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RESEARCH PAPER

Digital Technology and Adolescent Well-Being: A Comparative Study of Pakistan and Canada

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ABSTRACT

This study aims to assess the impact of digital technology use on the digital well-being of adolescents in Pakistan and Canada. Unlike previous research relying on secondary data, this study gathers primary data directly from adolescents on a five-dimensional Likert scale from the Center for Trusted Internet and Community at the National University of Singapore. The study examines the impact of digital technology use on digital consumption, health, civic participation, employment, and social relations, as well as their subsequent effects on digital well-being. A quantitative approach was employed, with data sample of 300 survey questionnaires from Pakistan and Canada. The findings show a positive correlation between digital technology use and digital consumption, civic participation, employment, and social relations. Negative impacts are observed on digital health due to low use of health apps, resulting in headaches, eye strain, and sleep issues. Differences in digital civic participation and online shopping habits are influenced by economic and accessibility factors. Encourage balanced digital consumption, promote health app usage, and enhance digital literacy programs to support informed civic participation.

KEYWORDS Adolescents, Digital Civic Participation, Digital Consumption, Digital Employment, Digital Well-Being

Introduction

In recent years, smartphone and device usage has grown significantly, permeating both professional and personal lives and encouraging use even in non-essential areas (Mishna et al., 2021). By 2024, the number of smartphone users globally has reached 7.1 billion, with higher penetration in developed economies (Kögler et al., 2024). In the data reported by Statista, UK smartphone surge as penetration was 93.8% in 2023, with 96% of adolescents owning smartphones (*Smartphone Ownership by Age 2012-2023*, 2024). In contrast, smartphone penetration in Pakistan rose from 10% in 2014 to 51% in 2020, with the highest usage among 21-30-year-olds (Ejaz et al., 2023). On average, teenagers spend 6.5-7 hours daily on screens for non-educational purposes (George et al., 2023). Although the global gap in smartphone usage between developed and developing countries is narrowing, a significant divide remains (Muzaffar, et. al., 2020; Wang et al., 2023).

Increased connectivity brings benefits like improved communication, expanded social circles, and enhanced technical skills (Garlinska et al., 2023). However, it also presents challenges, such as reduced social activities, distractions from work and study, health issues, and negative emotions like anxiety (Throuvala et al., 2021). Excessive

smartphone use can harm adolescents' mental health, leading to loneliness, depression, and suicidal thoughts, raising public and parental concerns.

Digital well-being, a concept focusing on maintaining a healthy relationship with technology, has become a significant public concern and research area (Gui et al., 2017). It involves understanding the positive and negative effects of digital engagement and fostering self-control to achieve a balanced digital lifestyle (Roffarello & De Russis, 2023). Digital well-being encompasses multiple dimensions—physical, psychological, emotional, and social (Messena & Everri, 2023). Most studies either discuss digital well-being in general or focus on mental health impacts(Burr et al., 2020). Few studies consider cultural, societal, and economic factors or use primary data from young adults, the most affected group.

This research aims to assess digital well-being among adolescents in Canada and Pakistan, considering cultural and economic influences, and to explore the impact of digital technologies, particularly smartphones, on all components of digital well-being, including digital consumption, employment, civic participation, health, and social relations. It also seeks to identify the challenges and opportunities associated with digital technology use across these areas.

Literature Review

"Digital technology use" refers to various tools, services, and application scenarios. Most adolescent use of digital technology these days occurs on mobile devices or smartphones. This is why smartphones are regarded as a "meta medium" since they provide the features and affordances of several different media and are essential to adolescent media use. Numerous services and platforms are available on smartphones and other digital devices(Dienlin & Breuer, 2023). A recent Pew Research study has revealed that 95% of teenagers in the United States have access to a smartphone, and 45% report being online nearly all the time (Chassiakos & Stager, 2020). When gender is taken into account, 50% of teenage females and 39% of teenage boys are nearly online all the time. When examining precise quantities of screen time, research indicates that kids who use the internet for entertainment purposes, such as social media, use the platform for more than six hours on average every day(Muppalla et al., 2023). One of the primary technology uses among adolescents is social media platforms and more than 81% of adolescents use these platforms for various purposes including self-expression, communication, sharing ideas and experiences, gaming, planning, and keeping up with current events(Schmitt, 2021).

According to the recent statistics available on Statista as of 2024, Facebook is the most popular social media platform with the maximum number of active users i.e., 3065 million followed by YouTube, Instagram, WhatsApp, and TikTok (*Social Network Usage & Growth Statistics (2024)*, 2023) (See Figure below)

