

Digitalization and Inequality: Digital Disparities and Mental Health among Adolescents in the U.S.

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ABSTRACT: Society is undergoing a fundamental transformation because of increasing digitalization, which offers great opportunities in all areas of social life, but it also poses new challenges for individuals. While the internet has provided children with access to a wealth of information and fostered creativity, it also poses risks to children's well-being. Moreover, there are concerns about how digital technology may exacerbate the existing social disparities. Drawing on sociologist Pierre Bourdieu's theory of 'habitus', this study takes an interdisciplinary approach by combining sociology, computer science, and public health to explore the potential of promoting mental health equity in an increasingly digitalized age. It proposes that children's virtual connectivity is another 'habitus' in their life, layered with children's social background factors in conjunction with their digital capital and digital engagement experiences, exerting influences on their mental health. We collected quantitative data with survey interviews from 301 adolescents in the U.S. Statistical models are processed to empirically examine the patterns in their digital engagement and mental health outcomes. The associations between children's social background factors, digital engagement experience, and mental health outcomes are also examined. This study contributes to illuminating the dimensions of critical dialogues about building equitable societies to enhance individual flourishing in an increasingly digitalized era. It further enriches the current sociological literature on the analysis of the social impacts of new digital technologies by highlighting children's experience of digital disparities.

KEYWORDS: adolescents, digital engagement, mental health, disparities

Introduction

Children's immersion in screens, their fast adoption of digital technology, and their increasing interactions with virtual worlds have been documented (Beneteau et al. 2019; Livingstone and Pothong, 2022). The COVID-19 pandemic has further expounded their connectivity with the virtual world, bringing permanent changes in the application of digital technology in children's learning and socializing (Chow 2021; Patrick et al. 2020; Shen 2020). Digital technologies have taken on a major role in accommodating the teaching and learning for children during the pandemic. The digital technologies and video platforms have also been of help in bringing the isolated world a little closer during the COVID-19 pandemic (Chow 2021), helping in maintaining their friendship and social relations, from peer friendship to intergenerational bonding. A recent study also indicates that majority of parents believe that the school closing and online teaching during the pandemic has further propagated children's digital dependency, bringing permanent changes in the application of digital technology in children's learning, studying, and socializing (Patrick et al. 2020). Given that virtual engagement is such an important feature of many children's lives, agendas which move beyond the "dependency & addiction debate" should be preferably explored to benefit every child in a digital era (Howard et al. 2021; Johnston 2021; Rahman et al. 2020). The internet has spurred creativity and has expanded children's access to a wealth of information. It also enlarged the platforms for children to freely express themselves and socialize with others. Some of the promises of virtual connectivity in helping children are obvious, whereas the continued proliferation of digital technology also poses risks to children's safety, privacy, and well-being. There exists an undeniable dark side of the internet and digital technology (Varona et al. 2023).

In addition to concerns for safe and secure digital engagement, there are also concerns related to the digital potential of aggravating the existing disparities in social life. The

technology does not make us all equal to enter the “flat world.” Following sociologist Pierre Bourdieu’s theory of ‘habitus’ and social practice (Bourdieu 1989), the diffusion of digital technology has created new ‘habitus’ to produce different forms of capital, which will throw individuals into new domains and “new interrelations between economic resources, internalized aptitudes, and social positioning” through interactions and reproduction (Ignatow and Robinson 2017). Internet and digital technology may even compound the deprivation for children who are already in a disadvantaged situation with limited resources and less preparedness (Lybeck et al. 2023).

Previous discussions of digital divide and social exclusion (Livingstone and Haddon, 2009; Selwyn and Facer 2007) mainly focused on the ownership and access to devices. With the advances of technology and the increasing potential risks with the digital tools and platforms, the new vision of digital disparity questions the simplified understanding of the digital inequalities as a dichotomous deterministic notion of ‘haves’ and ‘have-nots’, ‘connected’ and ‘not connected’ and even ‘users’ and ‘non-users’. Variations and disparities still exist even with equal access to the tools and platforms, highlighted in different online behaviors and experiences.

