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Differences in computer use for entertainment between boys and girls: Evidence from a global survey ☆

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ABSTRACT

In this exploratory study we analyzed the difference between boys and girls in computer use for entertainment related tasks at home using nationally representative samples of 15 year old students from 43 economies including both OECD and non-OECD member states. Even though there were substantial cross country variations, our results indicate presence of systematic gender based differences in frequency of computer use at home for entertainment related tasks with the mean frequency of use of boys exceeding that of girls for most tasks. By using an identical set of items, and a uniform sample selection procedure across all sampled countries our analytical procedures provide stronger evidence of cross country gender based differences in computer use for entertainment at home, as compared to evidence obtained from samples based on non-uniform sets of items and sampling procedures.

1. Introduction

Several recent studies have reported an increasing trend in high school students' computer use for entertainment related tasks at home [10,13,15,19,22,28]. An understanding of how students use computers at home is important because it can help teachers formulate strategies that combine learning and play outside of school. This is especially important given the evidence that there are key differences in students' computer use at home and school, with students undertaking those tasks at home, such as playing games, online chatting, and listening to music, that are usually discouraged or disallowed during school [7,9,16,17]. Thus, teaching strategies that work to enhance student learning at school may not be applicable when students are at home. In order to develop effective instructional strategies teachers not only need to be aware of how students' computer use differs between home and school, but also of how such use is affected by demographic differences such as age, gender, socioeconomic status, efficacy, grade level, prior computing experience, etc. [1,4,7,9,12,15,17,20,21,30,32].

Of these variables gender is especially important given the evidence of existence of a gender gap in computer use in recent literature [5,8,14,17,29]. Presence of such a gap means that boys and girls differ in exposure and/or access to opportunities related to computer use at home or school. Given the importance of computers in everyday life and the workplace today, any systematic evidence of such gender bias would signal a failure of either the education system or the social system or both in providing students with equitable access to a resource that has the potential to affect social and/or economic opportunities later in life [17]. Other recent empirical studies that have reported presence of gender based differences in computer use for entertainment related tasks at home include Colley and Comber [3,6,10,18,11,19], and Papastergiou and Solomonidou [26].

Although there has been some prior research on gender-based differences in computer use, such research varies across countries in terms of sample size, method of analysis, items used for scale construction etc., which makes it very difficult to compare countries with each other. Furthermore, although most of these studies support existence of gender based differences in computer use for entertainment, there is a lack of consensus about which entertainment related tasks are affected by gender and which are not. For example, Kuhlemeier and Hemker [18] employed a large sample of more than 2500 Dutch students aged 13–15 years and recruited from 116 classrooms in 68 schools. Results from their multilevel analysis suggested a significant mean difference in computer use for entertainment related tasks at home between boys and girls. Boys' computer use exceeded that of girls for tasks such as playing games, searching the Internet for information, and listening to music, while computer use of girls exceeded that of boys for tasks such as chatting online and emailing. In a similar, *albeit* smaller scale, study Papastergiou and Solomonidou [26] used a sample of

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340 Greek students aged 12–16 years and split evenly by gender, and found that computer use for some entertainment related tasks at home differed significantly between boys and girls. Their results indicated that boys' mean computer use exceeded that of girls for activities such as entertainment and web page creation. However, there was no significant difference in computer use at home between boys and girls for activities such as emailing, chatting online, and browsing the Internet.

In a UK based study Colley and Comber [3] collected survey responses from a sample of 364 students aged 11–12 and 575 students aged 15–16 in order to evaluate the effect of gender on computer use at home, and found that boys' computer use exceeded that of girls for activities such as playing games and listening to music, and that these gender based differences increased with age. On the other hand these researchers did not find any significant mean difference between boys and girls in computer use for tasks such as emailing and accessing the Internet.

Lahtinen [19] collected survey responses from a sample of 300 fourteen year old Finnish students over a period of two years using a cross-sectional design, and found that there was no significant mean difference in computer use at home between boys and girls. In another Finnish study, Ilömaki [10] collected survey responses on computer use for entertainment from a sample of 945 secondary school students between 1999 and 2000, and from a sample of 495 students between 2002 and 2004. Her analytical results suggested that in the 1999–2000 sample, boys' mean computer used exceeded that of girls for tasks such as emailing, downloading, and searching the Internet for information. However, there was no significant effect of gender on web browsing. In the 2002–2004 sample she found that boys' mean computer used exceeded that of girls for tasks such as web browsing, downloading, and searching the Internet for information. However, this time there was no significant effect of gender on emailing.

