their personal feelings. However, this result discloses that they need more awareness of technology and counseling program to prevent technophilia consequences.

Moreover, undergraduates moderately have techoreputation as they reported moderate mean scores on statements 2, 8, 10 and 17 which they indicate that they moderately felt fear, loss of control, afraid of being left behind and falling if they cannot access technology. This means that they are enjoying having the latest technology versions which could lead undergraduates to spend a lot of money on technology that they do not need (Martínez-Córcoles, Teichmann, Murdvee, 2017). The instructors and decision makers should help undergraduates foster technology awareness and literacy and afford a program and policies to avoid high levels of technophilia which could be negatively impacting on the undergraduate's life. Nevertheless, no previous study assessed technophilia in Jordan, Egypt, or Qatar to compare our findings. However, some related studies involving individuals' attitudes toward adopting specific technology exist. First, the result that the Jordanian undergraduates had a moderate level of technophilia agrees with some previous studies (Al Bataineh, 2014; Almaiah, 2018; Alnasraween et al., 2021; Hamad et al., 2021; Saeed & Al-Zayed, 2018), as well as Ta'an et al. (2021), reporting that Jordanian nurses comfortably use computer technology in healthcare. Second, the study results of Qatari undergraduates with a moderate level of technophilia align with those discovering that Qatari students had a positive attitude and willingness to adopt specific technology (Al-Abdulghani, 2021; Alshaboul et al., 2022; El-Masri & Tarhini, 2017). These results also align with those with moderate technology awareness and skill levels among Qatari undergraduates (Alkhateeb, 2019; Hendawi & Nosair, 2020). Finally, the result of moderate technophilia levels among Egyptian undergraduates is in line with those of the studies finding that Egyptians had positive attitudes and were willing to adapt to a specific technology, such as e-banking, e-learning, e-health, and IoT (Badran, 2019; El Alfy et al., 2017; Gawish et al., 2021; Hassan & Wood, 2020; Zaky et al., 2020).

Levels of Technophobia Among Undergraduates in Qatar, Jordan, and Egypt

This study's findings revealed that the Arabian undergraduates from Qatar, Jordan, and Egypt had varying levels of technophobia. For instance, Qatari undergraduates reported the minimum technophobia level, followed by Jordanians and Egyptians. Students from Jordan and Qatar cultures reported a low level, whereas those from Egypt reported a moderate level.

The results indicated that Qatari and Jordanian undergraduates had little irrational fear or anxiety about using, rejecting, or avoiding different forms of technology (Martínez-Córcoles et al., 2017;

Osiceanu, 2015). More than 70% of Qataris and Jordanians strongly disagreed that they disliked technology and were incompetent in using new technology. It is attributable to their cognitive, emotional, and behavioral components; in particular, they had good self-efficacy experience, as approximately 70% of Qatari and 50% of Jordanian undergraduates reported very good or excellent digital skills. The lockdowns imposed under COVID-19 restrictions could also have played a role in the interpersonal factors influencing their technophobia level; for instance, they forced them to communicate with others over technologies, making them more familiar with them and enhancing their skills. This result aligns with that of Jaradat and Ajlouni (2021), reporting that 29.2% of Jordanian undergraduate respondents had technophobia, as well as that Alkhawaja et al. (2021) found low technology anxiety among 70% of Jordanian university respondents.

Furthermore, the Egyptian undergraduates' reported moderate technophobia levels, indicating a moderate irrational fear or anxiety about using and adapting to technology. It causes dislikes, little use, rejection, or avoidance of technology's several forms (Martínez-Córcoles et al., 2017; Osiceanu, 2015). They respond to technology stimuli due to their mental fear of technology (Ahmad & Daud, 2011; Faloye et al., 2022; Khasawneh, 2015). More than 25% of the Egyptian respondents reported avoiding using new technology. It is attributable to their digital skills, as they reported that more than half had poor or good digital skills, making them uncomfortable using new technologies. This technophobia might have constrained their ability to use technology and refuse to adapt to it, thus hindering them from using it (Ahmad & Daud, 2011; Faloye et al., 2022). This result is in line with that by Gabr et al. (2021), who reported a moderate to a high level of technostress among Egyptian academic staff members.

Differences in the Levels of Technophilia According to Country

The results revealed no significant (p>.05) differences among Arabian undergraduates according to country, where Jordanian, Qatari, and Egyptian undergraduates reported a moderate level of technophilia. It means that all shared similar emotional, behavioral, and cognitive issues forming technophilia constructs. It is attributable to the lockdowns imposed under the COVID-19 pandemic, forcing technology use. This pandemic depicted the importance of technology to undergraduates. These experiences indicate that they have close beliefs about the benefits and importance of technology. It also suggests that they all had technology dependency and exhibited repetitive behaviors and frequent use, for example, to communicate, learn, and shop online during the pandemic.

Furthermore, the social distancing imposed under the lockdown provided undergraduates in all three countries equal opportunities to experience technology and rely on it in various areas of life. These beliefs, focusing on technology egocentric profits and the positive attitude required to adopt them, as well as technology dependency, construct technophilia (Osiceanu, 2015; Martínez-Córcoles et al., 2017; Barrientos-Gutierre). This result aligns with that obtained by a previous cross-country study by Usman et al. (2014), who found no significant (p>.05) differences in internet addiction among students according to country. However, it is inconsistent with the result by Ünal (2020), who found significant (p<0.05) differences in social media addiction among students according to country.