Adolescence is the critical period for sociocultural development (Blakemore and Mills 2014). Mental health and wellness have profound implications for adolescent children, their overall wellbeing, academic success, and other outcomes. However, rates of anxiety and depression, and other mental health challenges among adolescent children have been on the rise. Even before the COVID-19 pandemic, it has been reported that too many adolescents suffered from mental health disorders. And the association between isolation, the impact of social media and children’s mental health has been documented (Shen, 2020). The trauma of the COVID-19 pandemic has profound impacts on children’s social life and digital engagement experiences.

The present study designs a quantitative study to empirically illuminate the digital engagement of adolescent children during the COVID-19 pandemic, their mental health status, and the potential associations between these factors. Specifically, this study aims to: 1) identify the patterns of adolescents’ digital engagement, and mental health during the COVID-19 pandemic; 2) examine the potential mental health impacts from adolescents’ digital engagement during the COVID-19 pandemic.

Data and Methods

Data for this study was collected from April to July in 2023 among 301 children aged between 12 and 17 living in the Hampton Roads area in Virginia. We recruited our study subjects from different middle schools, high schools, sports program centers, and after-school program centers in the Hampton Roads area in Virginia. A brief introduction of the research project together with the informed consent form was provided to those children once they showed the interest to participate in our survey interviews. We finally recruited 301 children aged 12-17 years living in a wide variety of community settings in the Hampton Roads area in Virginia. We obtained parental consent and personal consent to participate in the study from all these children. The human study subject protection protocol and all study procedures were approved by the Institutional Review Board at Norfolk State University. We have followed the ethical codes to protect the interests of our study subjects in recruiting and interviewing them.

Paper-based in-person interviews with survey questionnaire were administered to participating children, intending to increase response rate and maximize the response. We included 32 closed-ended questions in our survey questionnaire, asking children’s socio-demographic background information, their mental health and well-being during the COVID-19 pandemic, their interactions with others, their school life, family life, and their digital engagement. Questions were grouped under topical categories to make the questionnaire clear,

and easy to follow. Data have been collected from in-person interviews with closed-ended questions. All data are based on participating children's self-reported answers to questions in the questionnaire.

Participants

All children included in this analysis were attending schools in the Hampton Roads area when they were interviewed. The average age of our study subjects was 14 years old (Figure 1). Children from all major racial groups were recruited (Figure 2). As presented in Figure 3, boys (57.5%) were slightly overrepresented than girls (42.5%). And the majority of participants (82.4%) were from two-parent households (Figure 4).

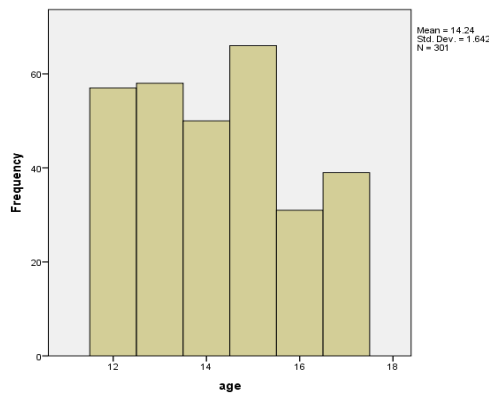


Figure 1. Distribution of Age (N = 301)

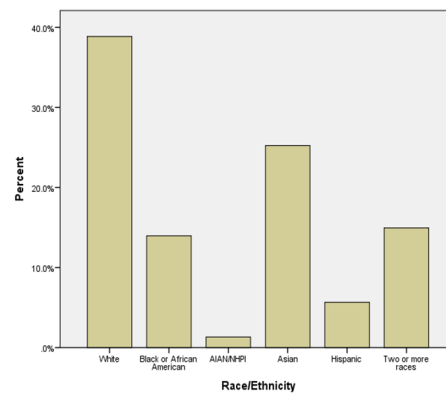


Figure 2. Distribution of Race/Ethnicity (N = 301)

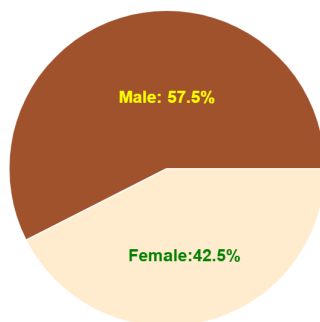


Figure 3. Distribution of Sex (N = 301)

