THE EMOTIONAL PROFILE AND PROCESSING OF EMOTIONAL STIMULI AMONG MEDIA MULTITASKERS

Ph.D. Thesis

By

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DISCIPLINE OF PSYCHOLOGY

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CANDIDATE'S DECLARATION

I hereby certify that the work which is being presented in the thesis entitled **THE EMOTIONAL PROFILE AND PROCESSING OF EMOTIONAL STIMULI AMONG MEDIA MULTITASKERS** in the partial fulfillment of the requirements for the award of the degree of **DOCTOR OF PHILOSOPHY** and submitted in the **DISCIPLINE OF PSYCHOLOGY, Indian Institute of Technology Indore**, is an authentic record of my own work carried out during the time period from July, 2012 to December, 2018 under the supervision of Dr. Pritee Sharma, Associate Professor, Indian Institute of Technology Indore and Dr. Sushanta Kumar Mishra, Professor, Indian Institute of Management Indore.

The matter presented in this thesis has not been submitted by me for the award of any other degree of this or any other institute.

signature of the student with date
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This is to certify that the above statement made by the candidate is correct to the best of my/our knowledge.

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DEDICATION

To my family

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December, 2018 **Shanu Shukla**

SYNOPSIS

The Emotional Profile and Processing of Emotional Stimuli among Media multitaskers

1 Introduction

'Stay connected, stay updated' is the motto of the modern digital era which has witnessed a revolution in the media activities and social interaction. One of the offsprings of this revolution is the spurt of media in the social dynamics. This mediated milieu has caused a quantum jump in the ability to utilize media and media devices in our daily lives. It has given birth to a unique community worldwide called media multitaskers who are seen to be juggling with several media/media devices at a particular instant. Formally, media multitasking[1] is defined as the simultaneous consumption of two or more media (TV, cell-phone, print, video games and so on and so forth). It may also involve rapid task switching of media related tasks.

It is seen that the younger generation succumb mostly to this habit (Voorveld, Seijn, Ketelaar, & Smit, 2014). This behavior has now diffused into every corner of the society so much so that a substantial amount of behavioral studies are, nowadays, devoted to perusing media multitasking behavior of the younger generation (Schuur, Baumgartner, Sumte, & Valkenburg, 2015; Uncapher, et al., 2017). A number of studies also point to the fallouts of too much of concurrent media use. In spite of some adverse consequences, media multitasking is becoming more and more popular, the reason for which may be attributed to emotional gratification of users received from this activity. Hence, this implies that emotion has a significant role in the studies of media multitasking. But there is a dearth of research work focusing on the interplay between emotions and coincident media use behavior. Thus, apart from studying the pattern and predictors of this behavior in the Indian context, another prime

[1] We use the terms 'media multitasking', 'concurrent media use' and 'coincident media use' interchangeably.

objective of the present thesis is to understand the emotional profiles and the performance in emotional tasks vary for different categories of media multitaskers.

2 Motivations for the study

Research data showed that the use of digital devices as also media multitasking is on the rise (Voorveld, Seijn, Ketelaar, & Smit, 2014). Though media multitasking may reported to have shown some positive effects (Lui & Wong, 2012), it may give rise to depression, makes one perform worse on cognitive measures of attention, fluid intelligence, leads to impulsivity, and results in difficulties in learning and concentrating on academic activities (Becker, Alzahabi, & Hopwood, 2013; May & Elder, 2018; Schuur, Baumgartner, Sumte, & Valkenburg, 2015). Heavy media multitasking was also seen to be responsible for distraction, information processing overload or poor attention control and hampers human performance during the task (Ophir, Nass, & Wagner, 2009).

Though the general consensus says that too much of media multitasking is harmful, yet this behavior, is becoming more and more popular day-by-day. There are several predictors and needs for this behavior, but the emotional gratification is primarily responsible for making people multitask with new media (Wang & Tchernev, 2012). For instance, some researchers inferred that avoidance of boredom and loneliness is the prime motivation for media multitasking. Others suggested that media multitasking gives positive experience and hence individuals enjoy media multitasking. It was also demonstrated that the fear of losing any information or communication compel an individual to frequently check media updates. Researchers found that individuals with higher media multitasking behavior suffer emotionally in the form of disorders such as depression, anxiety, stress etc. (Becker, Alzahabi, & Hopwood, 2013). These studies pointed out the role of emotions in media multitasking behavior as the facilitator and/or as the maintainer of behavior and the outcomes of it. However, there are few shortcomings/limitations in the existing scientific literature that require particular attention.

First and foremost, the research so far involved western countries like the USA, the UK as well as some European countries (Netherlands, Hungary etc.) and eastern countries (China, Indonesia, Malaysia etc.). But, attention needs to be paid to study the media multitasking behavior of some of the other under explored countries in which there is a large pool of internet and media users. India is one such example. It has one of the largest internet user bases in the World. Reports (e. g. Millward Brown AdReaction, 2014) establish that multi-screening use in India is about to touch the global average and the usage of smart phones in India is higher than the global average. With the growing use of media devices, it is expected that the media multitasking behavior will be prevalent in India too. Hence, it is necessary to study its impact on the Indian population. It is also important to find out the pattern and predictors of media multitasking behavior of the Indians.

Second, recent studies find that the day-to-day activities influence individuals emotions. For instance, individuals experience positivity when they take part in social activities, whereas undesirable work events, negative social interactions induce negative emotions in a person. However, these studies concentrate on single non media-related tasks and hence we may ask ourselves how the inferences will differ when we replace those tasks with media multitasking. Besides, there is also an absence of studies on the emotional differences among the people involved in varying extent of media multitasking. It may so happen that staying away from media multitasking generates more negative feelings in heavy media multitaskers than those who are not much into this behavior. Media multitasking may also create positive feelings. If media multitaskers experience both positive and negative emotions, it is likely that people with different media multitasking habits will experience emotions differently and one needs to verify whether their emotional profiles vary.

Third, due to the prevalence of media multitasking, a more thorough understanding of the consequences of media multitasking is of great practical importance. The extant research base in this regard is small, much of it is correlational, and we have a little understanding of the mechanisms by which

excessive concurrent media use affect an individual. Besides, the data associated with the impact of media multitasking on the processing of emotional stimuli is also limited.

3 Organization of the thesis

The thesis is divided into five chapters, the first of which prepares the background of the study. The next three chapters contain the research problem and the respective findings of the thesis. The fifth and last chapter summarizes the studies and includes further discussions for the extension/improvement of the work.

Chapter 2: Pattern and Predictors of Media multitasking Behavior of Indian College Students

To address limitation 1 (as mentioned in the previous section), the second chapter of this thesis examines media multitasking behavior of the Indian college students, e. g. their media use, media multitasking behavior and the media which they multitask the most with. There are certain variables like age, gender, duration of ownership of media and Big Five personality factors which may act as the predictors of media multitasking behavior and we verified whether they indeed influence the media multitasking behavior of the students.

Owing to the fact that the factors like the availability of internet and devices, educational level influence ones media multitasking habit, we conducted our study in a technological institute in India to achieve the maximum possible uniformity among the participants.

We first identified the pattern and predictors of media multitasking behavior of the Indian students aged between 18 to 24 years, and found out that the participants devoted most of the time surfing websites, engaging in instant messaging or social media use and watching videos on computer. One of the most important quantities in this context is Media Multitasking Index (MMI). The average Media Multitasking Index of the participants was found to be 4.24 which means that the participants used approximately 4 media during a typical media consumption hour. Using k-means cluster analysis, the participants were

categorized into High, Moderate, and Low Media Multitaskers (also termed as HMM, MMM, and LMM respectively) based on their MMI score.

Data further indicated that Instant Messaging (IM), sending SMS, web surfing, and using other computer applications were the most chosen media while multitasking, whereas media multitasking was the least during playing computer games, hearing non music audios and during phone calls. Music was found to be the most favorite medium combined with IM, SMS and other computer applications while web surfing was mostly combined with other web surfing activities. Results also suggested that on average participants spend 1.54 hours on typical day in doing media multitasking during face-to-face interaction but the average duration differs from LMM to HMM. The other conclusions which we draw from these studies are as follows:

i. The duration of ownership of media was positively related to media multitasking behavior.
ii. Higher openness of experience led to higher tendency of media multitasking.
iii. No relationship was observed between agreeableness and media multitasking behavior
iv. Higher level of neuroticism is positively related with heavy media multitasking behavior.

Besides, the other inferences we drew from the studies are:

i. There was not much digital divide between the genders and hence the female and the male students displayed similar media multitasking behavior.
ii. Age is positively related with the habit of media multitasking such that the media multitasking behavior was found to be more common in the older students.
iii. No relationship was observed between conscientiousness and media multitasking behavior.

iv. Higher level of extraversion is positively related with heavy media multitasking behavior.

Chapter 3: The Emotional Profile of Different Groups of Media multitaskers

This chapter deals with the profiling of media multitaskers emotions with the help of emotional variables like positive and negative emotions, tense and energetic arousal and emotional control. Positive as well as negative emotions and arousal (energetic and tense) are the basic dimensions of emotions (valence and arousal) and hence form a complete set of variables which could represent everyday emotions. The emotional profiles of different categories of media multitaskers are contrasted and following inferences are drawn:

i. HMM group experienced higher positive and higher negative emotions in comparison to LMM and MMM.
ii. HMM displayed higher tense and energetic arousal in comparison to LMM.
iii. HMM reflected higher valence (positive and negative) and arousal (energetic and tense) and poorer emotional control in comparison to LMM.

Chapter 4: The Processing of Emotional Stimuli among Media multitaskers

In this chapter we study the processing of emotional stimuli presented to different groups of media multitaskers who, we speculated, would process emotional stimuli differently. A handful of studies examined the effect of induced emotions on multitasking performance or employed emotional distractors but there was hardly any attempt to study the processing of emotional stimuli among different groups of media multitaskers. We attempted to bridge this gap in our study which was divided into three parts, the first two of which dealt with the facial emotional stimuli and the third one included self-referential emotional words. The tasks corresponding to these studies were as follows: a) emotional dot probe task, b) facial emotion recognition task, c) emotional categorization task, d)

emotional recognition task, and e) emotional recall task. These studies were discussed in Subchapters 4A, 4B and 4C in Chapter 4. All these studies were experimentally conducted and were performed on a computer (with the help of OpenSesame software (Mathôt, Schreij, & Theeuwes, 2012)). Inferences drawn from each of the studies are detailed below.

Subchapter 4A. From the Study 4A which aimed to investigate the attentional bias of HMM, MMM, and LMM towards emotional stimuli through emotional dot probe task, we infer that HMM oriented their attention towards positive stimuli and they chose to avoid negative stimuli when presented with neutral stimuli.

Subchapter 4B. Study 4B studied the facial emotion recognition ability of the media multitaskers when familiar (i.e. famous actress/ actors) and unfamiliar faces of Indian (categorize as 'in-group') and non-Indian (categorize as 'out-group') facial stimuli were shown to them. The first part of the study dealt with the familiar faces and in the second part, the familiar faces were replaced with those of the unfamiliar individuals (again in two different races 'Indian' and 'non-Indian'). In the first experiment the facial recognition ability of the HMM did not vary much from those of the MMM and the LMM. In the second experiment it was observed that LMM have significantly better emotion recognition ability in comparison to HMM when emotional stimuli was presented for a brief period of time. Further HMM were found to make more errors in identifying neutral and low intensity of facial emotional stimuli. Both LMM and MMM group took the advantage of 'in-group' favoritism and made less errors in identifying emotions from Indian facial stimuli as compared to non-Indian ones irrespective of the fact whether the faces are familiar or unfamiliar to them. However no 'in-group' bias was observed among HMM. The results indicate that HMM tend to avoid negative emotional states and they could not decode negative or neutral emotions of anonymous people which may result in poor social interaction and relationship. However, with the known or familiar faces no such recognition deficit was observed among them.

Subchapter 4C. In study 4C, we used self-referential emotional stimuli[2]. In this study we aimed to understand whether LMM, MMM, and HMM differ in the processing of self-referential emotional stimuli and whether there is any valence (positive or negative) specific bias towards those stimuli. Participants performed emotional categorization, emotional recall and emotional recognition tasks. In the emotional categorization task, we observed that HMM expressed his/her liking for positive words quicker than LMM and MMM, but no variation in the response time among HMM, MMM, and LMM in expressing disliking for negative words was observed. From the memory based tasks we inferred that HMM had a memory deficit for self-referential emotional words in both the recall and recognition task in comparison to LMM and MMM. It was also seen that HMM recalls negative words more than the positive words. However in recognition task, no positive or negative bias was observed among HMM (though HMM were quicker in recognizing negative words than positive).

The findings from the 'self-referential' emotional stimuli indicate that HMM have negative bias towards self-referential stimuli but from non-self referential emotional stimuli we observed participants bias towards positive stimuli. Though not intuitive, yet it is one intriguing result which can be seen as HMM developing negative bias about themselves and hence orienting their attention towards non-self positive emotional stimuli which may be one mechanism to escape from negative emotional state.

Chapter 5: A Coda of Our Findings and Discussions

It summarizes the studies, discusses the limitations and possible extensions of the present work. One such extension is the cross-cultural comparison of the findings. With a view to addressing this important aspect of the psychological studies, we have repeated the experiments for the sample chosen from the USA and a brief account of the studies has been given.

2 In the previous two studies we dealt with non-self referential emotional stimuli

4 Contributions of the studies

Study of media multitasking behavior has gained momentum in last few years, and given the fact that more and more of the human population of different age-groups is being involved in this, the studies are growing in number. The basic theme of the present thesis is also to tackle some of the queries related to media multitasking which so far remained unanswered. The author at this point, wishes to indicate how this thesis can advance the present knowledge about the topic under discussion. The novelty of the present thesis, first of all, lies in the chosen sample group on which the experiments were conducted, the Indians. In spite of being one of largest media user bases in the world, India was so far overlooked by the multitasking studies and there was no information about the Media Multitasking Index (MMI) (average number of media consumed during a typical media usage hour) of the Indians. We find that the sample group has an overall mean MMI of 4.24 which means the participants used approximately 4 media during a typical media use hour. This value is not far behind the indices calculated for some other nationalities and is worth paying attention to as this is one of the earliest evaluations of the Media Multitasking Index (MMI) in the laboratory based studies concentrating on Indian college students. Also, this study investigated the pattern and the predictors of their media multitasking behavior which is also a stepping stone in the Indian context.

Novelty of the studies related to the emotional profile of the media multitaskers lies in the fact that a correspondence between the category of media multitaskers (High, Moderate, and Low) and his/her emotional profile was established which helps in understanding their emotional differences in everyday lives without any ambiguity.

The studies on the emotional processing of media multitaskers advance our knowledge in understanding the differences in emotional behavior of the LMM, MMM, and HMM which was so far not much paid attention to. Studies also unfold that excessive media multitasking take a heavy toll on the emotions of an individual. Besides, by employing the emotional stimuli in the present studies

unlike the previous studies which mostly utilized non-emotional stimuli, the present study carries more ecological validity and mimics more closely the real life situation where stimuli can be both emotional and neutral in nature.

Having said so, we conclude our discussion but, the quest for knowledge evolves and evolves ceaselessly. The present study can be treated as one of the earlier ones dealing with the media multitasking habits of the Indian college students. Given the rising concern about the fallouts of this behavior, this research can be expected to have impacts on the understanding of the social and the emotional well-being of the digital natives and can be used as a prescription for the 'poised media diet' of the youngsters.

References

Becker, M. W., Alzahabi, R., & Hopwood, C. J. (2013). Media Multitasking is Associated with Symptoms of Depression and Social Anxiety. *Cyberpsychology, Behavior, and Social Networking, 16*(2), 132-135. doi:10.1089/cyber.2012.0291

Brown, M. (2014). *AdReaction: Marketing in a multiscreen world.* Retrieved from https://www.millwardbrown.com/adreaction/2014/report/Milward-Brown_AdReaction-2014_Global.pdf

Lui, K. F., & Wong, A. C.-N. (2012). Does media multitasking always hurt? A positive correlation between multitasking and multisensory integration. *Psychonomic Bulletin & Review, 19*(4), 647-653. doi:10.3758/s13423-012-0245-7

Mathôt, S., Schreij, D., & Theeuwes, J. (2012). OpenSesame: An open-source, graphical experiment builder for the social sciences. *Behavior Research Methods, 44*(2), 314-324. doi:doi:10.3758/s13428-011-0168-7

May, K. E., & Elder, A. D. (2018). Efficient, helpful, or distracting? A literature review of media multitasking in relation to academic performance. *International Journal of Educational Technology in Higher Education, 15*(13). doi:10.1186/s41239-018-0096-z

Ophir, E., Nass, C., & Wagner, A. D. (2009). Cognitive control in media multitaskers. *Proceedings of the National Academy of Sciences of the United States of America, 106*(37), 15583–15587. doi: http://doi.org/10.1073/pnas.0903620106

Schuur, W. A., Baumgartner, S. E., Sumte, S. R., & Valkenburg, P. M. (2015). The consequences of media multitasking foryouth- A review. *Computers in Human Behavior, 53*, 204-215. doi:10.1016/j.chb.2015.06.035

Uncapher, M. R., Lin, L., Rosen, L. D., Kirkorian, H. L., Baron, N. S., Bailey, K., . . . Wagner, A. D. (2017). Media Multitasking and Cognitive, Psychological, Neural, and Learning Differences. *Pediatrics, 140*(Supplement 2), S62-S66. doi:10.1542/peds.2016-1758D

Voorveld, H., Seijn, C., Ketelaar, P., & Smit, E. (2014). Investigating the Prevalence and Predictors of Media Multitasking Across Countries. *International Journal of Communication, 8*, 2755-2777.

Wang, Z., & Tchernev, J. M. (2012). The "Myth" of Media Multitasking: Reciprocal Dynamics of Media Multitasking, Personal Needs, and Gratifications. *Journal of Communication, 62*(3), 493-513. doi:10.1111/j.1460-2466.2012.01641.x

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ACRONYMS

ANOVA: Analysis of Variance

BS: Bias Scoring

EA: Energetic Arousal

EC: Emotional Control

HMM: High Media Multitaskers

IM: Instant Messaging

LMM: Low Media Multitaskers

M: Mean

MMI: Media Multitasking Index

MMM: Moderate Media Multitaskers

MMT: Media MultiTasking

NE: Negative Emotions

PE: Positive Emotions

RT: Response Time

SD: Standard Deviation

SMS: Short Message Servicing

TA: Tense Arousal

We're losing social skills, the human interaction skills, how to read a person's mood, to read their body language, how to be patient until the moment is right to make or press a point. Too much exclusive use of electronic information dehumanizes what is a very, very important part of community life and living together ~Vincent Nichols (n.d.)

Chapter 1

Introduction

1.1 Background

One of the attributes of today's digital age is the growing number of media, media devices, and a greater exposure to information. This plentitude has made some of the people so gripped by the 'Fear of Missing Out (FoMO)' (Przybylski, Murayama, DeHaan, & Gladwell, 2013) that they keep on checking the media networks and the media devices every now and then. An inability to do this often causes a surge of anxiety inside the users (Cheever, Rosen, Carrier, & Chavez, 2014). For some people involvement with media is the way to cope up with their feelings of boredom which may arise due to the absence of excitement in the primary task, and/or due to loneliness, or for enjoyment as well as relaxation (Song, Nam, Lim, & Kim, 2013; Tokan, Mattila, & Sihvonen, 2012; Kononova & Chiang, 2015; Zhang & Rau, 2015). It is observed that this involvement often results in handling several media together. This leaning is termed as 'media multitasking' which is defined as the simultaneous consumption of more than one media, or as a rapid task switching from one work/media to another media, and one of the primary goals of this leaning is to satiate one's emotional needs (Wang & Tchernev, 2012).

Emotion plays a pivotal role in media-related studies. According to the 'mood management theory' (Reinecke, 2017), media use is often a consequence of a desire to escape from aversive states and can be seen as an attempt to achieve the feeling of pleasure. 'Mood adjustment approach' (Knobloch, 2003) posits that in order to regulate the mood according to the one demanded by the anticipated situations, people engage in media consumption with a hope to set the desired mood. In brief, the 'media diet' of an individual depends largely on her emotional

state, and the attainment of the desired emotional satisfaction from heavy media use often makes an individual to choose it as a necessity. Even when one switches from single media task to media multitasking, the role of emotions can hardly be ruled out, too. Researchers (Weinstein & Mermelstein, 2007) further suggested that an individual's daily chores and everyday events determine his/her mood and well-being to a substantial extent. This influence is catalyzed if there is autonomy in choosing activities. So, if an individual is indulged in concurrent [1]media use behavior in everyday lifestyle, one of the relevant questions to be asked is whether different groups of media multitaskers (High, Moderate, and Low) experience and regulate emotions differently. Researchers also suggested that a poor executive functioning or cognitive demand can significantly affect the emotional processing of users (Bridgett, Oddi, Laake, Murdock, & Bachmann, 2013; Kellermann, et al., 2012; Phan, Collins, & Tucker, 2000). Since heavy media multitasking behavior is often accompanied by poor cognitive control, its impact on the processing of emotional stimuli is worth considering.

The present thesis thus aims to throw light on the pattern and predictors of media multitasking behavior of the Indian college students[2]. It also examines the contrast and comparison of the emotional profile and the processing of emotional stimuli among different groups of media multitaskers.

---

[1] We use the terms 'media multitasking', 'concurrent media use' and 'coincident media use' interchangeably.

[2] The participants chosen were all hostellers, and hence, they lived in an environment where they were exposed to less supervision (i.e., that from the parents when the students are at home). In this situation, students may media multitask voluntarily, and hence this action of media multitasking can be considered as a "self-chosen" action which influences emotions a lot more than the actions which are not "self–chosen."

1.2 Media multitasking and media use

Advancement in technology and communication can be held responsible for making media multitasking so popular among the modern human beings, and more so among the younger generation (Anderson & Rainie, 2013; Carrier, Cheever, Rosena, Beniteza, & Changa, 2009). Media multitasking can sometimes be considered as a habit (Oulasvirta, Rattenbury, Ma, & Raita, 2012) which makes one to scan messages or to check Facebook updates every now and then, for example. Otherwise, it is a trade-off activity which helps one to deal with several tasks simultaneously. One such example is driving and talking on a mobile phone or attending tasks according to their priorities in the 'switch-back mode' like opening several tabs on an internet browser.

This behavior has become popular globally. The data showing the change in the media multitasking habit of people of different nationalities points to rapid penetration of this behavior in the society in the past few years. In the next few paragraphs, we demonstrate some facts and figures which will establish this statement on firmer ground.

In a Deloitte report 'state of the media democracy survey' in 2010, media multitasking while watching TV was found to be a popular behavior in the UK, the USA, and Germany. The Kaiser Family Foundation survey on the American girls and boys (Foehr, 2006; Rideout, Foehr, & Roberts, 2010) aged between 8 to 18 years found that between 2004 and 2009 there is a sheer jump of one hour and seventeen minutes (from 381 minutes to 458 minutes) in the duration of their media multitasking activities. It was seen that on an average, Heavy Media Multitaskers deal with about twelve media per day, whereas the corresponding number is six for Low Media Multitaskers.

For the UK population, OfCom, and GfK, (2010) found that the media exposure on them is 9 hours 24 minutes a day, in which about 2 hours 44 minutes is spent in coincidental media use. The study also unfolds that 52% of the media activities reported by the participants aged between 16 to 24 years is concurrent. Hungary youth report 2007 (by the World Internet Project as mentioned in

Székely, 2015) observed that the young Hungarians, too, are inclined to coinciding media activities. On average, the Hungarian online multitaskers spend 780 minutes hearing music, 900 minutes on various internet-related activities and 192 minutes conversing on phone weekly (Székely, 2015).

Talking about the continent of Europe, 70% of the Europeans media multitask, and 52% of this section repeats it daily (Microsoft Advertising, 2009). On the other hand, for the Asian countries we can, for example, look at the report by Nielson advertising (2012) (see also another report by the Malaysian Communication and Multimedia Commission, 2016) which reflects the growing tendency of media multitasking in the countries like Indonesia, Malaysia, etc. Song, Nam, Lim and Kim (2013) in their media survey study in 2011, found that 70.4% of the 866 Korean undergraduate students (male=315) partake in media multitasking.

Apart from that, in the laboratory-based studies, researchers aimed at understanding more minute details of the media multitasking habit which can be understood with the help of Media Multitasking Index (MMI)[3], a conception developed by Ophir, Nass, and Wagner (2009). MMI yields the measure of the number of media handled by media multitaskers during a typical media consumption hour (there can be a maximum of twelve media while calculating the MMI). According to Kononova (2013), the Media Multitasking Index (MMI) was 3.88 for the US population. In the same report, the corresponding values for the Kuwait and Russia were found to be 3.94 and 3 respectively. MMI for the Chinese population (Yang & Zhu, 2015) and the Taiwanese population (Kononova & Chiang, 2015) were found to be 2.55 and 3.13 in that order. As evident in the studies (Nestor & Schutt, 2019; Schuur, Baumgartner, Sumte, and Valkenburg, 2015), this measuring concept has been fairly popular and reliable in the media multitasking studies. Several researchers have utilized MMI to measure media multitasking behavior of college or university students (refer to Table 1),

[3]A part of Media Use Questionnaire (MUQ) to measure media multitasking behavior

and have studied its association with the cognitive abilities, academic outcomes, work performances, etc. This quantification leads to a better comparison of the media multitasking habits of the participants in the laboratory research. The survey media studies and the MMI studies (for example, refer Table 1) together indicate a somehow global trend of media multitasking behavior, and a comparable tendency of concurrent media use among the Asian, European and the American population.

Table 1

List of the Media Multitasking Indices (MMIs) of different Nationalities

Study	Sample taken from	MMI
Ophir, Nass, and Wagner (2009)	Stanford University, USA	4.38
Lui and Wong (2012)	Chinese University of Hong Kong	3.82
Kononova (2013)	USA	3.88
ibid.	Russia	3.00
ibid.	Kuwait	3.94
Yap and Lim (2013)	National University of Singapore	3.15
Brandon, Thomson, Cheyne, and Smilek (2014)	University of Waterloo, Canada	3.33
Kononova, and Chiang (2015)	Taiwan	3.13
Yang and Zhu (2015)	China	2.55
Moisala et al., (2016)	Finland	3.23
Uncapher, Thieu, and Wagner (2016)	Stanford University, USA	4.41

Note. MMI = Media Multitasking Index

However, with respect to the Indian population, there is a paucity of research data on the frequency with which Indians media multitask. The Internet and Mobile Association of India (IAMAI) and the IMRB International in 2015 highlighted that India is currently the third largest internet user country with about

402 million users of the internet. AdReaction Millward Brown report (2014) described the Indians as 'phonistas' who use smartphones a lot daily. Since media factors (Jeong, & Fishbein, 2007, Voorveld, & Viswanathan, 2015) like the availability of media, internet connectivity, and smartphones usage favor the propensity of coincident media use[4], one may predict that the Indian population will also display this tendency.

1.3 Media multitasking: some open questions

In today's information age, people are devoting more and more time to the usage of digital media, often in the multitasking contexts (Foehr, 2006; Kononova, 2013; Nielsen, 2012; OfCom & GfK, 2010; Voorveld, Seijn, Ketelaar, & Smit, 2014) and at the expense of interaction with other humans (Anderson & Rainie, 2013). Though 'multitasking' is a very lucrative term in the practical world and people who can multitask are often seen as the successful ones according to the social notion, yet media multitasking may turn out to be harmful, too. Concurrent media use can take a toll on cognition because of distraction (Ophir, Nass, & Wagner, 2009; Rosen, Carrier, & Cheever, 2013), an overload in the processing of information (McCarthy, 2013), or because of poor attention control (Brandon, Thomson, Cheyne, & Smilek, 2014). These situations often affect one's performance during a task. While there may be some positive outcomes associated with multitasking (Kapadia, 2017; Lui & Wong, 2012), media multitaskers are prone to depression (Becker, Alzahabi, & Hopwood, 2013), perform worse on cognitive measures of attention, impulsivity and fluid intelligence (Brandon, Thomson, Cheyne, & Smilek, 2014; Minear, Brasher, McCurdy, Lewis, & Younggren, 2013; Ophir, Nass, & Wagner, 2009; Uncapher, Thieu, & Wagner, 2016), and face difficulties in learning and concentrating on academic activities (Carrier, Rosen, Cheever, & Lim, 2015 ; Lee, Lin, &

[4] We use the terms 'media multitasking', 'concurrent media use' and 'coincident media use' interchangeably.

Robertson, 2012). In spite of the negative attributes, it has been observed that media multitasking behavior is growing by leaps and bounds. According to the researchers (Voorveld, Seijn, Ketelaar, & Smit, 2014; Wang & Tchernev, 2012; Yang & Zhu, 2015; Zhang & Zhang, 2012), there are several predictors and needs for media multitasking behavior, and the emotional gratification of needs is one of the primary predictors which aids multitasking with new media (Wang & Tchernev, 2012). The part played by emotions in the media multitasking behavior, however, is unclear and contradictory opinions exist. Some researchers suggested that the aversion of boredom and loneliness is the main objective of media multitasking (Song, Nam, Lim, & Kim, 2013; Tokan, Mattila, & Sihvonen, 2012). Others view that media multitasking gives positive experience, and hence, individuals enjoy media multitasking (Laine-Hernandez, et al., 2013). However, researchers found that individuals with higher media multitasking behavior suffer emotionally and is prone to be depressed, anxious, and stressed (Becker, Alzahabi, & Hopwood, 2013; Mark, Wang, & Niiya, 2014; Rosen, Whaling, Rab, Carrier, & Cheever, 2013). Scholars even suggested that the fear of losing any information or communication compel an individual to frequently check with media updates such that when not allowed to do so, users become anxious. This emotional over-dependence on technology forces people to take up media multitasking as a compulsion and not as a preference. These studies pointed out the role of emotions in media multitasking behavior as the facilitator and/or as the maintainer of behavior. However, there are a few shortcomings/limitations in the existing works that call for particular attention. These unexplored aspects give rise to some broad open questions which are yet unanswered and they are as follows:

First of all, the research in this domain is predominantly confined to the developed economies (like the USA, the UK, the Netherlands, etc.). Though the media multitasking habits in the emerging economies (e.g., China, Malaysia, etc.) are growing rapidly, yet the number of studies examining media multitasking habits in these countries, such as India, is scant . We focus our study on India as it

is one of the largest internet user bases in the world, and is largely under-explored. Recent reports (e. g. Millward Brown AdReaction, 2014) suggest that India is coming closer to the global average regarding multi-screening use and that smartphone usage is higher than the global average. With the growing use of media devices, one may expect that the media multitasking behavior is prevalent in India too, and hence, there is a need to study its impact in the Indian context.

Second, there is a dearth of studies examining the emotional differences among the people involved in varying extent of media multitasking. If High Media Multitaskers experience both positive (e.g., enjoyment derived from media multitasking) and negative emotions (e.g., depression, anxiety), it is likely that people with different media multitasking habits (i.e. Moderate and Low Media Multitaskers) experience and regulate emotions differently in day-to-day lives. For instance, individuals who media multitask too much may feel more negative or more anxious if they stay away from media in comparison to those who are not much into heavy media multitasking.

Third, owing to the prevalence of media multitasking, understanding the consequences of this habit may be of great practical importance. The extant research base in this regard is small and mostly correlational in nature. Further, the data associated with the impact of media multitasking on the processing of emotional stimuli is limited (Schuur, Baumgartner, Sumte, & Valkenburg, 2015).

1.4 Organization of the thesis

The organization of the thesis is as follows:

Chapter 2: Pattern and Predictors of Media multitasking Behavior of Indian College Students

The second chapter of this thesis examines media multitasking behavior of the Indian college students. It is an exploratory study, and the study utilized self-reported questionnaires. In this chapter, we have examined the media use and the

media multitasking behavior of the students as well as the media which they multitask the most. Since media multitasking behavior can be influenced by the factors like the availability of the internet and media devices, educational level of an individual, therefore we conducted our study in a technological institute in India to achieve the maximum possible uniformity among the participants. Extant literature (Kononova, & Chiang, 2015; Wang, & Tchernev, 2012) suggest that age, gender, duration of ownership of media, and the personality factors impact media multitasking behavior. Hence, in this chapter, we also investigate in which manner the above variables can influence one's media multitasking behavior.

In addition to that, we categorized media multitaskers into three different groups (HMM, MMM, and LMM) whose emotional profile will be compared in chapter 3. This categorization will also be utilized in chapter 4 to compare their emotional processing.

Chapter 3: The Emotional Profile of Different Groups of Media multitaskers

Researchers suggested that our everyday activities influence our emotions and mood (Weinstein & Mermelstein, 2007). Media multitasking being a daily ritual of many people has the potential to alter and influence people's emotions to a great extent. Thus, this chapter aims to compare and contrast the emotional profiles of media multitaskers group to examine how they differ in experiencing and controlling emotions in everyday lives. Based on the studies in the second chapter we categorized the MMI of the sample students and clustered them into three groups – High Media Multitaskers (HMM), Moderate Media Multitaskers (MMM), and Low Media Multitaskers (LMM). We created the emotional profile, each of which is composed of five variables, namely – energetic arousal, tense arousal, positive emotion, negative emotion, and emotional control, of these three groups.

Chapter 4: The Processing of Emotional Stimuli among Media multitaskers

Studies in media multitasking often focus on understanding the consequences of media multitasking behavior from the cognitive perspective, and the stimuli involved in them are usually neutral in nature. But in everyday life, we experience the stimuli that display emotional characteristics. So, in this chapter, we aim to understand how different groups of media multitaskers, that are based on the categorization made in chapter 2 perform in a series of experimental tasks that consist of emotional stimuli. Since different levels of media multitaskers are believed to have different emotional profile, they may have different response to stimuli as well. Five separate tasks were designed, and they are as follows:

- **Attentional bias towards emotional versus neutral facial stimuli:** this study attempted to understand how excessive media multitasking can influence selective attention towards emotional stimuli (for example, facial expressions of emotions) using the emotional dot probe paradigm (MacLeod, Mathews, & Tata, 1986).

- **Facial emotion recognition task:** this task helped analyzing the facial emotion recognition ability among media multitaskers. This task had two parts. The first one consisted of 'familiar' facial stimuli, and the second one involved 'unfamiliar' facial stimuli. Besides, it also studied the media multitaskers' performance when they encountered the 'in-group' (Indian) and the 'out-group' (non-Indian) facial stimuli.

- **Emotional categorization, emotional recall and recognition task using self-referential emotional stimuli:** In the third task we aimed at studying whether there was any difference in the responses of HMM, MMM, and LMM in categorizing self-referential positive and negative emotional words. In the subsequent tasks, we examined if there was any memory-based (recall and recognition) differences among them.

According to the above summary, the core findings of the thesis are distributed in Chapters, 2, 3 and 4 that explain patterns and predictors of media multitasking behavior, the emotional profiles of media multitaskers, and how emotional stimuli are processed by them. In the fifth and the last chapter, we summarize the findings according to the research. Also, possible extensions of the study are indicated in that chapter accordingly. Having said so, we conclude our introductory discussion and move towards the detailed description of our studies in the subsequent chapters.

Chapter 2

Pattern and Predictors of Media multitasking Behavior of Indian College Students

2.1 Introduction

Existing studies (Foehr, 2006; MicrosoftAdvertising, 2009; Nielsen, 2012; OfCom & GfK, 2010; Rideout, Foehr, & Roberts, 2010) show that there is a quantum jump in the ability of the modern human being to utilize media and media devices in their daily lives. This ability has given birth to a unique community worldwide called media multitaskers who are seen to be handling several media/media devices at a particular instant. It is also seen that the younger generation succumb mostly to this habit (Carrier, Cheever, Rosena, Beniteza, & Changa, 2009; Voorveld, Seijn, Ketelaar, & Smit, 2014). This behavior is so omnipresent that lots of behavioral studies are, nowadays, devoted to perusing media multitasking behavior of the younger generation (Baumgartner, Schuur, Lemmens, & Poel, 2018; Baumgartner & Sumter, 2017; Becker, Alzahabi, & Hopwood, 2013; Minear, Brasher, McCurdy, Lewis, & Younggren, 2013; Ophir, Nass, & Wagner, 2009). India is also a growing market for media devices, and there is a constant growth of media use for the past several years (Deloitte, 2015). The worldwide 'media boom' has greatly influenced the Indian society, and it is not illegitimate to conjecture that media multitasking behavior has a strong presence in the Indian society, too. However, media multitasking studies have so far been concentrated around the societies representing mostly the developed countries and some developing economies. But, there is a paucity of information about the media multitasking behavior of the Indian youngsters. The current study takes a step to bridge this gap and looks into media multitasking behavior of the Indian youth, their preferred media combination, and the predictors of this behavior.

The present chapter is arranged in the following manner: in the next section, we introduce the working definition of media multitasking and its classification, in Sections 3 and 4 we discuss our sample parameters, the research questions, and hypotheses regarding the pattern and predictors of media multitasking behavior of the Indian college students. Sections 5, 6, and 7 cover the methodology, procedure, and the results respectively, and then we summarize our findings of this chapter in Section 8.

2.2 Classification and working definition of media multitasking

Media multitasking, in general, refers to the consumption of several media simultaneously, e. g. having a telephonic conversation and watching TV. Researchers use different variants of terminologies to refer to the act of media multitasking. Some such variants are: 'Multitasking with media' (Jeong & Fishbein, 2007), 'Digital multitasking' (Wallis, 2010), 'Media switching behavior' (Brasel & Gips, 2011), 'Multitasking with digital technologies' (Wood, et al., 2011), 'Media induced task switching' (Rosen, Carrier, & Cheever, 2013), 'Multi-screening' (Laine-Hernandez, et al., 2013), Laptop multitasking (Sana, Weston, & Cepeda, 2013), 'Multi-window multitasking' (Chinchanachokchai, Duff, & Sar 2015), 'Multitasking interaction with smart devices' (Zhang & Rau, 2016) etc.

Depending on the domain of study, the term media multitasking may refer to slightly varying behavioral aspects. For example, according to Jeong, and Fishbein, (2007) media multitasking behavior involves media use and another non-media activity. Similarly, Davidson (2013) suggested that media multitasking may be understood as a concurrent engagement with one or more media while performing even a real-time task (like doing home assignments). Ophir, Nass, and Wagner, (2009) defined media multitasking as using several media or as processing a stream of media contents at a particular instant. According to Wanga, et al. (2012) media multitasking in the context of communication studies is

defined as coinciding different tasks at least one of which involves the use of communication medium/channel.

Hence, we have observed that media multitasking can be of different forms, some of which we can identify instantly (Wallis Report, 2010):

a) Coinciding single medium and face-to-face interaction

b) Between two or more media

c) Engaging in several tasks on a particular medium, for example: using the same computer for reading an article online and for watching videos

According to Shih (2013), there can be two variants of media multitasking:

a) Media-media multitasking: all the tasks involved are media related

b) Media-non-media multitasking: at least one task involves media

Also, depending on the distribution of the user's attention, media multitasking can be of two types (Tokan, Mattila, & Sihvonen, 2012)

a) Active: where all the activities receive homogeneous attention, e.g., multiple chatting

b) Passive: when the user concentrates on the primary task, and the others remain as background, e.g., studying and listening to music

Media multitasking can be a) sequential where the actions are done in switching back and forth manner or b) simultaneous (Carrier, Rosen, Cheever, & Lim, 2015). It can also be classified as a) purely online (e-mail and online chat) b) purely offline (watching TV while eating) or c) Mixed media (watching TV and online chatting) (Shrivastava, Nakazawa, & Chen, 2016).

For the purpose of our study, Media multitasking (MMT)[5] is described by the following features:

1. An individual[6] may engage in two or more tasks at least one of which should be media[7] related.
2. Activities may be sequential[8] and/or simultaneous.
3. Activities may involve multitasking with a single medium or multiple media on a single device or on multiple devices.

2.3 Pattern of media multitasking behavior of the Indian college students: some open questions

India boasts of one of the largest user bases of smartphones, media devices, and the internet in the world. For example, the Internet and Mobile Association of India (IAMAI) and the IMRB International (2015) estimated India to have 402 million internet users, which are the third largest in the world. The corresponding number reached to 481 million in 2017 (Internet and Mobile Association of India (IAMAI) & Kantar IMRB, 2018), 64.81% of which are from the urban areas (Internet World Stats (n.d.), estimates this number to be 462.12 million for the year 2017). The projected figure for 2018 is 500 million (Agarwal, 2018; Chopra, 2017). India is a country of 299.24 million smartphone users (Statista (n.d.)) and of 11% of the global Facebook users (*ibid*.). Table 2 (Abbas & Singh, 2014) highlights that a large part of the global social media users resides

[5]Media multitasking in the thesis is a habitual/frequent multitasking behavior, which means it's a relatively stable attribute and has been developed over a long period of time.

[6]We assume individuals to be active users

[7]Media consists of both online and offline

[8] Actions are in the form of switching back and forth manner

in India. However, studies on the media multitasking pattern of the population are surprisingly absent.

Table 2

Social media usage: Global versus Indian (Abbas & Singh, 2014)

Medium	Global	Indian
Facebook	1.5 billion	115 million
Twitter	500+ million	77.49 million
Google+	500+ million	20 million
LinkedIn	238 million	23 million
Instagram	130 million	Data Not available
Pinterest	70 million	8.12 million
Tumblr	267 million	2.93 million
YouTube	Data Not Available	55 million

But there are a few studies which analyzed the simultaneous activities of Indian people during their interaction with a single media. For instance, Deloitte (n.d.) in a survey of Indian national sample (period was late 2011-early 2012) asked the respondents (age group 14-75 years) "which are the things they typically do while watching TV?" They found that the multitasking while watching TV is common among the Indians, and 32% of them check e-mails simultaneously. Also, 30% of the TV users read newspapers or engage in a cell-phone conversation during watching TV. It was apparent from the survey that the Indians also have a leaning towards media multitasking, but the study was not comprehensive enough to shed light on the media multitasking behavior related to many other media like music, web surfing, etc. Besides, it was also unclear about the media multitasking habit in a specific age group. Since media multitasking behavior differs with age, it is pertinent to understand this prevailing habit on a 'focused' age group, which is being influenced the most.

