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Review Article

Media Multitasking: A Cross-Cultural Study

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Abstract *- Media usage is increasing worldwide. Along with this increase in media, usage is a proliferation of mobile devices that facilitate the effortless behavior of media multitasking. This paradigm shift in the way in which media is consumed presents fundamental challenges for the domains of Human-Computer Interaction (HCI), education, psychology, and commerce.*

Media is also becoming increasingly global in nature, as much of it is now delivered over the internet. The global scale and digital delivery of media present a new challenge for those in the field of HCI as this technological change introduces a new dimension that is needed to understanding user interaction related to both the devices themselves and the digital platforms accessed on them.

This study begins the process of developing an understanding of cross-cultural media multitasking habits through a modified Media Multitasking Index (MMI) questionnaire. In this study, participants from five countries were surveyed. The countries used in this study were the USA, Brazil, India, and Germany.

This research provides valuable insights into the increasingly common phenomenon of media multitasking and the similarities and differences between cultures when engaging in this activity. This study contributes to previous research in the realm of media multitasking by expanding on foundational knowledge on a global scale setting the stage for more detailed research on predictors, outcomes, and habits of global media multitasking.

Keywords *- Media Consumption, Media Multitasking, Cross-Cultural, Polychronicity, Monchronicity.*

I. INTRODUCTION

Media has evolved over the past century from a print and radio dominant form to become dominated by television and film to its current streaming and digitally dominant forms. In the last few years, there has been a proliferation globally of untethered digital devices (such as mobile phones) that can access media content. The average daily duration of media consumption among the general public has increased, as has the number of occurrences of media multitasking. Media multitasking is defined as "The use of multiple media at the same time" [1]. A common example of this behavior would be browsing Facebook while watching a streaming film or television show on a larger screen. Anecdotally, many have observed this phenomenon but measuring, and deeply understanding media multitasking is nascent in academic research.

For the purpose of this study, media is defined as including, but is not limited to, print media, streaming video, computer games, social media, mobile phone usage, and traditional film and television consumption. Media multitasking, also known as second-screen viewing, is defined as using any two forms of media concurrently.

Understanding media multitasking is important because the activity is pervasive, and the number of occurrences is on the rise; it is also a relatively new phenomenon. This shift in behavior presents challenges and new opportunities for media producers, application developers, and software companies, educators, and advertisers. Media and technology are merging as delivery methods and distribution platforms and are increasingly pervasive and ubiquitous in everyday life. Media and commerce are increasingly global and interconnected, which means that understanding the cross-cultural habits of the media is becoming more important than ever. Recent research has illustrated that media multitasking behavior entails 20%–50% of our media time [1].

Media multitasking has increased dramatically in the last few years. A study from 2013 showed that nearly half of U.S. smartphone owners (46%) and tablet owners (43%) said they use their devices daily as second screens while watching TV [2]. Knowing this, it is of paramount importance for several industries, especially practitioners in the field of HCI, to understand this phenomenon in order to design and improve products with this behavior under consideration.

Previous research on media multitasking has predominantly taken place in the following domains [3]:

- Advertising and its impact on marketing effectiveness
- Differences between countries
- Relationship to learner outcomes
- Cognition and memory
- Academic performance
- Predictors of media multitasking behavior

In the field of HCI, understanding this multitasking phenomenon is extremely important to allow designers and developers to understand how users interact with products. The way users interact with products is changing, as attention is increasingly divided between devices. Also, the

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time spent on media multitasking and device proliferation is currently increasing and is likely to continue to rise. It is highly likely that the increases in this behavior will have an impact on human cognition, educational approaches, media design, and digital product design.

A. Causes and Predictors

A range of research has been conducted with the goal of understanding factors that either cause or predict media multitasking. Researchers have explored why users multitask, stating that [4]:

"The findings indicated that media ownership, polychronicity, and four motivations (control, entertainment, connection, and addiction) positively predicted media multitasking behaviors."

Polychronicity is defined as the idea that some people are more likely to multitask, and Monochronocity the idea that some people are more likely to do one task at a time [5]. Polychronicity and Monochronocity have long been associated with different cultural preferences.

Some research has examined the effect country may have on polychronicity. Researchers compared respondents from the USA and Taiwan and found that there are established differences that can be observed between the countries and cultures with respect to media multitasking habits [6]:

"American respondents were higher polychronic and heavier multitaskers than their Taiwanese counterparts. In the Taiwanese sample, polychronicity and motivations increased the effects of media ownership on media multitasking. In the American sample, polychronicity contributed little."

Some researchers have found age and gender to be predictors of media multitasking, demonstrating different habits among different demographic groups. One set of researchers published work that found, through experimentation, that women and younger people were significantly more likely to multitask [7].