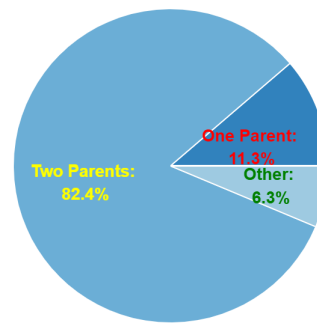


Figure 4. Distribution of Household Type (N = 301)

Measures

Children's Mental Health. Children's mental health is assessed by an index created by summing the question asking whether child was worried, was sad, was bored, was scared, was anxious, was irritable or easily angered during the COVID-19 pandemic. All these three items were measured at the ordinal level with five categories of "not at all," "slightly," "moderately," "very," and "extremely." Cronbach's α for these items is .86, which indicates a valid and reliable measure of mental health by summing these items.

Children's Mental Health Change. Children's mental health change is measured by the overall change in their mental health since the COVID-19 pandemic began compared to before the COVID-19, with five categories of "a lot worse," "a little worse," "about the same," "a little better," and "a lot better."

Children's Digital Access. Children's digital access was measured by the question asking how often they have access to the required digital technology for virtual connection during the

COVID-19 pandemic. It was measured at the ordinal level with five categories of “never,” “rarely,” “occasionally,” “most of time,” “always.”

Children’s Digital Skills. Children’s digital skill was measured by the question asking how often they have skills to use the digital technology during the COVID-19 pandemic. It was measured at the ordinal level with five categories of “never,” “rarely,” “occasionally,” “most of time,” “always.”

Children’s Online Program Participation. Children’s online program participation was measured by the question asking whether they have ever joined an online group for support or any programs.

Children’s Demographic Background Factors. Children’s demographic background information was also examined, including their sex (male vs. female), age (specific number of year from 12 to 17), race/ethnicity (white, Black, AIAN/NHPI, Asian, Hispanic, Two or more races), and their household type (two-parent, one-parent/grant-parent or other).

Results

Descriptive Statistics

Table 1 summarizes the unweighted percentage or mean and standard deviation of each variable included in this study. The average score of the mental health index is 15.61, on a scale of 6 to 30, with higher scores indicating more mental health disorder symptoms. Most participants had access to digital technology and skills to use the digital technology. More than half of the participants (67%) had joined online group for support or programs.

Table 1. Descriptive Statistics of Variables.

Variable	Mean (Percentage)	SD
Mental Health Index (6 – 30)	15.61	5.62
Mental Health Change (1-5)	2.53	.96
Digital Access (1-5)	4.53	.78
Digital Skills (1-5)	4.31	.88
Online Program/Support	67%	
Sex (1 = Male)	.57	.24
Age	14.24	1.64
Household Type		
Two-Parent	82.4%	
One-Parent	11.3%	
Grant-Parent or Other	6.3%	
Race		
White	38.87%	
Black	13.95%	
AIAN/NHPI	1.33%	
Asian	25.25%	
Hispanic	5.65%	
Two or More Races	14.95%	

However, variations existed in children’s mental health, their access to digital technology, their skills to use the digital technology. Figures 5-7 visually describe the variations in digital access, digital skills, and mental health status across race/ethnicity. Correlation analysis (statistical results are available upon request) further supports the variations in digital access, digital skills, mental health index and the mental health status change since the COVID pandemic across race/ethnicity. In comparison to white adolescents, Black adolescents and adolescents from other racial groups are more likely to join an online group for support or other programs. Mental health of Black adolescents were more likely to become worse, compared to their white counterparts. And mre Black adolescents were in need of stable access to digital technology.