Some of the earlier studies in the field of media use reported that media multitasking behavior was more common among 'net generation' people than in 'generation X' and 'baby boomers' (Carrier, Cheever, Rosena, Beniteza, &

Changa, 2009) and the technological divide was prominent between the digital natives and the digital immigrants (Prensky, 2001). An eye gazing study (Brasel, & Gips, 2011) demonstrated that young students had more frequent and shorter gazes in comparison to old age group college staffs. However, media multitasking nowadays is a ubiquitous behavior and is seen among people from all age groups. In 2013, Voorveld and Goot studied the prevalence of media multitasking among the Dutch participants dividing them into seven age groups. They found that all the age groups share a similar tendency of media multitasking (except the youngest group) but, they differ regarding media combinations and media use in general. They claimed that this difference in media combination arises due to the cohort effects that different age group people come from. Later, studying the pattern of media multitasking behavior cross-nationally (for six countries) in 2014, Voorveld, Seijn, Ketelaar, and Smit observed that age is a significant predictor of media multitasking globally, and that the younger generation choose to media multitask more with 'new media.' The study also pointed to the fact that the geographical area or country to which a participant belong should play a pivotal role in media multitasking research as the study sample from different places/countries differ in terms of the influences of media multitasking.

Similarly, a study on media multitasking on the Kuwaiti population (Kononova & Alhabash, 2012), the researcher chose the sample of the Kuwaiti students (age group 18-22 years) as they were the group who had the maximum exposure to information and communication technology and the maximum ownership of media in the country and found that even a small age gap influences media multitasking behavior significantly. Considering the internet penetration rate, media exposure, and peers influence, several other studies also took samples from colleges/university students to study the media multitasking pattern of the participants. However, lately the usage of smartphones and other media devices are diffusing more and more into the younger people in the United States and in the European countries, and hence the MMT researchers (Baumgartner, Weeda, Heijden, & Huizinga, 2014; Baumgartner & Sumter, 2017; Cain, Leonard,

Gabrieli, & Finn, 2016) are now including even sample of participants less than 16 years old, the group, which they believe encounter the critical major developmental stages, and hence are more susceptible to media multitasking behavior. Thus, for deciding the sample for a media multitasking study (specifically with new media) of any country, the following factors should be analyzed:

1. The national survey of the internet and the 'new media' users of different age groups

2. The ownership of mobile phones among people from different age groups in a country.

3. Demographic factors such as gender, region-wise internet penetration, and the smartphone usage among different age groups.

Taking into account the parameters as mentioned above, we analyzed the national surveys and other reports on the Indian population (Deloitte, 2015; Internet and Mobile Association of India (IAMAI) & Kantar, IMRB, 2018; Internet and Mobile Association of India (IAMAI) & IMRB, International, 2015; Statista, n.d.) and found that:

1. The 50% population of India is of less than 25 years of age.

2. Currently, India ranks second in the number of internet users globally, and out of that 71% are male, and 29% are female.

3. There is a strike difference of internet users in urban and rural India, and the internet is much more common in the urban part of India.

4. The report also found that 32% of the internet users are college-goers, and 26% are non-college-going young people. On the other hand, non-working women showed the highest growth among female internet users.

5. Another report by Deloitte, bearing the title "Digital Media — rise of on-demand content" (Deloitte, 2015) established that more than half of the app users in India are within the age range of 18 to 24 years, and a further 29% belong to the age group of 25 to 35 years (45% of the users belong to the 4 most densely populated Indian metro cities viz., Mumbai, Kolkata, Delhi, Chennai).

Based on the above data we conducted an exploratory study (with the help of Media Use Questionnaire, developed by Ophir, Nass, & Wagner, 2009) on the media use and media multitasking behavior of Indian college students who were hostellers and aged between 16 to 24 years. These college students have greater access to mediated technologies and have more freedom in their use compared to their high school counterparts and elderly people. In this chapter, we particularly addressed the following research questions:

Research Question 1 & 2: What is the average time participants devoted to each medium on a typical working day? Which media do they use the most?

Research Question 3 & 4: Which media participants multitask the most with during a media consumption hour, and what is the most common multitasking pair among them?

Research Question 5: What is the media multitasking behavior of the participants during face-to-face interaction?

2.4 Predictors of media multitasking behavior

With millions of media users worldwide and a considerable fraction of them doing media multitasking, one may think of identifying not only the pattern of media multitasking but also the predictors that may influence the media multitasking behavior. There may be different factors which control the media multitasking tendency shown by a population. Also, there may be different sets of predictors relevant for different countries which dictate the media use habits of those nationalities, but a general consensus is that the factors impacting media

multitasking behavior can broadly be divided into two categories: media factors and audience factors (Jeong & Fishbien, 2007).

Media factors are composed of two more sub-factors, structural and individual, namely. While structural media sub-factors mostly deal with the ambient influences like the mediated contents of a market or the access to technology, individual factors refer to, for example, the ownership of media. Audience factors, on the other hand, refer to the personal, non-media characteristics like age and gender, which are socio-demographic variables, and the psychological variables like personality traits. The present research focuses on looking into the predictors of the habit of concurrent media use and holds that both individual audience factors and individual media factors act as proximal antecedents of media multitasking behavior. More specifically, media ownership, age, gender and the Big Five personality traits (John & Srivastava, 1999) are identified to be the most important predictors of coincident media use behavior, and in the forthcoming sections, we discuss how those predictors may influence media multitasking behavior of an individual.

2.4.1 Media ownership

Media ownership is defined as the number of media owned by an individual and determines the extent of his/her interaction with them. There are indications in the research that the higher the level of media ownership is, the more is the extent of multitasking with media. We can, for example, cite the study carried out by the Kaiser Family Foundation (Foehr, 2006) who demonstrated that persons having more media in their bedrooms spent more time with media in general. On the same note, Jeong and Fishbein (2007) posited that media factors like the availability of television and computer with internet access could result in media multitasking. Besides, Cotten, Shank, and Anderson (2014) suggested that the ownership of media increases the use and leads to multitasking behavior with that media among adolescents. In a comparative study between the participants from the USA and Taiwan, Kononova and Chiang (2015) found that the disparity

in the media multitasking behavior of the participants from the two countries might be a consequence of the lopsided ownership of media. The American participants were seen to have possessed more media devices, and this could have been the reason why they were seen to be engaged more in media multitasking than their Taiwanese peers. In the Indian context, we have not come across any systematic study which investigated the connection of media multitasking with media ownership of the Indian college students. In the current study, media ownership implies the length of the time for which a participant is in possession of computers (laptop/desktop) and/or smartphones. Based on this definition, the participants were compartmentalized into three groups depending on their media ownership:

1) Those who owned a smartphone and/or laptop for less than six months

2) Those who owned a smartphone and/or laptop for six months to a year

3) Those who owned a smartphone and/or laptop for more than a year

It is hypothesized that,

H2.1: The duration of ownership of media is positively related with media multitasking behavior, such that individuals who owned a smartphone and/or laptop for more than a year will media multitask more than others.

2.4.2 Demographic variable: age

Empirical researches indicated that age is the universal predictor of media multitasking (Voorveld, Seijn, Ketelaar, & Smit, 2014). However, while investigating whether the media multitasking tendency is skewed towards the younger generation, researchers often encountered conflicting results. In one such study Carrier, Cheever, Rosena, Beniteza, and Changa, (2009) found that the "net generation" reported more multitasking than the "generation X" who reported to have multitasked more than the "baby boomers." A similar study conducted by the same authors in 2014 found a comparatively more converging leaning of the

media multitasking habits of those different generations (Carrier, Rosen, & Rokkum, 2018). Another study (Voorveld & Goot, 2013) found that the youngest generation (13-16 years old) in their sample media multitask the most, but the difference with the other age groups is not significant. In another study (Voorveld, Seijn, Ketelaar, & Smit, 2014) researchers demonstrated that as far as media multitasking with modern day media is concerned, age is a significant predictor in the countries like the United States of America, the United Kingdom, Germany, the Netherlands, France, and Spain. On the other hand, only in the USA, the UK, and Spain, age was found to be a significant predictor for multitasking with traditional media also. Kononova and Alhabash (2012) suggested that even a minor difference in the age groups can reflect an observable difference in the media multitasking behavior. Thus, it may be inferred that younger people media multitask more frequently than the older people, especially with 'new media,' and also that the multitasking behavior depends on the country in which the study took place.

There can be three explanations for this age dependence of media.

1. According to the life-span explanations (Voorveld & Goot, 2013), developmental processes while passing through different phases of life give birth to needs for specific types of media in one's life, and the person prefers to stick to the habit of using those media. This leads to the differences in media multitasking habits among different age groups.

2. Generational theory (Brasel & Gips, 2011) suggests that people belonging to a certain generation may get acquainted with and attached to certain types of media which they grew up with, and hence, they develop a distinct media multitasking habit.

3. Lastly, the cognitive elements of aging play a part in the media multitasking tendency of an individual, too. For example, the flexibility in the allocation of attentional resources (Prakash et al. 2009) and reliance on spatial processes for

coordinating deadlines is reduced with advancing age (Todorov, Missier, & Mantyla, 2014) which might resist the older people to media multitask.

Based on the above discussion we hypothesize that,

H2.2: Age is related with media multitasking behavior such that the younger participants will media multitask more.

2.4.3 Demographic variable: gender

Another demographic variable which acts as an important predictor of media multitasking is gender. Jeong and Fishbein (2007) in their work with a sample of 14 to 16 years old, found that the females had more leaning towards media multitasking than the males. The same conclusion was shared by Kononova and Alhabash, (2012) and Duff, Yoon, Wang, and Anghelcev, (2014) as well. In an fMRI experiment correlating brain density with distractibility with a somewhat small sample (N=14), Kanai, Dong, Bahrami, and Rees, (2011) demonstrated that females were more susceptible to distractions than males, which could indicate that they may be more inclined to media multitask. However, studies by Ophir, Nass, and Wagner, (2009); Sanbonmatsu, Strayer, Mederois-Ward, and Watson, (2013) and Zhong, Hardin, and Sun (2011) found no gender effects on multitasking with media. In a cross-cultural study, Voorveld, Seijn, Ketelaar, and Smit, (2014) found that different countries show different trends in the gender dependence of the media multitasking habits. According to this investigation, in Spain, women media multitask with new media significantly more than men, but no such clear demarcation was observed in the USA, the UK, and France. Cotten, Shank, and Anderson (2014) put that the dominance of females in media multitasking over males may be a reason of higher media ownership. In case of the Indian population, a significant digital gender gap has been observed in the reports, and only 29% of the internet users are seen to be females (Press Trust of India, 2017). According to another news report (Mehrotra, 2018), India ranks among the lowest in women's internet access and cell-phone ownership in a

comparative study among 18 countries. This implies that media ownership and the usage of the internet is higher among Indian males in comparison with females. Based on these observations, we hypothesize that,

H2.3: Gender will be positively related with media multitasking behavior such that males will multitask more than females.

2.4.4 Personality traits: Big Five

Researchers identified several personality traits/types that influence media multitasking behavior. For instance, according to Jeong and Fishbein (2007) as well as Duff, Yoon, Wang, and Anghelcev (2014), sensation seeking trait of a user is positively associated with his/her multitasking behavior. Similarly, Sanbonmatsu, Strayer, Mederois-Ward, and Watson (2013) reported that a high level of impulsivity and sensation seeking behavior of an individual is related to the increase in media multitasking habit. In another study, Minear, Brasher, McCurdy, Lewis, and Younggren (2013) found that high impulsivity is associated with high media multitasking behavior. Study on multitasking with smartphones (Lim & Shim, 2016) suggested that the 'need for cognition' trait, is an important predictor of smartphone multitasking, and it increases the likelihood of multitasking by interacting with the sensation seeking trait. Zhong, Hardin, and Sun (2011) found that lower 'need for cognition' is associated with high media use. Researchers like Brasel and Gips (2011) studied the relationship between the Type A personality and the amount of task switching and failed to find any connection between the duo. To summarize the studies describe so far, personality traits like sensation seeking, impulsivity, and the need for cognition were unanimously found to be general predictors of media multitasking behavior.

However, there are several researchers who voiced that the relationship between personality traits and media multitasking behavior should be analyzed from the Big Five factors of personality traits. Personality psychologists, in general, agree on the fact that the five domains of the Big Five factors demarcate the individual differences in personality traits and this model can act as the

basis of many other alternative trait models (Soto & Jackson, 2013). In accordance with that, we examined the relationship between media multitasking behavior with the Big Five personality traits. Big Five personality traits arise from the Five Factor model theory of Personality (McCrae & John, 1992). This model consists of five broad higher-order factors called domains which are namely a) openness to experiences, b) conscientiousness, c) extraversion, d) agreeableness, and e) neuroticism. These factors are bipolar in nature, and each of these factors are composed of six sub-factors called facets (John & Srivastava, 1999). This model is highly comprehensive and it is considered to be the one that includes several different traits of human personality. With reference to media multitasking behavior, there are a few direct studies analyzing the relationship between the Big Five personality traits and media multitasking behavior, and the present thesis elucidates this relationship with reference to the Indian sample.

2.4.4.1 Openness to experience and media multitasking

Openness to experience is defined as a trait which reflects a curious, imaginative, artistic, and unconventional behavioral pattern. According to Roccas, Sagiv, Schwartz, and Knafo, (2002), openness to experience gets along well with motivational goals of self-direction and stimulation values (novelty and excitement). According to Mark in her book 'Multitasking in the digital age' (2015), openness to experience is inversely related to the completion time of an interrupted task. It means that the higher a person scores in openness to experience, the faster he/she can complete an interrupted task. The consensus is that the more flexible, open, and receptive an individual is, the easier it is for him/her to reorient and to get back to the interrupted task. Though some researchers (Loh & Kanai, 2014; Ophir, Nass, & Wagner, 2009; Shih, 2013) suggested that media multitasking has no relationship with openness to experience, another study related to social media use demonstrated that the increase in openness to new experiences leads to the increase in social media use (instant messaging and social network use) by both college students and by others

(Alan & Kabadayi, 2016; Correa, Hinsley & Zúñiga, 2010). Since the present study deals with media multitasking behavior, we assumed that the use of social media will exacerbate media multitasking behavior. Accordingly, we can put the following hypothesis:

H2.4: Openness to experience is positively related with media multitasking behavior.

2.4.4.2 Conscientiousness and media multitasking

Conscientiousness trait implies the tendency to perform tasks carefully and in an organized way. Individuals high in this trait reflect competent, self-disciplined, orderly, and non-impulsive nature (John & Srivastava, 1999). According to Mark (2015), conscientiousness refers to the propensity for planning, the need for structure, and to seeking high achievement. Hence the researchers expected that the more flexible an individual is in his/her planning and personal structure (it means a low level of conscientiousness trait), the less would be the interruption cost. The researchers interpreted that an individual higher in conscientiousness may have a structured internal plan such that when they are interrupted this internal plan helps them retrieving quickly the ongoing task. Since media multitasking demands interruption of one or more works, it is intuitively expected that conscientiousness might have some relationship with the media multitasking ability of an individual. There are however, different conclusions drawn by different research groups and though some researchers assumed a direct relationship between conscientiousness and the time to complete an interrupted task, yet Cain, Leonard, Gabrieli, and Finn, (2016) found none. A similar inference was drawn by Ophir, Nass, and Wagner, (2009) and Shih, (2013), too. Cain, Leonard, Gabrieli, and Finn, (2016) however, inferred an indirect relationship between the two through impulsivity which is negatively related to conscientiousness, and is positively related to multitasking behavior, and hence hinted that conscientiousness may be negatively related to media multitasking. Salomon, Ferraro, Petros, Bernhardt, and Rhyner (2016) found that

an individual high in conscientiousness trait performs poorly in an automated multitasking environment. Similarly, Russell, Woods, and Banks (2017) suggest that an individual high in conscientiousness is not easily tempted by e-mail interruptions and deploy a self-control behavioral strategy when interruptions occur. Hence our stance in this regard is that a conscientious person is barely moved by task interruptions and hardly yields to media multitasking because of the inner tendency to retrieve the unfinished work. Hence, we propose the following hypothesis:

H2.5: Conscientiousness is negatively related with media multitasking behavior.

2.4.4.3 Extraversion and media multitasking

Earlier studies on multitasking and task switching suggested that extraversion is positively related to multitasking performance. According to Liberman and Rosenthall (2001), participants with high extraversion trait perform better in multitasking situations due to their low baseline level of catecholamines (arousal increases the level of catecholamines, and multitasking is assumed to be an arousing situation). On the other hand, introvert participants failed to perform well in nonverbal decoding during multitasking situation. Similarly, Loh and Kanai (2014) found that extraversion can significantly influence media multitasking behavior. Besides, a personality and social media use study (Zuniga, Diehl, Huber, & Liu, 2017) based on 20 countries found that extraversion is positively related with social media use. Researchers suggested that this may be a consequence of the fact that highly extrovert people always seek out opportunities to connect and to socialize with others. Contrarily, it was also suggested that extraversion is not a predictor of multitasking performance (Konig, Buhner, & Murling, 2005) and it is not even related to communication multitasking performance (Wanga, et al., 2012). Similarly, Ophir, Nass, and Wagner, (2009), Wang and Tchernev, (2012), and Shih, (2013) observed no significant relationship of media multitasking behavior with extraversion trait. According to Wang and Tchernev (2012), this observation may be explained if we consider the

fact that extroverts have a greater working memory capacity than others (Lieberman & Rosenthal, 2001) and this makes them successful multitaskers in demanding situations. The self-selected media multitasking behavior, however, hardly requires the fullest of the working memory, and hence, extraversion is less relevant in this situation. In the line of the latter school of thought we forward the hypothesis that:

H2.6: Extraversion is not related with media multitasking behavior.

2.4.4.4 Agreeableness and media multitasking

Agreeableness is a personality trait which manifests itself in warm behavior, co-operation, and consideration displayed by an individual. Individuals high in agreeableness often display altruistic, tender-minded, trustworthy, modest, straightforward, and compliant behavior. Researches in the field of multitasking found an inconsistent relationship between multitasking and agreeableness. For example, according to the study by Shih (2013), there was no relationship of different types of multitasking (media media multitasking, media non-media multitasking, non-media non-media multitasking) and agreeableness. Similarly, a study by Cain, Leonard, Gabrieli, and Finn, (2016) (see also Ophir, Nass, and Wagner, 2009) reported no relationship between Media Multitasking Index and agreeableness trait. On the contrary, other researchers (Widyahastuti & Anwar, 2018) found that higher agreeableness among university lecturers (non college student sample) leads to higher media multitasking behavior among them. Since, the present study is devoted to assessing personality factors of college students (like the studies previously mentioned) we hypothesize that,

H2.7: Media multitasking is not related with agreeableness trait.

2.4.4.5 Neuroticism and media multitasking

Individuals high in neuroticism trait often display anxiousness, impulsiveness, depressive, vulnerable, and self-consciousness. This trait is juxtaposed to

emotional stability of an individual. Some studies on media multitasking highlighted that neuroticism is one of the important predictors of multitasking behavior such that neurotic individuals are more prone to media multitasking behavior (Wang & Tchernev, 2012). According to Mark, Iqbal, Czerwinski, Jones, and Sano, (2016) in a workplace environment, an individual with high neuroticism tends to have shorter focus duration on any computer screen and hence may switch task excessively. Similarly, during driving and multitasking, researchers found that neuroticism is related to distraction due to their high level of anxiety (Johansson & Fyhri, 2017). In a neuroscience study by Loh and Kanai, (2014), neuroticism was shown to be related with media multitasking. Also, in a study by Hwang and Zeong (2018), researchers found a positive relationship between neuroticism and media multitasking behavior during info seeking and sharing activities. In other studies researchers suggested that a high level of neuroticism is related to poor multitasking performance (in the laboratory condition) due to the anxiety multitasking produces (Poposki, Oswald, & Chen, 2009; Salomon, Ferraro, Petros, Bernhardt, & Rhyner, 2016) or due to reduced activation of the task-associated brain areas (Szameitat, Saylik, & Parton, 2016). Some other studies found that neuroticism is not related with media multitasking behavior, but both of them are closely related with depression and social anxiety (Becker, Alzahabi, & Hopwood, 2013). Thus on the basis of the above literature, we hypothesize that,

H2.8: Neuroticism is positively related with media multitasking behavior.

This concludes the discussions on the background of the research questions to be addressed, and the hypotheses to be verified. Before moving onto the next section, we summarize them below.

Research Question 1 & 2: What is the average time participants devoted to each medium on a typical working day? Which media do they use the most?

Research Question 3 & 4: Which media participants multitask the most with during a media consumption hour, and what is the most common multitasking pair among them?

Research Question 5: What is the media multitasking behavior of the participants during face-to-face interaction?

Hypothesis H2.1: The duration of ownership of media is positively related with media multitasking behavior.

Hypothesis H2.2: Age is related with media multitasking behavior such that younger participants will multitask more.

Hypothesis H2.3: Gender will be positively related with media multitasking behavior such that males will multitask more than that of females.

Hypothesis H2.4: Openness to experience is positively related with media multitasking behavior.

Hypothesis H2.5: Conscientiousness is negatively related with media multitasking behavior.

Hypothesis H2.6: Extraversion is not related with the media multitasking behavior.

Hypothesis H2.7: Media multitasking will not be related with agreeableness trait.

Hypothesis H2.8: Neuroticism is positively related with media multitasking behavior.

2.5 Methodology

2.5.1 Participants

A total of 152 students[9] within the age range of 16-24 years pursuing Bachelor of Technology degree (B.Tech.) at a technological institute in India voluntarily participated in the study. All the participants were hostellers, studying engineering subjects, and were students from the same institution. The sample was so chosen to maintain uniformity in the technology supportive ambiance and the academic environment that the students are exposed to. In the sample, 113 of the participants were males, and 39 were females. The high male to female ratio in the sample might show imbalance and can generate bias in our studies but, this situation may hardly be avoided as the said ratio shows almost similar trends in the technical institutes in India, especially in those of national importance (Government of India, Ministry of Human Resource Development, 2018).

A pen and paper based cross-sectional questionnaires study was conducted in a strict laboratory setting. Since the study was based on media multitasking behavior, we had avoided presenting the questionnaire online that could have been a distraction for some. Also, each participant was called in the laboratory separately and was asked to take the questionnaire in a single sitting without any electronic gadgets. They were first briefed about the media multitasking behavior and the procedure of the entire study, and were encouraged to ask questions if they had any. After taking their consent of participation, a set of questionnaires were given to them along with the instructions. They were instructed to fill in the questionnaires taking into account their behavioral activities in the past one month (starting from the date of conduction of study). This instruction was given to avoid any recall-based errors that might creep in while filling up the questionnaire.

[9] In this sample institute, there were approximately 480 B.Tech students, so our sample size 152 has a margin of error of 6.58% at 95% confidence interval.

2.5.2 Measures

2.5.2.1 Media multitasking behavior

This construct is measured by Media Use Questionnaire (MUQ) developed by Ophir, Nass, and Wagner (2009). This is a fairly popular questionnaire and addresses 12 media activities such as: a) print media b) television c) computer-based video (such as YouTube or online serial episodes) d) music e) non-music audio (such as audio lectures) f) video/computer/mobile games g) fixed telephone and mobile phone voice calls h) instant messaging using social networking sites (such as Facebook, Twitter) i) SMS (text messaging using mobile phones) j) e-mail k) web-surfing l) other computer-based applications (such as word processing).

In the questionnaire, the participants reported the total time (in hours or in minutes) spend by them on each media on an average day (during the past one month beginning from the day of the test). Also, they reported how often they use other 11 media in conjunction with a primary medium (on a four-point rating scale: a) 'most of the time' b) 'some of the time' c) 'a little of the time' and d) 'never'). Questions designed may be answered with the help of this four-point rating scale. Following are two examples of the questions asked: "While reading print media how often do you watch television at the same time?", "While watching television how often do you listen to music at the same time?" and so on and so forth. With the aid of the replies, the Media Multitasking Index (MMI) was generated for each participants and the index, thus created, gives us an idea about the media multitasking behavior of an individual during a typical media-consumption hour. From the quantitative point of view, it tells us how many media a person uses during a typical media consumption hour on an average day.

In a pilot study with 5 participants, the test-retest reliability (within a time gap of 10 days) of the MUQ of the Indian college students (from the same institute) was 0.97 ($p < 0.01$).

2.5.2.2 Multitasking with media and face-to-face interaction

Multitasking index related to media and face-to-face interaction was computed just like the way MMI was calculated. The participants were first asked to provide the amount of time they spend in doing face-to-face interaction on any average media usage day. Secondly, they were asked to report (on a four-point rating scale a) 'most of the time' b) 'some of the time' c) 'a little of the time' and d) 'never') how often they do other secondary media activities (as listed section 5.2.1) in conjunction with face-to-face interaction.

2.5.2.3 Socio-demographics

Each participant in the preliminary information was asked to report their age (age was asked as an open-ended question and was included as a continuous variable in the analysis), gender (it had three options male/female/others), and the duration of ownership of media (it involved the question like: "how long they have been owning and using smartphones or laptops or both?") which had three response categories: a) category 1 (0 to 6 months), b) category 2 (6 months to 1 year), and c) category 3 (more than 1 year).

2.5.2.4 Personality traits

The personality traits were measured through the Big Five Inventory (BFI) developed by John and Srivastava, (1999). It is a 44-item inventory that measures Big Five personality factors (dimensions) of an individual such as openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. Each dimension is measured with the help of eight to ten items like–"I see myself as a person who is talkative," "I see myself as a person who worries a lot" etc. Participants had to report the extent of agreement or disagreement with the statement of each item. The responses ranged from 1 which stands for 'strongly

disagree' to 5 which stands for 'strongly agree'. The test-retest reliability[10] (as measured through the Pearson correlation) of the BFI scale in a pilot study was 0.96. The test-retest reliability (as measured using the Pearson correlation) of each dimension was, openness to experience = 0.93, conscientiousness = 0.87, extraversion = 0.96, agreeableness = 0.88, neuroticism = 0.88. The Cronbach's alpha[11] for openness to experience was 0.74, for conscientiousness, it was 0.69, for extraversion, it was 0.74, for agreeableness, it was 0.70, and for neuroticism it was 0.70.

2.5.3 Procedures

The study was conducted in a laboratory setting so that the participants could be free from distractions and it ensured a high response rate. The participants were selected through an open advertisement and they participated voluntarily. On their arrival in the laboratory they were explained thoroughly the phenomena of media multitasking behavior. Since the study involved self-reported questionnaires, we made sure that the participants understood what kind of behavior they were support to report. They were also encouraged to ask questions. Before the commencement of the study, they read a consent form which guaranteed confidentiality and anonymity of their participation. The study was administered in the English language (which is the medium of instruction in the institution the participants belonged to).

2.6 Results

On preliminary analysis, it was found that 15 participants had not completed the media multitasking questionnaire. So, their data had to be omitted from the final analysis. Also, data of 17 more participants had to be discarded as

[10] With five participants and with a time gap of ten days

[11] Related to the values reported for the main study

they possessed neither smartphones nor computers (laptop/desktop) in the past six months, and they had a very poor response rate in the media multitasking questionnaire. Thus, the final sample comprised of 120 participants[12] (Mean (M) = 20.9 years; Standard Deviation (SD) = 1.29; within the age range 18-24 years). There were 84 male and 36 female participants. Hence the resulting data represents that of the sample (in which age ranges from 18 to 24 years) obtained from one of the technological institutes in India.

2.6.1 Media Use

Participants were instructed to report the average time (in hours or minutes) they spend using the following twelve media: a) print media b) television c) computer-based video (such as YouTube or online serial episodes) d) music e) non-music audio (such as audio lectures) f) video/computer/mobile games g) fixed telephone and mobile phone voice calls h) instant messaging using social networking sites (such as Facebook, Twitter) i) SMS (text messaging using mobile phones) j) e-mail k) web-surfing l) other computer-based applications (such as word processing) on an average media use day.

Descriptive statistics were examined for each media use variable. It was found that participants devoted most of the time surfing websites, followed by engaging in instant messaging or social media use and watching videos on the computer. The average time devoted for each media is mentioned in Table 3.

[12] Since our final sample size was 120, the margin of error increased to 7.76% at 95% confidence interval. However, it is still below the 8%, which is considered to be statistically acceptable (DataStar, Inc., 2008).

Table 3

Average time spent using different media (in hours)

Medium	N	M	SD	Max Value
Web surfing (Internet)	120	2.87	1.30	7
Instant Messaging (online messages)/Social Media Use	118	2.02	1.29	11
Videos in computer like YouTube	120	1.97	1.38	9.5
Print	105	1.86	1.12	7.5
Music	117	1.69	1.31	9
Other computer applications	115	1.36	0.79	5.5
Games (Video, Computer, Smartphones)	102	1.07	0.65	3.5
Phone/ voice calls/online calls through Skype etc.	120	0.96	0.88	9
TV	60	0.71	0.43	3
SMS (offline messages through smart phones)	80	0.6	0.37	2
Non-music	46	0.45	0.22	1
E-mails	119	0.38	0.35	2.5

Note. N= number of participants who interact with the particular media usually, M = Mean (in hours), SD = Standard Deviation, Max value = Maximum value (in hours)

In the third question, we seek to know the media multitasking behavior of Indian college students and also with which media they multitask the most. To answer this question, we calculated the Media Multitasking Index (MMI) of 120 participants.

2.6.2 Media Multitasking Index (MMI)

We calculated the MMI from the following formula given by Ophir, Nass, and Wagner (2009)

$$\text{MMI}=\sum_{i=1}^{12}\frac{m_i h_i}{h_{total}}$$

Where m_i denotes how many media are typically used in conjunction with the primary medium i, h_i is the time (in hours) spent on an average day[13] using primary medium i, and h_{total} is the total time spent (in hours) using all primary media on an average media usage day.

Using this formula, we get individual MMI score, and on averaging, we obtained a relatively normal distribution whose Mean (M) is 4.24 and Standard Deviation (SD) is 1.27 (Skewness = -1.16 (z-score); Kurtosis = - 0.23 (z-score)) for 120 participants. Hence, it can be inferred that the participants (on average) used about 4 media simultaneously during a typical media consumption hour. Since media multitasking behavior differs among the groups of participants who frequently media multitask and those who partially or entirely try to refrain from this, we categorize media multitasking behavior in three clusters using k-means cluster analysis. The advantage of using cluster analysis is that it is based on the person-oriented theory (i.e. not variable oriented) and it forms cluster or groups that are more similar and homogeneous (other methods of classifying groups of media multitaskers are, mean ± 1 SD, median split, percentile split, tertile split, etc.).

Accordingly, we categorized the participants in the following groups as given in Table 4.

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[13] In the original Ophir, Nass, and Wagner (2009) formula, h was the number of hours reported for average week, but in our work, we have instructed participants to report their average hours for an average media usage day on all media. This was done to avoid any confusion in the usage of media in the week days or weekends that could have over or under inflate the media usage or media multitasking behavior. So, participants have to report their most likely or average behavior that they do in most of the days.

Table 4

Categorization of 120 participants in HMM, MMM, and LMM group with the respective mean MMI score of each group

MMT Groups	M	SD	Max Value	Min value	N
HMM	5.74	0.55	7.16	5.06	33
MMM	4.30	0.41	4.97	3.51	54
LMM	2.64	0.69	3.45	0.92	33

Note. MMT = Media Multitasking, HMM = High Media Multitaskers, MMM = Moderate Media Multitaskers, LMM = Low Media Multitaskers, M= Mean, SD = Standard Deviation, Max value = Maximum value, Min value = Minimum value, N = Number of participants

This suggests that those who frequently media multitask tend to use 5 to 6 media simultaneously during their media consumption hour. In contrast, those who do not prefer to media multitask limit themselves to 2 or 3 media during a typical media consumption hour. For Moderate Media Multitaskers, the mean of MMI is nearly 4. Thus, this demonstrates that media multitasking behavior is common among participants but with different intensities.

In order to understand the most common multitasking pair among participants (pertaining to research question 3), multitasking index of each medium is calculated separately to find the three most common media. On analysis, it was found that during instant messaging, sending SMS, web surfing, and while using other computer applications, participants multitask with other media the most, whereas during playing games, or hearing non-music and during phone calls, participants media multitask the least (Refer Table 5).

Table 5

Multitasking Index of each Media

Medium	N	Multitasking Index	Min Value	Max Value
Instant Messaging (online messages)/Social Media Use[#]	118	6.21	0.66	10.01
SMS (offline messages through smart phones)[#]	80	6.04	1.32	10.67
Web surfing (Internet)[#]	120	5.08	1.32	8.34
Other computer applications[#]	115	4.23	0.99	8.02
Music	117	4.13	0.66	7.34
E-mails	119	3.87	0	8.35
Print	105	3.68	0	7.37
TV	60	3.58	0	7.34
Videos in computer like YouTube	120	3.21	0.66	8.01
Phone/voice calls/online calls through Skype etc.[##]	120	2.25	0	8.36
Non-music[##]	46	1.65	0	6.34
Games (video, computer, smartphones)[##]	102	1.63	0	6.33

Note. N = Number of participants, Min value = Minimum value, Max value = Maximum value

[#]Media participants multitask the most with

[##]Media participants multitask the least with

Research question 4 aims to explore the common media multitasking pair among the participants. Since, IM, Web surfing, and other computer applications[14] are found to be three of the media the participants multitask the most with; we examined their multitasking frequency with different media. We obtained the following figures (Figure 1, Figure 2, and Figure 3) that explained the common multitasking pair while Instant Messaging, while web-surfing, and while using other computer applications, respectively.

[14] SMS was not examined as only 80 participants reported of using it. Whereas, there were 100 or more reported participants in case of IM, Web surfing, and other computer applications.

Figure 1 gives the multitasking tendency of the participants while being involved in IM. It was observed that participants while using IM multitask with music (97.46 % of the time) the most. They were also found to be indulged in web surfing 95.76% of the time and in multiple IM 89.83% of the time.

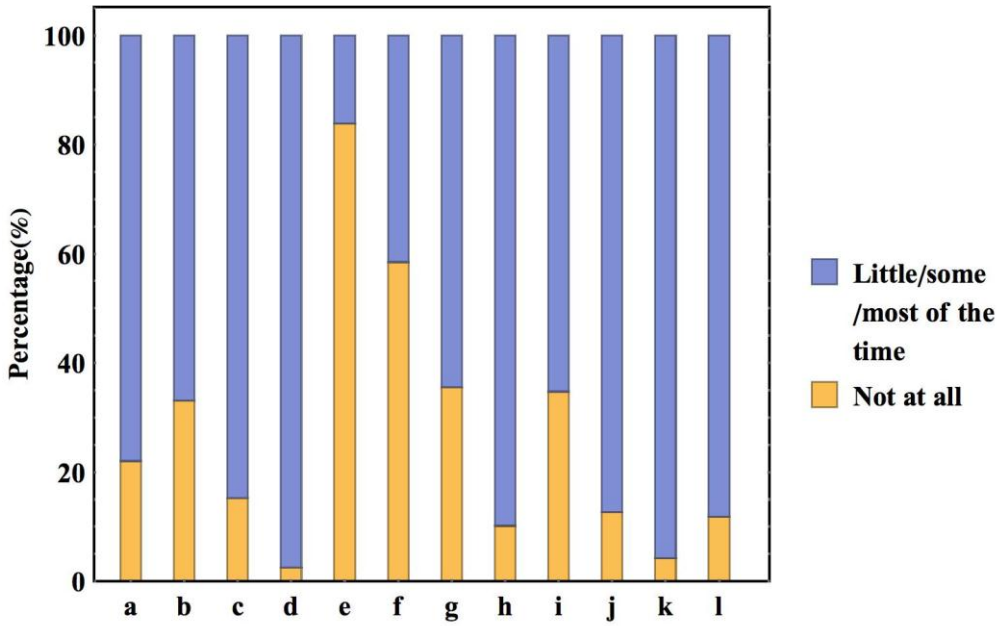

Figure 1. Multitasking while using IM. The letters in the x-axis denote the media. a: print, b: TV, c: computer based video, d: music, e: non-music, f: games, g: phone, h: multiple IM, i: SMS, j: e-mail, k: web-surfing, l: other computer applications.

Figure 2 gives the multitasking tendency of the participants while being involved in web surfing. It was observed that participants while using web surfing multitask 98.33 % of the time with other web-surfing the most. They were also found to be indulged in IM 95.83% of the time and in music 94.17% of the time.

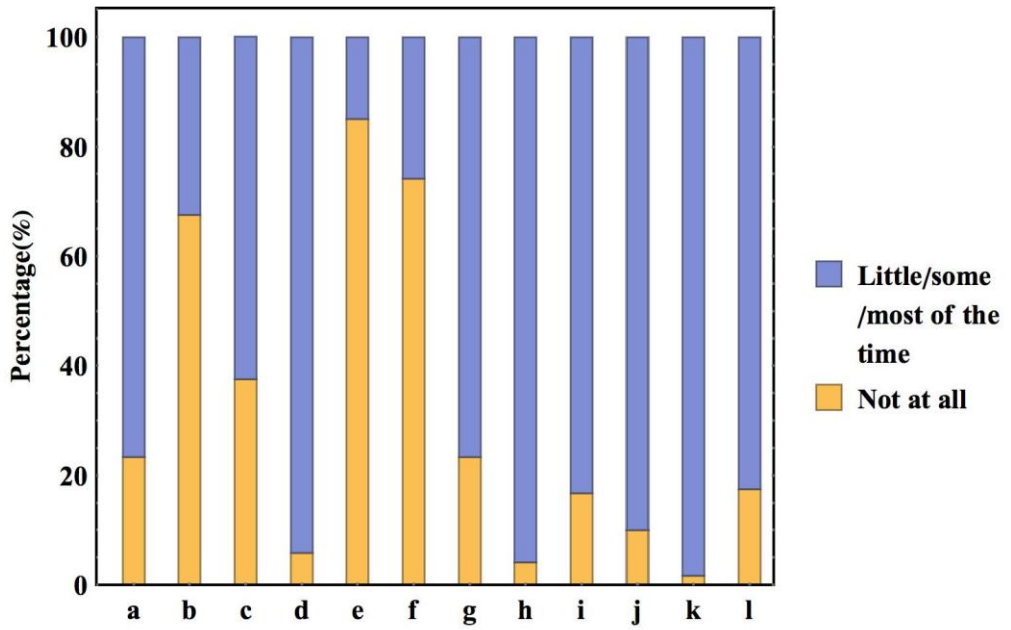

Figure 2. Multitasking while web-surfing. The letters in the x-axis denote the media. a: print, b: TV, c: computer based video, d: music, e: non-music, f: games, g: phone, h: IM, i: SMS, j: e-mail, k: multiple web-surfing, l: other computer applications.

Figure 3 gives the multitasking tendency of the participants while being involved in other computer applications. It was observed that participants, while using other computer application multitask with IM (95.65% of the time) the most. They were also found to be indulged in music 93.04% of the time and in web surfing 92.17% of the time.

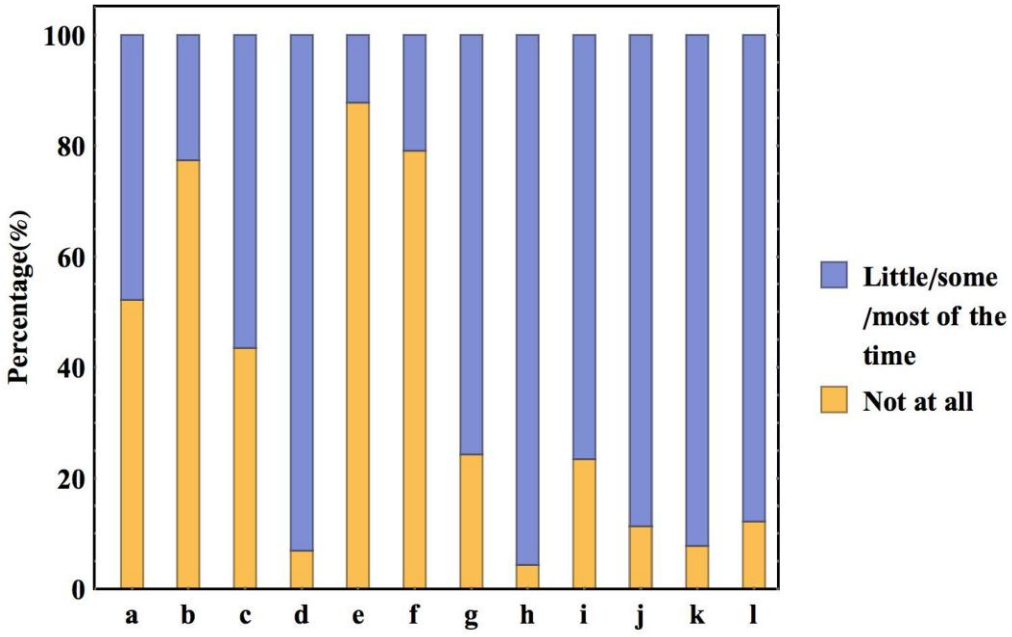

Figure 3. Multitasking while using other computer applications.The letters in the x-axis denote the media. a: print, b: TV, c: computer based video, d: music, e: non-music, f: games, g: phone, h: IM, i: SMS, j: e-mail, k: web-surfing, l: multiple other computer applications.

2.6.3 Media multitasking during face-to-face interaction

In research question 5, we aimed to examine the multitasking behavior of the participants during face-to-face interaction. With the help of the above-mentioned formula and following a similar procedure, we calculated how much time each participant spends in doing face-to-face interaction on an average day, and while doing interaction, to what extent they engage in other media activities. Results suggested that on average participants spend 1.54 hours in face-to-face interaction on a typical day, and also indulge in 1 to 2 media while doing face-to-face interaction. But we have to keep an account that this interaction time differs among different media multitasking groups (LMM, MMM, and HMM).

Table 6

Multitasking index and average time spent during face-to-face interaction

Media	N	M (Media use hours)	SD	Max value	Multitasking index
Face-to-face interaction	120	1.54	0.77	4	1.66

Note. N = number of participants, M= Mean, SD = Standard Deviation, Max value = Maximum value

Figure 4 gives the multitasking tendency of the participants, while being involved in face-to-face interaction. It was observed that participants while doing face-to-face interaction multitask with SMS (84.16% of the time) the most. They were also found to be indulged in IM 73.33% of the time and in TV 63.33% time.