B. Learning and Cognition

Several studies have addressed media multitasking and its effects across numerous dimensions related to learning cognition and academic performance. A number of researchers have focused on understanding media multitasking in the context of academic performance in colleges. Media multitasking in this context has been defined as engaging with another media source or media technology while primarily working on academic coursework. Researchers found that it is a pervasive phenomenon and that 97% of college students reported some form of media use distracts them while they are in the classroom [8].

Other researchers have expanded on this idea and found that a negative relationship between media multitasking and student academic performance and that in-class media multitasking led to poorer academic performance among university students [9].

Much of the research has associated this behavior with negative emotional outcomes such as procrastination, regret, and guilt [8]. This research is interesting but limited as college students in the US are used as participants. This is done primarily for convenience (given the geographic location of the researchers) but unfortunately means that the results represent a narrow sample selection. Also, college students being generally younger than the average population age, are also more likely to multitask [7].

Memory and cognitive function in relation to media multitasking has been investigated extensively by other researchers. They found that media multitasking comes with various costs, including lowered task performance, prolonged task completion time, and frequent attentional lapses. The researchers posited that [10]:

"It is plausible that heavy media multitaskers may find it difficult to prevent their minds from wandering off because they compromise top-down attentional control by frequently and consistently switching attention between multiple forms of media, diminishing their ability to stay focused on a single task."

Hence, memory and cognitive function seem to be negatively associated with media multitasking due to the cognitive load limitations of human cognition. Expanding on the idea that media multitasking can be correlated with negative cognitive outcomes, other researchers explored media multitasking in the context of cognitive flexibility. In these experiments, researchers extended the examination of cognitive effects and found that heavy media multitaskers were negatively affected by these distractors to a greater degree than lesser media multitaskers [11].

These studies provide knowledge and understanding and give insights into the collection of data from respondents with respect to media multitasking.

C. Demographic Factors

A range of demographic factors has been explored in relation to media multitasking. Research has examined age as a factor in media multitasking and found that generally, younger populations tend to media multitask more than older generations [7, 12].

Researchers have also explored gender and its connection to media multitasking as a secondary factor, and demonstrated that generally, women multitask more than men [7,12].

Other demographic factors have been explored, such as educational levels and family income; however, these differences did not accurately predict multitasking behaviors.

Researchers have explored the recent rise in media multitasking use by adolescents. They examined adolescent media use over the past 15 years finding that it had increased significantly and reported that [13]:

"today's youth pack a total of 10 hours and 45 minutes' worth of media content into those daily 71/2 hours."

The researchers found media being consumed concurrently meant the reported time difference was made up with media multitasking. Researchers also found that adolescents who spend more time with media report lower grades and lower levels of personal contentment.

Examination of multitasking among 7th - 12th graders while watching television reported the following results [13]:

- 39% say they multitask most of the time
- 29% say they multitask some of the time

The research indicates that media multitasking behavior is more prevalent than was first thought and seems to be expanding in use among young people.

Expanding on age-related research, other researchers investigated media multitasking across three generations. This work found that members of the 'Net Generation' reported more multitasking than members of 'Generation X,' who, in turn, reported more multitasking than members of the 'Baby Boomer Generation. Hence there was an increasing amount of general multitasking of media and resources in successively younger generations [14].

Hence, research has shown that generational media multitasking habits are observable and quantifiable. Research into broad demographic differences illustrates how cultural differences could be an important dimension to understand and likely to expand on the current research's foundational knowledge.

D. Understanding Media Factors

The shift from television to streaming and untethered media has been a relatively gradual one. Television programs are still popular, although the delivery of television programs has shifted to predominantly asynchronous streaming platforms. Whereas previous generations may have gathered around the TV to watch live scheduled programming, younger generations are binge-watching shows on streaming platforms and live-tweeting about them.

A number of researchers have explored the evolving way in which people now watch TV and the increasingly common behavior of media multitasking while watching television. One study explored how multitasking while watching television might impact stress and engagement with programming. They found that participants were able to multitask and remain engaged with the television program easily, without increasing their levels of stress [15].

Researchers have also investigated the rise of social TV, where television programs are live-tweeted, and the multitasking behavior (tweeting) becomes part of the larger overall television viewing experience. The researchers found that roughly 44% of general television viewers interact with a second screen while watching live-television shows. Cultural touchstone events, such as the world cup, generated 35.6 million tweets on this topic around the globe [16].

Other researchers developed a TV engagement matrix that quantifies television engagement immersion along 4 levels [17]:

- TV watching is a solo activity
- TV watching is one of two activities (user is still in front of set)
- TV watching is peripheral activity (user is not in front of the set most of the time)
- TV is background noise.

The researchers found that 90% of consumers are typically multitasking while watching TV and that 53% of viewers are multitasking every time or almost every time they watch TV [17].