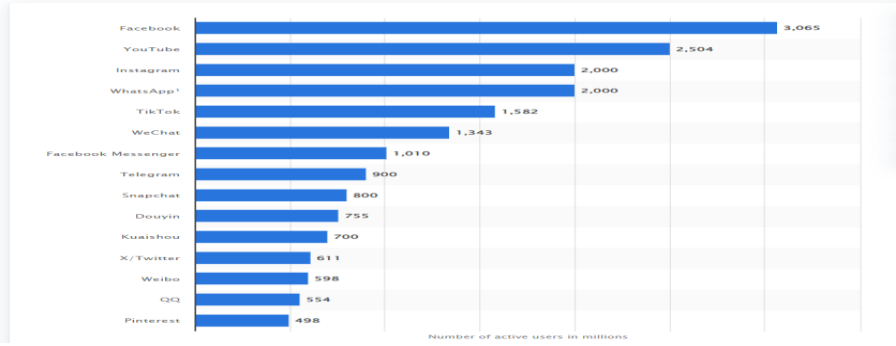

Figure 1: Most popular social media platform worldwide in 2024 Source: (*Social Network Usage & Growth Statistics (2024*)

There are various functionalities available across all social media platforms, leading to a variety of uses. Adolescents can post, like, share, and converse with others on social media which is known as active use. (Muzaffar, et. al., (2019). On the other hand, adolescents are also capable of passive use, simply lurking and seeing other people's content. The question of whether a behavior qualifies as goal-directed behavior or procrastination remains unanswered by the binary division between active and passive use. One instance of procrastination would be talking to people by delaying work on important assignments. However, if keeping up with friends' lives is the goal, then observing content without engaging with it can be deemed goal-directed (Steel, 2007). Digital technology use can also be categorized into social and non-social use. Social use includes liking pictures and sharing posts in addition to all forms of active interpersonal communication like texting and talking. Non-social activities include watching films or listening to music, as well as (certain kinds of) games and reading(Muzaffar, et. al., 2020; Kaye, 2021).

Effects of Digital Technology Use

Technology use among adolescents has become unavoidable and has both positive and negative effects. Research shows benefits like diversity, self-esteem, and access to health resources, but also risks such as cyberbullying, mental health issues, privacy breaches, and negative educational impacts (Winstone et al., 2023). The impact depends on the purpose and intensity of use; active use is generally positive, while passive use leads to negative outcomes (Röger, 2023). While technology can enhance learning, creativity, and social connections(Hashimi et al., 2019), it may also harm writing skills, social interactions, and mental health, leading to issues like anxiety and depression (Aguilar & Pifarre Turmo, 2019).

Digital Well-being

Contrary to the effects of technology use that are specific outcomes, digital well-being is a holistic concept that emphasizes preserving a balanced and healthy relationship with digital technology. Google defines digital well-being as an emerging intervention that uses digital technology to protect one's physical and mental health in a world where "digital abundance" rules the day (Chaiveeradech, 2022). The main goal of digital well-being is to integrate and modify one's tech habits to achieve necessary goals. One of the main, yet simple goals is improving mental wellness by encouraging social and familial relationships, reducing distractions when working or studying, and establishing reminders to unplug and detox (Zaidi et al., 2024). In essence, digital wellness emphasizes the degree of self-control someone may exercise over how they utilize digital technologies and centers on coordinating them to meet long-term objectives. Self-control is viewed as a more effective strategy for achieving digital well-being and as a way to lead a personal and healthy lifestyle (Gui et al., 2017).

The literature review has revealed that digital well-being is defined and interpreted differently by different authorities and researchers (Castellacci & Tveito, 2018). For example, According to Castellacci & Tveito, (2018), digital well-being is "a state" in which one's subjective well-being is preserved in an overabundance of digital information, which is, in and of itself, a balance between the positive and negative aspects of it. Royal provided a more optimistic definition, describing digital well-being as "a way of life" that uses digital technology to support optimum health and well-being. To live

more completely in the human, natural, and digital communities, this "way of life" entails integrating a person's body, mind, and spirit. Consequently, it refers to the optimal level of health and well-being that any person who uses digital technology is capable of attaining(Chaiveeradech, 2022).

Therefore, rather than being a source of distraction or interruption, technology should be used to help us "craft and maintain a healthy relationship." It should also be developed with our goals and needs in mind. As a result, Google released the "digital well-being" app, which enables users to monitor how much time they spend using different apps and strike a balance between digital and offline activities (Yue et al., 2021). The "Screen Time" application on iPhones and iPads had the same feature. Since then, legislators, educators, technology designers, and others have often explored digital well-being.

Measuring Digital Well-being

Measuring adolescents' digital well-being presents a significant challenge as there is no precise scale to measure it (Rosič et al., 2023). However, some researchers have made significant efforts to address this challenge. Measured digital screen time and psychological well-being among young American children based on the parental responses to four questions i.e., caregiver attachment, curiosity, resilience, and positive affect during the previous month. Nevertheless, the reliability of these items was quite low. In other cases, pediatric scales have been adopted to measure digital well-being during early age as Monteiro (2021) employed the Baby Pediatric Symptoms Checklist (BPSC) and Preschool Pediatric Symptoms Checklist (PPSC) to assess the behavioral and emotional problems among infants and young children (Monteiro et al., 2021). Similarly, Oliva (2021) also used these two scales to discover the protective factors and risks of mental health symptoms among Italian children during COVID-19 (Oliva et al., 2021). In addition to this, the Strengths and Difficulties Questionnaire Parent version (SDQ) has also been used to estimate the outcome of digital usage among young children. However, these studies have ignored the digital aspect while measuring well-being, therefore, developed the Problem Media Use Measurement Scale—Short Form (PMUM-SF) scale to measure the negative impacts of media usage among children between the ages of 4 and 11 years. The scale had 27 items that could be classified into five dimensions i.e., conduct problems, emotional symptoms, impulsivity/hyperactivity, peer relationship problems, and prosocial behaviors.