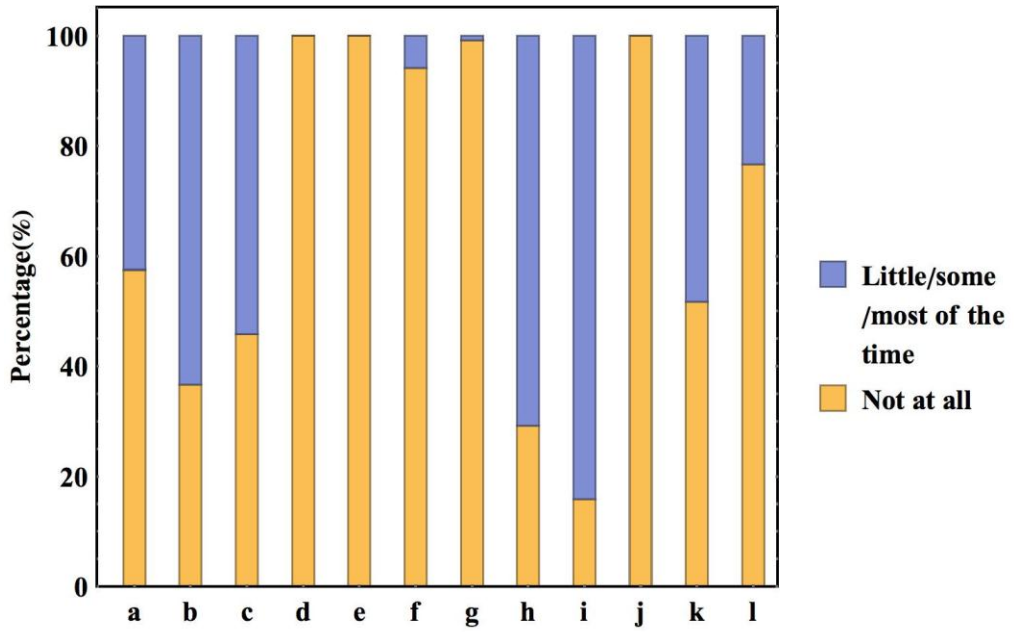

Figure 4. Media multitasking while doing face-to-face interaction. The letters in the x-axis denote the media. a: print, b: TV, c: computer based video, d: music, e: non-music, f: games, g: phone, h: IM, i: SMS, j: e-mail, k: web-surfing, l: other computer applications.

2.6.4 Predictors of media multitasking behavior

2.6.4.1 Media ownership and socio-demographic predictors

In the next research questions, we aimed at identifying the predictors that give rise to media multitasking behavior. We first hypothesized that the duration of owning and possessing smartphones or computer or both would be the significant predictors of media multitasking behavior such that the longer duration would lead to higher media multitasking behavior. An independent sample t-test was utilized to test the hypothesis. The duration of owning and possessing smartphones or computer or both was a categorical variable such that '1' represented the duration of less than six months, '2' denoted that between six months to one year, and '3' represented durations of more than a year. On descriptive analysis, it was found that all the 120 participants fall in the category of either 2 or 3. So the t-test[15] was conducted on categories 2 and 3 with MMI as the dependent variable. Results suggested that there was a significant difference between the Media Multitasking Indices of two categories [16]$t(118) = -8.59$, $p < 0.01$, such that the participants owning smartphones and/or computers for more than a year (category 3) multitask with media ($M = 4.89$, $SD = 1.03$) more than those who owned smartphones and/or computer for six months to one year (category 2) ($M = 3.30$, $SD = 0.96$). Hence, hypothesis H2.1, which says that the duration of ownership of media is positively related to media multitasking, was supported.

Our second hypothesis stated that age is a significant predictor of media multitasking behavior, and the younger participants media multitask more. Taking age as the continuous variable (age is measured in days) we applied a simple

[15] Assumption of t-test was met such that there were no significant outliers and MMI scores of categories 2 and 3 were normally distributed as assessed by Shapiro-Wilk's test ($p = 0.08$, $p = 0.21$; $p > 0.05$)

[16]Assumption of homogeneity of variance was met, as assessed by Leven's test, $p = 0.72$.

linear regression[17] analysis to examine the relationship between age and media multitasking behavior. Results suggested that age statistically significantly predicted media multitasking behavior, $F(1, 118) = 29.55$, $p < 0.0005$, accounting for 20% variation in MMI with adjusted $R^2 = 19.4\%$ (a medium size effect according to Cohen, 1988). However, age was seen to be positively related with media multitasking behavior, and hence older participants showed more media multitasking tendency than the younger ones. Consequently, hypothesis H2.2 which suggested that younger participants will media multitask more was not supported.

Hypothesis H2.3 stated that gender is another significant predictor of media multitasking behavior such that males display more tendency to media multitasking than females. An independent sample t-test[18] was conducted on two gender groups (male and female) for media multitasking index t[19](95.70) = -1.24, $p = 0.22$. Results found that the media multitasking behaviors of males ($M = 4.16$; $SD = 1.39$) and females ($M = 4.43$; $SD = 0.94$) are not significantly different. Hence hypothesis H2.3 was not supported.

[17]To assess linearity, a scatter plot of MMI against age was generated. A visual inspection of this plot indicated a linear relationship between the variables. There was homoscedasticity and normality of the residuals.

[18]Assumption of t-test was met such that there were no significant outliers and MMI score on male and female group was normally distributed as assessed by Shapiro-Wilk's test ($p = 0.74$, $p = 0.72$; $p > 0.05$).

[19]The assumption of the homogeneity of variance was not satisfied, as assessed by Levene's test for equality of variances ($p = 0.10$), so we interpret result using the equal variance not assumed values.

2.6.4.2 Personality traits as predictors

To examine the relationship between Big Five factors of personality and media multitasking behavior controlling the other variables like age, gender, and duration of ownership of media, we conducted hierarchical multiple regression analysis. Hypothesis H2.4, which stated that an individual higher in openness to experience will show higher media multitasking behavior, was supported. As Table 7 displays, openness to experience remains significant after controlling participants' socio-demographic variables, $\beta = 0.28$, $p < 0.0005$. Thus, participants with higher openness to experience tend to be higher media multitaskers.

Hypothesis H2.5, which suggested that conscientiousness was negatively related to media multitasking behavior, was not supported, $\beta = -0.08$, $p = 0.17$. Hypothesis H2.6, which stated that extraversion is not related with media multitasking behavior, was not supported. As observed in Table 7, it can be seen that $\beta = 0.14$, $p < 0.05$ for this factor. Hence, people with higher level of extraversion tend to be higher media multitaskers.

Next, in hypothesis H2.7 we predicted no relationship between agreeableness and media multitasking behavior. This was also supported as can be seen from the Table 7, $\beta = -0.01$, $p = 0.90$.

Finally, we hypothesized that individuals with higher level of neuroticism would indulge in higher media multitasking behavior. The hypothesis H2.8 was supported, $\beta = 0.33$, $p < 0.0005$.

In sum, the block of the control variables of the model explained 39.8% (adjusted R^2 was 0.38) of the variance of media multitasking index, $F(3, 116) = 25.57$, $p < 0.0005$. In the second block, when the five big factors of personality were included, R^2 increased by 68.1% (i.e. the variance explained increased by 28.3%) and this increase was statistically significant, $F(8,111) = 29.596$, $p < 0.0005$.

Table 7

Hierarchical multiple regression analysis

Variable	Model 1			Model 2		
	B	**β**	**P value**	**B**	**B**	**p value**
Constant	-2.132		0.178	-6.044		0.001
Gender	0.134	0.049	0.505	0.357	0.129	0.022
Age	0.000	0.123	0.169	0.000	0.125	0.063
Duration of ownership of Media	1.404	0.545	0.000	0.630	0.245	0.001
Openness to Experience				0.920	0.280	0.000**
Conscientiousness				-0.276	-0.076	0.171
Extraversion				0.357	0.137	0.045*
Agreeableness				-0.025	-0.007	0.896
Neuroticism				0.788	0.328	0.000**
R^2	0.398			0.681		
Adjusted R^2	0.383			0.658		

Note. N = 120, B = Unstandardized regression coefficient; β = Standardized coefficient

* $p < 0.05$,

**$p < 0.0005$

2.7 Discussions

Here we summarize our results. It has been observed that media multitasking is a very popular global tendency specifically among the youngsters, and the Indian youth is not an exception. With a view to examine the media multitasking behavior of the Indian college goers, and also to identify their favourite media during multitasking, we calculated the MMI which is found to be 4.24 for the chosen sample. This implies that the participants (on the average) used approximately 4 media simultaneously in a typical media consumption hour. This value can be compared with the ones obtained for other nationalities and this seems to be quite at par with the global trend of media multitasking (Kononova & Alhabash, 2012; Voorveld, Seijn, Ketelaar, & Smit, 2014) see Table 1. This high

media multitasking behavior shown by the Indian college students does not come as a surprise if we keep in mind the very frequent use of internet and other media devices by the Indian youth. As already discussed, this tendency can be a result of the urge to be connected with others or of the fear of missing out any information/update. However, the systematic analysis of the needs of the Indian youth that results in media multitasking behavior may be an interesting future research topic.

Coming back to the frequency of media multitasking, there may be three kinds of people:

a) One who succumbs to media multitasking very easily

b) One who strives hard to keep away from it and

c) One who is not inclined to be involved in it

Naturally, their MMIs of these three groups of people differ, and based on the respective values we compartmentalized the participants into High, Moderate and Low Media Multitaskers (abbreviated as HMM, MMM, and LMM). We observed that media multitasking with varied intensity is very common among the Indian college students. After examining the descriptive statistics for each media use variable, we found that students devoted most of the time to surfing websites, followed by engaging in Instant Messaging or social media use and watching videos on computer. In order to understand the most common multitasking combination among college students, MMI of each medium as primary medium was calculated separately and then their frequency tables were examined. On analysis, IM, web surfing, other computer applications, and sending SMS were observed to be the most favorite primary media for multitasking, whereas playing games (video/computer/smartphone), listening to non-music audios and phone/voice calls were the least chosen ones. These preferences reflect nearly similar media multitasking preferences among other countries (Carrier, Cheever, Rosena, Beniteza, & Changa, 2009; Kononova & Alhabash, 2012; Kononova, 2013). This may be due to the fact that certain media are more suitable for

facilitating concurrent media activities for instance multiple web surfing (Voorveld, Seijn, Ketelaar, & Smit, 2014) It was also observed that the participants who possessed smartphones/computers for more than a year yielded more to the habit of media multitasking than those whose duration of media ownerships were less. This observation suggested that an increase in the exposure of media may drive people towards media multitasking and this behavior is observed in other countries as well (Cotten, Shank, & Anderson, 2014; Jeong & Fishbein, 2007).

Media multitasking behavior of the participants while combining face-to-face interaction with media use suggested that on the average participants spent 1.54 hours mostly on a typical day in coinciding face-to-face interaction with using one to two media, but this interaction frequency differs among media multitasking groups (LMM, MMM, and HMM). Since the sample was that of hostel residents, there might not be any known risk (e.g., intervention from parents for not paying attention to the conversation) for them to indulge in multitasking during face-to-face interaction. However, this scenario might differ in other situations, e.g., when students reside at home. The difference in media multitasking behavior in different accommodation settings can be another interesting research topic which may be pursued in future.

With reference to the demographic variables like gender and age as predictors, our sample does not support the hypotheses. While considering gender, we noticed that the male population in the national sample had more access to media facilities, and so we expected that they would display more media multitasking behavior in comparison to females as it was seen in some of the studies (for example, see Cotten, Shank, & Anderson, 2014). However, our sample comprised of hostellers and engineering students from the same institute and, all the students, male or female, got uniform exposure, and hence no significant difference in multitasking behavior was observed. Though in our case, there was unequal male and female sample size, yet, the important message which

could be extracted from our result is that there is not much digital divide among the genders had they all got uniform exposure.

On the other hand, it was found that age is positively related with media multitasking behavior such that multitasking behavior is more common in older students as compared to the younger ones. This result is in sharp contrast with many other researches who suggested otherwise. However, we may argue that this difference may reflect the biggest cross-cultural difference in media use among the younger people. Since our sample was drawn from India which is a very diverse country in many aspects, there is a wide digital gap among the residents of metros, big cities, and of smaller cities. So, when the students converge to a nationalized university, they might start off with different media exposure which results in inhomogeneous media multitasking behavior. Students with very less media exposure may start off as Low Media Multitaskers, but after few years they might have good exposure of media environment and out of peer pressure, over dependence on media, and enjoyment etc. their multitasking frequency increases. However, it has to be mentioned that this study does not aim to generalize the data to the entire Indian population which is much more diverse, but comparing and contrasting the media multitasking habits on the basis of geographical diversity may be an interesting research topic to be pursued in the long run. In a nutshell, our study suggests that both age and gender act as predictors of media multitasking behavior, but the way they are connected differ with respect to the cultural backdrop of the sample.

In terms of the Big Five personality traits, our study suggested that extraversion, neuroticism and openness to experience are the predictors of media multitasking behavior. Out of these, neuroticism trait was consistently observed to be an important predictor of media multitasking behavior in all the prior studies (Johansson & Fyhri, 2017; Mark, Iqbal, Czerwinski, Jones, & Sano, 2016; Wang & Tchernev, 2012) reemphasizing the fact that emotional instability is an important antecedent of multitasking behavior. Besides, our study found that high extraversion trait is related with high media multitasking behavior. This may

appear to be not in keeping with the findings of Wang and Tchernev (2012) who found that extraversion is not related with multitasking with media. However, India is a collectivist country and people always want to connect and socialize with others. As a result, it may be suggested that they frequently check their social media profiles thereby showing excessive media multitasking behavior. This was also evident from the result that our sample media multitasked mostly with Instant Messaging followed by SMS use. This view is consistent with previous studies (Correa, Bachmann, Hinsley, & Zuniga, 2013; Zuniga, Diehl, Huber, & Liu, 2017) suggesting that the need for belonging and connecting with others are usually high among people having extraversion trait. Our results showed a positive relationship between openness to experience and media multitasking behavior and this finding supports the other studies (Hwang & Jeong, 2018). It is likely that in search of new things and excitement, college students with higher openness to experience indulge in media multitasking behavior. With reference to conscientiousness and media multitasking, our study did not find any evidence for the connection between the two, but it suggested an expected negative relationship, similar to the study of Cain, Leonard, Gabrieli, and Finn, (2016). It is possible that the factors like laziness, aimlessness or disorganized behavior may not be important for self-selected media multitasking behavior where individuals deliberately choose media to meet his/her needs. Lastly, consistent with the previous findings, agreeableness was not seen to have any relationship with media multitasking behavior.

Chapter 3

The Emotional Profile of Different Groups of Media multitaskers

3.1 Introduction

Studies of the epidemiological (Gormana & Green, 2016), cognitive and behavioral implications (Baumgartner, Schuur, Lemmens, & Poel, 2018; Becker, Alzahabi, & Hopwood, 2013; Cain & Mitroff, 2011; Lui & Wong, 2012; Ophir, Nass, & Wagner, 2009; Schuur, Baumgartner, Sumte, & Valkenburg, 2015; Uncapher, Thieu, & Wagner, 2016) of media multitasking is a popular field of research nowadays. The prime question of all these studies is whether media multitasking is the sine qua non of the modern society which somehow leads to benediction, or it is an evil. The emerging scientific belief is that the concurrent media use behavior affects users' bodily health, emotional regulation and basic aspects of attention and cognition (see for example, Cardoso-Leite, Green, & Bavelier, 2015; Magen, 2017). Some of the impacts positively affect the human beings (Lui & Wong, 2012; Kapadia, 2017) and some completely otherwise (Becker, Alzahabi, & Hopwood, 2013; Ophir, Nass, & Wagner, 2009). In spite of several claims of cognitive and psychological deficits (Baumgartner, Schuur, Lemmens, & Poel, 2018; Becker, Alzahabi, & Hopwood, 2013; Minear, Brasher, McCurdy, Lewis, & Younggren, 2013; Ophir, Nass, & Wagner, 2009; Sanbonmatsu, Strayer, Mederois-Ward, & Watson, 2013) associated with media multitasking, several researchers suggested that this behavior helps to achieve emotional gratification to some extent (Kononova & Chiang, 2015; Wang & Tchernev, 2012; Zhang & Zhang, 2012). Other works also hinted that there exists a strong affinity between emotions and media multitasking (Chinchanachokchai, Duff, & Sar, 2015; Hatchel, Negriff, & Subrahmanyam, 2018; Reinecke, et al., 2017). These observations have compelled the researchers to investigate the short

and the long-term effects of media multitasking on cognitive, emotional and social functioning.

There can be many reasons why an individual media multitask, but the coincident media use behavior has increased with the arrival of new media and digital devices (such as smartphone) and has been seen to be catalyzed by many internal/external parameters (like circumstances, and emotional states) which appear from inside/outside the devices (Oulasvirta, Rattenbury, Ma, & Raita, 2012). Calderwood, Ackerman, and Conklin (2014) hypothesized that pupils involved in homework assignments for a prolonged period of time may display media multitasking behavior. Their mood and motivation may be hampered due to long duration of the primary activity (doing assignments) thereby generating necessity for excitement which is otherwise absent from the primary task. This situation may lead to media multitasking in the form of listening to music and completing the assignment. According to Przybylski, Murayama, DeHaan, and Gladwell (2013) 'fear of missing out' may be another factor that drive people toward media multitasking. In another study, Verduyn, et al., (2015) conducted an experimental as well as a field study to find that using social media (such as Facebook) excessively and passively (i.e. consuming just the content) led to decline in affective well-being. Apart from these, there are many more studies which investigated the root cause of this unique behavior of media multitasking and indicated that individuals with affective psychopathology display media multitasking behavior (Becker, Alzahabi, & Hopwood, 2013; Mark, Wang, & Niiya, 2014). Researchers have identified emotional needs as the important predictors of media multitasking behavior that make individuals to ignore the fallouts of media multitasking and encourage to engage themselves in the act (Wang & Tchernev, 2012; Zhang & Zhang, 2012). On the other hand, media multitasking is often accompanied by negative socio-emotional outcomes which include difficulty of feeling of normalcy and one's inability to develop intimate friendship (Pea, et al., 2012). In a nutshell, the existing studies indicate a strong affinity of emotions with media multitasking in a sense that emotions can both be

the reason and the result of concurrent media use. However, the existing studies fail to comprehend the actual role of emotions in media multitasking behavior and the conclusions are not all in keeping with each other. They, rather, revolve around identifying the association between cognitive variables like attention, memory and exploring the mental models of different groups of media multitaskers thereby contemplating more on whether or not media multitasking is associated with cognitive deficits. Apart from studying the cognitive profile, researchers started striving hard to understand the psychological and neural profiles too. They (Uncapher, et al., 2017), observed a growing divergence among the cognitive, psychological and neural profiles of different groups of media multitaskers performing single task. Since performance optimization is indispensable for scaling success, full understanding of the multi-dimensional profiles of different groups of media multitaskers is absolutely necessary. Neuroscientists found that High Media Multitaskers possess less grey volume in the anterior cingulate cortex, the region responsible for cognitive and/or social-emotional controls (Loh & Kanai, 2014). Impaired cognitive control and heightened emotional reactivity among media multitaskers may result in depression, anxiety and addiction among the media multitaskers. Hence, it is imperative that along with the cognitive, psychological and neural aspects we summate the emotional profile of different groups of media multitaskers. To address this, the present study aims to throw some light on the emotional profiles of different groups of media multitaskers who are categorized based on the Media Multitasking Index (MMI) into different groups (Low, Moderate and High).

The plan of the chapter is following: Section 2 includes a general discussion on emotional profiles, in sections 3 and 4 we discuss the methodology and the results. Sections 5 and 6 contain discussions about the findings, limitations of the study and the future direction.

3.2 Emotional profile

It was shown in some studies that everyday activities greatly influence our mood and emotional well-being. On the other hand, media activities are considered to be an important way to satisfy one's emotional needs. For example, mood management theory suggests that individuals choose media to improve one's current emotional state. Combining these two ideas we may say that if a person is continuously immersed in multiple media in a multitasking way, there is a growing possibility that one's control of emotions and experiencing them will be different from the person with a different media multitasking behavior.

Media multitasking studies found several emotional differences in different groups of media multitaskers which are related either with emotional pathology such as depression, and anxiety or with other discrete emotional variables such as enjoyment. But, very few of them studied the emotional differences among media multitaskers from the viewpoint of basic dimensions such as valence and arousal. According to Schimmack and Grob (2000), emotional experiences can be best understood from the three-dimensional model that contains "pleasure-displeasure", "awake-sleepiness" and "tension-tiredness".

Our study aims to examine whether different groups of media multitaskers differ in their emotional experience which is measured in terms of the following dimensions viz. positive emotions, negative emotions, tense arousal, and energetic arousal. Additionally, heavy media multitaskers were found to have difficulties in self-control and often yield to instant gratifications. This point out that multitaskers also differ in controlling their emotions.

The emotional profile of different groups of media multitaskers is described by the five dimensions mentioned above and its study will aid in identifying the emotional characteristics that predispose individuals towards excessive media multitasking activities.

The detailed discussion of each dimension is mentioned below.

3.2.1 Positive emotions

Media multitasking may be the harbinger of positivity in multitaskers' daily life. Laine-Hernandez, et al., (2013) asserted that people enjoy media multitasking because they experience positive emotions during this activity. Other researchers (Song, Nam, Lim, & Kim, 2013; Tokan, Mattila, & Sihvonen, 2012) drew the conclusion that the inclination of avoiding boredom and loneliness is the reason behind media multitasking behavior. This implies that High Media Multitaskers might experience high positive emotions in daily life and hence they continuously seek to attain positive emotions through multitasking behavior. Pleasure obtained by an individual due to the presence of a more positive source of emotion may compel the person to media multitask. Hence, media multitasking may be seen as a behavior which is manifested when the primary task lacks the desired amount of positive emotion. This is why people are often seen to combine the daily chores with some other activities which act as a source of positivity. No wonder that Jeong and Fishbein (2007) found that the commonest task combinations include audio and traveling, TV and eating as well as Internet and homework.

According to the hedonistic school of thought, the prime objective of the human life is to seek for pleasure and intrinsic happiness. A hedonist endeavors to maximize the net pleasure, defined as pleasure minus pain, in one's life (Moore, 2013). Also, in the Freudian Psychoanalysis, human beings instinctively seek for pleasure and means of avoidance of pain in order to satisfy the biological and psychological needs (Snyder & Lopez, 2007). If we combine these two approaches with the media psychology, we may argue that an individual chooses media entertainment owing to her instinctive hedonistic approach. For instance, scholars noticed that enjoyment is the most basic motivation behind media consumption because of this hedonistic approach to life (Griffin, Ledbetter, & Sparks, 2015). Indeed, pleasure is found to be a potent predictor of media use, including telephonic conversation (O'Keefe & Sulanowski, 1995), Instant Messaging (Lou, Chau, & Li, 2005), and Facebook activities (Quan-Haase &

Young, 2010). In addition, Zillmann (1988) found that users choose certain combinations of media to maintain a desired mood state. This concurrent use of media gives birth to emotional gratifications (Wang & Tchernev, 2012) and caters to the emotional needs which are related to strengthening aesthetic, pleasurable, and emotional experiences (Katz, Gurevitch, & Haas, 1973).

Media multitasking is responsible for the pinch of positivity in a monotonous life. In a general study on multitasking, Hatchel, Negriff, and Subrahmanyam (2018) observed higher positive affect reported by people with high social anxiety and high levels of multitasking than those with low social anxiety and high levels of multitasking. Likelihood of paying attention to the elapsed time may be less for the individuals involved in coinciding different tasks and this may result in the feeling that time passed quickly. Interactivity involved in multitasking could give birth to the illusion of time distortion and may result in task enjoyment and a positive subjective experience (Agarwal & Karahanna, 2000; Chinchanachokchai, Duff, & Sar, 2015; Hoffman & Novak, 2009; Yang, Xu, & Zhu, 2015). In the study by Sackett, Meyvis, Nelson, Converse, and Sackett (2010) the tasks which generated this feeling were rated as enjoyable by the participants and the same may be the case for the media multitaskers, too. Some of the task combinations are more preferred to others and this indicates that search for positivity is the prime goal of the multitaskers as well as of the media multitaskers. This assertion gets supported in another study in which the scholars found that the difficulty of a task combination may affect the multitasking behavior (Carrier, Cheever, Rosena, Beniteza, and Changa, 2009). This selection depends on the cognitive demand of the combinations used. For example, reading books and playing video-games will have more cognitive demand than eating and watching TV. The factor which plays an important part in continuation is prior satisfaction with an activity (Hsu, Yen, Chiu, & Chang, 2006). We may extend this to the realm of media multitasking by saying that the prior experiences should influence the willingness of an individual in doing certain activities. As the human beings are more inclined to remember positive emotions during certain

activities and tend to repeat them to regain the same positivity, it is reasonable to infer that media multitasking, repeated by the human beings day in and day out might be a source of positive emotions. Hence, based on all these arguments we hypothesize that:

H3.1: High Media Multitaskers will experience higher positive emotions in everyday lives in comparison to other groups.

3.2.2 Negative emotions

Though media multitasking has been seen as a source of positive emotions which is otherwise absent from the primary task, like any other habit the fallout of too much of this behavior can hardly be ruled out. For example, Wilme, Sherman, and Chein (2017) opined that excessive interaction with smartphone and other media devices may have a negative and long lasting impact on users' thinking capability, memory, attention and emotion. It was seen in the studies that uncontrolled media multitasking makes people depressed and anxious (Becker, Alzahabi, & Hopwood, 2013; Rosen, Whaling, Rab, Carrier, & Cheever, 2013). In a study on the German internet users aged between 14 years and 85 years, their media multitasking habit was seen to be a reason for distress and depression (Reinecke et al., 2017). Media multitasking is also associated with significant increase in perceived stress both at the workplace (Mark, Gudith, & Klocke, 2008) as well as in the private domain (Misra & Stokols, 2012). Reinecke, et al., (2017) observed that communication load due to private e-mails, social media messages as well as internet multitasking aggravates perceived stress and causes burnout, depression, and anxiety. There are several reasons for these negative emotional behaviors stemming out of media multitasking. According to Meyer (a renowned expert on multitasking), these behaviors are the results of multiple demands in brain produced by media multitasking which lead to the release of adrenaline as well as stress hormones, and negatively affects our health and causes body strain (as mentioned in the article by Woolston, 2018). Other researchers suggested that the inner urge to engage in media multitasking

frequently triggers some thought processes as the predictors of the malevolence caused by the behavior. So if one feels too much ‘dependence’ on a smartphone (particularly in its absence), the irritability of not having it at any moment may cause negative effects (Hatchel, Negriff, & Subrahmanyam, 2018). This tendency which is a result of not being able to check text messages, missed cell phone calls, unattended personal e-mail and social network message is prevalent mostly among the ‘I’ generation and the ‘net’ generation people (Rosen, Whaling, Rab, Carrier, & Cheever, 2013). This phenomenon, which is also known as ‘Fear of Missing Out’(FoMO) (Przybylski, Murayama, DeHaan, & Gladwell, 2013) is the root cause of communication load and internet multitasking and is linked with general unhappiness, and later, may be a source of negative mood and depression (Morford, 2010; Wortham, 2011). Experience sampling research observed that media use frequently obstructs other goals in one’s day-to-day life (Hofmann, Vohs, & Baumeister, 2012). Such goal conflicts and the negative self-conscious emotions triggered by self-control failure due to media use (Reinecke, Hartmann, & Eden, 2014) can be other mechanisms which establish a connection between internet multitasking and increased stress. From the ‘time displacement’ theory it can be suggested that an increasing number of active tasks in multi-window multitasking results in the feeling of time passing faster and task enjoyment. However, there is likely a threshold. Higher number of tasks may exceed one’s ability to handle the tasks and this may lower overall enjoyment (Chinchanachokchai, Duff, & Sar, 2015; Yang, Xu, & Zhu, 2015). Though research on internal motives for social media engagement showed that media multitasking tendency is triggered when one wants to avoid frustrations about the relationship (Ellison, Steinfield & Lampe, 2007), loneliness (Burke, Marlow & Lento, 2010), or boredom (Song, Nam & Kim, 2013; Hwang, Kim, & Jeong, 2014; Baumgartner & Sumter, 2017), yet Hatchel, Negriff, and Subrahmanyam, (2018) observed that media multitasking, in turn, may render them feel lonelier owing to the detachment from the outer world. Hence, we establish that the

negative emotions can both be a cause and effect of media multitasking, and we hypothesize the following:

H3.2: High Media Multitaskers will experience high negative emotions in everyday life in comparison to Low Media Multitaskers and Moderate Media Multitaskers.

3.2.3 Arousal: energetic versus tense

Media multitasking and arousal are closely related with each other. According to McCarthy (2013), multitasking is a mindset which is developed voluntarily by multitasking activity and is characterized by excessive mental arousal level and decreased cognitive resources. This was empirically shown in a study by Yevkelis, Cummings, and Reeves (2014) where researchers found that the arousal level (measured through skin conductance) of an individual increased 12 seconds before the computer task switching act. This increase in arousal, they suggested, may be explained through 'mood management theory' where individual selects media to improve their mood state and to maintain their optimal arousal level. Similarly, Brumby, Toit, Griffin, Jiménez, and Cox, (2014) found that the arousal level (based on skin conductance difference) of participants increased every time whenever they were performing sequential media multitasking. Additionally, Bandodkar and Singh, (2014) suggested that multitasking is equivalent to a complex situation. Excessive cues and limited time provided by the multitasking increases the attention of the user, and hence multitasking serves as a source of stimulation and interest which initiate both higher energy and arousal in the users. Mark (2015) suggested that, multitasking is a challenging situation which provides a state of activation and arousal. Other researchers suggested that media multitasking gives stimulation and increases arousal. Hence, individuals who are sensation seekers, hyperactive, extrovert and neurotic, and who face trauma, indulge in high media multitasking behavior (Chang, 2017; Duff, Yoon, Wang, & Anghelcev, 2014; Jeong & Fishbein, 2007; (Nooner & Schaefer, 2015; Sanbonmatsu, Strayer, Mederois-Ward, & Watson,

2013; Szameitat, Saylik, & Parton, 2016). Besides, there are the external factors such as the size of the screen, task content that aid in increasing the arousal of an individual (Brasel & Gips, 2011) such that doing multi-screening will elevate the level of arousal. Other media related theories like mood adjustment theory, self-regulation theory, limited capacity model of mediated message processing, activation model of information exposure (Donohew, Palmgreen, & Duncan, 1980; Knobloch, 2003; Lang, 2000) suggested that people always seek for optimal level of arousal and regulate this arousal through media content and task demands. Additionally, arousal theory (Chang, 2017) suggests that individuals tend to negate insufficient or excessive environmental stimulation. By dint of the dynamic processes like various behavioral activities, human mind approaches an optimal comfortable level of arousal which may vary from person to person (Reeve, 1997). Media use favors the tendency of an individual to scale the optimal level of arousal. For example, high sensation seekers possessing high optimal level of arousal are inclined to opt for more novel and varied media content than the low sensation seekers (Chang, 2017). Collectively these studies suggest that media multitasking behavior and arousal are positively related and that the different groups of media multitaskers will experience intensity of arousal differently.

But in all these studies the researchers did not account for the multi-dimensional nature of arousal and usually defined arousal as a one-dimensional entity. Arousal is, rather, a multi-faceted construct which may be of several types such as autonomic, cortical and behavioral (and so on and so forth), that affect behavior differently (Lacey, 1967; Thayer, 1989). The present thesis attempts to examine one specific type of arousal i.e. energetic and tense arousal (Thayer, 1989). Utilization of these two levels of arousal is important for two reasons. One, it does not involve the concept of general activation which has no markers in day-to-day language. Two, the assumption of pleasantness and unpleasantness is not applicable to tense and energetic arousal (Schimmack & Grob, 2000).

3.2.3.1 Energetic arousal

Energetic arousal ranges from energy, vigor to tiredness and sleep and is associated with gross motor activity. Energetic arousal is also considered to be positively related to the behavior approach system. Besides, uninterrupted thoughts about the benefit of rewards sustain the high level of energy in individuals over time. Further, petty activities of everyday lives like unanticipated compliment, an engaging conversation, or a pleasant picture can boost up one's energetic arousal (Thayer, 1989). It has been suggested that people media multitask to reap the benefits of enjoyment, social connection and to save time (Chinchanachokchai, Duff, & Sar, 2015; Kononova & Chiang, 2015; Ledbetter, Taylor, & Mazer, 2016). Thus, media multitasking activities may generate energetic arousal in everyday lives. Previous studies in energetic arousal suggested that there are certain other factors like sleep, diet or physical activity that may influence state of energy among the individual. For example, Hartmann, Baekeland, and Zwilling (1972) suggested that short-sleepers were more energetic than low-sleepers and Hicks and Pellegrini (1977) indicated that short-sleepers have higher anxiety levels than long-sleepers. In case of studies related to sleep and media multitasking, researchers suggested that those who ended their daily activities earlier and went to sleep earlier tended to multitask less the next day (Mark, Wang & Niiya, 2014). Similarly, other researchers (Mark, Wang, Niiya, Reich, 2016) suggested that lack of sleep could make people more prone to distraction and thus more likely to switch focus from their current task at hand. Hence lower sleep leads to more frequent media multitasking behavior. These multitasking studies point to the fact that high media multitasking behavior can lead to high anxiety and lower sleep and hence increases energetic arousal among High Media Multitaskers.

Another potential example that could relate the association of media multitasking behavior with energetic arousal comes from the nutrition studies. It was noticed that if media multitasking makes users feel good, then they adopt healthy food choices (Kononova, McAlister, & Oh, 2018). Usually eating healthy

food produces high energetic arousal. On the basis of the review it can be suggested that in the everyday life high media multitasking participants will have high energetic arousal.

3.2.3.2 Tense arousal

Tense arousal is associated with tension to tiredness, related with behavior inhibition system and is associated with high level of stress and the feeling of fearfulness, anxiety and tension. According to Thayer (1989), distracted attention may be associated with a person with tense arousal such that her attention fluctuates rapidly between thoughts. Studies related to media multitasking revealed that too much of media multitasking often makes people depressed and anxious (Becker, Alzahabi, & Hopwood, 2013; Rosen, Whaling, Rab, Carrier, & Cheever, 2013). The increase in mental stress was also seen to be another fallout of heavy media multitasking (Mark, Wang, & Niiya, 2014). It was also suggested that when low resources do not match with the requirements of the ongoing activities, it generates negative arousal among individuals (Thayer, 1989). Hence, it can be predicted that the High Media Multitaskers will experience high tense arousal due to distracted attention and over-exhaustion. So, based on the literature study, the following hypothesis is proposed:

H3.3: Both energetic and tense arousal will increase as media multitasking activity increases. Therefore, High Media Multitaskers will have higher energetic and tense arousal as compared to Low and Moderate Media Multitaskers.

3.2.4 Emotional control

The presence of media often acts as a temptation in a working environment and creates distraction for an individual (Baumgartner & Sumter, 2017; Ward, Duke, Gneezy, & Bos, 2017). The distracted individual may often be seen to be engaged in media multitasking (Foehr, 2006). The individual difference among users in terms of ability to regulate one's behavior and emotion, attention

pattern, and thought processes in the environment replete with distractions can be attributed to the difference in 'self-control' (DeLisi, 2014). Individuals possessing high 'self-control' display the capacity to postpone gratifications and override automatic or habitual response tendencies. On the other hand, in several media related studies, poor self-control was observed to be associated with excessive media use. For example, it was demonstrated that the amount of time adults spend on television viewing is negatively associated with self-control (Kubey & Csikszentmihalyi, 1990). Similarly, in case of the internet users, the extent of the use of the Internet was seen to have a positive correlation with the deficiencies in self-regulation (LaRose, Lin, & Eastin, 2003). In case of media multitasking behavior, researchers suggested that High Media Multitaskers are more easily distracted and cannot sustain their attention thereby exhibiting poor self-control and increased media multitasking behavior (Minear, Brasher, McCurdy, Lewis, & Younggren, 2013). Panek (2014) claims that students who are low in self-control spend more time using "leisure media". Similarly, Szumowska, Popławska-Boruc, Kus, Osowiecka, and Kramarczyk, (2018) suggested that high levels of media multitasking frequency were related to more switches between tasks, but only for the participants low in self-regulation ability. Participants high in self-regulation were able to refrain from this task-switching tendency. However, according to Xu, Wang, and David (2016), that deficiency of self-control is related to media multitasking, is true only in certain situations, but not all the time (for example synchronous versus asynchronous communication). In another study, Deursen, Bolle, Hegner, and Kommers (2015) also failed to find any relationship between self-regulation and smart phone use. This disparity, we assume, might have originated due to the over-emphasis on identifying the differences in the behavior control, such as the ability to inhibit inappropriate behavior and delay gratification, rather than on the emotional control or emotion regulation ability of the user. Generally, people endeavor to influence the reception, perception and expression of their emotions instead of acting as passive viewers of the flow of emotions (Gross & Levenson, 1997). Emotional control or

emotional regulation is one of the facets of self-control and it is defined as an individual's ability to control (experience and expressed) emotions (both positive and negative). In one recent study (Magen, 2017) it has been demonstrated that frequent media multitasking behavior is related to lower emotional control. It means that High Media Multitaskers usually experience inappropriate or disproportionate emotional responses. This is also evident from the observation that people media multitask to attain emotional gratifications (Wang & Tchernev, 2012; Zhang & Zhang, 2012) or they choose to multitask whenever they feel bored or lonely (Tokan, Mattila, & Sihvonen, 2012). Thus, multitasking with media is a way to vent out excessive emotional experiences. Besides, High Media Multitaskers are also vulnerable to mood disorders such as anxiety, depression, stress etc., (Becker, Alzahabi, & Hopwood, 2013; Mark, Wang, & Niiya, 2014) which, to some extent, is related to their poor emotional coping ability. In short, High Media Multitaskers will have high positive and high negative emotions due to poor emotional control that High Media Multitaskers must be possessing and hence, this course of thought forms our hypothesis:

H3.4: High Media Multitaskers will have lower emotional control than the Low Media Multitaskers.

3.3 Methodology

3.3.1 Participants

A same sample group of 120 undergraduate students (as mentioned in the chapter 2) from a reputed institute of technology in India participated in the study[20] voluntarily. The mean age of participants was 20.9 years (Standard Deviation (SD) = 1.29, within the age range 18-24 years) and 70% of the participants were males.

[20]The same pool of participants participated in all the questionnaire and experiment based study throughout the thesis work.

3.3.2 Measures

The questionnaire for the present study was taken from the previous studies and was validated with a pilot study. In the pilot study 5 students were randomly selected from the same institute and were tested with all the questionnaires that were used in the present study. In the beginning of the study, media multitasking phenomena and all the other emotional variables were explained to the students. Afterwards, they completed the questionnaires in a single sitting individually in the laboratory. They were closely inspected if they faced any issue with the language of the questionnaires or in comprehending it. Same students were re-tested again after 10 days with the same set of instruments to assess the test-retest reliability of the questionnaires. The test-retest reliability of all the scales in the pilot study was satisfactory and are mentioned separately during description of each scale. Also no student reported any issue with the language of the questionnaires. Thus, on the basis of the pilot study, the following scales were administered in the main study.

3.3.2.1 Media multitasking behavior

This construct was measured by the Media Use Questionnaire (MUQ) developed by Ophir, Nass, and Wagner (2009). The detailed description of the questionnaire is mentioned in Chapter 2.

3.3.2.2 Positive and negative emotions

Positive and Negative emotions in the study were measured through Positive and Negative Affect Scale (PANAS) (Watson, Clark, & Tellegen, 1988). It comprises two scales, one measuring positive affect, and the other measuring negative affect. Participants were required to respond to a 20-item questionnaire (10 items assessing positive affect and 10 items assessing negative affect) using a five-point scale that ranges from 1 (very slightly or not at all) to 5 (extremely). The reliability and validity of the PANAS were found to be adequate in both non-clinical and clinical samples (Crawford & Henry, 2004; Ostir, Smith, Smith, &

Ottenbacher, 2005). In the pilot study the test-retest reliability for positive affect was 0.90 ($p < 0.05$) and that for negative affect was 0.94 ($p < 0.05$). Cronbach alpha values for positive and negative affect were 0.76, and 0.72 respectively.

3.3.2.3 Energetic and tense arousal

Energetic and tense arousal was measured through the short form of Activation–Deactivation Adjective CheckList (AD-ACL) (Thayers, 1989). This checklist included 20 activation descriptive adjectives and were rated on a four-point scale ('definitely feel', 'feel slightly', 'cannot decide', and 'definitely do not feel'). The test-retest reliability of the scale in the pilot study for energetic arousal was 0.97 ($p < 0.01$), for tense arousal it was 0.88 ($p < 0.05$). Cronbach alpha for energetic arousal was 0.73 and that for tense arousal was 0.70.

3.3.2.4 Emotional control

Emotional control was measured through Affective Control Scale (Williams K. , 1992; Williams, Chambless, & Ahrens, 1997) which consists of 42 items. These items measured individuals control of emotions in four categories: Anxiety (e.g. "once I get nervous, I think that my anxiety get out of my hand"), depressed mood (e.g., "I am afraid that I might try to hurt myself if I get too depressed"), strong positive emotion (e.g. "I am afraid that I'll do something dumb if I get carried away with happiness"), and anger (e.g. "I am afraid that letting myself feel really angry about something could lead me into an unending rage"). These items were rated on a seven-point rating scale in which '1' is "very strongly disagree" and '7' is "very strongly agree" (coding was reversed for certain items). The high score in the scale indicates poor emotional control. The test-retest reliability of the scale in the pilot study was 0.95 ($p < 0.05$) and the Cronbach alpha was 0.71.

3.3.3 Procedures

The participants were first provided with the brief of the study and were made familiarized with the phenomenon of media multitasking. Once they understood and agreed to participate, a written consent from every participant along with the details like age, gender, level of education, duration for which they had been personally possessing and using smart phone or computer (desktop/laptop) or both[21] were obtained. Afterwards, printed instructions for filling up the self-reported questionnaires were handed over to the participants. Once the participants read and understood the instructions, they filled up the pen-and- paper based questionnaires in the single sitting in the laboratory. In all the scales participants were instructed to report their behavior and feelings considering the time duration of past one month (beginning on the day of the test). This was done to minimize any recall-based errors that might originate from different time period. The questionnaires were presented in the following order MUQ, PANAS, ACS and AD-ACL. The order of the questionnaires was same for every participant.

3.4 Results

3.4.1 Media Multitasking Index (MMI)

The detailed description of the calculation of media use hours and MMI of 120 participants are mentioned in Chapter 2. But, to reiterate, the average MMI for 120 participants was 4.24, and the participants were categorized into 3 groups viz., Low Media Multitaskers (LMM), Moderate Media Multitaskers (MMM), and High Media Multitaskers (HMM). The number of participants in each groups were 33, 54 and 33 respectively (for detailed description, refer Table 4).

[21]This was a closed end question and consists of 3 options, 1) less than six months, 2) six months to one year, 3) more than a year.