Current trends in television watching suggest that television is used as a meeting place where family and friends gather to be with one another, both to watch programs together and also to do other tasks while not actively watching [18]. Television has been established as a primary media consumption tool, multitasking is common, and hence television has grown to serve a mediating social function rather than a primary engaging and immersive experience.

Researchers have also discovered that second-screen viewing has become especially popular around large-scale news events such as the U.S. presidential debates, election night, and the State of the Union address [2]. Previous research has also established that the more media and devices a person owns, the more they multitask [1].

This further illustrates the increasingly common behavior of media multitasking, where second screens are used as ancillary tools to increase understanding around events and to participate socially, remotely in television viewing. Expanding on this research by understanding media multitasking in a more modern and in-depth way will add to the body of previous research knowledge.

E. Location-Based Research

Very little work has been undertaken to assess the media multitasking habits of different countries. Previous cross-cultural or cross-national studies have been concentrated on the media multitasking behaviors of the United States. While this is important, the global reality of media and technology makes this an incomplete view of the phenomenon.

Most previous research in this domain has focused on the differences between the two countries. This existing research focuses on western democracies with similar demographics and economic standing. Some work has been done with more than two countries being compared, but it has been reported that (as of 2021) only three studies have

compared the prevalence of self-reported media multitasking behaviors across multiple countries [1].

For example, one recent study found that significant differences between multimedia viewing habits can be observed between the USA media multitask more than participants in the Netherlands. The research proved that participants in the USA media multitask significantly more than their counterparts in the Netherlands [1].

Few studies have been conducted to survey the media multitasking habits of several countries at once. One study explored predictors, prevalence, and different forms of media multitasking across six countries (the USA, UK, Germany, Netherlands, Spain, and France). This study found that age was a universal predictor of media multitasking behavior, indicating that younger demographics were the most likely to multitask, agreeing with much of the previous work int his field. The researchers also found that media multitasking was again more prevalent in the United States [12].

II. EXPERIMENTAL METHOD

Much of the location-based, media multitasking research has previously been focused on advertising, differences between two countries, between two similar cultures, effect on learner outcomes and habits of US college students.

This study aims to build on previous research to increase understanding of cross-cultural habits regarding so-called media multitasking. The project aims to gather data via surveys from various countries on their media multitasking habits.

The new dimension to this research study is the focus on multiple countries. This study expands on previous work in the fieldwork by examining four different countries that are significantly culturally different. The four countries involved in this study are the USA, Brazil, India, and Germany). Participants from each country were surveyed, and data was collected to build upon the understanding of media multitasking and cross-cultural habits associated with the phenomenon.

The countries chosen for this study are significantly different across several demographic and economic dimensions allowing for a deeper understanding of the cultural influence of media multitasking habits.

The aim of this project is to begin to identify the media multitasking habits of a wide array of cultures, which in turn, will lead to a deeper understanding of the similarities and differences pertinent to these cultures. Other information to be collected and analyzed includes data on which devices are used to multitask as well as what applications are used during multitasking.

This study aims to provide a starting point for further cross-cultural research on this increasingly important and increasingly ubiquitous cultural phenomenon.

A. Research Questions

This research project posits the hypothesis that there are differences in media multitasking behavior by cultures, whether by the medium the media is consumed or the applications used as secondary media sources with which users multitask with.

The project also posits the hypothesis that some of the modalities of media consumed will overlap cross-culturally, i.e., many will check their cell phones while streaming video media, but the degree to which users do that and the applications they use to carry out that behavior will be significantly different.

Similar to the findings of the few other research projects in this area, this project also predicts that the heaviest media multitaskers will be from the US due to the media-saturated environment and high device concentration in US households.

B. Participants

In the spring of 2020, a total of 140 participants were recruited through the Amazon Mechanical Turk platform. Surveys were deployed simultaneously to participants from the four countries of interest. Participants have compensated a low dollar sum for survey completion, which varied depending on the country.

The gender distribution of the participants was 81.5% male and 18.5% female across the total participant pool. A completion rate of 100 percent was recorded across all countries. The participant data, split by country, is shown in Table 1.

Table 1. Participant Data by Country

Country	Participant Numbers	Age Range
USA	43	16-65 years old
Brazil	36	16-65 years old
India	31	16-65 years old
Germany	30	16-65 years old

B. Design

Surveys have been utilized for hundreds of years for information gathering purposes and have become a common tool contemporaneously for HCI research. Surveys are useful to gather information about people's habits, interactions with technology, or behaviors, to obtain demographic information, and to characterize a population amongst others. Researchers have also found that surveys can be used to examine users' interactions with technology [19].

The survey for this particular experiment was developed to understand the media multitasking habits of participants in four different countries and cultures.

In previous, similar research, media multitasking has been explored using the MMI (Media Multitasking Index). This has been adopted as a common scale to understand self-reported media multitasking behavior [1, 2, 7, 8, 11, 12, 16].