The literature review has highlighted that none of the studies have successfully estimated digital well-being wholesomely by thoroughly integrating the digital aspect. Most previous studies have either focused only on the well-being of individuals or measured only the negative aspects of digital well-being. Therefore, the present study has designed a five-dimensional framework based on the domains of digital well-being defined by the Center for Trusted Internet and Community at the National University of Singapore (NUS) (See Figure below).

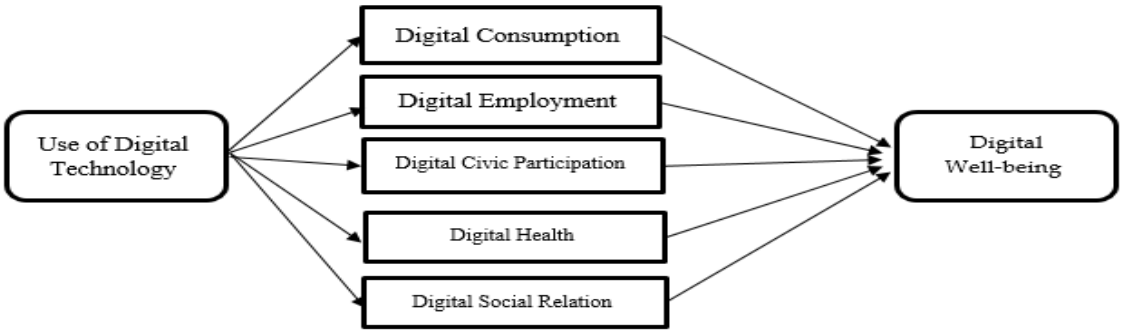

Figure 2: Framework to measure digital well-being among adolescents

The framework intends to thoroughly assess the digital well-being of adolescents in Canada and Pakistan. The following section highlights the studies discussing these variables and their influence on adolescents.

Digital Consumption

It is the sum of information and entertainment media consumed by individuals across digital platforms (Geers, 2020). The research indicates that currently average internet users when online spend seven hours a day with social media platforms and video streaming two hours a day, making them the most widely consumed digital platform. It is due to the wide popularity of social media platforms that most research studies have interpreted digital consumption as social media consumption and revealed that it has both positive and negative impacts on adolescents. For example, the positive impacts include increased opportunities for connection and conversation, improved self-esteem, and access to important medical information. On the other hand, negative consequences are observed on an individual's mental and psychological health. Additionally, cyberbullying and privacy concerns are other negative impacts widely reported among adolescents(Ossa et al., 2023). However, these studies have not examined the topic as comprehensively as needed, therefore, the first hypothesis is

H1: Digital technology use among adolescents has a positive relationship with digital consumption

Digital Health

It refers to the use of information and communication technologies in healthcare to manage illness, avoid health risks, and promote well-being (Aceto et al., 2018). The literature review has revealed that only a few studies have focused on assessing the effectiveness of technology use in improving health among adolescents. Most of the studies are focused on evaluating the impact of digital technology use on the physical and mental health of adolescents (Balcombe & De Leo, 2023). However, the present research intends to take into account both aspects, therefore, the next hypothesis is

H2: Digital technology use among adolescents has a positive relationship with the health of adolescents

Digital Civic Participation

It means the participation of young adults across socio-political processes by employing digital devices and platforms to influence policymakers and generate people-centered solutions (Cheshmehzangi & Dawodu, 2019). The research studies have

indicated that digital transformation entails both positive and negative impacts on civic participation. For example, the wide availability of online platforms, easy access to information, and the ability to interact with political leaders empower adolescents on socio-political and economic issues and inspire them to engage in real offline activities (Muzaffar, 2016; Turner, 2022). However, inequitable access to the internet, lack of adequate digital skills, widespread disinformation and fake news, and intergenerational gaps are some challenges that impede civic participation across digital platforms. To understand the impact of digital technology use on civic participation from both perspectives, the next hypothesis of the study is

H3: Digital technology use among adolescents has a positive relationship with digital civic participation

Digital Employment

Digital employment refers to jobs within or outside the ICT industry dependent on digital technologies and digital skills (Leahy & Wilson, 2014). Most prior research studies have documented a positive impact on digital employment. On the other hand, the fast technological advancements also entail challenges as Bessen, (2015) has indicated that technological innovations while promising innovation have also created job displacements (Bessen, 2015). However, there are rarely any studies that have assessed the quality of employment created due to digital technology use and how fast-paced technological advancements present a significant challenge, therefore, the next hypothesis is

H4: Digital technology use among adolescents has a positive relationship with digital employment

Digital Social Relations

It is the process by which people use the virtual relational spaces that are established on the Internet network to internalize and learn the norms and values of a particular social and cultural context (Šaras & Perez-Felkner, 2018). Prior studies have indicated that the reliance on digital technologies has improved the communication skills of adolescents and given them access to a wide array of personal and professional growth opportunities (Bitto Urbanova et al., 2023) but has evaded them to give adequate time to their social relations, thus generating atomistic attitudes toward family members. To further explore the relationship between the two and their contribution to adolescent's well-being, the next hypothesis is

H5: Digital technology use among adolescents has a positive relationship with digital social relations

Material and Methods

A cross-sectional online questionnaire-based study was conducted between June to August 2024 among individuals belonging to the age group of 10-25 years. The rationale behind choosing this research design is to fill the persistent gap in contemporary research that relies on systematic reviews and secondary data (X. Wang & Cheng, 2020).