3.4.2 The emotional profile of Low, Moderate, and High Media Multitaskers (LMM, MMM, and HMM)

To create the emotional profiles of low, moderate and high media multitaskers, a one-way Analysis of Variance (ANOVA) was conducted separately on all the five variables, positive emotions, negative emotions, energetic arousal, tense arousal, and emotional control with Low, Moderate, and High media multitaskers as three levels of independent variables.

3.4.2.1 Positive emotions

A one-way ANOVA was carried out to determine if the positive emotions was different for different media multitaskers group. Results suggested that there was no outlier, but the homogeneity of variances was violated, as assessed by 'Levene's test of homogeneity of variance' ($p = 0.03$). Positive emotions were statistically significantly different among Low, Moderate and High media multitaskers, Welch's $F(2, 68.13) = 10.48$, $p < 0.01$. Positive emotions increased from the LMM (3.49 ± 0.47), to the MMM (3.84 ± 0.37) and finally to the HMM (3.94 ± 0.32) group in that order. Games-Howell post-hoc analysis revealed that the increase of positive emotion from LMM to MMM and LMM to HMM was statistically significant ($p < 0.01$). However, the results indicated no significant difference ($p = 0.42$) between MMM and HMM group ($p < 0.05$). Thus, hypothesis H3.1 which states that HMM will experience higher positive emotions in everyday lives in comparison to LMM was supported (refer Figure 5).

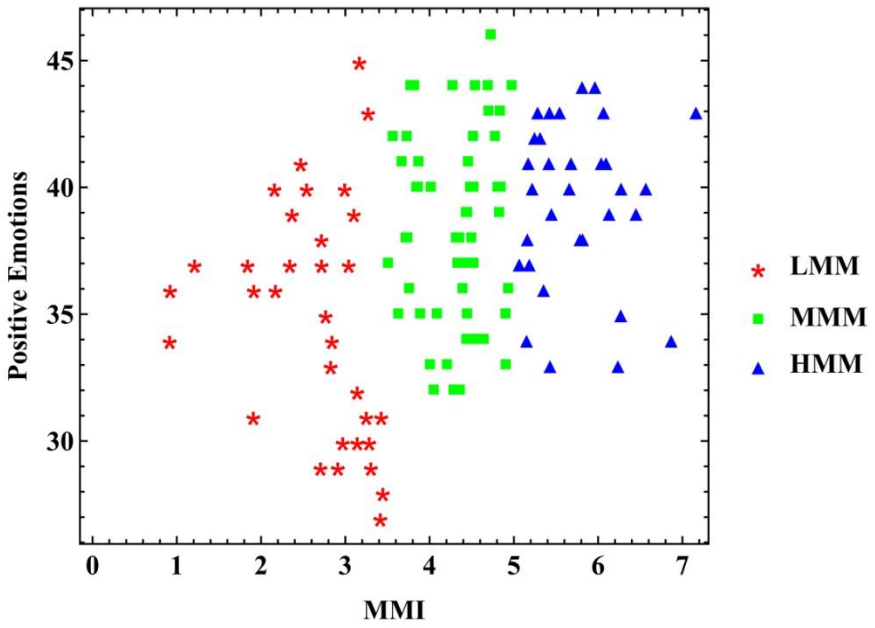

Figure 5. Positive emotions experienced by LMM, MMM, and HMM groups. LMM = Low Media Multitaskers, MMM = Moderate Media Multitaskers, HMM = High Media Multitaskers, MMI = Media Multitasking Index.

3.4.2.2 Negative emotions

A one-way ANOVA was conducted to determine whether negative emotions was different for different media multitasking groups (LMM, MMM, and HMM). There was no outlier in the data, but the homogeneity of variances was violated, as assessed by 'Levene's test of homogeneity of variance' ($p = 0.004$). So, we checked Welch's result and found that negative emotions were statistically significantly different among Low, Moderate, and High Media Multitaskers, Welch's $F(2,63.00) = 12.39$, $p < 0.01$. It suggested that negative emotions increased from the LMM (1.63 ± 0.30) to the MMM (1.67 ± 0.29) to the HMM (2.1 ± 0.48) group in that order. Games-Howell post-hoc analysis revealed that the increase of negative emotion from LMM to HMM and MMM to HMM was statistically significant ($p < 0.01$) but there was no significant difference ($p < 0.78$) in the negative emotions between LMM and MMM group. Thus, the hypothesis H3.2 which hypothesized that HMM would have high negative emotions in comparison to both LMM and MMM was supported (Figure 6).

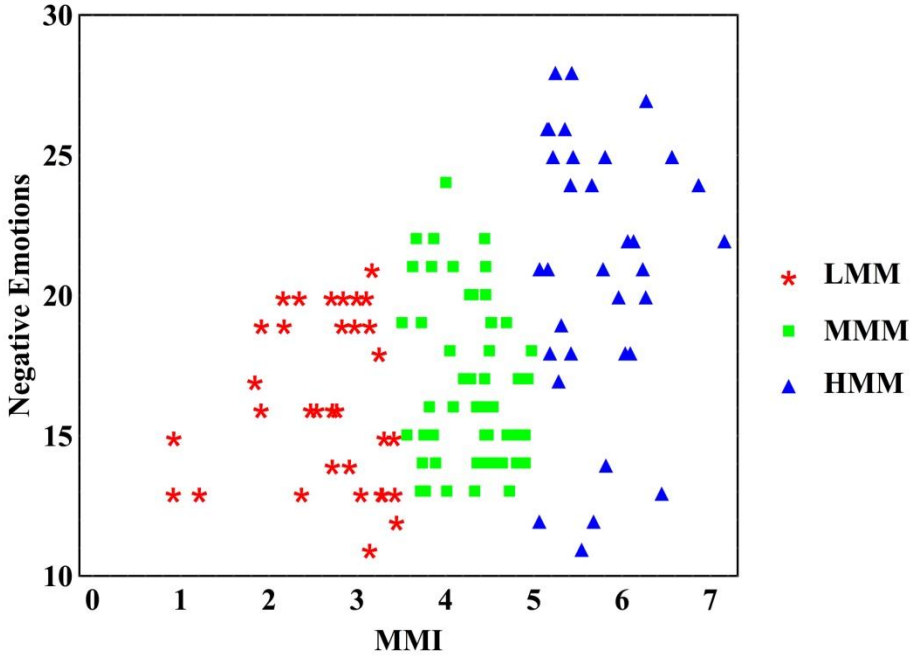

Figure 6. Negative emotions experienced by LMM, MMM and HMM groups. LMM = Low Media Multitaskers, MMM = Moderate Media Multitaskers, HMM = High Media Multitaskers, MMI = Media Multitasking Index.

3.4.2.3 Energetic arousal

A one-way ANOVA was conducted to determine if the energetic arousal was different for different media multitasking group (LMM, MMM, and HMM). There was no outlier in the data as assessed by boxplot and there was homogeneity of variance, as assessed by 'Levene's test of homogeneity of variance' ($p = 0.59$). Energetic arousal was statistically significantly different among different media multitasker groups, $F(2, 117) = 7.96$, $p < 0.01$. It suggested that negative emotions increased from the MMM (2.93 ± 0.39) to the LMM (3.00 ± 0.42) to the HMM (3.30 ± 0.46) group in that order. Tukey post-hoc analysis revealed that the increase of energetic arousal from LMM to HMM and MMM to HMM was statistically significant ($p < 0.05$), but there was no significant difference ($p = 0.73$) in the energetic arousal between LMM and MMM group (Figure 7).

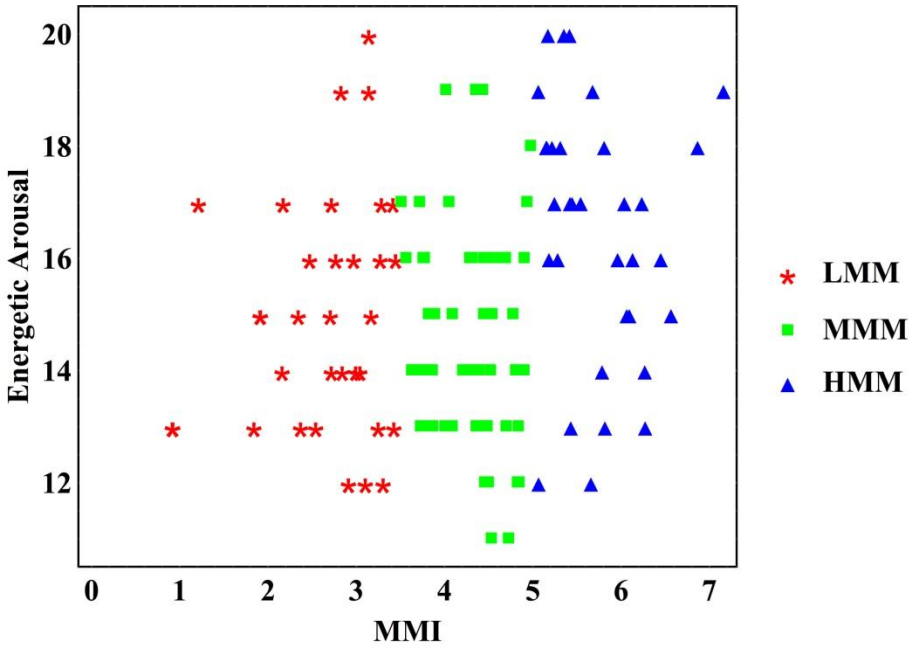

Figure 7. Energetic arousal experienced by LMM, MMM, and HMM groups. LMM = Low Media Multitaskers, MMM = Moderate Media Multitaskers, HMM = High Media Multitaskers, MMI = Media Multitasking Index.

3.4.2.4 Tense arousal

A one-way ANOVA was conducted to determine if the energetic arousal was different for different media multitasking groups (LMM, MMM, and HMM). There was no outlier in the data as assessed by boxplot, and there was homogeneity of variance, as assessed by Levene's test of homogeneity of variance ($p = 0.50$). Tense arousal was statistically significantly different among different media multitasker groups, $F(2, 117) = 18.62$, $p < 0.01$. It suggested that tense arousal increased from the LMM (2.17 ± 0.36) to the MMM (2.42 ± 0.36) to the HMM (2.71 ± 0.41) group in that order. Tukey post hoc analysis revealed that the increase of energetic arousal from LMM to HMM, LMM to MMM and MMM to HMM was statistically significant ($p < 0.01$). Thus, hypothesis H3.3 which hypothesized that HMM would be higher in both energetic and tense arousal was supported (Figure 8).

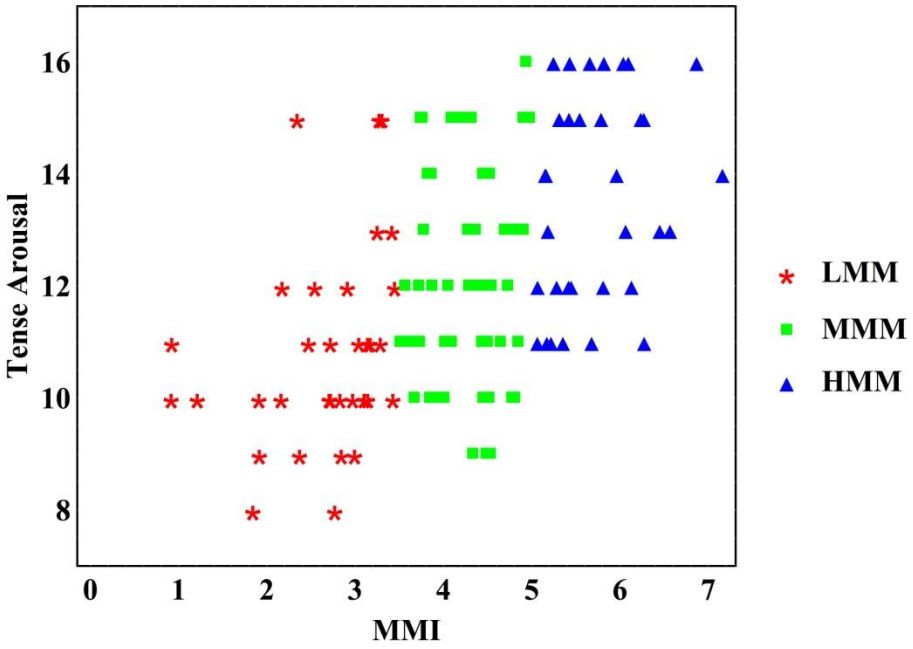

Figure 8. Tense arousal experienced by LMM, MMM, and HMM groups. LMM = Low Media Multitaskers, MMM = Moderate Media Multitaskers, HMM = High Media Multitaskers, MMI = Media Multitasking Index.

3.4.2.5 Emotional control

A one-way ANOVA was conducted to determine if emotional control was different for different media multitasking groups (LMM, MMM, and HMM). There was no outlier in the data as assessed by boxplot and there was homogeneity of variance, as assessed by Levene's test of homogeneity of variance ($p = 0.61$). Emotional control was statistically significantly different among different groups of media multitaskers, $F(2, 117) = 29.44$, $p < 0.01$. It suggested that the value increased from the LMM (4.12 ± 0.18) to the MMM (4.39 ± 0.22) to the HMM (4.48 ± 0.18) group in that order. Tukey post hoc analysis revealed that the increase of value from LMM to HMM and LMM to MMM was statistically significant ($p < 0.05$) but there was no significant difference ($p = 0.73$) in the value between MMM and HMM group. Thus, hypothesis H3.4 which states that HMM will have lower emotional control than LMM was supported (Figure 9).

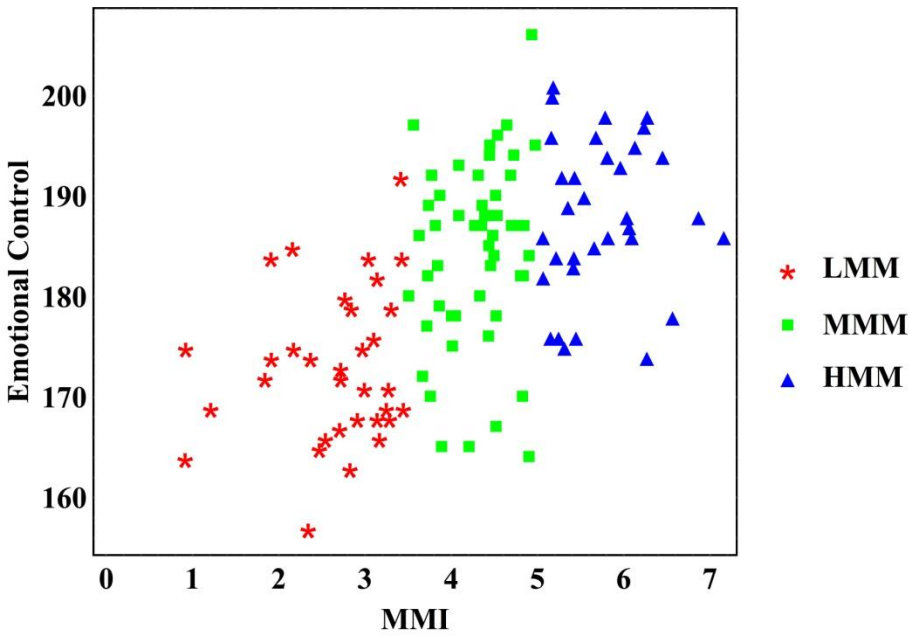

Figure 9. Emotional control experienced by LMM, MMM, and HMM groups. LMM = Low Media Multitaskers, MMM = Moderate Media Multitaskers, HMM = High Media Multitaskers, MMI = Media Multitasking Index.

3.5 Discussions

The present thesis examined whether different media multitasking habits among college students reflect differences in their emotional experiences in everyday lives. Five basic experiences (positive emotions, negative emotions, energetic arousal, tense arousal and emotional control) of three groups of media multitaskers Low, Moderate, and High (LMM, MMM, and HMM) were studied. As hypothesized, HMM group experienced higher positive and higher negative emotions in comparison to LMM. It suggests that in everyday life, college students who media multitask excessively tend to experience high intensity of both positive and negative emotions. This result can be perceived to have a built-in contradiction as most of the times increase in positive emotions is signified as decrease in the negative emotional state. However, there can be two explanations of this mixed emotional feeling among HMM. First, this mixed emotional feeling may be the result of the time substitution from a more prioritized work to a less

prioritized (such as social media) one frequently in a day (in the absence of any vigilance from the parents, as the sample college students are the hostellers). For example, at the time of multitasking with media, a person must be feeling good but afterwards a person may feel bad about ignoring other parts of the work. Thus, the genesis of a situation called 'guilty pleasure' (Panek, 2014) takes place. Secondly, theories in addiction suggest that initial repetitive use of any substance may produce pleasurable feelings, but later an individual is motivated to use it primarily to remove negative affect associated with withdrawal. Similarly, it can be suggested that media multitasking behavior often results in emotional gratifications and initially it is primarily used to avoid loneliness, boredom etc. This repetitive behavior generates a cycle where individuals experience positive affect while doing it, but experience negative affect (for example anxiety generated) while not doing it. In one such study, Przybylski, Murayama, DeHaan, and Gladwell, (2013) noted the ambivalent feelings among individuals with high 'fear of missing out' during the Facebook use. Thus, in everyday lifestyle, HMM display both high positive and high negative emotions. This result may help in resolving the ambiguities in the existing studies where some researchers suggest that media multitasking results in emotional gratifications such as pleasurable feeling, and other suggest that it leads to emotional disorders such as stress, depression and anxiety.

In the case of tense and energetic arousal, as hypothesized, HMM display higher arousal in both the cases in comparison to LMM. This result is aligned with the case of single dimension of arousal where researchers suggest that the increased level of arousal motivates an individual toward media multitasking behavior. Now, some theories of emotions suggest that arousal is related with emotions, and so it can be suggested that there may be two pathways of emotional experience among HMM in everyday lives. One may be related to high tense arousal and high negative emotion and the other may be related to high energetic arousal and high positive emotions. These situations may be tested empirically in future. Since tense and energetic arousal is based on the bio-psychological model,

this will also help future researchers to understand the neurological pathway of arousal related to HMM.

HMM also displayed poor emotional control and reflected high fear of losing emotional control in comparison to LMM. Since college students in their free or non-restricted environment has easy access to different digital devices and also have flexibility in their work schedule, this ease of access to the media devices may lower their level of emotional control. Also, high fear of losing emotional control may develop poor emotional regulation strategies among the HMM and they may experience difficulty in controlling their emotions as a result self-interruption for multiple media will arise.

Thus, the emotional profile (refer Table 8 and Figure 10) of the HMM reflected higher valence (positive and negative) and arousal (energetic and tense) and poorer emotional control in comparison to LMM. However, MMM displayed a mixed emotional profile. For instance, LMM and MMM did not differ in negative emotions and energetic arousal albeit they are lower than those of HMM. MMM and HMM were not statistically different in positive emotions and emotional control. These observations strengthened the argument that different groups of media multitaskers differ in their emotional experiences in everyday life. Since there are very few studies that have analyzed the behavioral differences of MMM with HMM ad LMM (Murphy, McLauchlan, & Lee, 2017), this study can be considered to be an important addendum to the existing literatures.

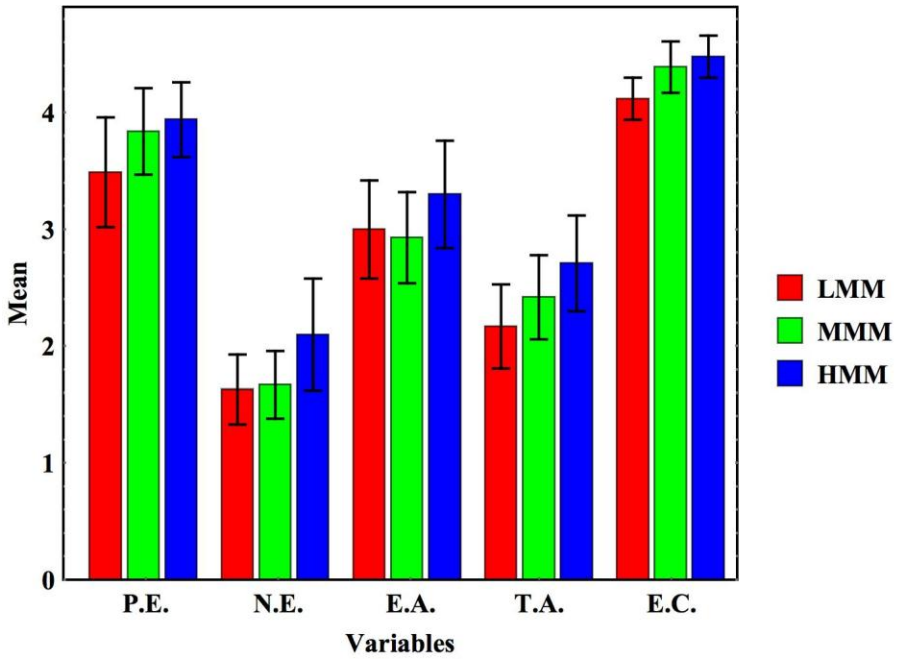

Figure 10. Emotional Profile of LMM, MMM, and HMM. LMM = Low Media Multitaskers, MMM = Moderate Media Multitaskers, HMM = High Media Multitaskers, P.E. = Positive Emotions, N.E. = Negative Emotions, E.A. = Energetic Arousal, T.A. = Tense Arousal, E.C. = Emotional Control[22]

Table 8

Emotional Profile of Media multitaskers (LMM, MMM, and HMM)

Variables	LMM	MMM	HMM
	M (SD)	M (SD)	M (SD)
Positive Emotion	3.49 (0.47)	3.84 (0.37)	3.94 (0.32)
Negative Emotion	1.63 (0.30)	1.67 (0.29)	2.10 (0.48)
Energetic Arousal	3.00 (0.42)	2.93 (0.39)	3.30 (0.46)
Tense Arousal	2.17 (0.36)	2.42 (0.36)	2.71 (0.41)
Emotional Control	4.12 (0.18)	4.39 (0.22)	4.48 (0.18)

Note. LMM = Low Media Multitaskers, MMM = Moderate Media Multitaskers, HMM = High Media Multitaskers, M = Mean, SD = Standard Deviation.

[22] High score in 'emotional control' indicates lower 'emotional control'.

Several limitations of the study are worth pointing out. First of all, in examining the emotional experience of college students in their everyday life we did not specify the emotional experience of students when they are media multitasking and when they are not. It is possible that the emotional experience of the students varies drastically from the one situation to other. The current study thus averages out their emotional experiences and took the discourse that the habitual media multitasking behavior effects individuals holistically. Secondly, experience sampling method or other observation techniques should be used in future in conjunction of self-report techniques for more robust results. Despite these limitations, this study contributes to the literature of emotions and media multitasking by demonstrating the dissimilarities in emotional experiences among High, Moderate, and Low Media Multitaskers. This may help future researchers to identify intervention techniques to combat the fallout of too much of media multitasking behavior on emotional experiences.

Chapter 4

The Processing of Emotional Stimuli among Media multitaskers

4.1 Introduction

Studies on media multitasking suggest that the difference in media multitasking habit can influence the processing of information among the media multitaskers and there exists several cognitive differences among different groups of media multitaskers. We can cite the following examples to establish our observation. According to the study by Ophir, Nass, and Wagner (2009) High Media Multitaskers (HMM) displayed poorer cognitive control as compared to the Low Media Multitaskers (LMM) and were found to be more immune to distractions. The former group was also found to be more impulsive and poorer in fluid intelligence measures as compared to the latter (Minear, Brasher, McCurdy, Lewis, and Younggren, 2013). According to Baumgartner, Weeda, Heijden, and Huizingi (2014), HMM faced cognitive problems in three domains of executive functions, namely, working memory, shifting, and inhibition, in their everyday lives. They were found to be suffering from attention deficit and performed poorly in the everyday goal directed behavior (Magen, 2017). On top of that, they experienced wider attentional scope (in comparison with the LMM), diminished working memory and poor long-term memory performance (Uncapher, Thieu, & Wagner, 2016). There are several such disparities that highlight the cognitive differences between HMM and LMM. However, in most of the lab experiments for assessing the cognitive differences, the stimuli involved are usually neutral/non-emotional in nature. Hence, they lack ecological validity and barely mimic the real-life situation where stimuli can be both emotional and neutral in nature.

Besides, in case of emotional behavior, HMM and LMM show emotional dissimilarities, too. This can be understood from the study of Becker, Alzahabi, and Hopwood, (2013) who found that HMM display unique predictor of depression and social anxiety symptoms. They are more susceptible to mood and anxiety related difficulties and as shown previously in Chapter 3, they differ from the LMM in the day-to-day emotional experiences. This implies that since emotion is closely associated with media multitasking habit, different levels of media multitaskers will process emotional and/or neutral information differently, but the extant research data in this area is scant. There are a number of studies (Cooper, 2013; Zamanzadeh, 2016) which examine the effect of induced emotions on multitasking performance or employed emotional distracters but there is hardly any attempt to study the processing of emotional stimuli among different groups of media multitaskers. To bridge this gap, we aim to focus on understanding the emotional processing of different groups of media multitaskers viz., LMM, MMM, and HMM in this chapter which is organized in the following manner: in the next section, we discuss different types of stimuli which an individual may encounter. Afterwards, we talk about the processing of the emotional stimuli by the media multitaskers and give an overview of the studies conducted to understand it. In the later part of the chapter we discuss details of the studies separately, tabulate our findings and conclude.

4.2 Stimuli — emotional versus non-emotional

An agency that gives rise to or evokes a psychological or physiological response from humans is known as stimulus (plural ‘stimuli’). The laboratory-based research experiments to study psychological processes are often so designed that they involve stimuli and record an individual’s response time when stimuli are presented to them. These stimuli can appear in many forms — visual,

auditory, haptic etc. When presented visually[23], there can be two major types of stimuli: emotional and non-emotional (also known as neutral/anodyne).

Non-emotional/neutral/anodyne stimuli are usually neutral in nature and consist of neutral words or images like geometric shapes, alphabets etc. On the other hand, emotional stimuli consist of materials that lead to emotional reactions (depending on the study, emotional reaction can be elicited either in the discrete form like happiness and sadness, or dimensionally in the form of valence[24] and arousal[25]) among the receiver at any level (physiological, subjective and/or behavioral). Within the visual modality, these emotional stimuli can be further categorized into two parts: symbolic (e.g. written emotional language, signs or simple drawings) and non-symbolic. Depending on the experimenters' purpose, the latter can be further subdivided into facial and non-facial affective stimuli (can be called 'emotional scenes' like insects, flowers etc). One should keep in mind that each emotional stimulus has its own affective frame (depending on particular experiment, it can be on the basis of valence and arousal scale or discrete scale). It is believed that the processing of emotional and non-emotional/neutral/anodyne stimuli have a distinctive neural and psychological processes and that emotional stimuli is highly prioritized and more rapidly analyzed (Brosch, Pourtois, & Sander, 2010; Carretié, 2014).

4.3 Emotional processing or the processing of emotional stimuli

The significance of emotion lies in the fact that in our mundane life we attend to and remember events or objects that has emotional intonations. It can be in the form of positive or negative feelings or of excitement or tenseness. Emotion

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[23]The present thesis is concerned with the visual tasks and hence we are focusing on stimuli pertaining to visual aspects.

[24] Item subjective emotional value ranging from positive to negative

[25]Excitement or intensity of items that ranges from high to low

is also an integral part of human relationship, and it influences the human activities, good or bad, to a great extent. From the socio-psychological perspective, emotions are the responses to internal and external stimuli which help one interpret the situation and react accordingly. Emotional processing, also known as 'processing of emotional stimuli' or 'emotional information processing' may be defined as the perception and evaluation of emotional stimuli (Kemp, Silberstein, Armstrong, & Nathan, 2004). It deals with the habitual or wilful processes that influence the "occurrence, intensity, duration, and expression of emotions" (Schmahl et al., 2014) during the range of tasks performed. It involves neural, physiological and psychological processes to perceive, decode and react to socio-emotional information (Kohler & Martin, 2006; Ochsner, 2008; Pelletier-Baldelli, Ives, & Mittal, 2015). People differ with regard to how they perceive, experience, and express emotions. Factors like individual's affective traits, affective states and cognitive processing style can produce a difference in the processing of emotional stimuli (Quarto, 2018; Hamann & Canli, 2004).

4.3.1 Why do media multitaskers differ in the processing of emotional stimuli?

Media multitaskers differ primarily in the frequency of media multitasking habits based on which they are usually categorized as HMM, MMM, and LMM. But on the basis of literature we identify that they may also differ in the ability to process emotional stimuli and following are the reasons:

- **Deficit in cognitive processing:** It is demonstrated that HMM differ from LMM in several cognitive processes like working memory and attention such that they display poor cognitive processing abilities in laboratory experiments (Schuur, Baumgartner, Sumte, & Valkenburg, 2015; Uncapher, et al., 2017). This deficit may hamper the processing abilities of emotional stimuli among media multitaskers, and they might show poor performance. If media multitasking compels cognitive control to deteriorate, then the ability to

regulate emotions may be affected, leading to obstacles in socio-emotional functioning.

- **Disruption and displacement:** Disruption and displacement in the face-to-face interaction may be the other reason why HMM differ from LMM. Face-to-face interactions play a crucial role in youths' healthy socio-emotional development (Pea et al., 2012). Limited face-to-face interactions may have a negative influence on socio-emotional functioning because emotions, like any other behavior, is learned through observing, modelling and imitating other individuals.

- **Differences in the emotional experiences:** Differences in the emotional experiences among HMM and LMM may be one further reason why they differ in processing of emotional stimuli. Several studies suggested that an individual with emotional disorder such as depression and anxiety process emotional stimuli differently (Fisher, et al., 2010; Ladouceur, et al., 2005; Scibelli, Troncone, Likforman-Sulem, Vinciarelli, & Esposito, 2016;). Since HMM are vulnerable to emotional disorders, and often experience mixed extreme emotions in everyday life, it is possible that they process emotional stimuli differently.

- **Difference in the personality traits:** Additionally, HMM and LMM also differ in their personality traits. HMM are often found to be neurotics, impulsive and sensation seekers (Chang, 2017; Minear, Brasher, McCurdy, Lewis, & Younggren, 2013; Wang & Tchernev, 2012). These differences in traits would further initiate a difference in the processing of emotional stimuli among HMM and LMM.

4.4 Overview of the studies

The cognitive processing ability of different groups of media multitaskers is a highly explored arena. The studies often conclude that HMM differ from

LMM, and MMM in their attention processing abilities, in the working and the long-term memory and in other cognitive control processes. It is therefore for these reasons we aimed to examine the emotional processing of media multitaskers through cognitive[26] tasks by employing emotional stimuli (e.g., facial emotional stimuli, emotional words etc.). High frequency of media multitasking behavior is related with several instances of cognitive irregularities and emotional disorders like anxiety, depression etc. Also, we analyzed in the previous chapter that different groups of media multitaskers experience different intensities of emotional valence and arousal in their everyday lives. Many studies from different domains like neuroscience, psychology etc. suggested that an individual's emotional response is determined by both the cognitive and affective information processing system (Gray, Braver, & Raichle, 2002; Ochsner & Phelps, 2007; Phelps, 2006). Taking these factors into account we believe that employing cognitive tasks with emotional stimuli will elucidate their emotional processing behavior. These tasks were inspired from the Oxford Emotional Test Battery (P1vital® Oxford Emotional Test Battery) that has been validated in clinical trials and had been reliably used in several studies related to anxiety, depression and cognitive disorders. Additionally, all these tasks were reliably and separately used in several emotional processing studies as well. As in the media multitasking literature we do not have any standardized paradigm to study emotional processing among HMM, MMM, and LMM, so the Oxford Emotional Test Battery served as the guiding protocol for our studies. However, we did not use the original test battery[27], but adopted the tasks with modifications[28] in the presentation, number of trials involved and created and used our own versions of emotional stimuli. Emotional stimuli involved in the tasks were facial stimuli and

[26] Cognitive task employing emotional stimuli can also be called as affective/emotional task

[27]As we have already conducted pilot studies on some of the tasks before we came across this battery

[28] Modifications were done by the experimental needs and considering studies that independently work on that particular task.

self-referential emotional words. There were in total five tasks involved in the study which evaluated the attention to emotional stimuli, perception and interpretation of social cues and memory for self-referential emotional information. The tasks were as follows:

1. Facial Dot Probe Task: It evaluated attention of the HMM, MMM, and LMM towards emotional stimuli (positive versus negative) by measuring their reaction time. Two emotional faces (one neutral and other one is positive or negative) presented horizontally were shown for a brief period of time and were replaced by a dot. Participants had to quickly press the designated key[29] to identify whether the dot was on the right side or on the left side. Differences in the reaction time towards emotional and neutral stimuli reflected the attentional bias of the HMM, MMM, and LMM.

2. Facial Emotional Recognition Task: This task examined the ability of the HMM, MMM, and LMM to perceive and interpret static facial expressions of male and female individuals whose faces are, in one case, familiar faces and, in another case, unfamiliar to the participants. Additionally, in each case, facial expressions also differed equally in 'racial' variables (which are called 'in-group' and 'out-group' facial stimuli). The procedure involved the presentation of emotional face (out of five emotional faces viz. high[30] positive, low positive, neutral, high negative and low negative) on the screen for few seconds and then the participants were required to identify the correct expression by pressing the designated key. Reaction times and errors were calculated to analyze the recognition ability of social cues among media multitaskers.

3. Emotional Categorization Task: It assessed how quickly different groups of media multitaskers attend to the self-referential emotional stimuli (positive and

[29]On the keyboard

[30]High and low indicates the arousal intensity of those stimuli

negative words). Positive and negative words were presented to them on a screen one by one, and they had to quickly respond whether they would 'like' or 'dislike' to be called by that descriptor by pressing the designated key[31]. The differences in reaction time measured their attention towards affective information.

4. Emotional Recall Task: This task tested the incidental encoding of self-referential emotional words and was a surprise free recall task. Participants were asked to recall the words that were shown to them in the Emotional Categorization Task within two minutes time duration. The relative recall of positive versus negative words measure the emotional bias in memory.

5. Emotional Recognition Memory Task: This task assessed the recognition memory of HMM, MMM, and LMM for self-referential emotional words that were shown in the Emotional Categorization Task. Emotional words along with the distracters were presented and participants were asked to state whether that word were earlier presented in the emotional categorization task or not. Correct recognition and correct rejection of the positive versus negative words were recorded and analyzed.

This is all about the preliminary discussions concerning this chapter dealing with the processing of emotional stimuli among media multitaskers. Emotional processing related to attention, memorization and perception of emotional stimuli are different for different levels of media multitaskers and in the forthcoming discussions, which give the detailed account of the studies, these three aspects will be treated separately under the names Study 4A, Study 4B and Study 4C. Each of the studies will contain rationale, statement of research problem, hypotheses and the results. Having said so, we conclude the introductory discussion and proceed towards more elaborate description of the studies conducted.

[31]On the keyboard

Subchapter 4A

Study 4A: Media multitaskers and Attentional Bias towards Emotional Stimuli

4A.1 Introduction

The present study aims to investigate attentional bias of HMM, MMM, and LMM towards emotional stimuli. Previous studies (Cain & Mitroff, 2011; Lin, 2009; Ophir, Nass, & Wagner, 2009; Uncapher, Thieu, & Wagner, 2016) suggested that the media multitasking habits lead to broader and shallow focus of attention. For instance, according to the 'scattered attention hypothesis' (Schuur, Baumgartner, Sumte, & Valkenburg, 2015) excessive media multitasking behavior affect an individual's ability to focus attention on one particular task and it is usually scattered around various sources of information. In one such major experimental study (Ophir, Nass, & Wagner, 2009), researchers used a 'filtering task' where two consecutive arrays of rectangles (red and blue in color) were shown to the participants, and they were asked to indicate whether there was any shift in the red rectangle's positions (in presence of the distractor blue rectangle which they were supposed to neglect). Results demonstrated that HMM divided their attention homogeneously among all the informational sources which might/might not be related to the main task, and yielded more to the distractions than the MMM and the LMM. In brief, HMM showed a 'breadth-biased' behavior while processing which simply implies the tendency to treat all the stimuli in a similar manner.

In another study, Cain and Mitroff (2011) looked into the breadth-biased attention of media multitaskers with the aid of the additional-singleton task. In this task the participants were asked to report which symbol (+ or -) was inside a circle (one of the shape singleton). All the shapes were green in color in the first half of the trial, and in the other half of the trials the color coding of the stimuli were divided between green and red. There were two task conditions —

'sometimes' and 'never'. Appearance of the condition 'sometimes' was accompanied by the target circle being a color singleton, but it was not so when the condition 'never' appeared. Participants with varied ability to utilize past knowledge or instructions in allocating attentions were seen to perform differently in two conditions. Results revealed that the attentional filter of the HMM is wider than the LMM and this filter is not influenced by the instructions.

Lui and Wong (2012) using the 'pip and pop paradigm' found that broader attentional style of HMM helped them integrate multi-sensory information. In the said paradigm, the participants were supposed to find out the target line in presence of 47 distractor lines. All these lines were of various orientations and of varied color (red and green) appeared at temporal intervals of 50, 100 and 150 ms. There were four blocks in the experiment, and in two blocks the target line was usually accompanied by an auditory tone (called 'pip') whenever it changes color (referred to as 'pop'). Participants were not informed about this association. Results suggested that HMM performed worse than LMM in the visual search task, but their performance improved whenever target line was accompanied by an auditory tone. This suggested that HMM had a breadth biased attention which helps them integrating multi-sensory information.

To sum up the results of the studies, HMM were found to be attending to all the information with equal attentional weightage and performed poorly in the tasks which demanded selective attention. However, all these findings emerged from the laboratory-based studies which employed neutral stimuli like geometric shapes, color etc. In day to day life, human beings are surrounded by stimuli which can both be emotional and non-emotional in nature. The general consensus is that the emotional stimuli are highly prioritized and can modulate the selective attention process (Attar & Müller, 2012) . In a meta-analytic study on neural and behavioral studies, researchers (Carretié, 2014) found that attention is biased towards emotional distractors. However, no such study exists which can definitively decide whether the HMM selectively attend to (neutral or emotional) stimuli or not. There are, however, some behavioral studies (Wang & Tchernev,

2012; Zhang & Zhang, 2012) which depicted that emotional gratification is one of the objectives of media multitasking behavior. Also, neuroscience studies (Loh & Kanai, 2014) indicated that excessive media multitasking behavior is linked with the areas of the brain associated with emotional processing. Besides, from Chapter 3 we analyzed that there exist group differences in several emotional variables of HMM, MMM, and LMM in their everyday lives suggesting different emotional orientation among HMM. Research (Yiend, 2010) on emotion and attention suggested that an individual's emotional state and the emotional quality of the stimulus both interact to initiate the process of selective attention. Since the emotional state and needs of HMM are different from those of LMM and MMM, it can be speculated that HMM will have different attentional processes for emotional and non-emotional stimuli.

4A.2 Attentional bias: positive versus negative emotional stimuli

Attention towards emotion, in the simplest form, can be split into positive and negative attentional bias. Research suggested that attention towards emotional stimuli is usually based on individual's affective state or trait characteristics. There are two perspectives to explain the specific emotional bias. First, according to the 'mood congruent hypothesis' (Bower, 1981), individuals tend to remember and focus attention towards those stimuli that are congruent with their current mood/emotional state. If a person experiences negative emotion all the time, then he/she tends to focus on the negative stimuli. This perspective is most commonly explored in sample vulnerable to psychopathological disorders such as depression, and anxiety. Contrary to the first, the second perspective is related to the mood incongruent information processing that is based on the mood-regulatory function. This approach is hedonistic and always aims for amplifying positive state and eliminating negative ones. It considers that individuals tend to focus on the objects or stimuli incongruent with their prevailing mood so as to optimize their current mood/emotional state. So, if an individual is sad, he/she will tend to search for the positive emotion stimuli to improve his/her mood.

In the media related studies, the second perspective is highly prevalent. According to the 'mood management theory' (Reinecke, 2017), individuals actively seek for and select media to manage their affective state, specifically to intensify and prolong positive emotion and alleviate negative one. With reference to the different groups of media multitaskers, it was found that the relationship between emotions and excessive media multitasking habit is a complex and inconclusive one. For example, some researchers suggested that HMM are positively related with the emotional disorders like anxiety, depression and stress (Becker, Alzahabi, & Hopwood, 2013; Mark, Wang, & Niiya, 2014). They viewed that this happens due to multiple demands on the brain that makes it to release stress hormones which cause anxiety. Also, the addiction of media prompts user to juggle with different media to prevent the feeling of 'fear of missing out' (Przybylski, Murayama, DeHaan, & Gladwell, 2013). Some others (Song, Nam, Lim, & Kim, 2013; Tokan, Mattila, & Sihvonen, 2012) claimed that to avoid loneliness and boredom people frequently indulge themselves in media multitasking behavior. Contrarily, there are studies which found that positive emotions like pleasure, excitement appear among individuals when they media multitask (Wang & Tchernev, 2012; Zhang & Zhang, 2012). This implies that media act as mood regulators, and hence HMM tend to avoid negative stimuli and prefer the positive ones. Based on the literature review we propose the following hypothesis:

H4A.1: HMM will show a preference towards emotional stimuli, such that they will be biased towards positive stimuli and tend to be disassociated from negative stimuli.

To study the attentional bias among HMM, MMM, and LMM, we used the emotional dot probe task (using facial expression as an emotional stimuli). This task is highly popular to measure attentional bias and has been reliably used in several studies related to emotional disorders, substance addiction etc. (Bullock & Bonanno, 2013; Chan, Ho, Law, & Pau, 2013; Rooijen, Ploeger, & Kret, 2017). In

this task two stimuli, one neutral and one emotional (positive or negative), were shown for a brief period of time (on the computer screen) followed by a dot probe that replaces one of the stimuli. Participants' task was to respond to a probe (by pressing the designated key on the keyboard) at the earliest. Attentional bias was measured by calculating and comparing the reaction time to the neutral and emotional stimuli. Hence in this task, neutral and emotional stimuli compete for participants' attention and we aimed to know whether HMM focus upon all the stimuli in a similar way or they show preferences toward emotional stimuli. We also endeavored to understand what kind of valence specific attentional bias they display toward facial emotional stimuli.

So, here we complete the preliminary discussion about the background of the Study 4A. In the next section we discuss the methodology of the study in detail. In Section 4 the findings of the study are presented. Section 5 contains the outlook we can derive from the study, and then we conclude in Section 6.

4A.3 Methodology

4A3.1 Participants

A total of 120 undergraduate students from a reputed institute of technology in India participated in the study[32] voluntarily. The mean age of participants was 20.9 years (Standard Deviation (SD) = 1.29, within the age range 18-24 years) and 70% of the participants were males.