The questionnaire used in the research project described in this paper was based upon a modified MMI in order to quantify the results of the study and understand the

multitasking habits across cultures. Components from several other surveys, specifically designed to understand media multitasking, were also incorporated [20].

The of the drawbacks of using the MMI is its length. The index assesses the total number of hours per week someone spends with 12 forms of media. For each of these 12 media forms, participants subsequently indicate how often they concurrently use each of the other 11 media forms. This usually results in 132 media multitasking combinations [21].

This level of detail is desirable on some level, but the questionnaire length can also present some disadvantages. The disadvantage of the length can be manifested through increased participant fatigue, low motivation, high dropout, and poor response quality [21].

A comprehensive literature review was undertaken to review all the relevant research in this area and study previously used surveys. This illuminated which approach was best for creating a useful survey that measured media multitasking.

The survey is utilized in this study comprised only thirteen questions. The independent variable was the survey, the dependent variable the country being surveyed, and the experiment used a between-subjects design.

The survey was created and deployed via survey monkey and amazon mechanical Turk to participants in the four chosen countries (USA, India, Brazil, and Germany). The survey gathered demographic information such as age, income, and education. The media-related questions surveyed media multitasking habits such as device used, applications used, and time spent consuming media type as well as which media was used concurrently.

C. Procedure

Participants were recruited via Mechanical Turk. Once they had agreed to participate, they were given information about the experiment and signed an informed consent form. After agreeing to participate and being given instructions, the participants completed a the survey. The survey consisted of three demographics questions (age and gender, income, and educational level). The ten questions that followed surveyed participant's media consumption habits. After completing the survey, the participants were debriefed and compensated.

III. RESULTS

A total of 140 responses were collected from Brazil, India, the US, and Germany. Chinese responses could not be obtained. Each respondent answered the same set of questions. Table 2 shows the gender, education, and age distribution.

Table 2. Participant Demographic Information

Gender	Brazil	Germany	India	USA	Average
Female	13.89%	16.67%	22.58%	20.93%	18.57%
Male	86.11%	83.33%	77.42%	79.07%	81.43%

Age	Brazil	Germany	India	USA	Average
18 - 24	52.78%	33.33%	0.00%	25.58%	28.57%
25 - 34	30.56%	56.67%	90.32%	51.16%	55.71%
35 - 44	5.56%	10.00%	6.45%	9.30%	7.86%
45 - 54	5.56%	0.00%	3.23%	4.65%	3.57%
55 - 65	5.56%	0.00%	0.00%	9.30%	4.29%

Education Level	Brazil	Germany	India	USA	Average
2 year degree	11.11%	6.67%	0.00%	6.98%	6.43%
4 year degree	25.00%	16.67%	90.32%	55.81%	47.14%
Doctorate	5.56%	0.00%	0.00%	0.00%	1.43%
High school graduate	19.44%	23.33%	0.00%	13.95%	14.29%
Less than high school	2.78%	0.00%	0.00%	2.33%	1.43%
Professional degree	16.67%	43.33%	3.23%	9.30%	17.14%
Some college	19.44%	10.00%	6.45%	11.63%	12.14%

On average, 70% of respondents spent up to 5 hours per day streaming video. In Brazil, this was most common with 80% and least common with India reporting 54.84%. Table 3 below provides the full breakdown. Germans clustered the most will all responses falling into up to 5 hours or 5-10 hours per day of streaming video.

Table 3. Hours Spent Streaming Video

Time (Hours)	Brazil	Germany	India	USA	Average
10 to 15	5.56%	0.00%	3.23%	4.65%	3.57%
15-24	0.00%	0.00%	3.23%	0.00%	0.71%
5 to 10	8.33%	20.00%	38.71%	30.23%	24.29%
Up to 5 hours	80.56%	80.00%	54.84%	65.12%	70.00%
None	5.56%	0.00%	0.00%	0.00%	1.43%

Participants then answered questions regarding how often they multitasked while watching streaming videos. Table 4 below shows the results. It can be seen that 98.5% of respondents reported multitasking with other media at least sometimes. The population who always chose the most were the respondents from the United States, and the lowest reported rates of multitasking were the German participants.

Table 4. How Often Participants Multitasked While Watching Video

How Often	Brazil	Germany	India	USA	Average
Always	16.67%	10.00%	12.90%	21.43%	15.83%
Most of the time	25.00%	33.33%	41.94%	38.10%	34.53%
About half the time	27.78%	36.67%	16.13%	19.05%	24.46%
Sometimes	27.78%	16.67%	29.03%	21.43%	23.74%
Never	2.78%	3.33%	0.00%	0.00%	1.44%

Participants reported their music streaming habits, and we found that the results varied by country. Overall the most common response cross-culturally was up to 5 hours per day. However, the Germans chose this at a rate of 93%, while the Indian participants reported this only 58% of the time. Table 5 displays all the results.