Sample Size and Sampling Technique

The study recruited 300 participants, 150 from each country. The target population was divided into two strata based on the geographical location or country by using a stratified random sampling technique (Taherdoost, 2016a).. This sampling technique has been chosen due to its effectiveness in drawing inferences on digital well-being that may differ due to the participant's geographical location. In each stratum, the random sampling technique was used to select the participants through online platforms and forums (social media platforms, LinkedIn, Reddit, Digital Spy Forums, and TechJuice Forums).

Validity and Reliability

The researcher has ensured validity and reliability by pre-testing with a small sample of young adults (n=25) from both countries to guarantee relevance, clarity, and reliability (Taherdoost, 2016b). Cronbach's alpha was calculated for every section of the questionnaire to assess internal consistency and obtained a value higher than 0.7

Results and Discussion

The research has studied the impact of technology use on the digital well-being of adolescents belonging to Canada and Pakistan. Digital well-being has been divided into five factors i.e., digital consumption, digital employment, digital civic participation, digital health, and digital social relations. To compare the results the forms filled by Canadian and Pakistani participants were separated and then analyzed. The descriptive statistics of these variables are discussed below.

Table 1
Age distribution among participants from Canada and Pakistan

Age Group	Canada (%)	Pakistan (%)
10-15 years	25	22
15-18 years	35	20
18-25 years	40	60

Table-1 indicates that in Pakistan most participants i.e., 60% belonged to the age group of 18-25 years whereas, in Canada, 25% 35%, and 40% of the participants fell in the age bracket of 10-15 years, 15-18 years, and 18-25 years old, indicating the ubiquitousness of internet and digital technologies usage among all age groups. This difference primarily owes to the difference in cultural, societal, and economic factors between the two countries and its influence on the usage of digital technologies.

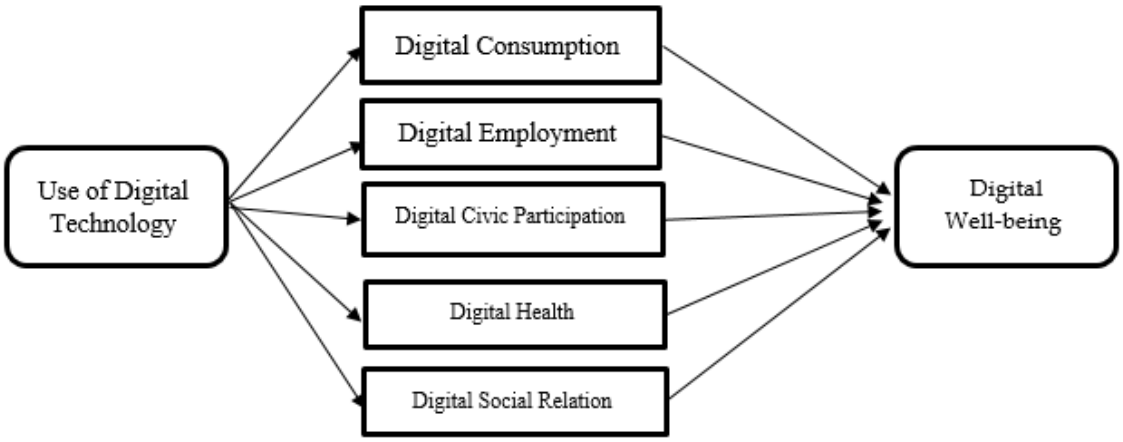

Figure 2 Conceptual Framework

The increasing usage of digital technologies among young adults has raised serious concerns about the well-being of users and has coined a new term known as digital well-being. To understand the relationship between the usage of digital technologies and digital well-being among adults from their perspective, the survey was started with a basic understanding of digital well-being. The descriptive statistics have revealed that most participants from both countries know what is meant by digital well-being and they understand that maintaining a healthy relationship with technology is considered digital well-being and their response is aligned with all prior studies discussing digital well-being(Parry et al., 2020).