4A3.2 Materials

Since the same participants were involved in all the studies discussed in this thesis, the record of their media multitasking behavior, their emotional states, personality etc. was already documented and analyzed in Chapters 2 and 3. In this

[32]The same pool of participants participated in all the questionnaire and experiment based study throughout the thesis work.

particular study, we analyzed their performance in the 'emotional dot probe task' and hence we will discuss the material pertaining only to the task.

4A.3.2.1 Emotional dot probe task

The task was conducted on a 15-inch HP laptop. OpenSesame (Mathôt, Schreij, & Theeuwes, 2012) software was used for the presentation of stimuli, which were the human facial expressions and for the recording of responses. We used photographs of the Indian and the non-Indian actors and actresses manifesting different emotional expressions: positive, neutral and negative. All the images had a uniform dimension of 150 x 175 pixel and were black and white in color. In the initial construction of set of stimuli, we selected 120 photographs in total (10 Indian actors, 10 Indian actresses, 10 non-Indian actors, 10 non-Indian actresses each one of whom showed three emotional expressions: positive, negative and neutral). We used the Indian movie database (Setty, et al., 2013) for the Indian faces and Google images for the non-Indian faces. Primarily, the entire set of facial images was shown to 10 undergraduate students independently for the emotional ratings of the photographs. The raters had to rate each photograph on a 9-point rating valence and an arousal scale[33]. Finally, 48 photographs (4 Indian actors, 4 Indian actress, 4 non-Indian actor, 4 non-Indian actress each showing three emotional expressions: positive, negative and neutral) were selected for the main study and another 12 photographs were selected for practice trials. In all the three facial pairs, positive-neutral, negative-neutral and neutral-neutral, we used the same faces so that the stimuli differ only in the emotional expression and not in the faces. Interclass correlation co-efficient (ICC) was calculated to measure the rating consistency among the raters. Raters in this study had ICC score of 0.94

[33]In case of valence scale rating less than 4 is negative, between 4-6 is neutral and more than 6 is positive. Similarly in case of arousal scale, rating less than 4 is low intensity, between 4-6 is neutral and more than 6 is high intensity.

on arousal scale and 0.96 on valence scale which is considered to be a good rater agreement (Koo & Li, 2016).

4A.3.3 Procedures

Participants were seated before a laptop screen where the instructions for the task were presented to them. The task consisted of 16 practice trials and 160 experimental trials. Face location, probe location, and male/female faces were all counter-balanced. Each trial had the following sequence: 1) a fixation cross was shown in the middle of the screen for 500 ms. 2) a pair of faces (it can be any of these pairs: positive-neutral, negative-neutral, neutral-neutral) were then presented on the screen horizontally for 500 ms. 3) after the disappearance of the facial images, a small dot appeared on either side of the facial image. The dot remained there until the participants pressed 'p' if a dot replaced right side of the image or pressed 'q' if the dot replaced left side of the image. Refer Figure 11. Participants were instructed to press the key as accurately and as quickly as possible. At the end of the task participants were asked to rate their familiarity with the faces [34]on a 5-point rating scale[35].

[34]Familiarity question was-"How familiar were you with the facial images shown to you in the task?"

[35] Rating scale ranges from: 'not at all familiar', 'slightly familiar', 'somewhat familiar', 'moderately familiar', 'extremely familiar'

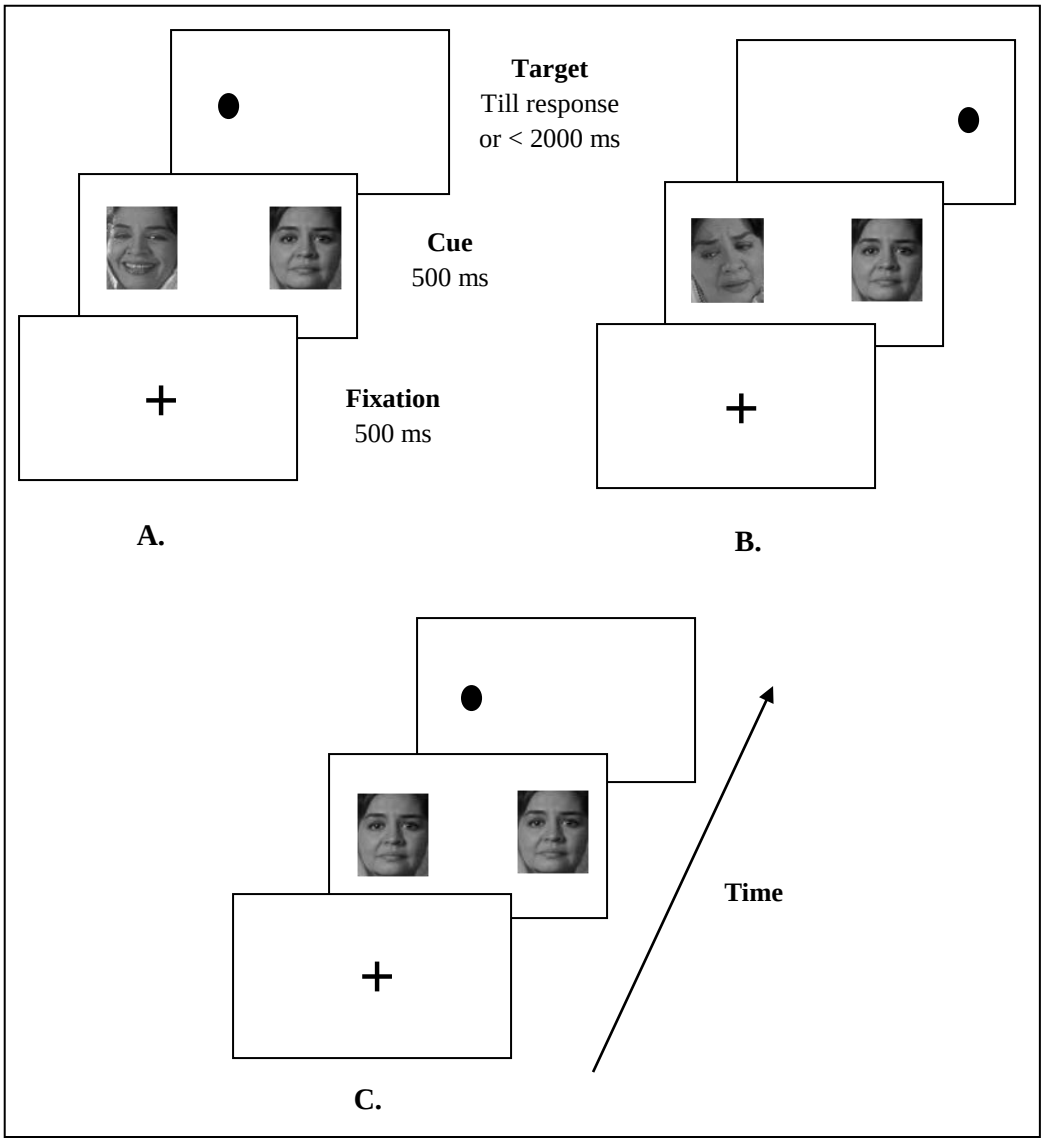


Figure 11. Emotional dot probe task procedure A. Congruent Trial, B. Incongruent Trial, C. Neutral Trial

4A.4 Results

SPSS 20 software was used for the data analysis. At first, we checked whether there were any differences in the participant's familiarity scale for the facial stimuli. For that, a one-way ANOVA was separately conducted for Indian and non-Indian facial stimuli for HMM, MMM, and LMM. Results suggested no significant difference among HMM, MMM, and LMM on the familiarity scale of the Indian ($F(2, 117) = 0.77$, $p = 0.46$) and non-Indian facial stimuli ($F(2, 117) =$

0.68, p = 0.51). This suggested that the facial stimuli were equally familiar for all the participants.

4A.4.1 Data reduction and analysis

Response time and correct/incorrect responses were recorded for each participant. Before analyzing the final data, we eliminated the data of certain trials. There were two reasons for the elimination, 1) if a trial consisted of errors, reaction time was not included in the calculation of mean reaction time, and 2) trials with reaction time less than 100 ms and more than 1000 ms were not included in the final analyses. As a result, 2.5% (approximately) data were eliminated[36]. Data analysis for the emotional dot probe task relied entirely on response time for correct responses. After the elimination of certain data, mean response time was calculated for all the participants and they were grouped in their respective media multitasking groups[37]: LMM, MMM, and HMM (refer Table 9).

[36]There was no group difference in the data elimination in all the three groups.

[37]As calculated previously in Chapter 2

Table 9

Mean Response Time (RT) for identifying probes appearing on different facial pairs among LMM, MMM, and HMM

	Face pair				
	Neutral-Neutral pair	Positive-Neutral pair		Negative-Neutral pair	
	Baseline M (SD)	Positive M (SD)	Neutral M (SD)	Negative M (SD)	Neutral M (SD)
LMM	213.11 (3.50)	213.42 (6.37)	213.93 (4.80)	212.43 (7.63)	213.72 (4.42)
MMM	213.23 (3.08)	212.85 (3.51)	213.72 (4.81)	212.68 (9.95)	213.49 (4.84)
HMM	213.12 (2.99)	209.67 (2.97)	213.55 (4.22)	214.89 (3.05)	212.15 (4.16)

Note. M = Mean, SD = Standard Deviation, LMM = Low media multitaskers, MMM = Moderate media multitaskers, HMM = High media multitaskers

4A.4.2 Attentional bias scoring

Attentional Bias Scoring (BS) was calculated by the following formula (adapted from Cooper & Langton, 2006):

$$BS = PN\text{-}PE,$$

where PN is the mean Response Time (RT) for the probe that appeared in the location of the neutral face, and PE is the mean RT for the probe that appeared in the location of the emotional face. Positive value indicates that attention is biased towards emotional face (vigilance) whereas negative value reflects that attention is biased towards neutral face (avoidance for emotional face). Attentional bias score was calculated for positive and negative emotional pairs separately. The bias scores for the current study is presented in Table 10.

Table 10

Attentional Bias Score for Positive and Negative Emotional Stimuli for LMM, MMM, and HMM

	Face pair				
	Neutral-Neutral Pair	Positive-Neutral Pair		Negative-Neutral Pair	
	Baseline M (SD)	Positive M (SD)	Neutral M (SD)	Negative M (SD)	Neutral M (SD)
LMM	213.11 (3.50)	213.42 (6.37)	213.93 (4.80)	212.43 (7.63)	213.72 (4.42)
		BS = 0.51		BS = 1.29	
MMM	213.23 (3.08)	212.85 (3.51)	213.72 (4.81)	212.68 (9.95)	213.49 (4.84)
		BS = 0.87		BS = 1.11	
HMM	213.12 (2.99)	209.67 (2.97)	213.55 (4.22)	214.89 (3.05)	212.15 (4.16)
		BS = 3.88		BS = -2.74	

Note. M = Mean, SD = Standard Deviation, LMM = Low media multitaskers, MMM = Moderate media multitaskers, HMM = High media multitaskers

4A.4.3 Hypothesis testing

Hypothesis H4A.1 was tested by analyzing attentional bias separately for both positive and negative stimuli.

4A.4.3.1 Attentional bias towards positive emotional face

All the three groups LMM, MMM, and HMM reflect attentional bias towards positive face in comparison to neutral face (refer Table 10) but the positive attentional bias was much higher in HMM as compared to both LMM and MMM. We conducted one-way ANOVA to determine whether the group differences were significant or not. The one-way ANOVA revealed a significant

group difference, Welsch's F[38] (2, 68.30) = 4.62, p = 0.01 (p <0.05). Post-hoc comparison using Games-Howell test found that the mean bias score for HMM differ significantly with the MMM and LMM group (p< 0.05). However, the mean bias score did not significantly differ between LMM and MMM. Further, we compared mean RT of probe occurring in the location of positive face (congruent condition) and mean RT of probe occurring in the neutral face (incongruent condition) in a positive-neutral pair with mean RT of neutral-neutral pair in all the three groups – LMM, MMM, and HMM separately to determine whether this attentional bias is due to the mechanism of facilitating attention towards the positive emotional face, inhibition towards neutral faces or both. According to Cooper and Langton, (2006) if the mean RT of the probe location would be smaller than the mean RT of neutral-neutral pair, then it indicates facilitation of attention towards that location. On the contrary, if mean RT would be higher than the mean RT of neutral-neutral pair it indicates inhibition or avoidance from that location.

For the HMM group, the baseline mean RT was 213.12 ms. In case of positive-neutral emotional pair, mean RT to probe appearing in the positive emotional faces was 209.67 ms which was significantly faster than the baseline 213.12 ms, t(64) = - 4.702, p < 0.005. The probe that appeared at the neutral emotional face had mean RT 213.55 ms which was not significantly different from baseline RT (p = 0.64). For LMM group, the mean RT for positive and neutral faces was not different from the baseline mean RT (p = 0.80, p = 0.83). Similarly, in case of MMM, the mean RT for positive and neutral face was similar to the mean RT at the baseline level (p = 0.55, p = 0.54). Overall this implies, HMM facilitated attention towards positive faces when paired with neutral faces while for LMM and MMM no such evidence of bias was found either towards positive or towards neutral face.

[38]The assumption of homogeneity of variance was violated as assessed by Levene's test for equality of variances (p = 0.04).

4A.4.3.2 Attentional bias towards negative emotional face

BS of LMM (BS= 1.29) and MMM (BS = 1.11) suggested that both the groups are biased towards negative emotional face. Results of the t-test showed that there was no significant difference in the bias score of LMM and MMM group, $t(85) = 0.2$, $p = 0.84$.

In case of HMM (BS = -2.74), BS demonstrated that the group is biased towards neutral face when it is paired with negative face.

Comparing the mean RT for the negative-neutral pair with the mean RT of neutral-neutral pair in all the three groups (LMM, MMM, and HMM) separately we found that HMM displayed inhibited attention towards probe appearing at the negative emotional faces, $t(64) = 2.37$, $p = 0.02$, $p < 0.05$, whereas there was no facilitation or inhibition towards neutral faces ($p = 0.28$). In the case of LMM and MMM, no evidence was observed for facilitation/inhibition towards probe appearing at negative face (LMM: $p = 0.65$; MMM: $p = 0.70$) or neutral face (LMM: $p = 0.54$; MMM, $p = 0.74$) when comparing it with the baseline (neutral-neutral pair mean RT).

Thus, the hypothesis H4A.1 which said that HMM would show a positive bias and tend to be disassociated with negative stimuli, is supported. This suggests that HMM does not give equal attention to all the stimuli but show preference towards emotional stimuli which in the present study were the human emotional faces.

4A.5 Discussions

The present study aimed to understand the selective attention or attentional bias toward emotional or non-emotional human facial stimuli among different groups of Media multitaskers (HMM, MMM, and LMM) with the help of "emotional dot probe task". The results suggested that when positive and neutral faces were shown simultaneously, all the three groups HMM, MMM, and LMM reflect "positive bias" such that they pay quicker attention towards positive faces than neutral ones. However, HMM were statistically significantly much faster in

paying attention towards positive faces in comparison to LMM and MMM. Further, on comparing with the baseline trials (neutral-neutral pairing) it was confirmed that HMM were more vigilant towards positive faces which was not the case for LMM and MMM. Besides, when neutral faces were paired with negative faces, HMM were found to pay quick attention towards neutral faces and were avoiding negative facial stimuli. On the contrary, both LMM and MMM were fast in directing their attention towards negative faces over neutral ones. Overall, results suggest that HMM orient their attention towards positive stimuli and they choose to avoid negative stimuli when presented with neutral stimuli. This supports our hypothesis H4A.1 and is consistent with the mood management theory where it is suggested that media often function as a regulation of one's mood and emotions and is directed towards attaining positive emotion and avoiding negative one. Thus, in case of media multitasking behavior, different media may either act as positive emotional stimuli or they may induce positive emotions among the users and therefore get attended several times in comparison to stimuli those are either negative in nature or do not have an emotional appeal. The results are also consistent with the growing consensus that the gratification of emotional needs is the prime motivations for media multitasking behavior (Song, Nam, Lim, & Kim, 2013; Tokan, Mattila, & Sihvonen, 2012, Wang & Tchernev, 2012). Hence, this suggests that in spite of breadth bias style of focussing, HMM are found to be biased towards emotional stimuli. Also, from the results it can be said that HMM attend to positive and negative emotional stimuli differently from those of LMM and MMM.

The results, thus produced, can have both positive and negative implications. As far as the positive consequences are concerned, results can be used in alleviating the problem of distraction among HMM by incorporating positive stimuli in the primary task. But the tendency to look for positive stimuli and to avoid negative stimuli altogether can have negative consequences in real life situations. One such case was examined by Greenfield (2010) who viewed

that excessive dependence on technology for communication and maintaining relationship reduces empathy among college students.

This study has certain limitations. First, the facial emotional stimuli that were used in the study were familiar popular faces and could have elicited individual's personal approach/avoidance behavior towards them irrespective of the emotional state displayed on the faces. Second, there are group differences in HMM, MMM, and LMM in several emotional and personality variables which we could not control in the study. However, when viewed from another angle these differences among them may be an additional reason suggesting that attentional bias towards emotional stimuli would be different among them. Third, a difference in the presentation time of the facial emotional stimuli could produce different result. This we reserve for future work[39].

Despite certain limitations, the present study contributes to the literature of media multitasking behavior and attention by demonstrating that HMM have an attentional bias towards emotional stimuli and that the researchers should incorporate both emotional and neutral stimuli to study the attentional processes of different groups of media multitaskers.

[39]Most probably facial emotional stimuli presentation time should be taken less than 500 ms as we received nearly similar results in both the 1000 ms (pilot study) and 500 ms (main study) studies.

Subchapter 4B

Study 4B: Facial Emotion Recognition Ability of Media multitaskers

4B.1 Introduction

The locus of our discussion indicates that understanding emotional processing of different levels of media multitaskers has many facets. After discussing one of them, the processing of emotional stimuli, in Study 4A, we now study the ability of the media multitaskers to recognize facial emotional stimuli. The capability of recognizing emotions on the faces, which emerge either naturally (like in a conversation) or in visual media, is an essential skill for social interaction. They are the essential aspects of social cognition for they help interpreting the intentions and emotional states of other people. The perception of changes due to facial movements plays a central role in social communication because misinterpretations due to impaired facial emotion recognition ability are likely to result in the impairment of social relationship and interaction (Sheaffer, Golden, & Averett, 2009).

Emotion recognition is defined as the ability to precisely infer the emotional state of others from their facial emotional expressions. It is a multi-layered process that involves interaction of emotion, cognition and behavioral adaptation. Thus, for recognizing facial emotional stimuli, we have to first attend the stimuli, identify the emotions using stored information in the memory and then label it according to the individual culture and context. An increase in interaction with people often improves this ability. However, any deficit/dysregulation pertaining to individuals' emotion and cognitive process may influence their ability to recognize emotions (Berg, et al., 2016; Hunter, Buckner, & Schmidt, 2009; Jarros, et al., 2012).

Lately, with the advancement of media and technology, researchers have found several changes in the way people communicate socially. They observed that people have been spending increasing amount of time using media devices and that individual screen time has considerably increased over the past decade (Kononova, 2013; Pea, et al., 2012; Rideout, Foehr, & Roberts, 2010). The troubles with all these new media are that they are the facilitators of the habit of multitasking. Every time we receive a message, or a notification, it stimulates the secretion of dopamine which instigates reward-motivated behavior (Holznagel, 2018). This random occurrence of reinforcement creates a compulsion loop by which we repeatedly indulge in the task of media multitasking like checking phone or looking at the Facebook posts etc. However, the spurt of this behavior comes with a price. People with excessive media multitasking behavior develop a fear of losing information or cannot control the cravings for media activities (Przybylski, Murayama, DeHaan, & Gladwell, 2013). As a consequence, they repeatedly check media devices and this makes them always on constant guard for checking any new media information that emerges. Since people displaying such behavior can be seen as immersed into a sea of media, they can suffer from fatigue and exhaustion that can have heavy toll on their emotions, health and well-being. For instance, in a study on 8-12 years old girls, researchers (Pea, et al., 2012) found that media multitasking is negatively associated with socio-emotional outcomes like positive feelings, social success, feeling of normalcy etc. Further, studies suggested that HMM are vulnerable to affective disorders like depression, anxiety, stress, etc. in comparison to LMM (Becker, Alzahabi, & Hopwood, 2013; Mark, Wang, & Niiya, 2014).

4B.1.1 Media multitaskers and face-to-face communication

Given the understanding that heavy media multitasking may take hold of one's health, emotions and overall well-being, another relevant question to ask is whether it has its foot-prints in his/her communication habits, too. Without much element of surprise, it has been observed that the mode of communication of the

HMM has thoroughly changed in a sense that they prefer new communication media instead of the face-to-face interaction (Brown, 2017; Subrahmanyam & Greenfield, 2008). The examples are many, such as, a) for interpersonal communication they prefer short messages or instant messages or phone call b) for communal communication they choose the social media like Twitter, Facebook, etc c) for important calls they are preferring video calls through Skype.

According to the cues-filtered out theory (Walther & Parks, 2002), communications that are mediated via computer or other digital platforms usually lack social, physical or non-verbal cues and often result in impersonal communication. Not only that, some people intentionally look at their mobile screens to avoid 'unnecessary interaction' (Nakamura, 2015). Even in the face-to-face conversation, individuals are not focusing on a person, rather, they are into the midst of several other activities. Since face-to-face interaction is essential for learning several non-verbal cues like eye contact and gesture, any displacement in this act can put an individual vulnerable towards poor interpersonal skill. For instance, in an experimental study by Sherman, Michikyan, and Greenfield (2013), it was shown that the bonding and affiliative cues were weaker among friends who indulged mostly in text-based communication in comparison to facial contact. Hence, insufficient practice of observing non-verbal cues like facial expressions can alter the way individuals perceive emotions of others and of him/herself (Nakamura, 2015).

This can be evident even in the case of media multitasking where disruption and displacement of face-to-face communication with the increasing multitasking habits may reduce one's ability to focus on emotions and other non-verbal cues (like eye contacts) and result in a decreased sensitivity to emotional cues. This observation was supported in a study (Pea, et al., 2012) with 8-12 years old girls where it was found that media multitasking behavior is negatively related to face-to-face interaction and socio-emotional outcomes. According to Nass (as mentioned in "Reclaiming Conversation- The power of talk in a digital age" by Turkle, 2015), due to insufficient face-to-face "practice in observing and

experiencing true emotions" young people of the Twitter era are suffering from "emotion atrophy". Like any other human behavior, emotion is also a learned behavior, and if a child grew up with screen, he/she would not get enough exposure for social interaction or learning social skills and falls prey to poor emotion recognition ability or can be identified as 'virtually autistic' (Waugh, 2017). Recently, researchers from the University of Sunshine Coast, Queensland, Australia (Hinchliffe, 2017) found that among the Australian young sample, excessive social media use like Facebook, Twitter resulted in poor emotion recognition ability and fewer social skills. Similarly, poor facial emotion recognition was observed among users who excessively indulged in video games (Kirsh & Mounts, 2007) or among internet addicted individuals (Chen, Poon, & Cheng, 2017; Ge, Zhong, & Luo, 2017).

Looking at the perils of frequent media use habits and reduced face-to-face interaction, researchers conducted a natural experiment on teenagers to study whether frequent media use affect emotion recognition ability and whether, placing teenagers in a media free environment would improve their emotion recognition ability (Uhlsa, et al., 2014). Research suggested that staying away from electronic gadgets for five days improved the emotional recognition ability among students in comparison to their peer group who continuously stayed in the same media environment during that time. This indeed indicates that excessive media multitasking habit makes an individual vulnerable to emotional recognition deficit.

4B.1.2 Media multitaskers and cognitive control

Other than the disruption in face-to-face contact and emotional dysregulation, studies suggested that HMM are also found to be the deficit in cognitive processes in areas related to attention, memory, etc. It was found that HMM have breadth biased focus of attention and they have relatively limited memory capacity in comparison to LMM (Lin, 2009; Minear, Brasher, McCurdy, Lewis, & Younggren, 2013; Ophir, Nass, & Wagner, 2009; Uncapher, Thieu, &

Wagner, 2016). Since facial emotion recognition process involves both attention and memory processes, deficiency in either of these can produce poor recognition ability. Also, in a neuroimaging study (Loh & Kanai, 2014), it was found that individuals with frequent media multitasking habits have smaller ACC volumes. This is linked with the cognitive control and emotional processing area and hence they suspected that HMM might be less disposed in emotional and motivational regulation. It is also suggested that cognitive deficit produce poor goal directed behavior or poor executive control. This may result in diminished facial emotion recognition. Based on the above discussion, we propose the following hypothesis:

H4B.1: Since HMM are deficit in cognitive processes, have emotional dysregulation and poor face-to-face interaction, it is hypothesized that HMM will have poor facial emotional recognition ability.

Initial attention towards emotional stimuli plays an important role in emotion recognition. In the previous study (Study 4A), we analyzed that HMM are more attentive towards positive facial stimuli and avoid the negative ones. This suggests that the interaction process of the HMM is such that they choose to have limited exposure towards negative facial stimuli. As a result of the above observations, we forward the following hypothesis:

H4B.2: HMM will make more errors in identifying negative facial emotional stimuli in comparison to LMM and MMM.

4B.1.3 Facial emotion recognition: 'in-group' versus 'out-group' emotional facial stimuli

Research suggested that a difference in the cultural backdrop of the facial stimuli is another factor that may influence the facial emotion recognition ability (Meissner & Brigham, 2001). Several studies reported significant difference in emotion recognition ability depending on whether the facial stimuli appeared from within or outside one's cultural milieu (Shioiri, Someya, Helmeste, & Tang, 1999; Kaspar, 2016; Liedtke, Kohl, Kret, & Koelkebeck, 2018). Participants were

seen to be more accurate at identifying emotions from the faces belonging to their own cultural group. This phenomenon related to emotion recognition is known as 'own-group/in-group' bias and according to the dialect or familiarity model (Elfenbein, Beaupre, Levesque, & Hess, 2007) it occurs because people are less likely to interact with 'out-group' members, and they are less familiar with subtle cultural differences in the expression and interpretation of emotion. As a result, they are less accurate in identifying 'out-group' facial expressions. However, in a gender related study (Lovén, Rehnman, & Herlitz, 2008) it was observed that under the phenomenon of 'divided attention' this 'own-group' bias (female recognizing female faces) does not exist. Researchers opined that under divided attention, recognition memory of the individual decreases and hence this 'own-group' bias ceases to exist.

Since excessive media multitasking habits lead to breadth bias attention and poor face-to-face interaction, it may therefore be the case that HMM will not give full attention to the facial stimuli and hence will make errors. However, the LMM may be more accurate in identifying emotions within their own race, but not necessarily those of different races. Hence, we hypothesize the following which, to our knowledge, has not been tested by any other studies so far:

H4B.3: HMM will have no specific emotion recognition deficit in 'in-group' versus 'out-group' facial emotional stimuli but, LMM will be more accurate in recognizing 'in-group' facial emotional stimuli.

4B.2 Methodology

4B.2.1 Participants

120 undergraduate students from a reputed institute of technology in India voluntarily participated in the study[40]. Age of the participants, 70% of whom were

[40]The same pool of participants participated in all the questionnaire and experiment based studies throughout the thesis work.

males, ranged between 18 to 24 years (Mean age was 20.9 years, Standard Deviation (SD) = 1.29).

4B.2.2 Materials

Owing to the fact that the same participants took part in all the studies, we already had the record of their media multitasking behavior, personality, emotional states from the previously conducted experiments. Therefore, in this section we will only discuss the material pertaining to the 'emotional facial recognition task'.

4B.2.2.1 Facial Emotion Recognition Task

The task was administered via a 15-inch Dell laptop. Presentation of task stimuli and recording of responses were done through the OpenSesame (Mathôt, Schreij, & Theeuwes, 2012) software.

Task Stimuli

Digital photographs of the Indian and the non-Indian actors and actresses manifesting five different emotional expressions and intensities[41]: high positive, low positive, neutral, low negative and high negative were utilized. The size (150 x 175 pixel) and color (black and white) of the photographs were kept uniform.

Stimuli preparation

[41]Emotional Expressions were Positive, Negative and Neutral while intensity was split into high and low. High and low in facial expression was differentiated from open and closed mouth variant. So, high positive expression would be a laughing expression, low positive — smiling expression. Similarly, examples for high negative — angry with open mouth expression and low negative — a sad and closed mouth expression.

Initially, 200 photographs[42] were selected from the Indian movie database (Setty, 2013) and from the Google images for the Indian and non-Indian face respectively. These photographs were then shown to 10 different participants (undergraduate students) from the same institute for the 'emotional rating task'. In this task, participants were shown each photograph on a computer screen (no time constraint) and they had to rate them on a paper based nine-point-rating valence and arousal scale[43]. After averaging ratings of each photograph, we finally selected 120 photographs (6 Indian actors, 6 Indian actresses, 6 non-Indian actors, 6 non-Indian actresses, each showing 5 emotional expressions: high positive, low positive, neutral, low negative, high negative) for the main study. For average ratings of these photographs please refer to Table 11. In addition to these, we had also selected 20 more photographs for practice trials.

Table 11

Average valence and arousal ratings of photographs in high positive, low positive, neutral, low negative and high negative categories

	Average Ratings	
Emotions	Arousal	Valence
High Positive	8.09	7.98
Low Positive	2.05	7.83
Neutral	5.08	4.93
Low Negative	2.00	2.23
High Negative	8.03	2.17

[42] 10 Indian actors, 10 Indian actresses, 10 non-Indian actors, 10 non-Indian actresses, each displaying 5 emotional expressions: high positive, low positive, neutral, low negative and high negative.

[43] In case of the valence scale rating, less than 4 is negative, between 4-6 is neutral and more than 6 is positive. Similarly, in case of arousal scale, rating less than 4 is relaxed/low intensity, between 4-6 is neutral and more than 6 is excited/high intensity.

To examine how consistently the 10 raters agree with each other, we calculated the Intraclass Correlation Co-efficient (ICC). ICC score of the 10 raters for the valence scale was 0.94, whereas for the arousal scale it was 0.92. These scores represent a good agreement among the raters (Koo & Li, 2016).

4B.2.3 Procedures

Before the commencement of the task, instructions and practice trials were presented to the participants. Once the participants understood the task, they proceeded with the main task. The main task comprised of 120 experimental trials each of which comprised the following steps (Figure 12):

- A fixation cross "+" was presented for 500 ms at the center of the screen.
- Then the emotional facial stimuli (high positive, low positive, neutral, low negative, high negative – any one) were presented for 400 ms.
- Five emotional labels (high positive, low positive, neutral, low negative, high negative) were then presented on the screen till the response was made.

The participants were asked to press the numerical key (numbers from 1 to 5) associated with the particular label that represents emotional expression of the presented stimuli. There was no time constraint on the participants, but they were instructed to respond as accurately and as quickly as possible. Once they finished the task, they were asked to rate how familiar they were with the emotional facial stimuli on a paper based five-point rating scale[44] for both the Indian and the non-Indian facial stimuli.

[44]Rating scale ranges from: Not at all familiar, slightly familiar, somewhat familiar, moderately familiar, extremely familiar.

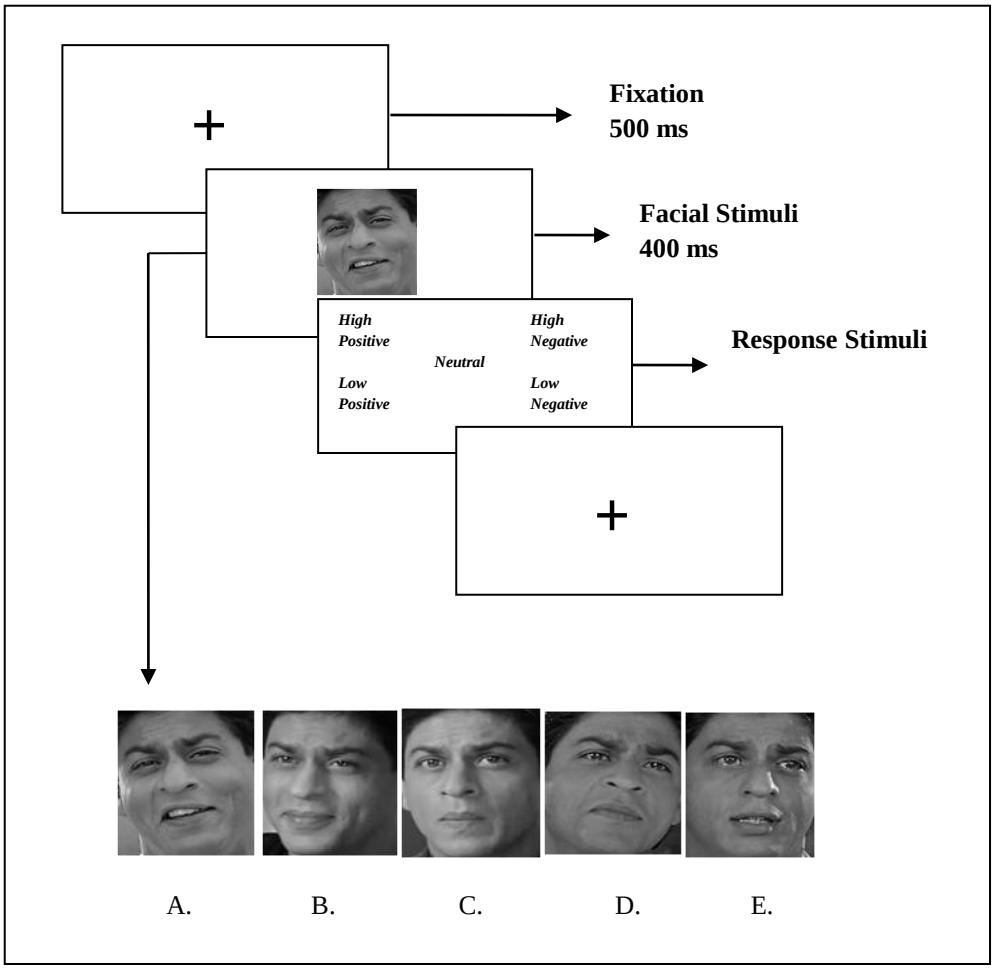


Figure 12. Procedure of 'Facial emotion recognition task' with familiarized facial emotional stimuli.

4B.3 Results

Data analysis was done using the SPSS 20 software. With the help of the MMI score (calculated in Chapter 2), participants were divided into three groups, namely, HMM, MMM and LMM. A one-way ANOVA was initially conducted on the familiarity ratings on facial emotional stimuli[45] given by the HMM, MMM, and LMM. No significant difference was observed among HMM, MMM, and

[45] It was done to be sure that the result is not biased due to the differences in familiarity/unfamiliarity facial stimuli among three groups.

LMM on the familiarity scale of the Indian ($F(2, 117) = 1.44$, $p = 0.24$) and the Non-Indian ($F(2, 117) = 0.35$, $p = 0.71$) facial stimuli. Hence, all the participants were equally familiar with the faces of the emotional stimuli (refer to Table 12 for familiarity ratings of the Indian and the non-Indian facial stimuli for LMM, MMM, and HMM)

Table 12

Familiarity ratings of Indian and non-Indian facial stimuli for LMM, MMM, and HMM

Media Multitaskers	Indian Facial Stimuli M (SD)	Non-Indian Facial Stimuli M (SD)
LMM	4.42 (0.50)	4.12 (0.70)
MMM	4.61 (0.49)	4.04 (0.55)
HMM	4.55 (0.51)	4.15 (0.80)

Note. LMM = Low Media Multitaskers, MMM = Moderate Media Multitaskers, HMM = High Media Multitaskers, M = Mean, SD = Standard Deviation

4B.3.1 Data reduction and analysis

During the course of the experiment, the response time (RT) and the accuracy of the participants were recorded. RTs greater than 2000 ms and less than 50 ms in any trial were omitted from the final analysis.

4B.3.1.1 Emotion recognition accuracy of LMM, MMM, and HMM

For every correct recognition of emotion, a score of 1 was given and accordingly accuracy was calculated for all the participants (see Table 13).

Table 13

Emotion recognition accuracy among LMM, MMM, HMM

Media Multitaskers	Accuracy Score M (SD)	Accuracy Percentage (%)
LMM	113.30 (2.17)	94.42
MMM	112.80 (2.14)	94
HMM	112.82 (1.59)	94.02

Note. LMM = Low Media Multitaskers, MMM = Moderate Media Multitaskers, HMM = High Media Multitaskers, M = Mean, SD = Standard Deviation.

A one-way ANOVA was conducted on LMM, MMM, and HMM with accuracy as the dependent variable and no significant difference in the emotion recognition accuracy among LMM, MMM, and HMM ($F(2, 117) = 0.73$, $p = 0.48$) was found. Further, a separate one-way ANOVA was conducted for each emotional expression and intensity with media multitaskers group as the independent variable and accuracy as the dependent variable. Results suggested that there was no significant difference among HMM, MMM, and LMM in recognizing any of the five emotional expressions – neutral ($p = 0.17$), low positive ($p = 0.97$), high positive ($p = 0.40$), low negative ($p = 0.79$), high negative ($p = 0.27$).

4B.3.1.2 Emotion recognition response time of LMM, MMM, and HMM

A one-way ANOVA was conducted with media multitaskers group as the independent variable and response time as the dependent variable. Results suggested that there was no significant difference in the response time among HMM, MMM, and LMM group ($F(2, 117) = 0.11$, $p = 0.89$). Further, a separate one-way ANOVA for each emotional expression was also conducted with media multitaskers groups as the independent variables and response time as the

dependent variable. Again, results suggested no significant difference among the MMT groups in any of the five emotional expression - neutral ($p = 0.25$), low positive ($p = 0.98$), high positive ($p = 0.09$), low negative ($p = 0.52$), high negative ($p = 0.14$).

Thus, from the above results it can be said that there was no significant difference among HMM, MMM, and LMM in facial emotion recognition task and also there was no specific emotional recognition deficit either. Thus, both hypotheses H4B.1 (which states that HMM will have poor facial emotional recognition ability) and H4B.2 (which suggest that HMM will make more errors in identifying negative facial emotional stimuli in comparison to LMM and MMM) are rejected.

To examine hypothesis H4B.3, we conducted paired t-test separately on HMM, MMM, and LMM with accuracy as dependent variable and 'in-group' and 'out-group' as two within group independent variables.

For LMM, results suggested that there was a significant difference in the accuracy in the 'in-group' and 'out-group' facial stimuli, $t(32) = 6.63$, $p < 0.01$ such that LMM were more accurate in identifying the 'in-group' stimuli ($M = 57.76$, $SD = 1.30$) than the 'out-group' stimuli ($M = 55.55$, $SD = 1.58$).

Similarly, for MMM, paired t-test suggested a significant difference among 'in-group' and 'out-group' stimuli, $t (53) = 3.40$, $p < 0.01$, such that HMM were more accurate in identifying 'in-group' stimuli ($M = 57.00$, $SD = 1.29$) than 'out-group' stimuli ($M = 55.80$, $SD = 2.00$).

However, for HMM, paired t-test suggested no significant difference among 'in-group' ($M = 56.70$, $SD = 1.07$) and 'out-group' stimuli ($M = 56.12$, $SD = 1.24$), $t (32) = 1.95$, $p = 0.06$.

Hence, hypothesis H4B.3 which suggested that HMM will have no specific emotion recognition deficit in 'in-group' versus 'out-group' is accepted.

4B.4 Discussions

The present study aimed to understand the facial emotion recognition ability among LMM, MMM, and HMM. We hypothesized that HMM would perform poorly in comparison to LMM and MMM, especially while recognizing negative emotions. However, our results did not provide any support for this hypothesis. We believe that this may be partly due to the reason that our facial stimuli used in the task were of popular faces which were familiar to all the participants and according to Bruce and Young (1986), individuals process familiar and unfamiliar faces differently. Studies suggested that we can even identify emotions of familiar faces from the facial stimuli even if the image quality is poor. Therefore, due to familiarity and frequent exposure of these faces to the participants results can be influenced. Hence, we decided to conduct a follow-up study with unfamiliar facial stimuli.

4B.5 Follow up study

The set-up of this study was completely similar to that of the previous part of Study 4B except the inclusion of new facial emotional stimuli.

4B.5.1 Preparation of stimuli

The stimuli for this task was again split into ‘in-group’ and ‘out-group’ stimuli. For ‘out-group’ stimuli, we used the static facial stimuli from Amsterdam dynamic facial expression set (Van der Schalk, Hawk, Fischer, & Doosje, 2011). The advantage of using this database was that it had all the five different intensity facial images of models (males and females). Besides, all the models were within the age group of 18-30 years (it has an advantage as research says that age of the facial stimuli can also influence the recognition ability of participants). From the database we initially selected 100 photographs and converted them into black and white ones with dimension 150 x 175 pixel.

For ‘in-group’ stimuli (Indian models (young Indian students)) we created a set of facial stimuli by taking five different emotional intensity photographs of 20 students (age group 18-30 years old). These photographs were of the dimension 150 x 175 pixel and were black and white in color. All these 200 photographs were then shown to 10 undergraduate students for ratings on valence and arousal scale. For average ratings of these photographs please refer to Table 14. Another 20 photographs were selected for practice trials.

Table 14

Average valence and arousal ratings of photographs in high positive, low positive, neutral, low negative and high negative categories

	Average Ratings	
Emotions	Arousal (M)	Valence (M)
High Positive	7.90	7.85
Low Positive	2.32	7.72
Neutral	4.40	4.68
Low Negative	2.44	2.56
High Negative	7.65	2.35

Note. M = Mean

To examine how consistently 10 raters agree with each other, we calculated the Intraclass Correlation Co-efficient (ICC). ICC score of the 10 raters for the valence scale was 0.93, whereas for the arousal scale it was 0.88. The scores represent a good agreement among the raters (Koo & Li, 2016).

4B.5.2 Results

Data was analyzed using SPSS version 20. With the help of the MMI score (measured in Chapter 2), participants were divided into three groups, namely, HMM, MMM, and LMM. A one-way ANOVA was initially conducted

on the familiarity ratings of facial emotional stimuli[46] provided by HMM, MMM, and LMM. No significant difference was observed among HMM, MMM, and LMM on the familiarity scale of the Indian ($F(2, 117) = 0.60$, $p = 0.55$) and the non-Indian ($F(2, 117) = 1.18$, $p = 0.31$) facial stimuli. Hence, all the participants were equally unfamiliar with the faces of the emotional stimuli (refer to Table 15 for familiarity ratings of Indian and non-Indian facial stimuli for LMM, MMM, HMM).