Table 5. Participant Music Streaming Habits

Time	Brazil	Germany	India	USA	Average
10 to 15 hours	5.56%	0.00%	3.23%	2.33%	2.86%
15-24 hours per day	0.00%	0.00%	3.23%	0.00%	0.71%
5 to 10 hours	16.67%	0.00%	35.48%	23.26%	19.29%
None	8.33%	6.67%	0.00%	2.33%	4.29%
Up to 5 hours	69.44%	93.33%	58.06%	72.09%	72.86%

Several follow-up questions on the survey addressed what participants multitasked with while primarily doing a specific task. The combinations were interesting and showed the pervasiveness of media multitasking behavior. Respondents were also asked to report how many social media alerts they received per hour of streaming video. Results vary between countries in intensity, but the pervasiveness of social media interruption is clear. Table 6 shows this data.

Participants were asked to report how they felt if they didn't have access to social media. Figure 1 illustrates the results. The results show that few people, regardless of the country, admit to feeling uncomfortable without access to social media.

Participants were also asked to gauge their own media consumption on a scale from a lot to not much. As with other results, the different countries produced different results. The most common answer was average. A minority of participants reported their media consumption was 'a a lot'; the Brazilian participants answered 'a a lot' 11.1% of the time while the German participants selected this answer only 3.33% of the time. Figure 2 displays the full results.

Table 6. Number of Social Media Alerts per Hour

Frequency	Brazil	Germany	India	USA	Average
1-2	41.67%	46.67%	32.26%	32.56%	37.86%
11-20	5.56%	0.00%	0.00%	0.00%	1.43%
3-5	33.33%	30.00%	54.84%	32.56%	37.14%
6-10	5.56%	10.00%	6.45%	16.28%	10.00%
More than 20	8.33%	6.67%	3.23%	2.33%	5.00%
None	5.56%	6.67%	3.23%	16.28%	8.57%

When streaming video as the primary focus for 1-hour, participants were asked to estimate how much of that time they spent playing video games. The 5-point scale ranged from 1 hour, 15 to 30 minutes, 30-45 minutes, Less than 15 minutes to No time at all.

The frequency of participants who reported multitasking the entire time they were streaming video was low at Brazil 2.78%, Germany 3.33%, USA 4.65%, India 6.45%, Average 4.29%.

More common was the answer 'Less than 15 minutes with results Brazil 44.44%, Germany 60.00%, USA 32.56%, India 22.58%, Average 39.29%. Both India and the USA reported 0% that they never multitasked with streaming video and video games. This data is shown in Table 7.