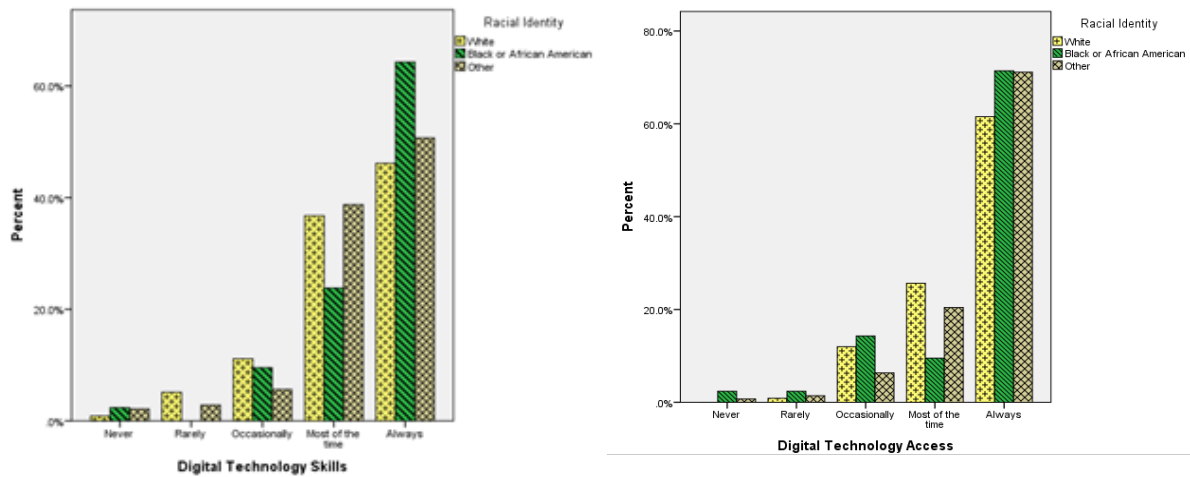


Figure 5. Digital Skills by Race/Ethnicity. Figure 6. Digital Access by Race/Ethnicity

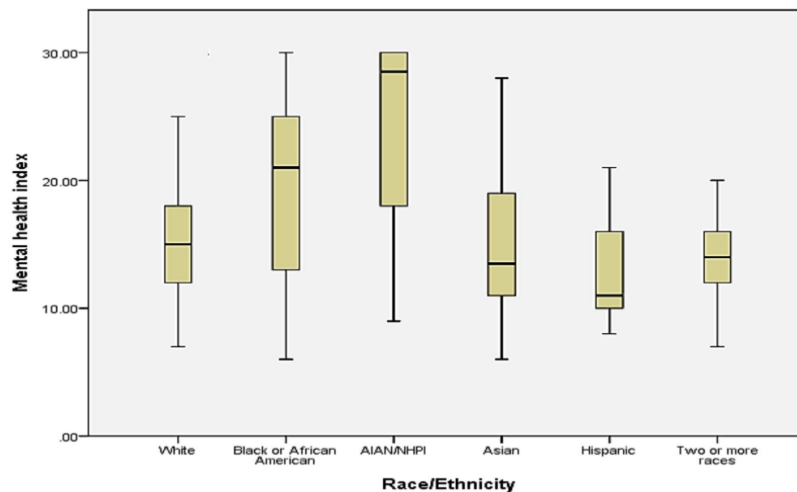


Figure 7. Box Plot of Mental Health Index across Race/Ethnicity

Ordinal Regression Analysis

An ordinal regression model was processed to predict the odds of mental health becoming worse, on digital access, digital skills, and digital engagement as well as the socioeconomic predictors. Table 2 presents the statistical analysis results from the ordinal regression analysis. Females’ mental health status would be more likely to become worse. Black adolescents and adolescents from other racial groups are more likely to have worse mental health in comparison to their white counterparts. Whether they joined an online group for support or other programs was associated with their mental health status change. Those who had joined an online group would have a greater likelihood of having better mental health during the COVID pandemic. Those who already had more mental health problems would be more likely to experience worse mental health.

We find no statistical significance between adolescents’ mental health status change and their access to digital technology and their skills to use the digital technology. We find no evidence that household type would be significantly related to the likelihood of reporting worse mental health among the adolescents.

Table 2. Ordinal Regression Results Predicting Odds of Mental Health Becoming Worse (N = 301)

	OR	SE	Wald	95%Confidence Interval	
				Lower Bound	Upper Bound
Explanatory Variables					
Female (ref. = Male)	.49*	.13	1.05	.68	1.13
Age	.58	.49	1.38	-1.54	.38
Black (ref. = white)	.057*	.39	.02	-.48	1.15
Asian (ref. = white)	.13	.35	.15	-.55	.81
Two or More Races (ref. = white)	.19	.38	.26	-.56	.94
Other Race (ref. = white)	1.27*	.53	10.01	.64	2.70
Other Household Type (ref. = two parents)	.06	.36	.02	-.76	.65
Digital Access	.91	.59	2.36	-.25	2.07
Digital Skills	-1.62	2.20	.54	-5.94	2.69
Online Program/Support	-.63*	.34	3.39	-.04	1.30
Mental Health Index	.67*	.32	4.34	.04	1.29
Model Fit Statistics					
Model χ^2	65.69				
df	35				
p-value	<.001				
Cox & Snell Pseduo-R ²	.196				
Nagelkerke Pseduo-R ²	.229				
McFadden Pseduo-R ²	.112				