Table 2
Perceived Benefits and Factors of Digital Well-being

Factor	Pakistan (%)	Canada (%)	Benefit	Pakistan (%)	Canada (%)
Maintain a healthy relationship with technology	30	50	To ensure psychological and emotional health	30	30
Understanding the positive and negative impacts of technology	20	20	To promote positive health behavior	25	20
Knowing how to manage and control factors contributing to digital well-being	15	10	To enhance productivity	25	25
All of the above	35	20	To improve lifespan	5	5
			All of the above	20	20

On further asking about the importance of understanding the concept of digital well-being and integrating it into one's life, most participants from both countries (28% and 30%) believed that digital well-being is important to ensure psychological and emotional health. The prior studies by Odgers & Jensen, (2020) have also confirmed the negative psychological impacts of the excessive usage of digital technologies. On the other hand, 25% of participants from both countries highlighted that integrating digital well-being into one's life is important to enhance productivity. This finding is a valuable addition to the field of digital well-being as only a few studies have explored the relationship between digital well-being and productivity.

Digital Consumption

Table 3
Comprehensive overview of online activities, device usage, and gaming frequency in Pakistan and Canada.

Activity	Canada (%)	Pakistan (%)	Device	Pakistan (%)	Canada (%)	Frequency	Pakistan (%)	Canada (%)
Social media browsing	60	65	Smartphone	90	80	Never	10	10
Reading news/articles/blogs	5	10	Tablet	20	20	Rarely	10	10
Listening to music/podcasts	5	10	Laptop/PC	40	70	Occasionally	20	20
Watching videos on YouTube & Netflix	40	40	Smart TV	20	20	Frequently	40	60

Table-3 indicates that social media browsing is the most popular digital activity among participants of both countries 57% of Canadians and 55% of Pakistani young adults spent maximum time on social media browsing. The second most popular activity

is watching videos on Netflix and YouTube as 41% of Canadian and 40% of Pakistani adolescents like watching videos on these platforms. These findings indicate the increasing proliferation of social media platforms and rising inclination towards video watching among nations irrespective of any cultural, societal, or economic differences. These findings are consistent with the prior studies indicating social media platforms' popularity among young adults (Odgers & Jensen, 2020). Nevertheless, only a few numbers of the studies have compared the usage of these platforms among countries with different cultures, economies, and societies.

Moreover, the most widely used device among both countries is smartphone as 90% of Pakistani and 80% of Canadian young adults use smartphones and the laptop is also a considerable device among adults as 70% of Canadians and 43% of Canadians also use laptops along with smartphones.

Similarly, the trend of online shopping, an emerging indicator of digital consumption has also been explored among the participants (See Table-3)

The results have highlighted that online shopping is more common in Canada in comparison to Pakistan as 60% of the participants frequently do online shopping whereas in Pakistan 40% buy frequently and 40% occasionally, indicating that Canada as a developed economy and modern society offers more favorable environment for online shopping compared to a developing country like Pakistan.

Digital Health

Contrary to other studies where digital health is interpreted as the use of digital resources to gain health-related information or access digital health services, in this study digital health refers to both constructive use of digital resources to improve health and destructive health impacts of excessive usage of digital technologies.

The results have revealed that despite having awareness of the harmful impacts of excessive usage of digital technologies and platforms, only 40% of the participants from Pakistan and 50% of participants from Canada are very concerned about their health.

Table 4
Comprehensive overview of digital well-being concerns, awareness, health issues, and statements in Pakistan and Canada

Factor	Pakistan (%)	Canada (%)
Level of Concern		
Not concerned	40	10
Slightly concerned	10	5
Moderately concerned	10	30
Very concerned	40	50
Awareness		
Yes	20	20
No	70	60
Don't Know	10	10
Health Issues		
All of the above	10	5
Back/neck pain	15	15
Sleep disturbances	30	35
Headaches	55	50
Eye strains	40	40
Statements		
Strongly Agree	15	30

Agree	5	15
Disagree	60	40
Strongly Disagree	20	15

This is the reason that most participants i.e., 67% of Pakistani and 65% of Canadian adolescents do not use any application to manage their screen time (See Table-4below).

Resultantly, all participants have reported different health problems among which headaches (43% Pakistani, and 45% Canadian), eye strain (54% Pakistani and 56% Canadian), and sleep disturbances (32% Pakistani and 30% of Canadian) are the major problems reported among participants of both countries.

Furthermore, when asked from participants whether they use digital technologies or platforms to access health information or healthcare services, the results revealed that 30% of Canadians use digital technologies to improve their health whereas, 40% do not use digital platforms for this purpose. On the other hand, in Pakistan, 60% of the participants denied the use of digital technologies (See Table-4).

The results of descriptive statistics in the case of digital health thus reveal that most participants have reported negative health impacts in the form of sleep disturbances, headaches, and eyestrains, and only a few numbers of participants have reported a constructive use of digital technologies and improved or manage the health implication, indicating coherence with the previous studies (Arshad et al., 2021). These results highlighting both constructive and destructive impacts of digital technologies on the health of adolescents give a more comprehensive picture in comparison to previous studies.

Digital Civic Participation

To assess digital technology use among adolescents and its impacts on civic participation, this section dealt with assessing the relationship between the two variables across two nations and how difference in cultural and economic conditions influence digital civic participation.