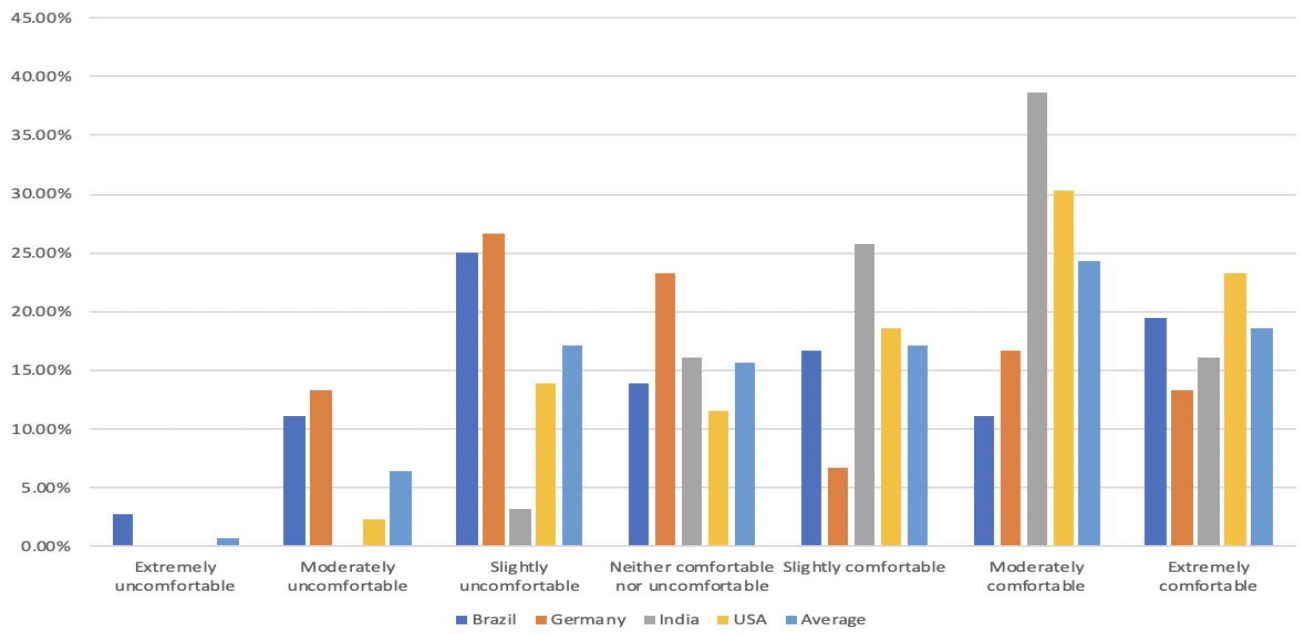

Fig. 1 Comfort Levels When Access to Social Media is Removed

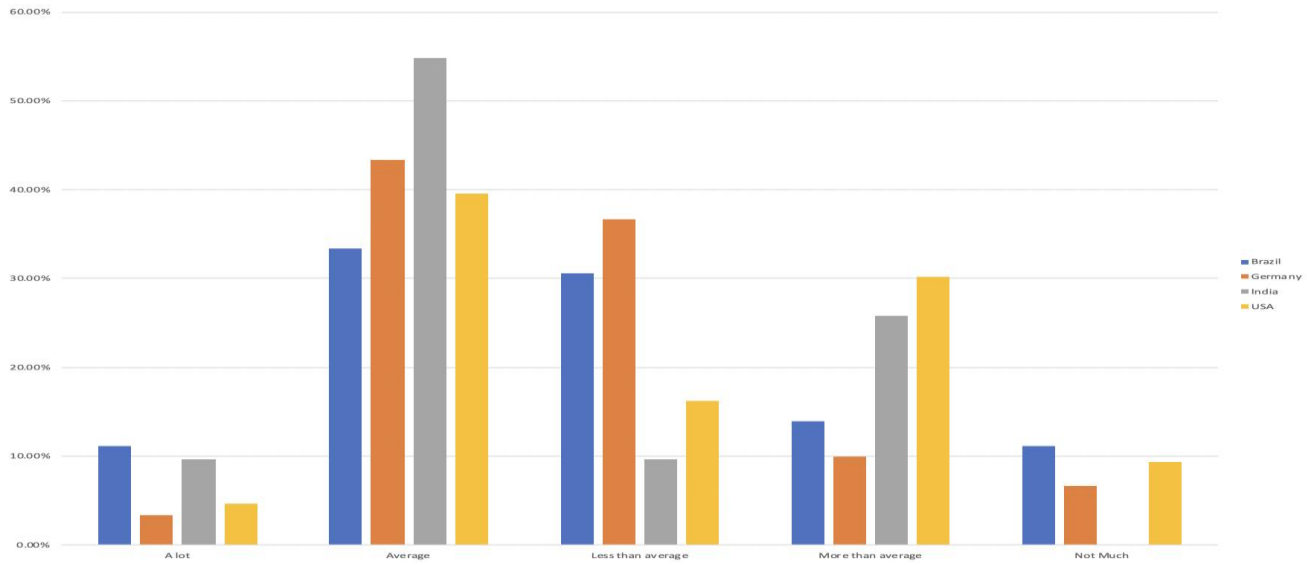

Fig. 2 Participant Media Consumption Levels

Table 7. Participant Time Spent Playing Video Games

Time	Brazil	Germany	India	USA	Average
1 hour	2.78%	3.33%	6.45%	4.65%	4.29%
15 to 30 minutes	33.33%	26.67%	58.06%	44.19%	40.71%
30-45 minutes	11.11%	3.33%	12.90%	18.60%	12.14%
Less than 15 minutes	44.44%	60.00%	22.58%	32.56%	39.29%
No time at all	8.33%	6.67%	0.00%	0.00%	3.57%

When streaming music as the primary focus for 1-hour, participants were asked to estimate how much of that time they spent playing video games. The results were different from the results from the previous media combination. The 5-point scale ranged from 1 hour, 15 to 30 minutes, 30-45 minutes, Less than 15 minutes to No time at all.

Table 8. Time Spent on Playing Video Games while Listening to Music

Time	Brazil	Germany	India	USA	Average
1 hour	5.56%	0.00%	6.45%	9.30%	5.71%
15 to 30 minutes	27.78%	6.67%	51.61%	32.56%	30.00%
30-45 minutes	2.78%	0.00%	22.58%	18.60%	11.43%
Less than 15 minutes	38.89%	46.67%	16.13%	16.28%	28.57%
No time at all	25.00%	46.67%	3.23%	23.26%	24.29%

The frequency of participants who reported multitasking the entire time they were streaming video was low at Brazil 5.56%, Germany 0%, USA 9.30%, India 6.45%, with an average value of 5.71%. More common was the answer 'No Time at All' with results breaking out to Brazil 25%, Germany 46.67%, USA 23.26%, India 3.23%, with an average value of 24.29%. This data is shown in Table 8.