Differences in the Level of Technophobia According to Country

This study's findings indicated significant (p<.05) differences in Arabian undergraduates' technophobia according to country; Qatari undergraduates had significantly (p<.05) lower technophobia than Jordanian undergraduates. In addition, Qatari undergraduates had significantly (p<.05) lower technophobia than Egyptian undergraduates. A possible reason for these circumstances could relate to cultures and socioeconomic issues because many factors could influence technophobia levels. They include social factors, the level of technological and economic development of a country, the public attitude toward technology, cultural characteristics, political climate, computer use in the educational system, and the general availability of technological innovations (Nestik et al., 2018; Weil & Rosen, 1995; Wang & Kong, 2020; Zakour, 2007).

The country's differences in technophobia levels in this study are attributable to three factors. First is the technological development of the country. Data on the availability of the technological and digital index (depicted in Table 1) reveal that Qatar scored higher in all index values (digital government, innovation, technological readiness, information technology service usage, and access index) than in Jordan and Egypt. Therefore, students in Qatar, with more technological propagation and adoption, are more familiar with the technology. Thus, they have less fear and anxiety than in countries with little technology availability and dependency, such as Jordan and Egypt, where students have fewer opportunities to interact with technology. It aligns with Tekinarslan's (2007) findings, indicating that culture can decrease computer anxiety levels by increasing their computer experience.

The second is the economic development of the country. As illustrated in Table 1, Qataris have a higher level of national income than Jordanians and Egyptians; the average per capita income for

Qataris is more than 10 and 14 times higher than for Jordanians and Egyptians, exacerbating the socioeconomic divisions in these populations. Moreover, Qatar has a lower unemployment rate with a higher ADEI. Qatar is considered "the leading country" in Group A, according to the ADEI report for 2022. It indicates that Qatar has a sustainable strategic investment in digital transformation to support its socioeconomic development plans, whereas Jordan and Egypt are considered "digitally promising countries" in Group B. It demonstrates that they have appropriate resources and infrastructure but require a more comprehensive and inclusive socioeconomic development plan. Thus, Qatari undergraduates in wealthy countries are more likely to own and use modern technologies than those in less wealthy countries. Thus, Qatari undergraduates have fewer technophobic undergraduates.

The third factor is digital literacy. The Qatari undergraduates reported that they had a higher level of digital skills, as Table 2 depicts. It indicates that they had more digital skills and knowledge, facilitating their technology use and making them aware of the benefits of technology adaptation. This result is consistent with Weil and Rosen's (1995) findings that cultural factors influence technophobia (i.e., the value of technology, technology availability, political climate, literacy, and poverty). Tekinarslan (2008) found that computer anxiety levels differ significantly (p<.05) according to country and culture, socioeconomic levels, and computer penetration rates influence them. In addition, they align with cross-national studies reporting that technology acceptance significantly (p<.05)differs according to country (Khushman et al., 2009; Taufik et al., 2021) . They are also supported by Alam et al.'s (2020) study, which found that the adoption of mHealth services significantly (p<.05) differs according to country and is influenced by social factors. This result contradicts Vu and Lim's (2021) results, revealing that public acceptance of artificial intelligence and robotics technologies did not significantly (p<.05) differ according to country.

This study fills the gaps of the little previous cross-national studies that investigated the psychological consequences of technology (technophilia and technophobia). This study is novel because it is the first cross-national study considering technophilia and technophilia in Arabian countries. It could afford a path for further research and fill the gap by adding a theoretical framework as a novelty in technophobia and technophilia. Therefore, our study provides new data to illustrate that the technophobia and technophilia constructs should be addressed in Arabian countries.

Conclusion and Implications

This research is the first Arabian cross-national study assessing technophobia and technophilia levels among undergraduates in Egypt, Qatar, and Jordan. The results revealed that Arabian undergraduates had moderate levels of technophilia, with no significant differences according to country. In addition, Qatari and Jordanian undergraduates had a low level of technophobia, while Egyptians had a moderate level. It also revealed a significant difference in technophobia levels according to country, where Qatari undergraduates had less technophobia than Egyptians and Jordanians, attributable to cultural and socioeconomic factors. Based on these results, more attention should be paid to undergraduates in Egypt, Qatar, and Jordan to enhance their technophilia construct, such as developing programs and policies to enhance their level and avoid high levels. In particular, undergraduates in Egypt need more digital skill training to decrease their technophobia level, and decision-makers in Jordan and Egypt should take a serious step to minimize this level among their undergraduates, helping the country achieve its sustainability goals and minimizing the digital divide. Our results provide an interesting view of technology's psychological influences in the Arab world. Despite the limitations concerning the sample size and number of countries involved in the study sample, our research can assist policy-makers in education and strategic planners of sustainable development in Qatar, Egypt, and Jordan. It addresses the psychological constructs (technophilia and technophobia) among undergraduates that hinder achieving learning outcomes, future employability skills, and sustainable development goals. This study is recommended to be replicated by including more countries and participants. The expected implications of this study are to encourage decision-makers to plan strategies, policies and program to enhance technophilia and technophobia constructs among Arabian undergraduates in Qatar, Egypt, and Jordan. To sustains it within a healthy level avoiding negative consequences, like stress, anxiety, or severe addiction. Thus, digital skill development training should be conducted for technophobes. This recommendation is based on the finding that 16 % of participants reported lack in digital skills. In addition, we recommend psychological interventions, such as coaching and counseling, to address technophobia and technophilia constructs, sustain them with appropriate levels and avoid high levels of them, and foster technology awareness to boost undergraduates' technology acceptance, attitude, reliance, and belief in their benefits.

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