Table 5
Online Activism and Awareness in Pakistan and Canada

Category	**Country**	**Yes**	**No**
Overall Participation	Pakistan	70%	30%
	Canada	90%	10%
Online Activities			
Online Activities		Pakistan	Canada
	Signing online petitions	50%	30%
	Participating in online discussions & forums	30%	30%
	Volunteering for digital campaigns & causes	10%	30%
	Donating to online fundraisers	5%	10%
Opinions on Issues			
Opinions on Issues		Pakistan	Canada
	Strongly Disagree	5%	10%
	Disagree	60%	20%
	Agree	30%	60%
	Strongly Agree	5%	10%
Issues			
Issues		Pakistan	Canada
	Disinformation	30%	10%
	Fake news	40%	5%

Inequitable access to internet	20%	20%
Intergenerational gap	10%	5%

Table-5 has indicated that social media platforms play a significant role in enhancing the digital civic participation among adolescents as in Pakistan 70% of the participants and in Canada 90% of the participants use social media platforms to organize and participate in various community events focusing on socio-political causes and encouraging people-centered decisions.

On further intriguing the participants about their favorite or popular digital civic activity, it was found that signing petitions for different causes and participating in online discussions and forums are most popular civic activities (See Figure below).

Table-5 has indicated that signing online petition is regarded the most popular digital civic activity by 50% of the participants in Pakistan whereas 35% of participants highlighted their inclination toward online discussion and forums. On the other hand, in Canada, all options i.e., signing online petitions, participating in online discussions and forums, and volunteering for digital campaigns are equally popular among Canadian adolescents. Moreover, the impact of digital technology use on civic participation is different in both countries (See Table below).

Table-5 has highlighted a startling difference in the impact of digital technology use on civic participation as 60% of the participants from Pakistan disagree that digital technologies have generated a positive impact of civic participation whereas 60% of the Canadian believed that digital technologies have led to positive impacts on civic participation across digital platforms.

On further probing the reason behind this difference, it was revealed that participants from Pakistan face an increasing number of challenges while digital civic participation in comparison to Canadian participants. As fake news, disinformation, and inequitable access to the internet are prominent challenges highlighted by 40%, 30%, and 20% of Pakistani adolescents. On the other hand, only a few numbers of Canadian participants encountered such problems (See Table below)

These findings are consistent with the prior study conducted by UNDP (2021) highlighting that equitable access to technology, civic education digital skills, and existence of civic space across societies are active enablers for civic participation (UNDP, 2021). The studies done by Epifantsev et al., (2024) have also emphasized easy access to reliable information and the availability of online platforms for digital civic participation.

The results inferred from descriptive statistics highlight that though the digital civic participation among young adults in both countries have enhanced due to the use of digital technologies, however, the absence of these active enables for digital civic participation in Pakistan in comparison to Canada is impeding adolescents to enjoy the positive impacts on digital civic participation.

Digital Employment

Another crucial domain of digital well-being is digital employment; therefore, the next section is focused on assessing the extent of digital employment among participants of both countries with the increased use of digital technologies.

Remote work is an important aspect of digital employment, therefore, the first question dealt with assessing the prevalence of remote work among young adults of both countries.

The results of the descriptive statistics highlighted in the Table below indicates that participants of both countries are involved in remote work as 57% of Pakistani and 58% of Canadian participants selected the yes option (See Table below).

Table 6
Attitudes and Perceptions: A Cross-Cultural Analysis

Category	Pakistan	Canada
Video Conferencing - Yes	50%	60%
Video Conferencing - No	50%	40%
Project Management - Yes	30%	50%
Project Management - No	70%	50%
Communication - Yes	50%	70%
Communication - No	50%	30%
Cloud Storage - Yes	20%	40%
Cloud Storage - No	80%	60%
Perception: About the Same - Yes	10%	5%
Perception: About the Same - No	90%	95%
Perception: Slightly Higher - Yes	30%	30%
Perception: Slightly Higher - No	70%	70%
Perception: Much Higher - Yes	60%	65%
Perception: Much Higher - No	40%	35%
Response: Strongly Agree - Yes	10%	5%
Response: Strongly Agree - No	90%	95%
Response: Agree - Yes	40%	35%
Response: Agree - No	60%	65%
Response: Neutral - Yes	20%	25%
Response: Neutral - No	80%	75%
Response: Disagree - Yes	30%	40%
Response: Disagree - No	70%	60%
Response: Strongly Disagree - Yes	10%	5%
Response: Strongly Disagree - No	90%	95%

Apart from remote work, digital employment also includes the use of different types of digital tools and platforms. Therefore, the next question focused on identifying the digital tools used by the young adults of both countries.

The results portrayed in Figure 18 have revealed that the most popular digital tools among adolescents in both countries are communication, video conferencing, project management, and cloud storage tools. In Pakistan, 50% of the participants prefer using communication and video conferencing tools whereas project management tools and cloud storage are less popular and their use is reported by 30% and 20% of the Pakistani adults. On the other hand, in Canada, 70% and 60% of the participants used communication and video conferencing tools and 50% and 40% of them used project management and cloud storage tools, indicating that all digital tools are slightly more common in Canada in comparison to Pakistan.

The use of these digital tools is considered to pose a significant impact on the productivity of employees as 60% of Pakistani and 65% of Canadian Adults have reported a significant improvement in their productivity with the use of these digital technologies

However, the increased digital connectivity has also negatively impacted its users as more than 65% of participants from both countries indicate that they often feel stressed during work.