Table 15

Familiarity ratings of Indian and Non-Indian facial stimuli for LMM, MMM, and HMM

Media Multitaskers	Indian Facial Stimuli M (SD)	Non-Indian Facial Stimuli M (SD)
LMM	1.39 (0.50)	1.06 (0.24)
MMM	1.50 (0.50)	1.02 (0.14)
HMM	1.52 (0.51)	1.09 (0.29)

Note. LMM = Low media multitaskers, MMM = Moderate media multitaskers, HMM = High media multitaskers, M = Mean, SD = Standard Deviation.

4B.5.2.1 Data reduction and analysis

Participants' response time (RT) and accuracy were recorded. RT greater than 2000 ms and less than 50 ms in any trial was omitted from the final analysis.

4B.5.2.2 Emotion recognition accuracy of LMM, MMM, and HMM

For every correct recognition of emotion, a score of 1 was given and accordingly accuracy was calculated for all the participants (see Table 16)

[46] It was done to be sure that the result is not biased due to the differences in familiarity/unfamiliarity facial stimuli among three groups.

Table 16

Emotion recognition accuracy among LMM, MMM, and HMM

Media Multitaskers	Accuracy Score M (SD)	Accuracy Percentage (%)
LMM	112.24 (1.94)	93.53
MMM	111.94 (2.97)	93.28
HMM	110.03 (1.90)	91.69

Note. LMM = Low media multitaskers, MMM = Moderate media multitaskers, HMM = High media multitaskers, M = Mean, SD = Standard Deviation.

A one-way ANOVA was conducted on LMM, MMM, and HMM with accuracy as the dependent variable and a significant difference in the emotion recognition accuracy among LMM, MMM, and HMM ($F(2, 117) = 8.32$, $p < 0.005$) was found.

Further, a separate one-way ANOVA was conducted for each emotional expression and intensity with media multitaskers group as the independent variable and accuracy as the dependent variable. Results suggested that there was a significant difference among HMM, MMM, and LMM in emotion recognition in two out of the five emotional expressions – neutral and low negative intensity. In case of neutral emotion ($F(2,117) = 13.63$, $p< 0.005$), Tukey post hoc analysis revealed that LMM ($M = 20.03$, $SD = 1.47$) were significantly better than HMM ($M = 18.45$, $SD = 1.52$) in recognizing emotions of neutral faces. However, there was no difference between MMM ($M = 20.17$, $SD = 1.63$) and LMM or HMM. In case of low negative emotion ($F(2,117) = 3.43$, $p < 0.05$), Tukey Post Hoc analysis revealed that LMM ($M = 20.90$, $SD = 1.35$) were significantly better than HMM ($M = 20.06$, $SD = 1.46$) in recognizing emotions of neutral faces. However, there was no difference in MMM ($M = 20.76$, $SD = 1.47$) with LMM or HMM. There was no significant difference among HMM, MMM, and LMM in emotion

recognition in other three emotional expression low positive ($p = 0.16$), high positive ($p = 0.56$), high negative ($p = 0.35$).

4B.5.2.3 Emotion recognition response time of LMM, MMM, and HMM

A one-way ANOVA was conducted with media multitaskers group as the independent variable and response time as the dependent variable. Results suggested that there was a significant difference in the response time among HMM, MMM, and LMM group ($F (2, 117) = 256.03$, $p < 0.005$). Tukey post hoc analysis revealed that HMM ($M = 21007.48$, $SD = 111.22$) showed longer response time in comparison to LMM ($M = 20441.85$, $SD = 87.96$) and MMM ($M = 20720.24$, $SD = 103.06$) in identifying facial emotion recognition.

Thus, from the above discussion, it can be said that HMM performed significantly worse in case of facial emotion recognition task in comparison to MMM and LMM especially in identifying the neutral and low negative emotional expressions. Thus, the hypotheses H4B.1 and 4B.2 are accepted.

To test hypothesis H4B.3, we conducted paired t-test separately on HMM, MMM, and LMM with accuracy as dependent variable and 'in-group' and 'out-group' as two within group independent variables.

For LMM, result suggested that there was a significant difference in the accuracy in 'in-group' and 'out-group' facial stimuli, $t(32) = 10.13$, $p < 0.005$ such that LMM were more accurate in identifying 'in-group' stimuli ($M = 57.70$, $SD = 1.24$) than 'out-group' stimuli ($M = 54.55$, $SD = 1.39$).

Similarly, for MMM, paired t-test suggested a significant difference among 'in-group' and 'out-group' stimuli, $t (53) = 6.37$, $p < 0.005$, such that HMM were more accurate in identifying 'in-group' stimuli ($M = 57.05$, $SD = 1.27$) than 'out-group' stimuli ($M = 54.89$, $SD = 2.44$).

However, for HMM, paired t-test suggested no significant difference among 'in-group' ($M = 55.21$, $SD = 1.19$) and 'out-group' stimuli ($M = 54.88$, $SD = 1.19$), $t (32) = 1.25$, $p = 0.22$

Hence, hypothesis H4B.3 is accepted.

4B.6 Discussions

The aim of our study was two-fold: first, assessing the emotion recognition ability of LMM, MMM as well as HMM, and to assess whether there was any valence or intensity specific deficit; and second, to examine whether there was any 'in-group' bias in emotion recognition ability among LMM, MMM, and HMM.

Interesting results emerged when we replaced the familiar facial stimuli with the unfamiliar ones in the second part of the study. It was observed that LMM have significantly better emotion recognition ability in comparison to HMM when emotional stimuli were presented for a brief period of time. Further, HMM were found to make more errors in identifying neutral and low intensity of negative facial emotional stimuli. This result is analogous to our emotional attentional bias study where we observed that HMM usually pay more attention to positive facial stimuli in comparison to negative ones. The positive attentional bias may be one such factor that might have helped HMM identifying positive emotional stimuli and limit identifying low intensity negative emotion. Further, from Chapter 2 we already know that our sample HMM group have higher multitasking habits during face-to-face interaction in comparison to LMM and MMM. This may be an additional hindrance that might have limited their ability to recognize emotional stimuli when presented for a shorter duration. The implications of these results are alarming because consciously or unconsciously, HMM are learning to avoid negative emotional states instead of facing it. As a result, they could not decode negative or neutral emotions of anonymous people which may result in poor social interaction and relationship. The consolation is, with the known or familiar faces no such recognition deficit was observed among HMM.

Additionally, in both the experiments one common thing we observed is that HMM did not display any 'in-group' bias during emotion recognition task, and made equal numbers of errors when the Indian and the non-Indian facial stimuli were presented. This was not the case for LMM and MMM group who

took the advantage of ‘in-group’ favoritism and made less errors in identifying emotions from the Indian facial stimuli as compared to the non-Indian ones. This finding is consistent with other studies which suggested that divided attention or poor attention allocation during encoding stage usually mitigate ‘in-group’ bias (Young, Bernstein, & Hugenberg, 2010; Zhou, Pu, Young, & Tse, 2014).

However, our results should be taken with caution as the facial stimuli we prepared for the task were not the standardized ones. Future research endeavors in this direction should involve more standardized emotional stimuli. The futures studies may also involve dynamic facial stimuli which, some researchers (Torro, 2013) found, are superior to the static ones used in the present study.

Subchapter 4C

Study 4C: The Processing of Self-referential Emotional Stimuli by Media multitaskers

4C.1 Introduction

In the previous studies 4A and 4B we have analyzed that HMM have markedly more attention towards the positive visual emotional stimuli than LMM and HMM, and they have poor emotion recognition ability of unfamiliar facial emotional stimuli. This aspect of studying emotional stimuli pertains to non self-referential emotional stimuli.

In this study, we aim to examine how LMM, MMM, and HMM process emotional stimuli when it is related to self[47]. Self-referential emotion refers to the process of assessing emotional stimuli related to one self or one's personal experience.

It was argued that the 'self-reference' attached to any stimulus plays a big role in the processing and regulation of emotions (Herbert, Pauli, & Herbert, 2011). People process the self-referential emotional stimuli preferentially quicker than other stimuli thereby allowing for goal directed behavior (Zhou, et al., 2017). This behavior persists even when an individual is in a sleepy state (Blume, et al., 2017). Thus, the way we identify, categorize and store positive and negative information surrounding us depends to a great extent on our self-reference attached to it.

Studies on the processing of self-referential emotional information suggested that people usually display bias towards positive information such that they tend to identify and categorize positive information about themselves more quickly than negative information (Allison, Messick, & Goethals, 1989;

[47]There are various ways we can present self-referential emotional stimuli to a participant and study the processing of those stimuli. Emotional stimuli exhibited in the present Study 4C, however, are semantic in nature. The stimuli appear in the form of the self-referential words.

Messick, Bloom, Boldizar, & Samuelson, 1985; Watson, Dritschel, Jentzsch, & Obonsawin, 2008). According to Mezulis, Abramson, Hyde, and Hankin, (2004) it occurs because individuals attribute positive information or outcomes with their stable and global personality traits and negative information are perceived as unassociated with their personality characteristics.

However, in certain cases like affective or personality disorders or while being in temporarily negative emotional state, individuals often entail negative biased processing (Denny & Hunt, 1992; Winter, 2016). The reason is, they pay the maximum attention to or ruminate over that self-referential emotional information which are mostly negative in nature (congruent with his/her emotional state) (Watson, Dritschel, Jentzsch, & Obonsawin, 2008).

With the arrival of the new media this consciousness about the self has increased manifold (Fox & Rooney, 2015). The social media activities have largely been dedicated to creating illusive rose-colored glass images of the lives of the users. People are taking utmost interest in checking the 'likes' (on the Facebook, for example), in posting on the social media or in capturing 'selfies' (Sorokowski, et al., 2015). These different media entice individuals to repeatedly check different media platforms to get some positive and rewarding comments about oneself which eventually lead to excessive media multitasking behavior. Media multitasking is also escalated due to the fear of missing out any self-referential information (Przybylski, Murayama, DeHaan, & Gladwell, 2013). These observations prompt us to ask the following question: when habitual media multitaskers are exposed to myriad of emotional information from several media (can be at different times or at the same time) specifically related to 'selves' do they show any bias towards positive or negative information?

In order to explore this question, we rely on a widely used self-referential task (Bentley, Greenaway, & Haslam, 2017; Symons & Johnson, 1997). In this task participants were shown some words (which are categorized into — 'likeable' and 'positive' words, and 'dislikeable' and 'negative' words), and were asked whether they would 'like/dislike' if described by those words.

Since, HMM are found to be associated with the narcissistic tendency (over admiration for the self) (Lee, Murphy, & Andrew, 2018) and show positive bias towards non-self-emotional stimuli, we hypothesize that HMM will show positive bias for self-referential emotional stimuli as well. This translates into the following:

H4C.1: HMM will take less time in liking positive words over negative words in comparison to LMM and HMM

4C.2 Media multitaskers and memory for self-referential emotional words

Research suggests that excessive media multitasking habit usually reduce the ability of brain to store new information. In an empirical study by Uncapher, Thieu, and Wagner, (2016) researchers found four important findings with respect to the memory of HMM. First, HMM displayed a deficit in working memory capacity in comparison to LMM. They suggested that it is the inability of HMM to encode or maintain information in working memory that resulted in poor task performance. Second, this working memory deficit was not confined only to task related stimuli like rectangles but was extended to common objects (like bird, aeroplane etc.) that we encounter in daily lives. Third, researchers found that this memory deficit was manifested in long term memory as well such that HMM displayed worse performance in comparison to LMM when the former were asked to recall previously shown target information. Fourth, they observed that this working and long-term memory deficit in HMM was found even during single tasking condition. However, this study is limited with respect to the stimuli that have been employed in the task. The stimuli involved were non-emotional and non self-related.

In the current study we have used self-referential emotional stimuli. The advantages of self-referential words are that they have mnemonic properties and that information is more deeply and elaborately encoded and stored when it is related to self (Klein, Loftus, & Burton, 1989). Even though HMM were found to have poor memory, yet with the availability of mnemonic cues maybe the performance would have been otherwise. The availability of the cues may be one of the reasons why other researchers

(Minear, Brasher, McCurdy, Lewis, & Younggren, 2013) did not find working memory deficit among HMM. Besides, researchers suggested that there are several types of memory and that individual process information differently. Thus, HMM may be poor in working and in long term memory but not so in other types of memories like the autobiographical one. Hence, we aim to examine whether there is any deficit in memory performance related to self-reference emotional words among HMM in comparison to LMM and MMM.

4C.3 Retrieving information: recognition versus recall

When an individual retrieves information from the memory it can be done by two ways – free recall and recognition. The difference between the two lies in the number of cues that aids in retrieving information. In free recall**,** the number of cues available to retrieve any information is less in comparison to recognition. Hence during free recall, the amount of workload is higher and individual performance tends to be poorer than that in the recognition task. Since HMM have a breadth bias attention, they may focus on all the stimuli, and as a result, when a cue comes in front of them, they may perform better in the recognition task than in the recall task. In everyday lives we use both recall and recognition procedure and even their combination to retrieve information, and hence it seems rational to use both the recall and recognition task to understand media multitaskers' performance in retrieving the self-referential emotional words. From the above discussions, we hypothesize,

H4C.2: HMM will perform poorly in free recall task in comparison to LMM and MMM and they will recall more positive words in comparison to negative words.

H4C.3: There will not be any significant variation in the recognition of the self-referential emotional words among HMM, MMM and LMM. However, HMM will recognize more positive words than negative one.

4C.4 Methodology

4C.4.1 Participants

The same sample[48] that consisted of 120 undergraduate students from a reputed institute of technology in India participated in the study voluntarily. They were in the age range of 18 to 24 years (Mean (M) age was 20.9 years, Standard Deviation (SD) = 1.29) and 70% of them were males.

4C.4.2 Materials

The current study comprises of three tasks: Emotional Categorization, Emotional Recall and Emotional Recognition. In all the three tasks emotional words were used as task stimuli.

4C.4.2.1 Construction of task stimuli

A set of 100 positive and negative personality words were prepared for the task. Two steps were followed in the selection of the words, 1) words were first selected from the list of affective English words developed by Warriner, Kuperman, and Brysbaert, (2013). In this list researchers provided the valence, arousal and dominance ratings of nearly 14000 English words. We selected those personality related words whose valence ratings were above 6 (in 9-point rating scale) and below 4 (in 9-point rating scale) and categorized them as positive words and negative words respectively. 2) Next, we checked the likeableness value of each selected words from the 'Anderson list of likeableness ratings (1968)'. We categorized words whose value were greater than 300 as the 'the most-desirable' or 'likeable' words. Whereas, words whose ratings were less than 300 were identified as 'the least-desirable' or 'dislikeable' words. Our final criteria for selection was — words whose valence rating was equal to or greater than 6 and likeableness rating was greater than 300 were categorized as positive/likable words. Words whose

[48]The same pool of participants participated in all the questionnaire and experiment-based study throughout the thesis work.

valence rating was less than 4 and likeableness rating was less than 300 were classified as negative/dislikable words.

As a result, we got 50 positive (mean (M) valence = 7.21, mean (M) likeableness = 480.76) and 50 negative (mean (M) valence = 2.56, mean (M) Likeableness = 25.68) words (for list of words see Appendix D.1).

For emotional categorization task we took 25 positive and 25 negative words from our prepared list and for emotional recognition task we took all the 100 words (50 positive and 50 negative).

Emotional categorization and emotional recognition tasks were administered through a 15-inch HP laptop. Presentation of task stimuli and recording of responses was done through OpenSesame (Mathôt, Schreij, & Theeuwes, 2012) software. Emotional recall task was a pen-paper based one.

4C.4.3 Procedures

Once participants were comfortably seated in front of the laptop screen, emotional categorization task was given. Initially, instructions were provided to them and then the main trial started. 50 positive and negative self-referent personality words were displayed on the screen one by one (with no time constraint) and participants were instructed to express whether they would 'like' or 'dislike' if described by those words by pressing the designated key ('l' for like and 'd' for dislike) as quickly as possible. Participants' response time and correct categorization score[49] were recorded. After a gap of 15-20 minutes[50] participants were given emotional recall task. They were asked to recall and write on the sheet of paper as many words as possible from the emotional categorization task within 2 minutes. The number of correct emotional words recalled was recorded.

After 15-20 minutes of emotional recall task, participants performed emotional recognition task. It was a computerized task and 100 emotional

[49] Correct categorisation score is 1 when the participants 'like' the 'positive/likable' words or'dislike' the 'negative/dislikable' words.

[50]During this period participants were indulged in other experimental task.

words were presented on the screen one by one. Out of 100 words, 50 words were from the emotional categorization task and other 50 words were distractor words. Participants' task was to identify words that were present in the emotional categorization task by pressing the key '1' for 'Yes' and '2' for 'No'. Correct recognition and correct rejection scores were recorded along with response time.

The order of the 3 tasks was same for all the participants.

4C.5 Results

SPSS 20 was used for statistical analysis.

4C.5.1 Emotional Categorization Task

A one-way ANOVA was conducted on media multitaskers group with correct categorization[51] score as a dependent variable. Results suggested that there was no significant difference between HMM, MMM, and LMM, $F (2, 117) = 1.38$, $p = 0.26$ in categorization score.

A two-way ANOVA (3 X 2) was conducted to check whether there is any significant difference in the media multitaskers group (LMM, MMM, HMM) and valence (positive, negative) on correct categorization score. Results suggested that there is no significant interaction effect observed between Media multitaskers group and valence, $F (2, 234) = 1.67$, $p = 0.19$, partial $\eta^2 = 0.014$. Also, there is no significant main effect observed for media multitaskers group, $F (2, 234) = 1.34$, $p = 0.26$, partial $\eta^2 = 0.011$ and valence, $F (1, 234) = 1.16$, $p = 0.28$, partial $\eta^2 = 0.005$.

Another two-way ANOVA (3 X 2) with media multitasking group (LMM, MMM, and HMM) and valence (positive and negative) as independent variable and response time as a dependent variable was conducted. Results suggested that there was a significant interaction effect between media multitasking groups and valence for response time, $F (2, 234) = 6.44$, $p <$

[51]Categorization for 'likeable' or 'dislikeable' words

0.0005, partial η^2 = 0.052. Also, a significant main effect was observed for media multitasking groups, F (2, 234) = 4.80, p < 0.05, partial η^2 = 0.039 and valence, F (1, 234) = 7.06, p < 0.05, partial η^2 = 0.029. A pair wise comparison suggested that HMM differ from LMM and MMM in response time during positive words such that HMM (M = 163.68) were faster in liking positive words than LMM (M = 166.46) and MMM (M = 164.48). There was no response time difference in HMM, MMM, and LMM during negative words.

Hence hypothesis 4C.1 which states HMM will take less time in liking positive words over negative words in comparison to LMM and HMM is supported.

4C.5.2 Emotional Recall Task

A one-way ANOVA was conducted for media multitasking groups as independent variables and correct words recalled as dependent variable. A significant difference was observed F (2, 117) = 3.95, p < 0.05. Games Howell[52] post hoc analysis revealed that the recall score of LMM (M = 5.09, SD = 0.95) was significantly higher than that of HMM (M = 4.33, SD = 1.36). But no difference of MMM (M = 4.61, SD = 1.04) with either LMM or HMM was observed. Further, a one-way ANOVA was separately conducted on the recall of positive and negative words. Result suggested that there was a significant difference in the recall score of positive words, F (2, 117) = 5.14, p < 0.05. Tukey post hoc analysis revealed that LMM (M = 2.61, SD = 0.61) scored significantly higher than HMM (M = 2.00, SD = 0.87).

A one-way ANOVA conducted on the recall of negative words suggested no significant difference in the recall score of negative words in LMM, MMM, and HMM F (2, 117) = 1.00, p = 0.37.

In order to examine the recall bias toward positive or negative words among LMM, MMM, and HMM, we conducted a paired t-test. Results suggested that both LMM (t (32) = 0.89, p = 0.38) and MMM (t (53) = 0.72, p

[52]Levene's test of homogeneity of variance was violated, p = 0.02

= 0.47) show no significant difference in the positive and negative recall. However, in case of HMM we found a significant difference (t (32) = -2.07) = 0.89, $p < 0.05$) in the recall of positive and negative words such that HMM recall more negative (M = 2.33, SD = 0.78) words than positive (M = 2.00, SD = 0.87).

Hypothesis 4C.2 which suggests that HMM will perform poorly in free recall task in comparison to LMM and MMM and they will recall more positive words in comparison to negative words is partially accepted.

4C.5.3 Emotional Recognition Task

We first calculated the total recognition score for positive and negative words. Here one point was given for every correct recognition and correct rejection of words. Their combined score determined the recognition score. The maximum points a single participant can attain was 100 (50 for positive and 50 for negative recognition).

A one-way ANOVA was conducted for media multitaskers group as independent variable and total recognition score as dependent variable. Result suggested a significant difference in the overall recognition score among LMM, MMM, and HMM, $F(2, 117) = 26.18$, $p < 0.0005$. Tukey post-hoc analysis revealed that LMM (M = 56.39, SD = 4.51) recognized significantly more words than MMM (M = 51.93, SD = 3.41) and HMM (M = 49.79, SD = 3.68). Also, MMM recognized more words than HMM.

A two-way ANOVA (3 X 2) with media multitasking group (LMM, MMM, HMM) and valence (positive and negative) as independent variables and total recognition score as a dependent variable was conducted. Result suggested that there was a significant interaction effect between media multitasker groups and valence for total recognition score, $F (2, 234) = 20.41$, $p < 0.0005$, partial $\eta^2 = 0.149$. Also, there is a significant main effect observed for media multitaskers group, $F (2, 234) = 26.13$, $p < 0.0005$, partial $\eta^2 = 0.183$ and valence, $F (1, 234) = 5.29$, $p < 0.05$, partial $\eta^2 = 0.022$. A pair wise comparison suggested that LMM had a significantly better recognition score of positive words (M = 30.09) in comparison to HMM (M = 25.03) and MMM

(M = 25.17). There was no significant difference between HMM and MMM. Similarly, LMM had a significantly better recognition score of negative words (M = 26.30) in comparison with HMM (M = 24.76). But their score was not so different from that of MMM (M= 26.76).

In order to examine the recognition bias toward positive or negative words among LMM, MMM, and HMM, we conducted a paired t-test. Results suggested that both LMM ($t(32) = 4.92$, $p < 0.0005$) and MMM ($t(53) = -3.64$, $p < 0.0005$) show significant difference in the recognizing positive and negative words. However, in case of HMM there was no significant difference ($t(32) = 0.38$, $p = 0.70$) in the recognition of positive and negative words.

Hence the hypothesis H4C.3 which suggested that there will not be any difference in the recognition score of LMM, MMM, and HMM is not supported.

4C.6 Discussions

The purpose of the study was to understand whether LMM, MMM, and HMM differ in the processing of self-referential emotional stimuli and whether there is any valence (positive or negative) specific bias towards self-referential emotional stimuli. Three tasks (emotional categorization, emotional recall and emotional recognition) were conducted to examine the purpose. In the emotional categorization task, we observed that HMM expressed his/her liking for positive words quicker than LMM and MMM, but there was no variation in the response time among HMM, MMM, and LMM in expressing disliking for negative words. These findings are consistent with the studies (Lee, Murphy, & Andrew, 2018) that suggest that HMM display self-admiration behavior.

In the memory-based tasks, our results suggest that HMM had a memory deficit for self-referential emotional words in both the recall and recognition task in comparison to LMM and MMM. Further, we analyzed that HMM recalls negative words more than positive words. However, in recognition task, no positive or negative bias was observed among HMM (though HMM were quicker in recognizing negative words than positive). This is a vital finding from several aspects. At first, it lends its support to the

memory studies which suggested that excessive media multitasking habit leads to poor memory. Our finding extends this observation even for the self-referential emotional words. It was often suggested that self-referential words are encoded deeply in the mind of an individual and hence are stored for a long time. But, continuously immersion in media leads to shallow attention and one may conjecture that the heavy dependence on the memory of the media devices such as phone numbers stored in cell-phones, search engines (Google, for example) for finding out any information instantly, aids in multitasking and lead to a weakened memory of an individual. This memory deficit was observed even in the recognition task where we thought that the presence of cues would mitigate any memory differences among HMM, MMM and LMM.

Secondly, contrary to our previous studies related to non-self-facial emotional stimuli where we observed that HMM displayed positivity bias, in the case of self-referential stimuli there was an indication of bias towards negativity. This implies that since HMM tend to remember negative information about them, they tend to look for the positive non-self-stimuli in the environment to improve their emotional states or mood. It is consistent with the observation made by Adler and Benbunan-Fich, (2013) who stated that self-interruptions or negative emotional states of an individual motivate towards media multitasking behavior, and may be explained through 'mood management theory' where individual often select different media to improve his/her mood.

Chapter 5

A Coda of our Findings and Discussions

We have now trodden a fairly long path to understand how different groups of media multitaskers vary in the manifestations of their emotions and how similar/dissimilar they are in processing emotions. But there are many more miles to go. No study is, by any means, ever complete and it evolves like a living organism every time it is visited and revisited. The present chapter will not put any new results or analysis, rather, it is the time to pause and ponder what we wanted to learn, what we have learnt so far and where this learning can lead us to.

The present thesis talks about a relatively recent leaning of people i.e. media multitasking. Millions of human beings indulge in this behavior, day in and day out. The data shows that this behavior is ubiquitous, and one of our aims is to understand how media multitaskers differ in terms of experiencing and controlling emotions and how they process emotional stimuli. There has already been several studies on the media multitasking habits of people from different countries but the information about the media multitasking habit of the Indians, that consist of one of the largest internet and smartphone user bases in the world, is scant. Another prime objective of this thesis is to bridge this gap.

Under the light of this discussion, we first identified the pattern and predictors of media multitasking behavior of the Indian college students aged between 18 to 24 years. This age group has been chosen because on carefully analyzing the national survey data we believe that this is the age group which mostly yields to this behavior. Also, college environment is one such setting where college students voluntarily chose to media multitask without any intervention. The participants in our study spent most of the time surfing websites, engaging in instant messaging or in social media use and watching videos on computer. The average time devoted for each of these media was 2.87 hours, 2.02 hours and 1.97 hours respectively. The average Media Multitasking Index of the present sample was found to be 4.24 which means

that on the average the participants used approximately 4 media during a typical media usage hour. This value is worth paying attention to as this is one of the earliest laboratory based estimations of the Media Multitasking Index (MMI) of the Indian college students. This value may be compared with those obtained for people from other countries (for examples refer Table 1) and emphasizes the fact that the Indian college students are not far behind the global trend.

Pattern of media multitasking habit indicated that concurrent media use behavior increases when people get involved in Instant Messaging (IM), sending SMS, web surfing and while using other computer applications. Besides, media multitasking was the least when people play computer games, listen to non-music audios and attend phone calls. It is interesting to see that the task combinations chosen by the Indian college students for multitasking is in keeping with the fact that people often choose the media combinations which have the least cognitive load (Carrier, Cheever, Rosena, Beniteza, & Changa, 2009). IM, SMS and other computer applications were mostly seen to be combined with music. On the other hand web-surfing was mostly accompanied by other web surfing activities.

With regard to media multitasking behavior during face-to-face interaction our result suggested that on an average, participants spent 1.54 hours on a typical day in doing face-to-face interaction and also indulged in one to two media while doing face-to-face interaction, but this duration of interaction differs from LMM to HMM. Since the participants were young students and college hostellers, they could afford to media multitask during face-to-face interaction owing to the absence of any strict supervision. At home, there is a possibility of intervention by the parents which may lead to the constraints on their media activities. This aspect of varying media multitasking habit with a change in one's accommodation settings can be another future subject matter to be investigated in detail.

Next, we identify that the media factor like the duration of ownership of media and the audience factors like age, gender, personality traits (openness to experience, conscientiousness, extraversion, agreeableness &

neuroticism) to be the predictors of media multitasking and obtained the following relationships:

- Duration of ownership of media was found to be positively related with media multitasking behavior. The findings supported the proposed hypothesis H2.1. It suggested that the participants who possessed smartphones and/or computers for more than a year media multitask the most. This behavior is consistently observed in other countries as well (Jeong & Fishbein, 2007). Researchers suggested that the accessibility of media devices impart some social status on the user which generates pleasure. So, the primary motivation may be the attainment of pleasure through the social recognition. But it may so happen that after owning these devices people start exploring them and yield to the behavior of media multitasking which again acts as an alternative source of pleasure.

- With reference to age, we hypothesized that the young participants will media multitask the most. Contrarily, we observed that media multitasking behavior is more common in older students than in the younger ones. Hence, the hypothesis H2.2 was not supported. This observation is diametrically opposite to the ones reported by many other researches (Kononova & Alhabash, 2012; Voorveld, Seijn, Ketelaar, & Smit, 2014). This difference may be a consequence of the cross-cultural difference in media use among the younger people. Our sample represented students from India which is very diverse country socially and culturally. Even among the urban residents, there exists a wide digital gap among those from the metro cities, cities, and from the smaller cities. When students from different background come to a nationalized university, they might start off with different media exposure and those with very less media exposure may start off as low media multitaskers. Being subjected to media environment for few years out of peer pressure and enjoyment their media multitasking frequency increases, However, no generalization of this inference to the entire Indian population, which is much more diverse, is intended.

Studying the effect of demographic difference on the media multitasking habits of the Indians may be another interesting research topic to be pursued in the long run. Also, since the sample age groups was between 18-24 years, we may extend our research for people from other age groups (like teens or middle age people etc.) in future.

- As far as gender is considered, we expected that since the male population in the national sample had more access to media facility, they would display more media multitasking behavior in comparison to the females even in our sample group. But, the hypothesis H2.3 was not supported. The findings suggested no significant difference in media multitasking behaviour between the male and female participants. The reason may be that as our sample comprised of hostellers and engineering students from the same institute, and all the students, male or female, got a nearly uniform media exposure. Hence, no significant difference in media multitasking behaviour between them was observed. So, we can infer that digital divide among the gender is not too prominent when all of them are exposed to similar media ambiance. However, our results should be interpreted with caution as the number of males way exceeded the number of females in our sample. So, in future more uniformity in the number of participants from each gender group may be sought for.

Hence, to summarize, we suggest that both age and gender act as predictors of media multitasking behavior of Indian students, but their connection with coincident media use behavior may strongly depend on the cultural backdrop of the sample.

Next we summarize our findings about the relationship between the Big Five personality traits and media multitasking.

- We found that higher openness to experience was positively related with media multitasking behaviour. This is consistent with our hypothesis H2.4. It may be so because it is easy for people with this

trait to reorient themselves in getting back to an interrupted task. This favors media multitasking and easy access to pleasure.

- With regards to the trait conscientiousness, we could not find any significant relationship with media multitasking behaviour. Hence, the hypothesis H2.5 was not supported. We believe that the context of the environment may influence this relationship. For example, Salomon, Ferraro, Petros, Bernhardt, and Rhyner, (2016) found an indirect relationship of conscientiousness with automated multitasking environment. Since, the current research was based on individuals free choice of media multitasking behavior, conscientiousness does not play much role. Future research should explore more.

- Higher extraversion was found to be positively related with higher media multitasking leaning. This contradicts our hypothesis H2.6. The relationship between extraversion and media multitasking may appear to be in contrast with the findings of Wang and Tchernev, (2012) who found that extraversion is not related with multitasking with media. Since India has a collectivist social structure, socialization with others is very common. As a result, people frequently check social media status and get involved in media multitasking behavior. Indeed, we found that our sample media multitasked mostly with Instant Messaging followed by Short Messages Servicing. This result is aligned with previous studies (Correa, Bachmann, Hinsley, & Zuniga, 2013; Zuniga, Diehl, Huber, & Liu, 2017) who found that the need for belonging and connecting with others is usually high among people having extraversion trait.

- Further, we did not find any significant relationship between agreeableness and media multitasking behaviour. This supports our hypothesis H2.7. This inference is also supported by other studies, too (Hwang & Jeong, 2018).

- Lastly, individuals with higher level of neuroticism were found to be indulged in high media multitasking behavior. This supports the hypothesis H2.8. This trait was observed to be a predictor of media multitasking behaviour in all the prior studies, too (Johansson & Fyhri, 2017; Mark, Iqbal, Czerwinski, Jones, & Sano, 2016; Wang & Tchernev, 2012). This fact demonstrates that emotional instability is an important antecedent of media multitasking behavior.

Another important aspect of our studies is to compare the emotional profiles of different groups of media multitaskers. The emotional profiles in the present study consists of five components viz. positive emotions, negative emotions, tense arousal, energetic arousal, and emotional control. Each of these components were compared separately among different groups of media multitaskers to elucidate how they differ in experiencing and controlling emotions in everyday lives at the level of basic dimensions. In our study media multitaskers were categorized into three types. They were High Media Multitaskers (Mean MMI = 5.74, no. of participants = 33), Moderate Media Multitaskers (Mean MMI = 4.30, no. of participants = 33), and Low Media Multitaskers (Mean MMI = 2.64, no. of participants = 33). Following conclusions are drawn after comparing HMM, MMM, and LMM on each of the emotional profile components:

- HMM group experienced higher positive and higher negative emotions in comparison to LMM and MMM. This is consistent with the hypothesis H3.1 and H3.2.
- HMM displayed higher tense and energetic arousal in comparison to LMM. This supports the hypothesis H3.3.
- HMM reflected lower emotional control in comparison to LMM. It is because HMM seek for pleasure in the act of media multitasking and can not control their urge to do it exhibiting poor emotional control. Hence hypothesis H3.4 is supported.

Thus, we can infer the emotional profile of HMM in the present sample, such that they have higher valence (positive and negative emotions) and higher

arousal (tense and energetic) but lower emotional control in comparison to LMM.

It is however, worthwhile to point put some limitations of the study which may be addressed in the long run. First of all, the emotional experience of the participants is averaged out in a sense that the incongruence of emotional experience, if any, while media multitasking and while refraining from it was not taken into account. Second of all, these studies tacitly assume that media multitasking is a choice of an individual and hence, situations where an individual is subjected to concurrent media use because of her profession (e.g. business processing organizations, call centres etc.) or owing to some other compulsion were ruled out. Considering these possibilities may add new dimensions to the study under discussion. And last but not the least, experience sampling method or other observation techniques in conjunction of self-report techniques should be used in future for more robust results. In spite of these, the present study stands as a stepping stone in understanding the media multitasking behavior and the emotional profile of the young Indian multitaskers. It demonstrated the differences in emotional experiences among High, Low and Moderate Media Multitaskers. This may help future researchers to identify intervention techniques to combat the effect of excessive media multitasking behavior on emotional experiences.

Hence, we establish the fact that the emotional profile of the HMM shows clear distinction from those of the MMM and the LMM. Also, from Chapter 2 we analyzed that HMM, MMM, and LMM differs in Big Five personality traits and that HMM expressed higher disruption and displacement during face-to-face interaction. Thus, we conjecture that the emotional stimuli, when presented to different groups of media multitaskers shall undergo very different processing rituals. In other words, markedly different media multitasking habits may lead to an idiosyncratic processing of emotional stimuli. There are a number of studies which examine the effect of induced emotions on multitasking performance or employed emotional distractors (Cooper, 2013) but there is few attempt to study the processing of emotional stimuli among different groups of media multitaskers. In the present study the

processing of emotions has been studied through computerized experimental tasks. These tasks were discussed in the Subchapters 4A, 4B and 4C (describing Studies 4A, 4B and 4C respectively). Inferences drawn from each of the studies are detailed below.

In Subchapter 4A, which aims to investigate the attentional bias of HMM, MMM, and LMM towards emotional stimuli, we found that HMM were more attentive towards positive stimuli and they chose to avoid negative stimuli when presented with neutral stimuli. This is consistent with our hypothesis H4A.1. It can be inferred that media act as a mood regulators and hence, HMM tend to avoid negative stimuli and prefer the positive ones. This study however, has certain limitations which may be taken care of in future. Since, we introduced familiar popular faces, the response may be influenced by the familiarity because of participant's personal approach/avoidance behavior towards those faces no matter what emotion the faces showed. Second, we could not control the group differences in HMM, MMM, and LMM in several emotional and personality variables. Third, the presentation time of the facial emotional stimuli was not varied.

Subchapter 4B, which deals with the facial emotion recognition ability of the media multitaskers, has two sub-parts. In one part the participants were presented with familiar faces (i. e. famous actresses/actors) and were asked to identify the emotions on their faces. In the second part, the familiar faces were replaced with those of the unfamiliar individuals and the same experiment was repeated. The conclusion which we drew from these studies is interesting. While in the first experiment the facial emotion recognition ability of HMM was found to be not so substantially different from those of MMM and LMM, the second experiment found that LMM have significantly better emotion recognition ability in comparison to HMM when emotional stimuli were presented for a brief period of time (i.e. 400 ms). It was also found that HMM made more errors in identifying neutral and low intensity of negative facial emotional stimuli. Thus, hypotheses H4B.1 and H4B.2 were supported in second part of the study and not in the first one. These results have also established the negative impact of excessive media multitasking behavior in

emotional functioning. Hence poor face-to-face interaction, emotional dyseregulation and deficit in cognitive processes may some of the factors those are giving rise to this poor emotional functioning. However, the consolation is, with the known or familiar faces no such recognition deficit was observed among HMM.

In both the parts it appeared that both LMM and MMM group took the advantage of the 'in-group' favoritism and made fewer errors in identifying emotions from the Indian facial stimuli when compared with the non-Indian ones, but no 'in-group' bias was observed among HMM. The findings, thus, supported Hypothesis 4B.3. It is suggested that under divided attention, recognition memory of the individual decreases and hence this 'own-group' bias ceases to exist.

However, the facial stimuli we prepared for the task were not the standardized ones and it may affect the conclusion. Future research endeavors in this direction should involve more standardized emotional stimuli. Futures studies may also involve dynamic facial stimuli which, according to some researchers (Torro, 2013), are superior to the static ones used in the present study.

In subchapter 4C we employed self-referential emotional stimuli in tasks and searched for any difference in the processing of them among different groups of media multitaskers. We also investigated whether any valence (positive or negative) specific bias towards those stimuli exists. Participants were subjected to a) emotional categorization task b) memory-based recall and recognition tasks. In the emotional categorization task, HMM were swifter in liking positive words than LMM and MMM. While expressing disliking for negative words, no variation in the response time among HMM, MMM, and LMM was observed. This supported the hypothesis H4C.1. The results from the memory-based tasks suggest that HMM had a memory deficit for self-referential emotional words in both the recall and recognition task when compared with LMM and MMM. This observation is in keeping with other media multitasking studies signaling poor memory among HMM. Further, HMM were found to recall more negative words than positive words.

However, in recognition task, though HMM recognized negative words more promptly, yet no positive or negative bias was observed among them. Hence, the hypothesis H4C.3 was not supported.

The findings from the 'self-referential' emotional stimuli indicate that HMM have negative bias towards self-referential stimuli but from non-self - referential emotional stimuli we observed participants were biased towards positive stimuli. Though not intuitive, yet it is one intriguing result which can be seen as HMM developing negative bias about themselves and hence orienting their attention towards non-self positive emotional stimuli which may be one mechanism to escape from negative emotional state.

Here, we conclude summarizing our findings reported in this thesis. We have tried to indicate, wherever possible, future directions which the present study may take up. In addition to all those, reproducibility of study is a desired quality and hence the present study may be repeated, maybe with a bigger sample size. One may explore the role of content to media multitasking behavior, i.e. whether searching news/information, or playing games or chatting with social media make a difference. Also, cross-cultural comparison of the findings will be another interesting aspect worth pursuing. With a view to look into this aspect of the study we conducted our experiments in which sample was chosen from the people of the USA. An account of this cross-cultural study has been provided in Appendix E.1.

Having said so, we bring down the curtain. This is a nascent study which, we hope, will assume a bigger shape in future. The study, for certain, has displayed several interesting features about the media multitasking habits of the young Indian students some of which were looked into in greater detail and some of which were spared for future. It has been a wonderful journey, from the conception of the study, to the execution and to penning down the findings. All the efforts will be rewarded if the thesis is found helpful for the future researchers pursuing this field.

APPENDIX A: PRELIMINARY PREPARATION

Appendix: A.1.
Poster for Recruiting Participants

Media multitasking involves using TV, web, radio, television, print or any other media in conjunction with other media. This behavior has become increasingly common among human beings. Researchers have often stressed that working simultaneously on several media is cognitively taxing and often leads to symptoms of depression, anxiety etc. However, some researchers claim that people media multitask because it emotionally satisfies them.

In order to break this ongoing debate and to understand the issue of emotional processing among media multitaskers we invite volunteers* to participate in the research study on "Emotional Processing among Media multitaskers".

Please, register for the study and give your contribution in the academic research.

VENUE: HFAC Lab, Indian Institute of Technology Indore

STATUS: Ongoing Experiment.....

For further information

Please contact:

Shanu Shukla, shanu.shukla11@gmail.com, +91-9589629173.

HUMAN FACTORS
AND APPLIED COGNITION LAB,
Department of Psychology, School of Humanities and Social Sciences, IIT Indore

*selection on the basis of experimental criteria

Appendix: A.2.
Informed Consent Form

Affective Science Research

Human Factors and Applied Cognition Lab,
Indian Institute of Technology Indore

Informed Consent Form

Please read the following information carefully.

Experiment:	Emotional Processing among Media multitaskers
Experimenter:	Shanu Shukla
Affiliation:	Indian Institute of Technology Indore

DESCRIPTION: You are invited to participate in a research study that investigates emotional experiences of different groups of media multitaskers and how they process emotional stimuli. There are two phases in the experiment. First, you have to fill questionnaires related to media multitasking, emotion, and personality. In the second phase you have to work on computerized tasks related to emotion recognition, reaction time etc.

RISKS AND BENEFITS: There are no known risks involved in this procedure. Apart from the remuneration that you will receive, there is no direct benefit of participation. But it will be helpful for the researchers in their future studies on emotion and media multitasking behavior.

TIME INVOLVEMENT: Your participation will take approximately 60-90 minutes.

PARTICIPANT'S RIGHTS: If you have read this form and have decided to participate in this experiment, please understand that your participation is voluntary and you have the right to withdraw your consent or discontinue participation at any time without penalty. Your individual privacy will be maintained in all published and written data resulting from the study as all the personal details will be permanently deleted once the data collection procedure will get over.

If you agree with the above-stated conditions and are willing to participate in the experiment, please sign below. By signing the form, you confirm that you meet the following conditions:

- You have read the above consent form, understood it and you agree to it.
- You want to participate in the above-mentioned experiment.

Name: _____

Date: _____ Signature: _____

APPENDIX B: DATA GATHERING TOOL

Appendix: B.1.