When streaming music as the primary focus for 1-hour, participants were asked to estimate how much of that time they spent on social media. The rating was based on a 5-point scale that ranged from 1 hour, 15 to 30 minutes, 30-45 minutes, Less than 15 minutes, to No time at all.

No time at all was a much more common response than previous questions. The results for 'No Time at All' were Brazil 33.33%, Germany 33.33%, USA 23.26%, India 3.23%, with an average value of 23.57%. The results for multitasking in this combination for the entire 1-hour time span were Brazil 5.56%, Germany 3.33%, India 9.68%, USA 11.63%, with an average value of 7.86% (see Table 9).

Table 9. Time Spent on Social Media while Listening to Music

Time	Brazil	Germany	India	USA	Average
1 hour	5.56%	3.33%	9.68%	11.63%	7.86%
15 to 30 minutes	22.22%	23.33%	41.94%	18.60%	25.71%
30-45 minutes	13.89%	3.33%	32.26%	30.23%	20.71%
Less than 15 minutes	25.00%	36.67%	12.90%	16.28%	22.14%
No time at all	33.33%	33.33%	3.23%	23.26%	23.57%

When streaming music as the primary focus for 1-hour, participants were asked to estimate how much of that time they spent streaming video. The rating was based on a 5-point scale that ranged from 1 hour, 15 to 30 minutes, 30-45 minutes, Less than 15 minutes, to No time at all. Results vary, and almost no respondents answered no time at all except India. This data is shown in Table 10.

Table 10. Time Spent on Streaming Video while Listening to Music

Time	Brazil	Germany	India	USA	Average
1 hour	13.89%	13.33%	9.68%	11.63%	12.14%
15 to 30 minutes	27.78%	23.33%	48.39%	32.56%	32.86%
30-45 minutes	19.44%	10.00%	19.35%	27.91%	20.00%
Less than 15 minutes	19.44%	26.67%	22.58%	9.30%	18.57%
No time at all	19.44%	26.67%	0.00%	18.60%	16.43%

When using social media as the primary focus for 1-hour, participants were asked to estimate how much of that time they spent streaming video. The results seem to indicate this a common media multitasking behavior cross-culturally. The German participants seem to multitask the most in this combination. This data is shown in Table 11.

Table 11. Time Spent Streaming Video while Using Social Media

Time	Brazil	Germany	India	USA	Average
1 hour	11.11%	20.00%	6.45%	16.28%	13.57%
15 to 30 minutes	25.00%	26.67%	41.94%	34.88%	32.14%
30-45 minutes	25.00%	26.67%	29.03%	20.93%	25.00%
Less than 15 minutes	36.11%	20.00%	22.58%	23.26%	25.71%
No time at all	2.78%	6.67%	0.00%	4.65%	3.57%

When using social media as the primary focus for 1-hour, participants were asked to estimate how much of that time they spent streaming music. Streaming music and social media as a combination are less common than other combinations from previous questions. This data is shown in Table 12.

Table 12. Time Spent Streaming Music while Using Social Media

Time	Brazil	Germany	India	USA	Average
1 hour	0.00%	3.33%	6.45%	4.65%	3.57%
15 to 30 minutes	25.00%	16.67%	45.16%	16.28%	25.00%
30-45 minutes	2.78%	0.00%	22.58%	30.23%	15.00%
Less than 15 minutes	38.89%	33.33%	25.81%	27.91%	31.43%
No time at all	33.33%	46.67%	0.00%	20.93%	25.00%

When using social media as the primary focus for 1-hour, participants were asked to estimate how much of that time they spent playing video games. Spending 15-30 minutes was closely common across cultures. The other Responses varied. This data is shown in Table 13.

When playing video games as the primary focus for 1-hour, participants were asked to estimate how much of that time they spent on social media. Social media and video games as a combination were reported as common. The US respondents did this most, with 18% of respondents reporting spending all the time on social media while playing video games. This data is shown in Table 14.

Table 13. Time Spent Playing Video Games while Using Social Media

Time	Brazil	Germany	India	USA	Average
1 hour	0.00%	0.00%	9.68%	9.30%	5.00%
15 to 30 minutes	44.44%	43.33%	41.94%	37.21%	41.43%
30-45 minutes	2.78%	13.33%	29.03%	23.26%	17.14%
Less than 15 minutes	33.33%	26.67%	19.35%	20.93%	25.00%
No time at all	19.44%	16.67%	0.00%	9.30%	11.43%

Table 14. Time Spent on Social Media while Playing Video Games

Time	Brazil	Germany	India	USA	Average
1 hour	16.67%	3.33%	9.68%	18.60%	12.86%
15 to 30 minutes	16.67%	40.00%	32.26%	34.88%	30.71%
30-45 minutes	33.33%	26.67%	16.13%	23.26%	25.00%
Less than 15 minutes	30.56%	23.33%	41.94%	18.60%	27.86%
No time at all	2.78%	6.67%	0.00%	4.65%	3.57%

When playing video games as the primary focus for 1-hour, participants were asked to estimate how much of that time they spent streaming video. This data is shown in Table 15.