Note. OR = Odds Ratio; SE = Standard Error; *p < .05, **p < .01, ***p < .001.

Discussion

This study aimed to empirically examine the disparities in adolescent children's digital access, digital skills, digital engagement, and their mental health status and change in their mental health during the COVID pandemic. Our study empirically evidences the disparities of adolescents' mental health status and the change in their mental health. Compared to white adolescents, Black adolescents and adolescents from other racial groups reported more mental health disorder problems during the COVID pandemic. And their mental health were more likely to become worse compared to before the COVID pandemic. While the virus itself is a biological agent that may infect any of us, we are deeply unequal when confronted with it. Existing economic, social, and political inequalities could be reinforced, and new forms of inequality may arise. Inequalities in social structure and disparities across different groups have been mirrored in people's experience during the COVID-19 pandemic. The COVID-19 pandemic exacerbates social inequalities in health and health care, notably in terms of class, race and gender (Singh et al. 2020).

Findings from this study further document that variations and disparities exist in adolescents' digital access, digital skills, and digital engagement. The new modes of communication may widen the gap between different social groups, favoring the groups with better socio-economic status (Chow 2020). The application of digital technology and virtual engagement can even exacerbate disparities among children. It will fuel new missed opportunities by compounding the deprivation for those who are already in a disadvantaged situation. It will leave those who are not fully prepared for the new modes of communication and connectivity lagging their advantaged peers in fulfilling their potentials. Digital technology and the internet open another domain of field in children's social life (Ignatow and Robinson 2017).

The social structure also exerts its impact on children's digital engagement. Inequalities in social structure and disparities across different groups will be mirrored in children's capacities and experiences for safe, secure, and meaningful online engagement, in addition to their access to devices and connection. According to Bourdieu (Bourdieu 1989; Ignatow and

Robinson 2017), ‘habitus’ is a system of ‘disposition to act in a certain way and it results from the intersections of multiple social ‘fields’ that the social individual is positioned at a micro and macro level. Both ‘habitus’ and ‘field’ are always layered and are structured by individual’s socio-demographic background. Digital technology and virtual space open another domain of ‘habitus’ and ‘field’ to produce and reproduce capitals and inequalities. Existing economic, social and political inequalities could be reinforced, and new forms of inequality may arise.

Limitations

There are several limitations in this study. First, this study did not ask children further about their family background, such as parent’s educational levels and their household income, which are usually indicated as significant sociodemographic factors associated with children’s behaviours and health. This study collected data with in-person survey interviews with children being the respondents of survey questions. For privacy concern and with an aim to improve response rate, we only asked children about their household type. In addition, we had a relatively small sample of study subjects from the Hampton Roads area in Virginia, which limits the power and capacity for more detailed subgroup analysis. Future study in this area might aim for a nationally representative sample across a range of geographical areas with relatively large numbers of study subjects for each racial/ethnic group to provide further details.

Conclusions

This study provides empirical evidence regarding the disparities in adolescent children’s access to digital technology, their skills to use digital technology, their digital engagement, and their mental health. It shows that racial/ethnic disparities exist in adolescent’s mental health and their digital engagement. Findings from this study reinforce that digitalization, together with social factors, is producing and reproducing unequal opportunities for people in different social groups.

The explosion of new technology is producing new ‘habitus’ for children’s social life. Children need to be equipped with not just access to technology but also the appropriate knowledge and skills for meaningful digital engagement to produce profit through digital engagement. Differences in social life go beyond ownership and access but extend into meaningful engagement. For children, the differentiation in the type and levels of economic and social resources they possess, their awareness of cyber risks will make them have different levels of digital capital and different experiences in digital engagement in virtual platforms, which directly or indirectly impacts their mental health and well-being.

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