Vital Information Sheet

	Affective Science Research Human Factors and Applied Cognition Lab, Indian Institute of Technology Indore **Vital Information Sheet**

1. Gender (*Male/Female/others*):
2. Date of Birth:
3. Residential Address:
4. Course Level:
5. E-mail ID:
6. How long have you been using smartphones or computer (laptop/desktop)?

   (Please tick the corresponding box given below)

0-6 months (1)	**6 months – one year (2)**	**More than one year (3)**

.....

For Researcher use only

Assigned Id No.:

Note *(if any)***:**

Appendix: B.2

Media Use Questionnaire

Affective Science Research
Human Factors and Applied Cognition Lab,
Indian Institute of Technology Indore

Media Multitasking Index (MMI)

Dear Participant,
Please provide your responses to allow the experimenter to know your media multitasking preferences in a given block of time. Some people are more inclined to do one thing at a time before getting involved in another task, whereas, others prefer combining activities. Express your own preference on this page. Please read the 'directions' carefully before giving your responses.

Directions:
Twelve statements related to your preferences in media activities are there in the inventory. You have to provide two major pieces of information: first is the average number of hours per day (on a typical day considering the past one month timeframe) you spend on each medium, and second, you have to give your ratings stating how frequently you use primary media along with other media at the same time. Please tick the appropriate box for each statement according to what you think is right for you (no statement should be skipped). Make your own responses considering what best applies to you. There is no right or wrong response. Feel free to take help of the researcher if you feel the meaning of any statement is not clear.

1.Do you read PRINT MEDIA (for either work or pleasure)?
This would include books, newspapers, magazines, traditional mails etc.

YES
NO

If YES, approximately how many hours on an average day you spend doing this activity?

.....

(Please count all hours spent doing this activity, whether you are doing this activity only or whether you are doing additional things at the same time. Please feel free to use decimals. If you do not do this activity on a typical day, please enter 0.)

When you are reading PRINT MEDIA, how often are you also doing the following at the same time?

	Never	A little of the time	Some of the time	Most of the time
Watching Television, Video, and/or DVD's (on a TV)				
Watching video content on a computer				
Listening to music				
Listening to non-musical audio (news radio, podcasts, etc)				
Playing video or computer games				
Talking on the phone				
Instant messaging (chat)				
Mobile phone text messaging				
Reading/writing e-mails				
Reading web pages, pdfs, and/or other electronic documents				
Using other computer applications (word processing, spreadsheets, programming,etc)				

Reading other print media simultaneously				

2. Do you WATCH TELEVISION?
This would include watching network/cable/on-demand/TV programs, as well as watching videos and/or DVDs on a TV (but not computer/internet downloaded or streaming video)

YES
NO

If YES, approximately how many hours on an average day you spend doing this activity?

.....

(Please count all hours spent doing this activity, whether you are doing this activity only or whether you are doing additional things at the same time. Please feel free to use decimals. If you do not do this activity on a typical day, please enter 0.)

When you are WATCHING TELEVISION/video/DVDs, how often are you also doing the following at the same time?

	Never	**A little of the time**	**Some of the time**	**Most of the time**
Reading Print media				
Watching video content on a computer(not on a TV)				
Listening to music				
Listening to non-musical audio (news radio, podcasts, etc)				
Playing video or computer games				

Talking on the phone				
Instant messaging (chat)				
Mobile phone text messaging				
Reading/writing e-mails				
Reading web pages, pdfs, and/or other electronic documents				
Using other computer applications (word processing, spreadsheets, programming,etc)				
Watching another television, video, and/or DVDs (on a TV)				

3.Do you watch VIDEO on a COMPUTER?
This includes You tube, watching television episodes on your computer, DVDs, online lectures, video streaming etc.

YES
NO

If YES, approximately how many hours on an average day you spend doing this activity?

.....

(Please count all hours spent doing this activity, whether you are doing this activity only or whether you are doing additional things at the same time. Please feel free to use decimals. If you do not do this activity on a typical day, please enter 0.)

When you are WATCHING VIDEO CONTENT on a COMPUTER, how often are you also doing the following at the same time?

	Never	A little of the time	Some of the time	Most of the time
Reading print media				
Watching Television, Video, and/or DVD's (on a TV)				
Listening to music				
Listening to non-musical audio (news radio, podcasts, etc)				
Playing video or computer games				
Talking on the phone				
Instant messaging (chat)				
Mobile phone text messaging				
Reading/writing e-mails				
Reading web pages, pdfs, and/or other electronic documents				

Using other computer applications (word processing, spreadsheets, programming,etc)				
Watching multiple videos on a computer simultaneously				

4.Do you LISTEN to MUSIC?
This would include listening to an MP3 player (such as an ipod), listening to music on CDs, on the radio, on the internet or on your computer, etc.

YES
NO

If YES, approximately how many hours on an average day you spend doing this activity?

.....

(Please count all hours spent doing this activity, whether you are doing this activity only or whether you are doing additional things at the same time. Please feel free to use decimals. If you do not do this activity on an average day, please enter 0.)

When you are LISTENING to MUSIC, how often are you also doing the following at the same time?

	Never	**A little of the time**	**Some of the time**	**Most of the time**
Reading print media				
Watching Television, Video, and/or DVD's (on a TV)				
Watching video content on a computer (not on a TV)				

Listening to non-musical audio (news radio, podcasts, etc)				
Playing video or computer games				
Talking on the phone				
Instant messaging (chat)				
Mobile phone text messaging				
Reading/writing e-mails				
Reading web pages, pdfs, and/or other electronic documents				
Using other computer applications (word processing, spreadsheets, programming,etc)				
Listening to other music				

5.Do you LISTEN to NON-MUSICAL AUDIO?
This includes news/sports/talk radio, web casts, audio books, etc.

YES
NO

If YES, approximately how many hours on an average day you spend doing this activity?

.....

(Please count all hours spent doing this activity, whether you are doing this activity only or whether you are doing additional things at the same time. Please feel free to use decimals. If you do not do this activity on an average day, please enter 0).

When you are LISTENING to NON-MUSICAL AUDIO how often are you also doing the following at the same time.

	Never	**A little of the time**	**Some of the time**	**Most of the time**
Reading print media				
Watching Television, Video, and/or DVD's (on a TV)				
Watching video content on a computer				
Listening to music				
Playing video or computer games				
Talking on the phone				
Instant messaging (chat)				
Mobile phone text messaging				
Reading/writing e-mails				
Reading web pages, pdfs, and/or other electronic documents				
Using other computer applications (word processing, spreadsheets, programming,etc)				

Listening to other non-musical audio.				

6.Do you PLAY VIDEO or COMPUTER GAMES?
This includes online role-playing and multi-player games, console games, portable games, any computer-games, etc.

YES
NO

If YES, approximately how many hours on an average day you spend doing this activity?

.....

(Please count all hours spent doing this activity, whether you are doing this activity only or whether you are doing additional things at the same time. Please feel free to use decimals. If you do not do this activity on an average day, please enter 0.)

When you are PLAYING a VIDEO GAME, how often are you also doing the following at the same time?

	Never	**A little of the time**	**Some of the time**	**Most of the time**
Reading print media				
Watching Television, Video, and/or DVD's (on a TV)				
Watching video content on a computer				
Listening to music				
Listening to non-musical audio (news radio, podcasts, etc)				
Talking on the phone				

Instant messaging (chat)				
Mobile phone text messaging				
Reading/writing e-mails				
Reading web pages, pdfs, and/or other electronic documents				
Using other computer applications (word processing, spreadsheets, programming,etc)				
Playing other video or computer games				

7.Do you TALK on the TELEPHONE?
This includes both land-line and mobile phones, as well as computer-based voice calls and video conferencing calls using such services as Skype or iChat.

YES
NO

If YES, approximately how many hours on an average day you spend doing this activity?

.....

(Please count all hours spent doing this activity, whether you are doing this activity only or whether you are doing additional things at the same time. Please feel free to use decimals. If you do not do this activity on an average day, please enter 0.)

When you are TALKING to somebody on PHONE, how often are you also doing the following at the same time?

	Never	A little of the time	Some of the time	Most of the time
Reading print media				
Watching Television, Video, and/or DVD's (on a TV)				
Watching video content on a computer				
Listening to music				
Listening to non-musical audio (news radio, podcasts, etc)				
Playing video or computer games				
Instant messaging (chat)				
Mobile phone text messaging				
Reading/writing e-mails				
Reading web pages, pdfs, and/or other electronic documents				
Using other computer applications (word processing, spreadsheets, programming,etc)				
Talking to somebody else on a phone or video conference				

8. Do you use INSTANT MESSAGING?
This includes text-based instant messaging programs such as Google Talk, iChat or Skype chats (not voice or video calls), etc. Please do not include mobile-phone text-messaging, SMS, MMS, or IM.

YES
NO

If YES, approximately how many hours on an average day you spend doing this activity?

.....

(Please count all hours spent doing this activity, whether you are doing this activity only or whether you are doing additional things at the same time. Please feel free to use decimals. If you do not do this activity on an average day, please enter 0.)

When you are using INSTANT MESSAGING, how often are you also doing the following at the same time?

	Never	**A little of the time**	**Some of the time**	**Most of the time**
Reading print media				
Watching Television, Video, and/or DVD's (on a TV)				
Watching video content on a computer				
Listening to music				
Listening to non-musical audio (news radio, podcasts, etc)				
Playing video or computer games				
Talking on the phone				

Mobile phone text messaging				
Reading/writing e-mails				
Reading web pages, pdfs, and/or other electronic documents				
Using other computer applications (word processing, spreadsheets, programming,etc)				
Instant messaging (or chatting with) multiple people at the same time				

9.Do you send and receive TEXT MESSAGES or SMS using A MOBILE PHONE? This includes MMSs (Multimedia Messaging Service-such as picture messages).

YES
NO

If YES, approximately how many hours on an average day you spend doing this activity?

.....

(Please count all hours spent doing this activity, whether you are doing this activity only or whether you are doing additional things at the same time. Please feel free to use decimals. If you do not do this activity on an average day, please enter 0.)

When you are using TEXTING with your MOBILE PHONE, how often are you also doing the following at the same time?

	Never	A little of the time	Some of the time	Most of the time
Reading print media				
Watching Television, Video, and/or DVD's (on a TV)				
Watching video content on a computer				
Listening to music				
Listening to non-musical audio (news radio, podcasts, etc)				
Playing video or computer games				
Talking on the phone				
Instant messaging (chat)				
Reading/writing e-mails				
Reading web pages, pdfs, and/or other electronic documents				
Using other computer applications (word processing, spreadsheets, programming,etc)				
Texting with multiple people at the same time				

10.Do you READ and WRITE E-MAILS?
This includes regular e-mail and webmail.

YES
NO

If YES, approximately how many hours on an average day you spend doing this activity?

.....

(Please count all hours spent doing this activity, whether you are doing this activity only or whether you are doing additional things at the same time. Please feel free to use decimals. If you do not do this activity on an average day, please enter 0.)

When you are READING and/or WRITING E-MAIL, how often are you also doing the following at the same time?

	Never	**A little of the time**	**Some of the time**	**Most of the time**
Reading print media				
Watching Television, Video, and/or DVD's (on a TV)				
Watching video content on a computer				
Listening to music				
Listening to non-musical audio (news radio, podcasts, etc)				
Playing video or computer games				
Talking on the phone				
Instant messaging (chat)				

Mobile phone text-messaging				
Reading web pages, pdfs, and/or other electronic documents				
Using other computer applications (word processing, spreadsheets, programming,etc)				
Reading and/or writing multiple e-mails at the same time				

11.Do you SURF the Web, read web pages, pdfs, and/or other electronic documents?

YES
NO

If YES, approximately how many hours on an average day you spend doing this activity?

.....

(Please count all hours spent doing this activity, whether you are doing this activity only or whether you are doing additional things at the same time. Please feel free to use decimals. If you do not do this activity on an average day, please enter 0.)

When you are READING WEB PAGES, pdfs, and/or electronic documents, how often are you also doing the following at the same time?

	Never	**A little of the time**	**Some of the time**	**Most of the time**
Reading print media				
Watching Television, Video, and/or DVD's (on a TV)				
Watching video content on a computer				

Listening to music				
Listening to non-musical audio (news radio, podcasts, etc)				
Playing video or computer games				
Talking on the phone				
Instant messaging (chat)				
Mobile phone text-messaging				
Reading/writing e-mails				
Using other computer applications (word processing, spreadsheets, programming,etc)				
Reading multiple web pages, pdfs, and/or other electronic documents at the same time				

12.Do you use COMPUTER APPLICATIONS such as word processing, spreadsheets, programming and other application not already asked about?
YES
NO

If YES, approximately how many hours on an average day you spend doing this activity?

.....

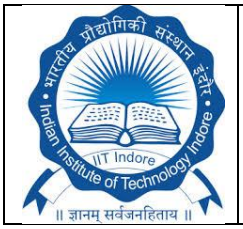
(Please count all hours spent doing this activity, whether you are doing this activity only or whether you are doing additional things at the same time. Please feel free to use decimals. If you do not do this activity on an average day, please enter 0.)

When you are using these "other" applications, how often are you also doing the following at the same time?

	Never	A little of the time	Some of the time	Most of the time
Reading print media				
Watching Television, Video, and/or DVD's (on a TV)				
Watching video content on a computer				
Listening to music				
Listening to non-musical audio (news radio, podcasts, etc)				
Playing video or computer games				
Talking on the phone				
Instant messaging (chat)				
Mobile phone text-messaging				
Reading/writing e-mails				
Reading web pages, pdfs, and/or other electronic documents				
Using more than one of these "other" applications at the same time.				

Appendix: B.3.

Big Five Inventory



Affective Science Research

Human Factors and Applied Cognition Lab,
Indian Institute of Technology Indore

Big Five Inventory

Directions:

The following statements concern your perception about yourself in a variety of situations. Your task is to indicate the strength of your agreement with each statement, utilizing a scale in which 1 denotes strong disagreement, 5 denotes strong agreement, and 2, 3, and 4 represent intermediate judgments.

There are no "right" or "wrong" answers, so select the rating that most closely reflects you on each statement. Feel free to take help of the researcher if you feel the meaning of any statement is not clear.

I see myself as someone who:

	Strongly Disagree (1)	**Disagree a Little (2)**	**Neither Disagree nor Agree (3)**	**Agree a Little (4)**	**Strongly Agree (5)**
Warms up quickly to others					
Prefers to be alone					
Is always on the go					
Can talk others into doing things					

	Strongly Disagree (1)	Disagree a Little (2)	Neither Disagree nor Agree (3)	Agree a Little (4)	Strongly Agree (5)
Seeks quiet					
Is assertive and takes charge					
Holds back from expressing his/her opinions					
Enjoys being part of a group					
Lets things proceed at their own pace					
Often feels blue					
Is not easily bothered by things					
Becomes stressed out easily					
Becomes overwhelmed by emotions					
Is calm, even in tense situations					
Is afraid that "I will do the wrong thing"					
Keeps myself cool					
Does things I later regret					

	Strongly Disagree (1)	Disagree a Little (2)	Neither Disagree nor Agree (3)	Agree a Little (4)	Strongly Agree (5)
Does not have a good imagination					
Loves to read challenging material					
Is interested in many things					
Tries to understand myself					
Is not interested in abstract ideas					
Believes in the importance of art					
Prefers to stick with things that I know					
Tends to vote for conservative political candidates					
Suspects hidden motives in others					
Trust others					
Contradicts others					
Values cooperation over competition					
Is easy to gratify					

	Strongly Disagree (1)	Disagree a Little (2)	Neither Disagree nor Agree (3)	Agree a Little (4)	Strongly Agree (5)
Think highly of himself					
Is concerned about others					
Puts people under pressure					
Completes tasks successfully					
Often makes last-minute plans					
Excel in what I do					
Often forgets to put things back in their proper place					
Postpones decisions					
Works hard					
Pays my bills on time					
Doesn't see the consequences of things					

Appendix: B.4.

Self Assessment Inventory

Affective Science Research

Human Factors and Applied Cognition Lab, Indian Institute of Technology Indore

Self Assessment Inventory (SAI)

Dear Participant,

Please provide your responses to allow the experimenter to know your self assessment level in a given block of time. Please read the 'directions' carefully before giving your responses.

Directions:

Following are some adjectives that describe people's feelings. Please, read each of the adjectives and then indicate how you feel in general (considering the timeframe of past one month from today) by circling the appropriate response. There are no right or wrong answers, so do not spend too much time on any one item. Check to make sure you have responded to all the items.

	Definitely Feel	**Feel Slightly**	**Cannot decide**	**Definitely do not feel**
Active				
Placid				
Sleepy				
Jittery				
Energetic				
Intense				
Calm				
Tired				
Vigorous				

At Rest				
Drowsy				
Fearful				
Lively				
Still				
Wide-awake				
Clutched-up				
Quiet				
Full-of-pep				
Tense				
Wakeful				

Appendix: B.5.

Positive and Negative Affect Schedule

Affective Science Research

Human Factors and Applied Cognition Lab, Indian Institute of Technology Indore

Positive and Negative Affect Schedule (PANAS)

Dear Participant,
Please read the 'directions' carefully before giving your responses.

Directions:
Following are some adjectives that describe people's feelings. Please read each of the adjectives and then indicate how you feel this way in general in past one month (from today) by ticking the appropriate response. There are no right or wrong answers so do not spend too much time on any one item. Feel free to take help of the researcher if you feel the meaning of any word is not clear.

Indicate the extent you feel this way in general	**Very Slightly or not at all**	**A Little**	**Moderately**	**Quite a bit**	**Extremely**
Interested					
Distressed					
Excited					
Upset					
Strong					
Guilty					
Scared					
Hostile					
Enthusiastic					

Proud					
Irritable					
Alert					
Ashamed					
Inspired					
Nervous					
Determined					
Attentive					
Jittery					
Active					
Afraid					

Appendix: B.6.

Emotional Control Scale

Affective Science Research

Human Factors and Applied Cognition Lab, Indian Institute of Technology Indore

Emotional Control Scale

Directions:
Please rate the extent of your agreement with each of the statements below by circling the appropriate number below each statement.

There are no "right" or "wrong" answers, so select the rating that most closely reflects you on each statement. Feel free to take help of the researcher if you feel the meaning of any statement is not clear.

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Very Strongly Agree

1. I am concerned that I will say things I'll regret when I get angry

1	2	3	4	5	6	7

2. I can get too carried away when I am really happy.

1	2	3	4	5	6	7

3. Depression could really take me over, so it is important to fight off sad feelings.

1	2	3	4	5	6	7

4. If I get depressed, I am quite sure that I will bounced right back.

1	2	3	4	5	6	7

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Very Strongly Agree

5. I get so rattled when I am nervous that I cannot think clearly.

1	2	3	4	5	6	7

6. Being filled with joy sounds great, but I am concerned that I could lose control over my actions if I get too excited.

1	2	3	4	5	6	7

7. It scares me when I feel "shaky" (trembling)

1	2	3	4	5	6	7

8. I am afraid that I will hurt someone if I get really furious.

1	2	3	4	5	6	7

9. I feel comfortable that I can control my level of anxiety.

1	2	3	4	5	6	7

10. Having an orgasm is scary for me because I am afraid of losing control.

1	2	3	4	5	6	7

11. If people were to find out how angry I sometimes feel, the consequences might be pretty bad.

1	2	3	4	5	6	7

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Very Strongly Agree

12. When I feel good, I let myself go and enjoy it to the fullest.

1	2	3	4	5	6	7

13. I am afraid that I could go into a depression that would wipe me out.

1	2	3	4	5	6	7

14. When I feel really happy, I go overboard, so I don't like getting overly ecstatic.

1	2	3	4	5	6	7

15. When I get nervous, I think that I am going to go crazy.

1	2	3	4	5	6	7

16. I feel very comfortable in expressing angry feelings.

1	2	3	4	5	6	7

17. I am able to prevent myself from becoming overly anxious.

1	2	3	4	5	6	7

18. No matter how happy I become, I keep my feet firmly on the ground.

1	2	3	4	5	6	7

19. I am afraid that I might try to hurt myself if I get too depressed.

1	2	3	4	5	6	7

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Very Strongly Agree

20. It scares me when I am nervous.

1	2	3	4	5	6	7

21. Being nervous isn't pleasant, but I can handle it.

1	2	3	4	5	6	7

22. I love feeling excited—it is a great feeling.

1	2	3	4	5	6	7

23. I worry about losing self-control when I am on cloud nine.

1	2	3	4	5	6	7

24. There is nothing I can do to stop anxiety once it has started.

1	2	3	4	5	6	7

25. When I start feeling 'down', I think I might let the sadness go too far.

1	2	3	4	5	6	7

26. Once I get nervous, I think that my anxiety might get out of hand.

1	2	3	4	5	6	7

27. Being depressed is not so bad because I know it soon pass.

1	2	3	4	5	6	7

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Very Strongly Agree

28. I would be embarrassed to death if I lost my temper in front of other people.

1	2	3	4	5	6	7

29. When I get 'the blues', I worry that they will pull me down too far.

1	2	3	4	5	6	7

30. When I get angry, I don't particularly worry about losing my temper.

1	2	3	4	5	6	7

31. Whether I am happy or not, my self control stays about the same.

1	2	3	4	5	6	7

32. When I get really excited about something, I worry that my enthusiasm will get out of hand.

1	2	3	4	5	6	7

33. When I get nervous, I feel as if I am going to scream.

1	2	3	4	5	6	7

34. I get nervous about being angry because I am afraid that I will go too far, and I will regret it later.

1	2	3	4	5	6	7

35. I am afraid that I will babble or talk funny when I am nervous.

1	2	3	4	5	6	7

1	2	3	4	5	6	7
Very Strongly Disagree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Very Strongly Agree

36. Getting really ecstatic about something is a problem for me because sometimes being too happy clouds my judgement.

1	2	3	4	5	6	7

37. Depression is scary to me—I am afraid that I could get depressed and never recover.

1	2	3	4	5	6	7

38. I don't really mind feeling nervous; I know it's just a passing thing.

1	2	3	4	5	6	7

39. I am afraid that letting myself feel really angry about something could lead me into an unending rage.

1	2	3	4	5	6	7

40. When I get nervous, I am afraid that I will act foolish.

1	2	3	4	5	6	7

41. I am afraid that I will do something dumb if I get carried away with happiness.

1	2	3	4	5	6	7

42. I think my judgement suffers when I get really happy

1	2	3	4	5	6	7

Appendix: B.7.

MMI and Face-to-face interaction Questionnaire

	Affective Science Research Human Factors and Applied Cognition Lab, Indian Institute of Technology Indore **MMI and Face-to-Face interaction**

Directions:

Media and face to face talk related preferential statements are there in the inventory. You have to answer two major questions that apply to you during the past one month. Please tick the appropriate box for each statement according to what you think is right for you (no statement should be skipped). Make your own responses considering what best applies to you. There is no right or wrong response. Feel free to take help of the researcher if you feel the meaning of any statement is not clear.

1.Do you spend TALKING FACE-TO-FACE with a person?

YES
NO

If YES, approximately how many hours on an average day you spend doing this activity?

.....

(Please count all hours spent doing this activity, whether you are doing this activity only or whether you are doing additional things at the same time. Please feel free to use decimals. If you do not do this activity on a typical day, please enter 0.)

When you are talking face-to-face with other person, how often are you also doing the following at the same time?

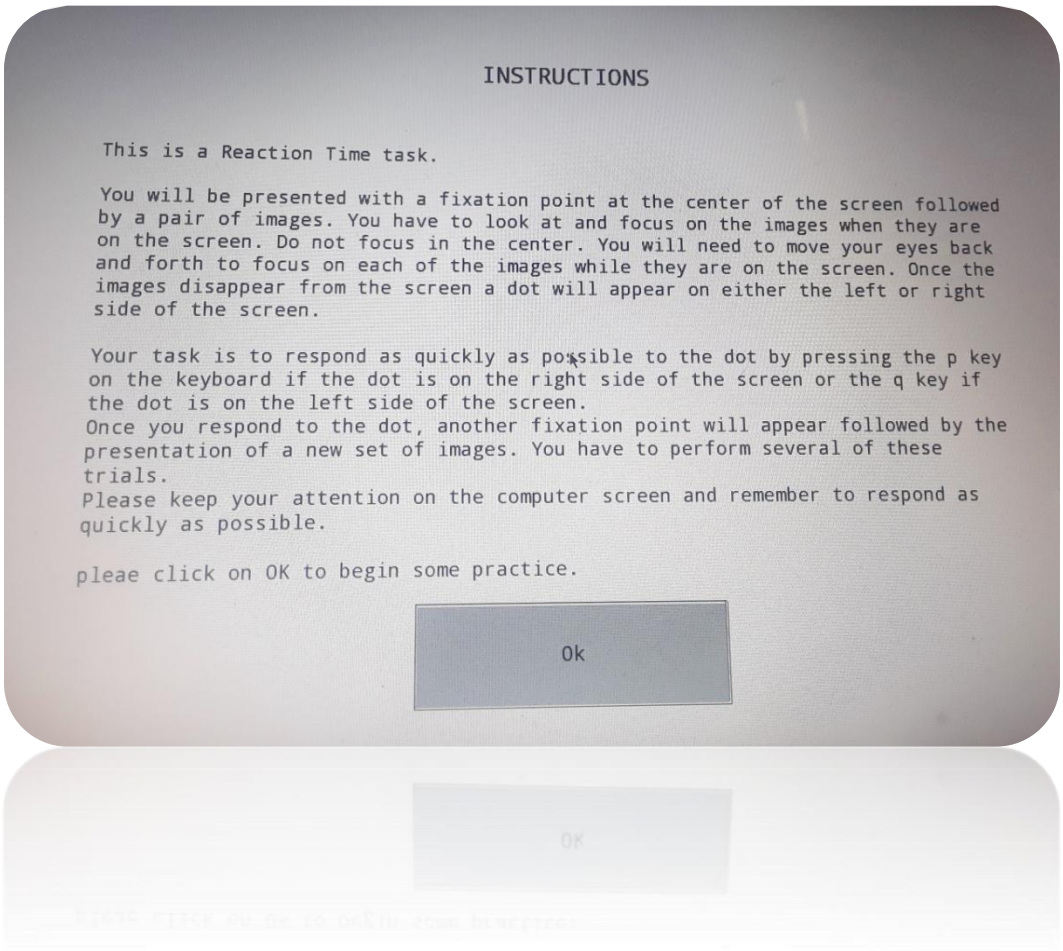
	Never	**A little of the time**	**Some of the time**	**Most of the time**
Reading Print media				

Watching Television, Video, and/or DVD's (on a TV)				
Watching video content on a computer				
Listening to music				
Listening to non-musical audio (news radio, podcasts, etc)				
Playing video or computer games				
Talking on the phone				
Instant messaging (chat)				
Mobile phone text messaging				
Reading/writing e-mails				
Reading web pages, pdfs, and/or other electronic documents				
Using other computer applications (word processing, spreadsheets, programming,etc)				
Taking face to face with a second person.				

APPENDIX C: EMOTIONAL PROCESSING TASKS

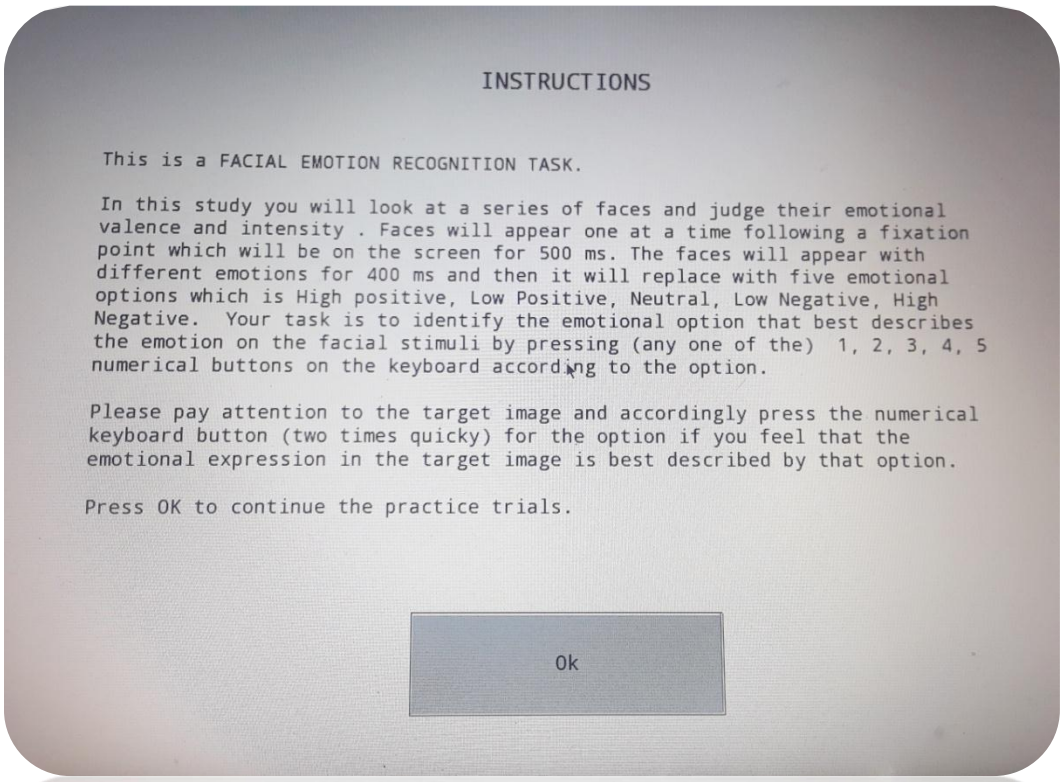
Appendix: C.1.

Screenshot of Emotional Dot Probe Task



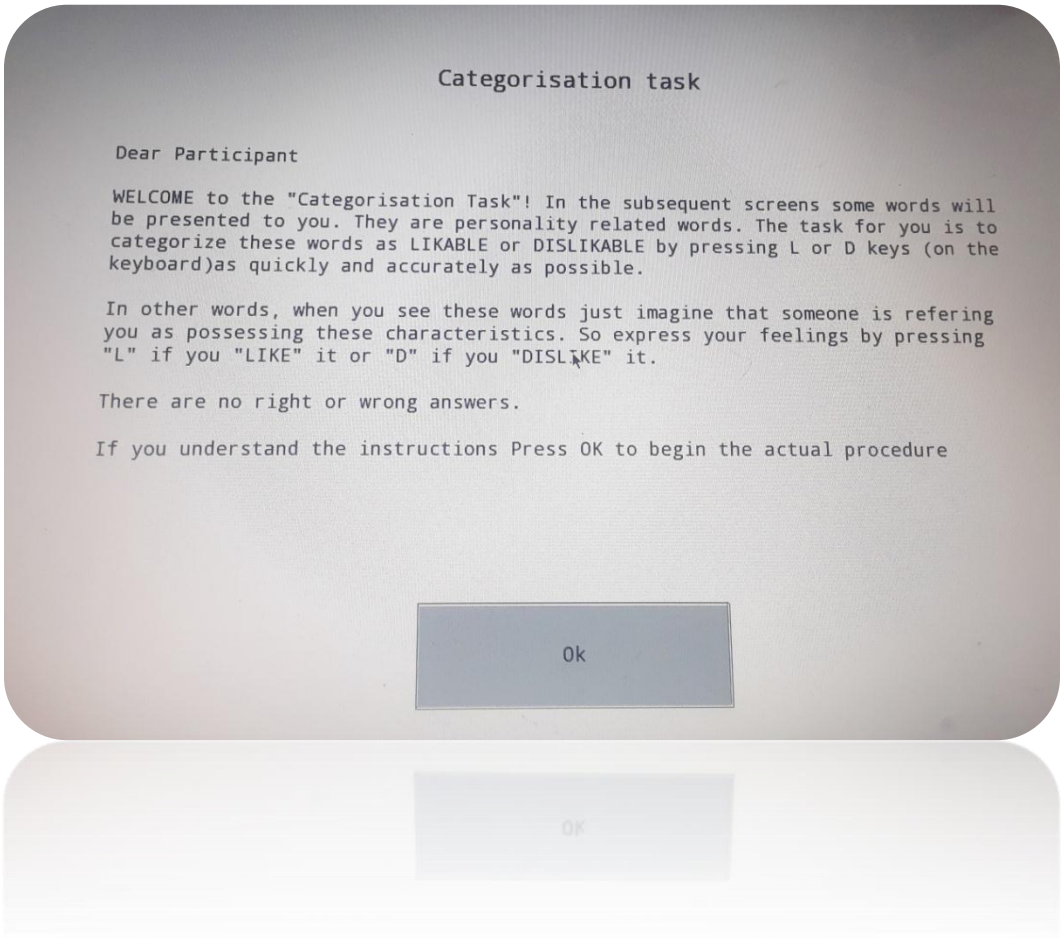
Appendix: C.2.

Screenshot of Facial Emotion Recognition Task



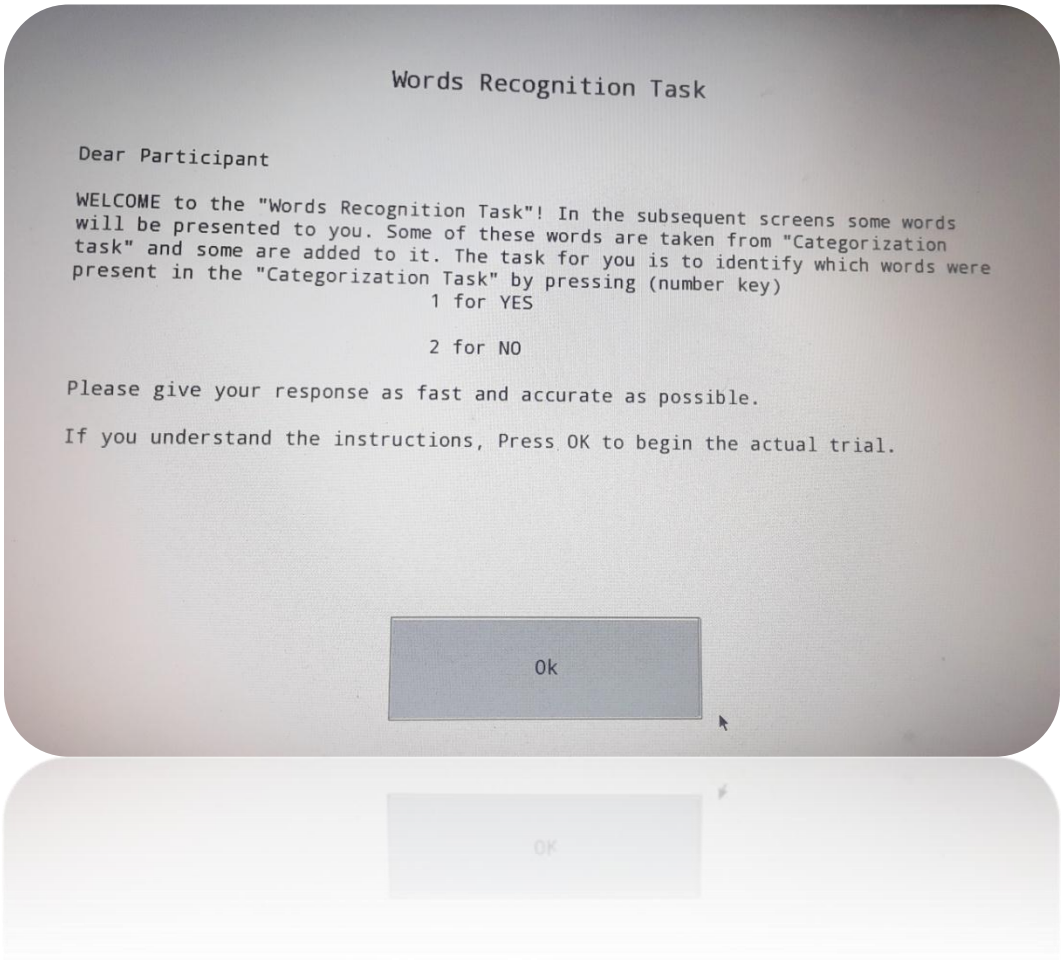
Appendix: C.3.

Screenshot of Emotional Categorization Task



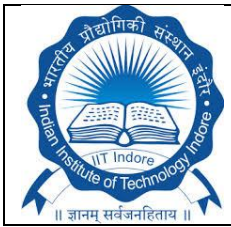
Appendix: C.4.

Screenshot of Emotional Word Recognition Task



Appendix: C.5.

Words Recall Task (response sheet)



Affective Science Research

Human Factors and Applied Cognition Lab,
Indian Institute of Technology Indore

Word Recall Task

Dear Participants,

In this task, you have to recall as many words as you can from the word list that has been shown to you during "Categorization Task" within 2 minutes. Please feel free to write as many words as you can.

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APPENDIX D: SUPPLEMENTARY MATERIAL

Appendix: D.1.

Self-referential Emotional Stimuli

A. List of ‘positive words’ used in ‘emotional categorization task’.

Positive Words	**Mean Valence**	**Likability-Dislikability Ratings**
Wise	7.42	528
Kind	7.78	520
Smart	7.73	488
Happy	8.47	514
Modest	6.42	428
Polite	6.57	489
Active	6.47	455
Bright	6.84	483
Helpful	7.43	492
Logical	6.38	465
Cheerful	8	504
Truthful	7.48	545
friendly	7.84	519
humorous	7.81	505
Pleasant	7.24	495
Sociable	6.43	429
Confident	7.56	401
Efficient	6.95	482
Agreeable	6.9	434
Brilliant	7.5	490
Thoughtful	7.26	529
Courageous	8.05	471
Adventurous	7.37	441
Cooperative	6.62	476
Intelligent	7.6	537

B. List of ‘negative words’ used in ‘emotional categorization task’.

Negative Words	Mean Valence	Likability-Dislikability Ratings
Rude	2.04	76
Liar	2.41	26
Bossy	2.86	112
Cruel	2.73	40
Greedy	2.1	72
Stingy	2.53	143
Hostile	2.35	91
Jealous	2.38	104
Unhappy	1.84	203
Cowardly	2.85	110
Helpless	2.24	136
Spiteful	2.89	72
Insecure	2.3	198
Deceitful	2.6	62
Depressed	2.27	166
Insulting	1.89	69
Irritable	2.85	143
Negligent	2.05	139
Unhealthy	2.55	197
Frustrated	2.55	188
Prejudiced	2.7	106
Unfriendly	2.3	92
Incompetent	2.14	110
Hypochondriac	2.89	118
Irresponsible	2.5	106

C. List of ‘positive distractor words’ used in ‘emotional word recognition task’.

Positive Distractor Words	Mean Valence	Likability-Dislikability Ratings
Nice	6.95	436
Loyal	7.31	547
Witty	7.25	480
Moral	6.85	411
Honest	8.16	555
Humble	6.52	427
Lively	7.12	466
Sincere	6.86	573
Relaxed	7.25	439
Creative	7.06	462
Generous	7.43	459
Reliable	7.3	527
Talented	7.95	478
Likeable	6.83	497
Outgoing	6.89	412
Courteous	7.05	494
Easy-going	7.03	412
Energetic	7.57	457
Optimistic	7.45	443
Respectful	7.45	483
Reasonable	6.84	500
Independent	6.86	455
Interesting	6.78	511
Responsible	6.28	505
Enthusiastic	7.55	489

D. List of ‘negative distractor words’ used in ‘emotional word recognition task’.

Negative Distractor Words	Mean Valence	Likability-Dislikability Ratings
Mean	2.43	37
Weak	2.95	155
Phony	2.52	27
Tense	2.75	215
Unkind	2.55	66
Lonely	2.67	256
Abusive	2.05	100
Fearful	2.66	214
Unlucky	2.7	280
Wasteful	2.85	160
Scornful	2.5	145
Insolent	2.74	78
Obnoxious	2.76	48
Malicious	2.32	62
Heartless	2.8	78
Unhealthy	2.55	197
Conceited	2.75	74
Unpopular	2.95	222
Unpleasant	2.53	104
Unreliable	2.74	104
Unromantic	2.74	214
Ungrateful	2.68	109
Troublesome	2.74	140
Discontented	2.75	237
Disrespectful	2.71	83

APPENDIX E: ADDITIONAL WORK

Appendix: E.1

Cross-cultural study Overview

TITLE: Emotions and Media multitasking behavior of US and Indian Youth

Principal Investigator: Shanu Shukla, M.S.
Faculty Advisor: Priti Shah, PhD

Location: Basic and Applied Cognition Lab, University of Michigan, Ann Arbor, Michigan USA

Funding: United States-India Educational Foundation

The University of Michigan Institutional Review Board Health Sciences and Behavioral Sciences has determined that this study is exempt from IRB oversight.

Objective: In today's Information Age, people are spending increasing amounts of time interacting with digital media, often in multitasking contexts and at the expense of interaction with other humans. This is a widely popular behavior. But, in the Indian context, media multitasking phenomenon is relatively unexplored. However the Milward Brown AdReaction 2014 study highlights that the India is coming closer to the global average in terms of multi-screening use and that the smart phone usage is higher than the global average use. Thus, the growing media multitasking scenario is the burgeoning topic that needs immediate attention to study its impact on Indian population. On the other hand, media multitasking has been lifestyle of the American population and extensive research is being done in USA in this context. Since researches have identified that the differences in socioeconomic and democratic developments (Kononova,2013) influence the media multitasking behaviour it will be worthwhile to compare and contrast the media-multitasking trend in two countries. This comparative study will be interesting and informative to understand how the media multitasking behavior in India and US produce emotion processing differences among their respective population.

SECTION 2: Specific Aims/Hypotheses

We had used experimental tasks that assess accuracy in emotion detection as well as survey measures to assess multitasking and cognitive and emotional problems in a series of related studies all of which use similar measure and tasks but vary in the specific ones

selected. We predict that media multitasking is a global phenomenon and hence multitaskers will have different emotional profiles and will face difficulties in processing emotional stimuli irrespective of cultural differences.

SECTION 3: Methods.

The study has been conducted in two parts.

Part 1 comprised of computerized experimental task. Psychology subject pool participants came to the lab and perform a series of emotional processing tasks. Tasks were:

1. Facial emotional recognition task: they first viewed a series of faces that vary in emotional valence (positive or negative), intensity (somewhat to extremely) and race ('in-group' and 'out-group'). Facial stimuli were similar to the one that we used in the experiment pertaining to the Indian participants. Participants had used a likert scale (5-point) to judge the valence and intensity of a emotion on the faces that were presented rapidly (400 ms). This task had two variants, one deals with familiar facial stimuli and other unfamiliar facial stimuli. They then performed the same task (both the variants) in a self-paced context. Finally, they filled out standardized questionnaires about media multitasking (REF), internet addiction (REF). 213 participants participated in this task

2. Emotional dot probe task : In another study, different sets of participants performed dot probe task followed by working on questionnaires such as media multitasking (REF), internet addiction (REF). 14 participants participated in this task.