Table 15. Time Spent Streaming Video while Playing Video Games

Time	Brazil	Germany	India	USA	Average
1 Hour	5.56%	0.00%	9.68%	4.65%	5.00%
15 to 30 minutes	13.89%	16.67%	45.16%	25.58%	25.00%
30-45 minutes	8.33%	6.67%	25.81%	30.23%	18.57%
Less than 15 minutes	41.67%	30.00%	19.35%	20.93%	27.86%
No time at all	30.56%	46.67%	0.00%	18.60%	23.57%

When playing video games as the primary focus for 1-hour, participants were asked to estimate how much of that time they spent streaming music. Streaming music while playing video games appears to behavior most common with the Indian respondents and relatively flat amongst other respondents. This data is shown in Table 16.

Table 16. Time Spent Streaming Music while Playing Video Games

Time	Brazil	Germany	India	USA	Average
1 hour	0.00%	0.00%	6.45%	6.98%	3.57%
15 to 30 minutes	11.11%	23.33%	48.39%	25.58%	26.43%
30-45 minutes	11.11%	3.33%	22.58%	20.93%	15.00%
Less than 15 minutes	41.67%	30.00%	19.35%	25.58%	29.29%
No time at all	36.11%	43.33%	3.23%	20.93%	25.71%

IV. DISCUSSION

In this study, the survey responses provided a rich data set which, when analyzed qualitatively, showed insights into how several different countries multitask with media. Drawing from a global sample set allowed the results to reflect the habits of 140 participants from four different countries. The data collected demonstrated that multitasking behaviors are different cross-culturally and that different country prefer different media combinations when multitasking. This supported one of the primary hypothese of this work.

Based on the results, multiple aspects of media multitasking could be explored further. An unexpected result arose from consideration of the types of media multitasking performed across various countries. The data showed that it

was common for video games to be played during almost all other media activities surveyed. Perhaps the results from social media and video game multitasking were due to live streaming videogames and platforms that facilitate these activities becoming more common.

The results also indicate that multitasking often occurs to a high degree with mediums that seemingly would stress human attention. For example, it was widely reported in the results that video games were often combined with streaming video, music, and social media. The least common video game multitasking behavior was to stream music, which one would think would require a lower cognitive load than the other activities.

This study had an overall sample size of 140 participants; this still a relatively small sample. In order to fully understand the subtleties of the media multitasking habits of different cultures, more cultures and larger sample sizes of each country/culture should be considered. This study examined several different cultures but was limited to four cultures/countries. Also, the sample size was slightly weighted towards men and younger respondents. In the future, it would be interesting to explore a more demographically balanced sample set.

Surveys are a powerful and common tool in HCI research. More insights could perhaps be gleaned with other research methods, especially when utilized in tandem with surveys. For example, some of the previous related research in the domain of media multitasking has utilized in-person testing and video recordings to better understand the actual behavior of media multitasking in action.

Relying solely on self-reported behavior can be effective but is, by its very nature, inherently limited as a research method. It has been reported that some of the participants can be poor at estimating just how much time they are spending on digital devices and so misrepresent the extent to which they media multitask [18].

Incorporating predictors of media multitasking, such as device ownership and access to media, is also an area that should be explored. Also, metrics such as the amount of media access available and factors such as press freedom and media structures (public vs. private broadcasting) could also be of interest. Media systems vary greatly by country and should be explored as a potential factor in media consumption behavior.

Monochronistic cultures are a factor that could have a large influence on media multitasking, and these differences should also be explored in future research.

"Certain countries have a time orientation that can be characterized as monochronic, whereas the time orientation of other countries can be characterized as polychronic. Monochronic individuals prefer to do things in a structured and linear manner and employ a one-step-at-a-time approach. Polychronic individuals, schedules have less meaning, and individuals tend to be more flexible and less regimented, preferring to handle multiple tasks simultaneously [12]."

Future research could also benefit from concentrating in a more detailed way on specific media combinations with respect to different countries.

V. CONCLUSION

This research project demonstrated that there are differences in media multitasking behavior by cultures, irrespective of the medium the media is consumed. The results of this study agreed with previous research that found in the USA media multitasking is common and intense. Further filtering by age and gender did show that cultural differences largely could still be observed.

The project also demonstrated that some of the modalities of media consumed would overlap cross-culturally; the degree to which users' media multitask and the applications they use to carry out that behavior will be significantly different.

Similar to the findings of the few other research projects in this area, this project also showed that in most cases, the heaviest media multitaskers would be from the US due to the media-saturated environment and high device concentration in the US households.

Future research could benefit from concentrating in a more detailed way on specific media combinations with respect to different countries.

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