The presence of mixed findings in examples of studies that investigated the effect of gender on computer use and cited in this section is understandable given the often significant cross country differences along social, economic, and political dimensions. A second reason for these ambiguous results could be the use of varying instruments and samples across studies. Finally, the fast changing nature of information communication technology (ICT) over the recent years means that what was true of computer use just a decade or two ago may not be applicable any more. The continuing trend of faster and cheaper computers, easy availability and increase in supply of software programs, online games and social networking opportunities, and widespread access to high speed Internet at homes mean that empirical evidence from older studies need to be updated as new data become available.

One way to counter these issues is to use more recent and nationally representative cross country samples in order to gather robust and generalizable empirical evidence. Following this line of reasoning, in this study we seek to investigate gender based differences in computer use for entertainment related tasks such as playing games, emailing, chatting online, participating in social networks, etc. using a uniform set of survey items and nationally representative samples across a large number of countries. The purpose of the current study is not to explore factors responsible for creating gender based differences but it is to rather understand the nature of such differences in a global context. Our research is motivated by questions such as, "How do gender differences in computer use for entertainment related tasks at home vary across countries?" and "Which entertainment related tasks are performed more frequently by students using computers at home around the globe?"

The rest of this paper is organized as follows. Section two describes our methodology including a description of our sample, measures, and analytical method, section three provides interpretations of results of statistical analyses, and the final section provides a discussion including implications, limitations, and recommendations for future research.

2. Methodology

2.1. Participants

The data for this study came from the Program for International Student Assessment (PISA) 2012 student survey [24]. PISA is overseen by Organisation for Economic Co-operation and Development (OECD), and its primary objective is to assess literacy of 15 year old students in more than 65 countries using nationally representative samples [25]. The survey is administered in three year cycles. In addition to assessment and background information components of the survey, many participating countries administer an information communication technology (ICT) component that collects information such as ICT access and use at home and school. In the 2012 administration of the survey, 43 economies participated in the ICT component. We refer to participating units as economies instead of countries because some of these units are sub-regions of independent countries. Examples include Perm that is a part of the Russian Federation, and Hong Kong, Macao, and Shanghai that are all regions of the People's Republic of China. The economies included in this study represent 40 independent countries. Although the PISA survey was administered in 2012, international version of the student data file became available only in December 2013. Thus, with the next PISA round scheduled for 2015 and its ICT survey results expected to be released in late 2016, PISA 2012 student ICT use survey remains the latest available at the time of writing this paper.

The original dataset consisted of 295,195 cases from the 43 sampled economies. However, these data contained missing or incomplete responses on many of the variables of interest. After listwise deletion of cases with missing responses (3.68% sample attrition rate) our sample data consisted of 284,717 complete responses (boys, 140,477; girls, 144,240) with economy level samples ranging from a minimum of 278 for Liechtenstein to a maximum of 31,085 for Mexico ($M = 6{,}621.33$, $SD = 6{,}183.45$). It should be noted that the data analyzed in this study were originally collected from participating countries under OECD supervision. We are not aware of any other comprehensive study that has used PISA 2012 data in the manner employed in the current study.

2.2. Measures

2.2.1. Computer use for entertainment

PISA 2012 survey included ten questions that asked a student about their computer use at home [23]. The stem of the question was, "How often do you use a computer for following activities at home?" The activities surveyed included (1) one-player games, (2) collaborative games, (3) use email, (4) chat online, (5) social networks, (6) browse the Internet for fun (such as watching videos), (7) read news, (8) obtain practical information from the Internet, (9) download music, and (10) upload content.

The original scale categories for these ten items were (1) never or hardly ever, (2) once or twice a month, (3) once or twice a week, (4) almost every day, and (5) every day. Since the distance between these categories is not constant we used mean value for each category in order to derive an interval scale. Assuming a four week - month (28 days) this translated into frequencies of 0, 1.5, 6, 14, and 28 days per month that correspond to the five original categories. The reliability of responses on these ten items was .83 for the global sample. Country level reliability estimates ranged from