Moreover, the rising technological advancements have also led to some challenges and job displacement is the most crucial among them. On inquiring participants about their view on this theme, mixed opinions were obtained in the case of

Pakistan 40% of the participants agreed while 30% of them disagreed. Conversely, in the case of Canada, 35% of the participants agreed whereas 40% of them disagreed.

Similarly, skill mismatch is another challenge faced by the young adults due to fast-paced technological advancements. The survey has revealed mixed results as 40% of Canadians whereas in Pakistan 30% agreed and 30% disagreed with this proposition.

Digital Social Relations

The increased reliance on digital platforms also influences the social relations of users. The survey has indicated that most participants i.e., 60% of Pakistanis and 66% Canadians often and 30% of adolescents of both countries always participate in different online activities (virtual meetups, messages, and online gaming).

Table 7
Comparative Analysis of Behaviors, Attitudes, and Opinions in Pakistan and Canada

Category	Behavior Frequency	Agreement Level	Yes/No Question
Pakistan			
Never	5%	N/A	N/A
Rarely	3%	N/A	N/A
Sometimes	3%	N/A	N/A
Often	60%	N/A	N/A
Always	30%	N/A	N/A
Strongly Disagree	N/A	20%	N/A
Disagree	N/A	30%	N/A
Agree	N/A	40%	N/A
Strongly Agree	N/A	10%	N/A
Yes	N/A	N/A	40%
No	N/A	N/A	60%
Canada			
Never	1%	N/A	N/A
Rarely	2%	N/A	N/A
Sometimes	3%	N/A	N/A
Often	65%	N/A	N/A
Always	29%	N/A	N/A
Strongly Disagree	N/A	10%	N/A
Disagree	N/A	30%	N/A
Agree	N/A	40%	N/A
Strongly Agree	N/A	20%	N/A
Yes	N/A	N/A	65%
No	N/A	N/A	35%

Moreover, most participants from both countries i.e., 60% often and 30% always use social media platforms to connect with their friends and family (See Table-7).

This improved digital communication has also influenced the relationship of users with others. However, the survey has revealed mixed opinions in this regard as half of the participants from both countries (50%) agreed that improved digital communication has improved their relationship with others whereas the other half of the participants (50%) do not agree with this proposition (See Figure below), indicating that impact of digital platforms on relationships is dependent on extent or pattern of usage, a finding that is highlighted by only a few numbers of studies (Dwivedi et al., 2021).

Despite improved digital communication, the users of digital technologies also face issues like bullying as 40% of Pakistanis and 65% of Canadians face such incidents. The difference in the responses owes to the significant cultural and societal factors that encourage or discourage the victim to report and acknowledge the incident.

Another important issue reported among users of digital technologies is loneliness as most participants i.e., 65% from both countries have highlighted that they often face this issue (See Table-7), aligning with the previous studies confirming the negative psychological impacts of using digital technologies (Beaudry & Pinsonneault, 2010).

Table 8
Correlation matrix in the case of Canada

Variable	Use of Digital Technologies	Digital Consumption	Digital Health	Digital Civic Participation	Digital Employment	Digital Social Relations
Use of Digital Technologies	1	0.443**	0.754**	0.674**	0.686**	1.000**
Digital Consumption	0.443**	1	0.377**	0.764**	0.943**	0.159
Digital Health	0.754**	0.377**	1	0.897**	0.987**	0.007
Digital Civic Participation	0.674**	0.764**	0.897**	1	0.466**	0.049
Digital Employment	0.686**	0.943**	0.987**	0.466**	1	-0.113
Digital Social Relations	1.000**	0.159	0.007	0.049	-0.113	1

Note: All correlations are significant at the 0.01 level (2-tailed).

Table 9
Correlations Matrix in the case of Pakistan

Variable	Use of Digital Technologies	Digital Consumption	Digital Health	Digital Civic Participation	Digital Employment	Digital Social Relations
Use of Digital Technologies	1	0.267**	0.869**	0.926**	0.287**	0.306**
Digital Consumption	0.267**	1	0.501**	0.285**	0.944**	0.929**
Digital Health	0.869**	0.501**	1	0.891**	0.554**	0.541**
Digital Civic Participation	0.926**	0.285**	0.891**	1	0.322**	0.324**
Digital Employment	0.287**	0.944**	0.554**	0.322**	1	0.939**
Digital Social Relations	0.306**	0.929**	0.541**	0.324**	0.939**	1

Note: All correlations are significant at the 0.01 level (2-tailed).

The study comparing the use of digital technologies among adolescents from Canada and Pakistan had two types of data sets, therefore correlation among variables was determined separately.

Despite the difference in societal, cultural, and economic factors in Canada and Pakistan, Table 1 and Table 2 indicate that the use of digital technologies among adolescents in both countries has generated similar correlations among variables.

The *first hypothesis* examines the relationship between digital technology use and digital consumption. The higher the digital technology use, the more the digital consumption, therefore, there is a positive relationship between the two variables in case of both countries. On the other hand, the *second hypothesis* indicates a significant negative relationship between digital technology use and digital health, indicating that uncontrolled use of digital technologies hurts the physical and mental health of users from both countries, thus rejecting this hypothesis. The *third hypothesis* investigates the impact of using digital technologies on digital civic participation and reveals that this factor is also positively correlated for both nations. Similarly, the *fourth hypothesis* highlights a significant positive relationship between digital technology use and digital

employment. The results indicate that as the use of digital technologies increases, there are increasing possibilities for young adults of both countries to pursue their careers across digital platforms. The use of digital technologies among adolescents possesses a positive correlation with digital social relations as well, therefore, the *fifth hypothesis* is also accepted like others.

The findings of the study, including the key factors and corresponding insights, are presented in Table 10.

Table 10
Key Factors and insight

Category	Factor/Activity	Pakistan (%)	Canada (%)	Insights
Digital Well-being	Maintain a healthy relationship with technology	30	50	Canadians are more inclined than Pakistanis to maintain a healthy relationship with technology.
	Psychological and emotional health importance	28	30	Both countries acknowledge the importance of digital well-being for psychological and emotional health.
	Enhance productivity	25	25	Equal proportion in both countries believes that digital well-being improves productivity.
	Social media browsing	65	60	Social media browsing is the most popular digital activity in both countries.
	Watching videos (YouTube, Netflix)	40	40	Watching videos is equally popular among adolescents in both nations.
	Device usage: Smartphone	90	80	Smartphones are the primary devices for digital activities in both countries.
Digital Health	Very concerned about health	40	50	Canadians show a higher concern for health related to digital use compared to Pakistanis.
	Health issues: Headaches	55	50	Both countries report headaches as a common digital-related health issue.
	Health issues: Eye strain	40	40	Eye strain is equally reported by both countries.
	Use of apps to manage screen time	33	35	A minority in both countries use apps to manage screen time.
Digital Civic Participation	Online activism participation	70	90	Canadian adolescents show higher participation in online activism.
	Signing online petitions	50	30	More popular in Pakistan compared to Canada.
	Challenges: Fake news, disinformation	70 (Fake news + Disinformation)	15 (Fake news + Disinformation)	Higher reported incidence of challenges in Pakistan.
Digital Employment	Involvement in remote work	57	58	Similar levels of involvement in remote work across both countries.
	Use of communication tools	50	70	Higher usage of communication tools in Canada for digital employment.
	Use of cloud storage	20	40	Canadians are more likely to use cloud storage for digital work.
Digital	Participate in online social activities often	60	65	High engagement in online social activities like virtual meetups and gaming.

Impact of digital communication on relationships	50 (Agree)	50 (Agree)	Mixed opinions on whether digital communication improves relationships.
Experiences of online bullying	40	65	Canadians report a higher incidence of online bullying compared to Pakistanis.
Feelings of loneliness	65	65	Loneliness is a common issue associated with digital use in both countries.

Key Takeaways

1. **Digital Well-being Awareness**: Awareness of digital well-being is present among young adults in both Pakistan and Canada, with a higher inclination towards maintaining a healthy relationship with technology in Canada.
2. **Digital Consumption Patterns**: Social media browsing and video streaming are the most common activities in both countries, highlighting the pervasive influence of digital media on young adults.
3. **Digital Health Concerns**: Health concerns such as headaches and eye strain are commonly reported, indicating a negative impact of prolonged digital engagement.
4. **Digital Civic Participation**: Higher levels of online activism are observed in Canada, while Pakistani youth face more challenges like fake news and disinformation.
5. **Digital Employment**: Both countries exhibit a similar prevalence of remote work, but Canadians show a higher utilization of digital tools like cloud storage.
6. **Digital Social Relations**: High levels of participation in online social activities are reported, with a notable incidence of online bullying and feelings of loneliness.

Conclusions

This study evaluates the impact of digital technology use on the digital well-being of adolescents in Pakistan and Canada using a quantitative research approach. Unlike previous studies that relied on secondary data, this research gathers primary data directly from adolescents to assess their digital well-being across five domains: digital consumption, digital health, digital civic participation, digital employment, and digital social relations, as defined by the Center for Trusted Internet and Community at the National University of Singapore (NUS).

The findings highlight both positive and negative impacts of digital technology use on the digital well-being of adolescents in both Pakistan and Canada across these domains. While digital consumption and civic participation show positive correlations with well-being, challenges such as poor digital health management, online bullying, and skill mismatches in digital employment are evident.

Recommendations

To improve the digital well-being of adolescents, several key actions are recommended. Promoting healthy digital habits can help balance digital consumption and reduce issues like screen time addiction. Enhancing digital health management strategies, such as online safety education, is essential for safeguarding physical and mental health. Encouraging safe digital civic engagement can promote community involvement. Developing digital employment skills through targeted training will better prepare adolescents for future job markets. Finally, addressing online bullying and social isolation through positive behavior initiatives and support systems is crucial. Further research with larger sample sizes and mixed-methods approaches is suggested to gain deeper insights and develop more targeted solutions.

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