In Part 2 we designed an exploratory study to understand emotional profiles of different group of media multitaskers. We had used the media multitasking scale as well as additional standardized scales of internet addiction, emotional control, activation scale, PANAS scale, emotional regulation scale, Big Five inventory and executive skill questionnaires. The study was online based and sample pool was the Amazon's Mechanical Turk workers. Data of 286 participants were collected.

SECTION 4: Data Analysis

In both the parts (Part 1 and Part 2) MMI was calculated and categorized into three groups High, Moderate, and Low (HMM, MMM, and LMM). Statistical methods were used to compare the performance of HMM, MMM, and LMM in Part 1 and to understand

emotional profiles of these groups in Part 2. Further a detailed analysis on the cross-cultural comparison is currently undergoing and will soon contribute the cross-cultural research in emotions and media multitasking behavior.

References

A.M.Voorveld, H., & Viswanathan, V. (2015). An Observational Study on How Situational Factors Influence Media Multitasking with TV: The Role of Genres, Dayparts, and Social Viewing. *Media Psychology, 18*(4), 499-526. doi:10.1080/15213269.2013.872038

Abbas, S., & Singh, A. K. (2014). Media Industry Trends and Dynamics: The Social Media Boom. *Procedia - Social and Behavioral Sciences, 155*, 147-152. doi:10.1016/j.sbspro.2014.10.271

Adler, R. F., & Benbunan-Fich, R. (2013). Self-interruptions in discretionary multitasking. *Computers in Human Behaviour, 29*, 1441-1449. Retrieved from http://dx.doi.org/10.1016/j.chb.2013.01.040

Agarwal, R., & Karahanna, E. (2000). Time Flies When You're Having Fun: Cognitive Absorption and Beliefs about Information Technology Usage. *MIS Quarterly, 24*(4), 665-694. doi:10.2307/3250951

Agarwal, S. (2018, February 20). Internet users in India expected to reach 500 million by June: IAMAI. The Economic Times. Retrieved from https://economictimes.indiatimes.com/tech/internet/internet-users-in-india-expected-to-reach-500-million-by-june-iamai/articleshow/63000198.cms

Alan, A. K., & Kabadayi, E. T. (2016). The effect of personal factors on social media usage of Young consumers. *Procedia- Social and Behavioral Sciences, 235*, 595-602. doi:10.1016/j.sbspro.2016.11.086

Allison, S. T., Messick, D. M., & Goethals, G. R. (1989). On Being Better but not smarter than others: The Muhammad Ali effect. *Social Cognition, 7*(3), 275-295. doi:10.1521/soco.1989.7.3.275

Anderson, J., & Rainie, L. (2013). *Millennials Will Benefit and Suffer Due to Their Hyperconnected Lives.* Pew Internet & American Life Project

report. Retrieved from http://www.pewinternet.org/2012/02/29/millennials-will-benefit-and-suffer-due-to-their-hyperconnected

Anderson, N. H. (1968). Likableness ratings of 555 personality-trait words. *Journal of Personality and Social Psychology, 9*(3), 272-279. doi:10.1037/h0025907

Attar, C. H., & Müller, M. M. (2012). Selective Attention to Task-Irrelevant Emotional Distractors Is Unaffected by the Perceptual Load Associated with a Foreground Task. *PLoS ONE, 7*(5), e37186. doi:10.1371/journal.pone.0037186

Bandodkar, N. R., & Singh, R. (2014). Affect Infusion in a Computer Based Multitasking Environment: An Empirical Investigation. *Twentieth Americas Conference on Information System*, (pp. 1-12). Savannah.

Baumgartner, S. E., & Sumter, S. R. (2017). Dealing with media distractions: An observational study of computer-based multitasking among children and adults in the Netherlands. *Journal of Children and Media, 11*(3), 295-313. doi:10.1080/17482798.2017.1304971

Baumgartner, S. E., Schuur, W. A., Lemmens, J. S., & Poel, F. t. (2018). The Relationship Between Media Multitasking and Attention Problems in Adolescents: Results of Two Longitudinal Studies. *Human Communication Research, 44*(1), 3-30. doi:10.1111/hcre.12111

Baumgartner, S. E., Weeda, W. D., Heijden, L. L., & Huizinga, M. (2014). The Relationship Between Media Multitasking and Executive Function in Early Adolescents. *The Journal of Early Adolescence, 34*(8), 1120-1144. doi:10.1177/0272431614523133

Becker, M. W., Alzahabi, R., & Hopwood, C. J. (2013). Media Multitasking is Associated with Symptoms of Depression and Social Anxiety.

Cyberpsychology, Behavior, and Social Networking, 16(2), 132-135. doi:10.1089/cyber.2012.0291

Bentley, S. V., Greenaway, K. H., & Haslam, S. A. (2017). An online paradigm for exploring the self-reference effect. *Plos one, 12*(5), e0176611. doi:10.1371/journal.pone.0176611

Berg, H. E., Ballard, E. D., Luckenbaugh, D. A., Nugent, A. C., Ionescu, D. F., & Jr, C. A. (2016). Recognition of emotional facial expressions in anxious and nonanxious depression. *Comprehensive Psychiatry, 70*, 1-8. doi:10.1016/j.comppsych.2016.06.007

Blume, C., Giudice, R., Lechinger, J., Wislowska, M., P.J.Heib, D., Hoedlmoser, K., & Schabus, M. (2017). Preferential processing of emotionally and self-relevant stimuli persists in unconscious N2 sleep. *Brain and Language, 167*, 72-82. doi:10.1016/j.bandl.2016.02.004

Bower, G. H. (1981). Mood and memory. *American Psychologist, 36*(2), 129-148. doi:10.1037/0003-066X.36.2.129

Brandon, R. C., Thomson, D. R., Cheyne, J. A., & Smilek, D. (2014). Media multitasking and failures of attention in everyday life. *Psychological Research, 78*(5), 661-669. doi:10.1007/s00426-013-0523-7

Brasel, S. A., & Gips, J. (2011). Media Multitasking Behavior:Concurrent Television and Computer Usage. *CYBERPSYCHOLOGY, BEHAVIOR, AND SOCIAL NETWORKING, 14*(9). doi:10.1089/cyber.2010.0350

Bridgett, D. J., Oddi, K. B., Laake, L. M., Murdock, K. W., & Bachmann, M. N. (2013). Integrating and differentiating aspects of self-regulation: Effortful control, executive functioning, and links to negative affectivity. *Emotion, 13*(1), 47-63. doi:10.1037/a0029536

Brosch, T., Pourtois, G., & Sander, D. (2010). The perception and categorisation of emotional stimuli: A review. *Cognition and Emotion, 24*(3), 377-400. doi:10.1080/02699930902975754

Brown, M. (2014). *AdReaction: Marketing in a multiscreen world.* Retrieved from https://www.millwardbrown.com/adreaction/2014/report/Milward-Brown_AdReaction-2014_Global.pdf

Brown, M. A. (2017). *Solutions for High-Touch communications in a High-Tech world.* Hershey, PA: IGI Global.

Bruce, V., & Young, A. (1986). Understanding face recognition. *British Journal of Psychology, 77*(3), 305-327. doi:10.1111/j.2044-8295.1986.tb02199.x

Brumby, D. P., Toit, H. D., Griffin, H. J., Jiménez, A. T., & Cox, A. L. (2014). Working with the Television on: An Investigation into media multitasking. *Proceedings of the 2014 Conference on Human Factors in Computing Systems* (pp. 1807-1812). New York: ACM.

Bullock, A. B., & Bonanno, G. A. (2013). Attentional Bias and Complicated Grief: A Primed Dot-Probe Task with Emotional Faces. *Journal of Expermental Psychopathology, 4*, 194-207. doi:DOI:10.5127/jep.020411

Burke, M., Marlow, C., & Lento, T. (2010). Social network activity and social well-being. *CHI '10 Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 1909-1912). Atlanta: ACM New York. doi:10.1145/1753326.1753613

Cain, M. S., & Mitroff, S. R. (2011). Distractor filtering in media multitaskers. *Perception, 40*(10), 1183-1192. doi:10.1068/p7017

Cain, M. S., Leonard, J. A., Gabrieli, J. D., & Finn, A. S. (2016). Media Multitasking in Adolescence. *Psychonomic Bulletin & Review, 23*(6), 1932-1941. doi:10.3758/s13423-016-1036-3

Calderwood, C., Ackerman, P. L., & Conklin, E. M. (2014). What else do college students "do" while studying? An investigation of multitasking. *Computers & Education, 75*, 19-29. doi:10.1016/j.compedu.2014.02.004

Cardoso-Leite, P., Green, C. S., & Bavelier, D. (2015). On the impact of new technologies on multitasking. *Developmental Review, 35*, 98-112. doi:10.1016/j.dr.2014.12.001

Carretié, L. (2014). Exogenous (automatic) attention to emotional stimuli: a review. *Cognitive, Affective & Behavioral Neuroscience, 14*, 1228-1258. doi:10.3758/s13415-014-0270-2

Carrier, L. M., Cheever, N. A., Rosena, L. D., Beniteza, S., & Changa, J. (2009). Multitasking across Generations: Multitasking Choices and Difficulty Ratings in Three Generations of Americans. *Computers in Human Behavior, 25*(2), 483-489. doi:10.1016/j.chb.2008.10.012

Carrier, L. M., Rosen, L. D., & Rokkum, J. N. (2018, January 8). *Productivity in Peril: Higher and Higher Rates of Technology Multitasking*. Retrieved from Behavioral Scientist: http://behavioralscientist.org/productivity-peril-higher-higher-rates-technology-multitasking/

Carrier, L. M., Rosen, L. D., Cheever, N. A., & Lim, A. F. (2015). Causes, effects, and practicalities of everyday multitasking. *Developmental Review, 35*, 64-78. doi:http://dx.doi.org/10.1016/j.dr.2014.12.005

Chan, M. W., Ho, S. M., Law, L. S., & Pau, B. K. (2013). A Visual Dot-Probe Task as a Measurement of Attentional Bias and its Relationship with the Symptoms of Posttraumatic Stress Disorder among Women with Breast Cancer. *Advances in Cancer: Research & Treatment*, 1-7. doi:10.5171/2013.813339

Chang, Y. (2017). Why Do Young People Multitask With MultipleMedia? Explicating the Relationships Among Sensation Seeking, Needs, and

Media Multitasking Behavior. *Media Psychology, 20*, 685-703. doi:10.1080/15213269.2016.1247717

Cheever, N. A., Rosen, L. D., Carrier, L. M., & Chavez, A. (2014). Out of sight is not out of mind: The impact of restricting wireless mobile device use on anxiety levels among low, moderate and high users. *Computers in Human Behavior, 37*, 290-297. doi:10.1016/j.chb.2014.05.002

Chen, Z., Poon, K.-T., & Cheng, C. (2017). Deficits in recognizing disgust facial expressions and Internet addiction: Perceived stress as a mediator. *Psychiatry Research, 254*, 211-217. doi:10.1016/j.psychres.2017.04.057

Chinchanachokchai, S., Duff, B. R., & Sar, S. (2015). The effect of multitasking on time perception, enjoyment, and ad evaluation. *Computers in Human Behavior, 45*, 185-191. doi:10.1016/j.chb.2014.11.087

Chopra, A. (2017, March 2). Number of Internet users in India could cross 450 million by June: report. Livemint. Retrieved from https://www.livemint.com/Industry/QWzIOYEsfQJknXhC3HiuVI/Number-of-Internet-users-in-India-could-cross-450-million-by.html

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences.* Routledge.

Cooper, C. K. (2013). The Impact of Emotional Content on Cognitive Performance and Self-Evaluations during Media Multitasking (Masters thesis). Retrieved from https://etd.ohiolink.edu/rws_etd/document/get/osu1366289749/inline

Correa, T., Bachmann, I., Hinsley, A. W., & Zuniga, H. G. (2013). Personality and Scial Media Use. In E. Li, S. Loh, C. Evans, & F.Lorenzi (Eds.), *Organization an Social Networks: Utilizing Social media to Engage Consumers* (pp. 41-61). IGI Global. doi:10.4018/978-1-4666-4026-9.ch003

Correa, T., Hinsley, A. W., & Zúñiga, H. G. (2010). Who interacts on the Web?: The intersection of users' personality and social media use. *Computers in Human Behavior, 26,* 247–253. doi:10.1016/j.chb.2009.09.003

Cotten, S. R., Shank, D. B., & Anderson, W. A. (2014). Gender, technology use and ownership, and media-based multitasking among middle school students. *Computers in Human Behavior, 35,* 99-106. doi:10.1016/j.chb.2014.02.041

Crawford, J. R., & Henry, J. D. (2004). The Positive and Negative Affect Schedule (PANAS): Construct validity, measurement properties and normative data in a large non-clinical sample. *British Journal of Clinical Psychology, 43,* 245-265. doi:10.1348/0144665031752934

DataStar, Inc. (2008, October). What Every Researcher Should Know About Statistical Significance. Retrieved from http://www.surveystar.com/startips/oct2008.pdf

Davidson, C. (2013). Media Multitasking's Effect on Cognitive Processing. *Unpublished Masters Thesis*. California State University, Sacramento. Retrieved from csus-dspace.calstate.edu/bitstream/handle/10211.9/2358/media%20multitasking%27s effect on cognitive processing.pdf?sequence=1

DeLisi, M. (2014). Low Self-Control Is a Brain-Based Disorder. In K. M. Beaver, J. Barnes, & B. B. Boutwell, *The Nurture Versus Biosocial Debate in Criminology: On the Origins of Criminal Behavior and Criminality* (pp. 172-183). London: Sage Publications Ltd. doi:10.4135/9781483349114.n11

Deloitte. (2010). Digital media: Rise of on-demand content. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/in/Documents/technology-media-telecommunications/in-tmt-rise-of-on-demand-content.pdf

Deloitte. (2010). *State of the Media Democracy Fourth edition.* Deloitee Global Services Limited. Retrieved from https://mediaandentertainmentobservatory.files.wordpress.com/2010/10/2010-state-of-media-democracy-survey.pdf

Deloitte. (2015). Digital Media:Rise of On-demand Content. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/in/Documents/technology-media-telecommunications/in-tmt-rise-of-on-demand-content.pdf

Deloitte. (n.d.). Which are things you typically do while watching TV?. In Statista - The Statistics Portal. Retrieved May 4, 2018, from https://www.statista.com/statistics/248375/simultaneous-media-use-in-india/.

Denny, E. B., & Hunt, R. (1992). Affective valence and memory in depression: dissociation of recall and fragment completion. *Journal of Abnormal Psychology, 101*(3), 575-580. doi:10.1037/0021-843X.101.3.575

Deursen, A. J., Bolle, C. L., Hegner, S. M., & Kommers, P. A. (2015). Modeling habitual and addictive smartphone behavior The role of smartphone usage types, emotional intelligence, social stress,self-regulation, age, and gender. *Computers in Human Behavior, 45*, 411-420. doi:10.1016/j.chb.2014.12.039

Donohew, L., Palmgreen, P., & Duncan, J. (1980). An activation model of information exposure. *Journal Communication Monographs, 47*(4), 292-303. doi:10.1080/03637758009376038

Duff, B. R.-L., Yoon, G., Wang, Z., & Anghelcev, G. (2014). Doing it All:An Exploratory Study of Predictors of media Multitasking. *Journal of Interactive Advertising*. doi:10.1080/15252019.2014.884480

Elfenbein, H. A., Beaupré, M., Lévesque, M., & Hess, U. (2007). Toward a dialect theory: Cultural differences in the expression and recognition of

posed facial expressions. *Emotion, 7*(1), 131-146. doi:10.1037/1528-3542.7.1.131

Ellison, N. b., Stienfield, C., & Lampe, C. (2007). The Benefits of Facebook "Friends": Social Capital and College Students' Use of Online Social Network sites. *Journal of Cmputer-Mediated Communication, 12*(4), 1143-1168. doi:10.1111/j.1083-6101.2007.00367.x

Fisher, J. E., Sass, S. M., Heller, W., Silton, R. L., Edgar, J. C., Stewart, J. L., & Miller, G. A. (2010). Time course of processing emotional stimuli as a function of perceived emotional intelligence, anxiety, and depression. *Emotion, 10*(4), 486-497. doi:10.1037/a0018691

Foehr, U. G. (2006). *Media Multitasking Among American Youth: Prevalence, Predictors And Pairings.* Retrieved from https://kaiserfamilyfoundation.files.wordpress.com/2013/01/7592.pdf

Fox, J., & Rooney, M. C. (2015). The Dark Triad and trait self-objectification as predictors of men's use and self-presentation behaviors on social networking sites. *76*, 161-165. doi:10.1016/j.paid.2014.12.017

Ge, Y., Zhong, X., & Luo, W. (2017). Recognition of facial expressions by urban internet-adicted left-behind children in China. *Psychological Reports, 120*(3), 391-407. doi:10.1177/0033294117697083

Gormana, T. E., & Green, C. S. (2016). Short-term mindfulness intervention reduces the negative attentional effects associated with heavy media multitasking. *Scientific Reports, 6*(24542), 1-7. doi: 10.1038/srep24542

Government of India, Ministry of Human Resource Development. (2018). *All India Survey on Higher Education 2017-18.* Retrieved from http://aishe.nic.in/aishe/viewDocument.action?documentId=245

Gray, J. R., Braver, T. S., & Raichle, M. E. (2002). Integration of emotion and cognition in the lateral prefrontal cortex. *Proceedings of the National Academy of Sciences, 99*(6), 4115-4120. doi:10.1073/pnas.062381899

Greenfield, P. (2010). Social networking, mental health and human development. *Paper presented at the Lab School of Washington's 15th Annual ScientificResearch Conference.* Washington, DC. Retrieved from test.baltimorelabschool.org/content/scientificconference

Griffin, E., Ledbetter, A., & Sparks, G. (2015). *A First Look at Communication Theory* (Ninth ed.). New York: McGraw-Hill.

Gross, J. J., & Levenson, R. W. (1997). Hiding feelings: The acute effects of inhibiting negative and positive emotion. *Journal of Abnormal Psychology, 106*(1), 95-103. doi: 10.1037/0021-843X.106.1.95

Hamann, S., & Canli, T. (2004). Individual differences in emotion processing. *Current Opinion in Neurobiology, 14*, 233-238. doi:10.1016/j.conb.2004.03.010

Hartmann, E., Baekeland, F., & Zwilling, G. R. (1972). Psychological Differences Between Long and Short Sleepers. *Arch Gen Psychiatry, 26*(5), 463-468. doi:10.1001/archpsyc.1972.01750230073014

Hatchel, T., Negriff, S., & Subrahmanyam, K. (2018). The relation between media multitasking, intensity of use, and well-being in a sample of ethnically diverse emerging adults. *Computers in Human Behavior, 81*, 115-123. doi:10.1016/j.chb.2017.12.012

Herbert, C., Pauli, P., & Herbert, B. M. (2011). Self-reference modulates the processing of emotional stimuli in the absence of explicit self-referential appraisal instructions. *Social Cognitive and Affective Neuroscience, 6*(5), 653-661. doi:10.1093/scan/nsq082

Hicks, R. A., & Pellegrini, R. J. (1977). Anxiety Levels of Short and Long Sleepers. *Psychological Reports, 41*(2), 569-570. doi:10.2466/pr0.1977.41.2.569

Hinchliffe, J. (2017, September 26). *ABC News.* Retrieved from Too much social media could hamper your child's ability to read facial emotions : https://www.abc.net.au/news/2017-09-26/screen-time-could-hamper-ability-to-read-facial-emotions-study/8987512

Hoffman, D. L., & Novak, T. P. (2009). Flow Online: Lessons Learned and Future Prospects. *Journal f Interactive Marketing, 23*, 23-34. doi:10.1016/j.intmar.2008.10.003

Holznagel, C. (2018, June 14). *My Wekly Preview*. Retrieved from Slaves to social media: myweeklypreview.com.au/news/slaves-to-social-media/

Hsu, M.-H., Yen, C.-H., Chiu, C.-M., & Chang, C. M. (2006). A longitudinal investigation of continued online shopping behavior: An extension of the theory of planned behavior. *International Journal of Human-Computer Studies*, *64*(9), 889-904. doi:10.1016/j.ijhcs.2006.04.004

Hunter, L. R., Buckner, J. D., & Schmidt, N. B. (2009). Interpreting facial expressions: The influence of social anxiety, emotional valence,and race. *Journal of Anxiety Disorders, 23*, 482-488. doi:10.1016/j.janxdis.2008.10.004

Hwang, Y., & Jeong, S.-H. (2018). Information Seeking and Sharing while Media Multitasking Demographic, Psychological, and Cultural predictors. *Journal of Media Economics and Culture, 16*(3), 78-109. doi:10.21328/JMEC.2018.8.16.3.78

Hwang, Y., Kim, H., & Jeong, S.-H. (2014). Why do media users multitask?: Motives for general, medium-specific, and content-specific types of multitasking. *Computers in Human Behavior, 36*(C), 542-548. doi:10.1016/j.chb.2014.04.040

IAMAI. (n.d.). Retrieved from https://www.iami.in/knowledgeCentre/

IBM Corp. Released 2011. (n.d.). *IBM SPSS Statistics for Windows, version 20.0* . Armonk,NY: IBM Corp.

Internet and Mobile Association of India (IAMAI); Kantar, IMRB. (2018). *Internet in India 2017.* Retrieved from https://www.iamai.in/KnowledgeCentre

Internet and Mobile Association of India, IAMAI; IMRB, International. (2015, November 17). *Internet in India 2015.* Retrieved from www.iamai.in/media/details/4486

Internet World Stats. (n.d.). Countries with the highest number of internet users as of June 2017 (in millions). In Statista - The Statistics Portal. Retrieved May 4, 2018, from https://www.statista.com/statistics/262966/number-of-internet-users-in-selected-countries/

Jarros, R. B., Salum, G. A., Silva, C. T., Toazza, R., Costa, M. d., Salles, J. F., & Manfro, G. G. (2012). Anxiety disorders in adolescence are associated with impaired facial expression recognition to negative valence. *Journal of Psychiatric Research, 46*, 147-151. doi:10.1016/j.jpsychires.2011.09.023

Jeong, S.-H., & Fishbein, M. (2007). Predictors of Multitasking with Media: Media Factors and Audience Factors. *Media Psychology, 10*(3), 364-384. doi:10.1080/15213260701532948

Johansson, O. J., & Fyhri, A. (2017). "Maybe I Will Just Send a Quick Text…" – An Examination of Drivers' Distractions, Causes, and Potential Interventions. *Frontiers in Psychology, 8*, 1957. doi:10.3389/fpsyg.2017.01957

John, O. P., & Srivastava, S. (1999). The Big-Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin, & O. P. John,

Handbook of personality: Theory and research (Vol. 2, pp. 102-138). New York: Guildford Press.

Kanai, R., Dong, M. Y., Bahrami, B., & Rees, G. (2011). Distractibility in Daily Life Is Reflected in the Structure and Function of Human Parietal Cortex. *Journal of Neuroscience, 31*(18), 6620-6626. doi:10.1523/JNEUROSCI.5864-10.2011

Kapadia, C. (2017). More tasks More Ideas: The Energy Spillover of Multitasking on subsequent creativity. *Doctoral Dessertation*.

Kaspar, K. (2016). Culture, group membership, and face recognition. Commentary: Will you remember me? Cultural differences in own-group face recognition biases. *Frontiers in Psychology*, 1-3. doi:10.3389/fpsyg.2016.01101

Katz, E., Gurevitch, M., & Haas, H. (1973). On the Use of the Mass Media for Important Things. *American Sociological Review, 38*(2), 164-181. Retrieved from http://repository.upenn.edu/asc_papers/267

Kellermann, T. S., Sternkopf, M. A., Schneider, F., Habel, U., Turetsky, B. I., Zilles, K., & Eickhoff, S. B. (2012). Modulating the processing of emotional stimuli by cognitive demand. *Social Cognitive and Affective Neuroscience, 7*(3), 263-273. doi:10.1093/scan/nsq104

Kemp, A., Silberstein, R., Armstrong, S. M., & Nathan, P. (2004). Gender differences in the cortical electrophysiological processing of visual emotional stimuli. *NeuroImage, 21*(2), 632-646. doi:10.1016/j.neuroimage.2003.09.055

Kirsh, S. J., & Mounts, J. R. (2007). Violent video game impacts facial emotion recognition. *Agressive Behavior, 33*(4), 353-358. doi:10.1002/ab

Klein, S. B., Loftus, J., & Burton, H. A. (1989). Two self-reference effects: The importance of distinguishing between self-descriptiveness judgments and

autobiographical retrieval in self-referent encoding. *Journal of Personality and Social Psychology, 56*(6), 853-865. doi:10.1037/0022-3514.56.6.853

Knobloch, S. (2003). Mood Adjustment via Mass Communication. *Journal of Communication, 53*(2), 233-250. doi:10.1111/j.1460-2466.2003.tb02588.x

Kohler, C. G., & Martin, E. A. (2006). Emotional processing in schizophrenia. *Cognitive Neuropsychiatry, 11*(3), 250-271. doi:10.1080/13546800500188575

Konig, C. J., Buhner, M., & Murling, G. (2005). Working Memory, Fluid Intelligence, and Attention Are Predictors of Multitasking Performance, but Polychrnicity and Extraversion Are Not. *Human Performance, 18*(3), 243-266. doi:10.1207/s15327043hup1803_3

Kononova, A. (2013). Multitasking Across Borders: A Cross-National Study of Media Multitasking Behaviors, Its Antecedents, and Outcomes. *International Journal of Communication, 7*, 1688-1710. Retrieved from http://ijoc.org/index.php/ijoc/article/view/2119

Kononova, A., & Alhabash, S. (2012). When one medium is not enough: Media use and media multitasking among college students in Kuwait. *Journal of Middle East Media, 8*(1).

Kononova, A., & Chiang, Y.-H. (2015). Why do we multitaskwith media? Predictors of media multitasking among internet users in the United States and Taiwan. *Computers in Human Behavior, 50*, 31-41. doi:10.1016/j.chb.2015.03.052

Kononova, A., McAlister, A., & Oh, H. J. (2018). Screen overload: Pleasant multitasking with screen devices leads to the choice of healthful over less healthful snacks when compared with unpleasant multitasking. *Computers in Human Behavior, 80*, 1-11. doi:10.1016/j.chb.2017.10.042

Koo, T. K., & Li, M. Y. (2016). A Guideline of Selecting and Reporting Intraclass Correlation Coefficients for Reliability Research. *Journal of Chiropractic Medicine, 15*(2), 155-163. doi:10.1016/j.jcm.2016.02.012

Kubey, R., & Csikszentmihályi, M. (1990). *Communication. Television and the quality of life: How viewing shapes everyday experience.* Hillsdale, NJ, US: Lawrence Erlbaum Associates, Inc.

Lacey. (1967). Somatic response patterning and stress: Some revisions of activation theory. In M. H. Appley, & R. Trumbull, *Psychological Stress.* New York: Appleton-Century-Crofts.

Ladouceur, C. D., Dahl, R. E., Williamson, D. E., Birmaher, B., Ryan, N. D., & Casey, B. J. (2005). Altered Emotional Processing in Pediatric Anxiety,Depression, and Comorbid Anxiety-Depression. *Journal of Abnormal Child Psychology, 33*(2), 165-177. doi:10.1007/s10802-005-1825-z

Laine-Hernandez, M., Kinnunen, T., Kusumoto, K., K • atsyri, J., Westman, S., Ravaja, N., & Oittinen, P. (2013). *Multitasking influence on Engagement.* Next Media- a TIVIT Programme. Retrieved from http://virtual.vtt.fi/virtual/nextmedia/Deliverables-2012/D2.3.3.7_PMD_Multitasking_influence_on_engagement.pdf

Lang, A. (2000). The Limited Capacity Model of Mediated Message Processing. *Journal of Communication, 50*(1), 46-70. doi:10.1111/j.1460-2466.2000.tb02833.x

LaRose, R., Lin, C. A., & Eastin, M. S. (2003). Unregulated Internet usage: Addiction, habit, or deficient self-regulation? *Media Psychology, 5*, 225-253. doi:10.1207/S1532785XMEP0503_01

Ledbetter, A. M., Taylor, S. H., & Mazer, J. P. (2016). Enjoyment fosters media use frequency and determines its relational outcomes: Toward a synthesis of uses and gratifications theory and media multiplexity theory.

Computers in Human Behavior, 54, 149-157. doi:10.1016/j.chb.2015.07.053

Lee, J., Lin, L., & Robertson, T. (2012). The impact of media multitasking on learning. *Learning, Media and Technology, 37*(1), 97-104. doi:10.1080/17439884.2010.537664

Lee, M., Murphy, K., & Andrew, G. (2018). Using Media While interacting face-to-face is associated with psychosocial well-being and personality traits. *Psychological Reports, 0*(0), 1-24. doi:10.1177/0033294118770357

Liberman, M. D., & Rosenthal, R. (2001). Why Introverts Can't Always Tell Who Likes Them: Multitasking and Nonverbal Decoding. *Journal of Personality and Social Psychology, 80*(2), 294-310. doi:10.1037/0022-3514.80.2.294

Liedtke, C., Kohl, W., Kret, M. E., & Koelkebeck, K. (2018). Emotion recognition from faces with in- and out-group features in patients with depression. *Journal of Affective Disorders, 227*, 817-823. doi:10.1016/j.jad.2017.11.085

Lim, S., & Shim, H. (2016). Who Multitasks on Smartphones? Smartphone Multitaskers' Motivations and Personality Traits. *CYBERPSYCHOLOGY, BEHAVIOR, AND SOCIAL NETWORKING, 16*(3), 223-227. doi:10.1089/cyber.2015.0225

Lin, L. (2009). Breadth-biased versus focused cognitive control in media multitasking behaviors. *Proceedings of the National Academy of Sciences of the United States of America, 106*(37), 15521–15522. doi:http://doi.org/10.1073/pnas.0908642106

Loh, K. K., & Kanai, R. (2014). Higher Media Muti-Tasking Activity is Associated with Smaller Gray-Matter Density in the Anterior Cingulate Cortex. *Plos One, 9*(9), e106698. doi:10.1371/journal.pone.0106698

Lou, H., Chau, P. Y., & Li, D. (2005). Understanding Individual Adoption of Instant Messaging: An Empirical Investigation. *Journal of the Association for Information Systems:*, *6*(4), 102-129. Retrieved from https://aisel.aisnet.org/jais/vol6/iss4/5

Lovén, J., Rehnman, J., & Herlitz, A. (2008). Attention modifies gender differences in face recognition. *International Journal of Psychology*, *43*(3-4), 503. Retrieved from https://pdfs.semanticscholar.org/f6ba/294c0032c337b36bd74c727dda222b9d0259.pdf

Lui, K. F., & Wong, A. C.-N. (2012). Does media multitasking always hurt? A positive correlation between multitasking and multisensory integration. *Psychonomic Bulletin & Review*, *19*(4), 647-653. doi:10.3758/s13423-012-0245-7

M.Cooper, R., & Langton, S. R. (2006). Attentional bias to angry faces using the dot-probe task? It depends when you look for it. *Behaviour Research and Therapy*, *44*(9), 1321-1329. doi:10.1016/j.brat.2005.10.004

MacLeod, C., Mathews, A., & Tata, P. (1986). Attentional bias in emotional disorders. *Journal of Abnormal Psychology*, *95*(1), 15-20. doi:10.1037/0021-843X.95.1.15

Magen, H. (2017). The relations between executive functions, media multitasking and polychronicity. *Computers in Human Behavior*, *67*, 1-9. doi:10.1016/j.chb.2016.10.011

Malaysian Communications and Multimedia Commission. (2016). *Internet Users Survey 2016.* Selangor Darul Ehsan: Malaysian Communications and Multimedia Commission. Retrieved from https://www.mcmc.gov.my/skmmgovmy/media/General/pdf/IUS2016.pdf

Mark, G. (2015). *Multitasking in the digital age. Synthesis Lectures on Human-Centered Informatics* (Vol. 8). (J. M. Carroll, Ed.) Morgan and Claypool Publishers. doi:10.2200/S00635ED1V01Y201503HCI029

Mark, G., Gudith, D., & Klocke, U. (2008). The cost of interrupted work: more speed and stress. *CHI '08 Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 107-110). Florence: ACM New York. doi:10.1145/1357054.1357072

Mark, G., Iqbal, S. T., Czerwinski, M., Jones, P., & Sano, A. (2016). Neurotics Can't focus: An in situ Study of Online Multitasking in the Workplace. *CHI'16* (pp. 1-6). San Jose, CA: ACM. doi:10.1145/2858036.2858202

Mark, G., Wang, Y., & Niiya, M. (2014). Stress and Multitasking in Everyday College Life: An Empirical Study of Online. *CHI 2014.* Toronto: ACM. doi:doi.org/10.1145/2556288.2557361

Mark, G., Wang, Y., Niiya, M., & Reich, S. (2016). Sleep Debt in Student Life: Online Attention Focus, Facebook, and Mood. *CHI '16 Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (pp. 5517-5528). San Jose: ACM New York. doi:10.1145/2858036.2858437

Mathôt, S., Schreij, D., & Theeuwes, J. (2012). OpenSesame: An open-source, graphical experiment builder for the social sciences. *Behavior Research Methods, 44*(2), 314-324. doi:doi:10.3758/s13428-011-0168-7

McCarthy, J. (2013). Enhanced Media Multitasking: The restorative cognitive effects of temporarily escaping the multitasking mindset. *Masters Thesis*. Stanford University, United States of America. Retrieved from http://comm.stanford.edu/mm/2013/01/JordanMcCarthyMAThesis.pdf

McCrae, R. R., & John, O. P. (1992). An Introduction to the Five-Factor Model and Its Applications. *Journal of Personality, 60*(2), 175-215. doi:10.1111/j.1467-6494.1992.tb00970.x

Mehrotra, K. (2018, August 8). *Internet in India: Gaping gender gap.* Retrieved from The Indian Express: https://indianexpress.com/article/technology/tech-news-technology/internet-in-india-gaping-gender-gap-5296818/

Meissner, C. A., & Brigham, J. C. (2001). Thirty years of investigating the own-race bias in memory for faces: a meta-analysis review. *Psychology, Public Policy, and Law, 7*(1), 3-35. doi:10.1037//1076-8971.7.1.3

Messick, D. M., Bloom, S., Boldizar, J. P., & Samuelson, C. D. (1985). Why we are fairer than others. *Journal of Experimental Social Psychology, 21*(5), 480-500. doi:10.1016/0022-1031(85)90031-9

Mezulis, A. H., Abramson, L. Y., Hyde, J. S., & Hankin, B. L. (2004). Is There a Universal Positivity Bias in Attributions? A Meta-Analytic Review of Individual, Developmental, and Cultural Differences in the Self-Serving Attributional Bias. *Psychological Bulletin, 130*(5), 711-747. doi:10.1037/0033-2909.130.5.711

MicrosoftAdvertising. (2009). *Media Meshing: meet Europe's media multi-taskers.* Retrieved from https://advertising.microsoft.com/espana/WWDocs/User/es-es/ResearchLibrary/ResearchReport/DigiMix_Media%20Meshing_EMEA%20FINAL.pdf

Minear, M., Brasher, F., McCurdy, M., Lewis, J., & Younggren, A. (2013). Working memory, fluid intelligence, and impulsiveness in heavy media multitaskers. *sychonomic Bulletin and Review*. doi:10.3758/s13423-013-0456-6

Misra, S., & Stokols, D. (2012). Psychological and Health Outcomes of Perceived Information Overload. *Environment and Behavior, 44*(6), 737-759. doi:10.1177/0013916511404408

Moisala, M., Salmela, V., Hietajärvi, L., Salo, E., Carlson, S., Salonen, O., . . . Alho, K. (2016). Media multitasking is associated with distractibility and increased prefrontal activity in adolescents and young adults. *Neuroimage, 134*, 113-121. doi:10.1016/j.neuroimage.2016.04.011

Moore, A. (2013, October 17). *Hedonism.* (E. N. Zalta, Ed.) Retrieved from The Stanford Encyclopedia of Philosophy: https://plato.stanford.edu/archives/win2013/entries/hedonism/>

Morford, M. (2010, August 4). Oh my god you are so missing out. San Francisco Chronicle. Retrieved from <http://www.sfgate.com/cgi-bin/article.cgi?f=/g/a/2010/08/04/notes080410.DTL&ao=all>.

Murphy, K., McLauchlan, S., & Lee, M. (2017). Is there a link between media-multitasking and the executive functions of filtering and response inhibition? *Computers in Human Behavior, 75*, 667-677. doi:10.1016/j.chb.2017.06.001

Nakamura, T. (2015). The action of looking at a mobile phone display as nonverbal behavior/communication: A theoretical perspective. *Computers in Human Behavior, 43*, 68-75. doi:10.1016/j.chb.2014.10.042

Nestor, P. G., & Schutt, R. K. (2019). *Research Methods in Psychology-Investigating human behavior* (Third ed.). Los Angeles: Sage.

Nichols, V. (n.d.). *Vincent Nicholes Quotes.* Retrieved September 24, 2018, from BrainyQuote.Com: https://www.brainyquote.com/quotes/vincent_nichols_532641

Nielsen. (2012). *The Asian media landscape is turning digital. How can marketers maximise their opportunities?* The Nielsen Company. Retrieved from www.nielsen.com/content/dam/corporate/au/en/report/2012/changing-asian-media-landscape-feb2012.pdf

Nooner, K., & Schaefer, L. (2015). A Pilot Investigation of Media Multitasking and Trauma Symptoms Among Adolescents. *Journal of Human Behavior in the Social Environment, 00,* 1-10. doi:10.1080/10911359.2015.1013659

Ochsner, K. N. (2008). The social-emotional processing stream: five core constructs and their translational potential for schizophrenia and beyond. *Biological Psychiatry, 64*, 48-61.

Ochsner, K. N., & Phelps, E. (2007). Emerging perspectives on emotion–cognition interactions. *TRENDS in Cognitive Sciences, 11*(8), 317-318. doi:10.1016/j.tics.2007.06.008

OfCom & GfK. (2010). *The Consumer's Digital Day.* Retrieved from http://stakeholders.ofcom.org.uk/binaries/research/811898/consumers-digital-day.pdf

O'Keefe, G. J., & Sulanowski, B. K. (1995). More Than Just Talk: Uses, Gratifications, and the Telephone. *Journalism and Mass Communication Quaterly, 72*(4), 922-933. doi:10.1177/107769909507200415

Ophir, E., Nass, C., & Wagner, A. D. (2009). Cognitive control in media multitaskers. *Proceedings of the National Academy of Sciences of the United States of America, 106*(37), 15583–15587. doi: http://doi.org/10.1073/pnas.0903620106

Ostir, G. V., Smith, P. M., Smith, D., & Ottenbacher, K. J. (2005). Reliability of the Positive and Negative Affect Schedule (PANAS) in medical rehabilitation. *Clinical Rehabilitation, 19*(7), 767-769. doi:10.1191/0269215505cr894oa

Oulasvirta, A., Rattenbury, T., Ma, L., & Raita, E. (2012). Habits make smartphone use more pervasive. *Personal and Ubiquitous Computing, 16*(1), 105-114. doi:10.1007/s00779-011-0412-2

P1vital® Oxford Emotional Test Battery. (n.d.). Retrieved from P1 vital: http://p1vital.com/wp/home-page-content/clinical-trials-overview/emotional-test-battery/

Panek, E. (2014). Left to Their Own Devices: College Students' "Guilty Pleasure" Media Use and Time Management. *Communication Research, 41*(4), 1-17. doi:10.1177/0093650213499657

Pea, R., Nass, C., Meheula, L., Rance, M., Kumar, A., Bamford, H., . . . Zhou, M. (2012). Media Use, Face-to-Face Communication, Media Multitasking and Social Well-Being Among 8- to 12-Year-Old Girls. *Developmental Psychology, 48*(2), 327-336. doi:10.1037/a0027030

Pelletier-Baldelli, A., Ives, L., & Mittal, V. A. (2015). Increased Internet Use And Poorer Ability To Manage Emotions in Youth at High-Risk for Psychosis. *Schizophrenia Research Cognition, 2*(4), 220-226. doi:10.1016/j.scog.2015.08.002

Phan, L., Collins, P., & Tucker, D. M. (2000). Mood, personality, and self-monitoring: Negative affect and emotionality in relation to frontal lobe mechanisms of error monitoring . *Journal of Experimental Psychology, 129*(1), 43-60. doi:10.1037/0096-3445.129.1.43

Phelps, E. A. (2006). Emotion and Cognition: Insights from Studies of the Human Amygdala. *Annual Review of Psychology, 57*, 27-53. doi:10.1146/annurev.psych.56.091103.070234

Poposki, E. M., Oswald, F. L., & Chen, H. T. (2009). *Neuroticism Negatively Affects Multitasking Performance through State Anxiety.* Millington, Teennessee: Navy Personal Research, Studies, and Technology.

Prakash, R. S., Erickson, K. I., Colcombe, S. J., Kim, J. S., Voss, M. W., & Kramer, A. F. (2009). Age-related differences in the involvement of the prefrontal cortex in attentional control. *Brain and Cognition, 71*(3), 328-335. doi:10.1016/j.bandc.2009.07.005

Prensky, M. (2001). Digital Natives, Digital Immigrants Part 1. In *On the Horizn* (Vol. 9, pp. 1-6). doi:10.1108/10748120110424816

Press Trust of India. (2017, December 12). *UNICEF Report Warns of 'Digital Gender Gap' in India With Only 29 Percent Online Users Female.* Retrieved from Gadget 360 An NDTV venture: https://gadgets.ndtv.com/internet/news/india-female-internet-users-population-unicef-study-1786597

Przybylski, A. K., Murayama, K., R.DeHaan, C., & Gladwell, V. (2013). Motivational,emotional,and behavioral correlates of fear of missing out. *Computers in Human Behavior, 29*, 1841-1848. doi:10.1016/j.chb.2013.02.014

Quan-Haase, A., & Young, A. L. (2010). Uses and Gratifications of Social Media: A Comparison of Facebook and Instant Messaging. *Bulletin of Science Technology & Society, 30*(5), 350-361. doi:10.1177/0270467610380009

Quarto, T. (2018). Individual differences in emotion processing (Doctoral Dissertation). Retrieved from https://helda.helsinki.fi/bitstream/handle/10138/235319/Individu.pdf?sequence=1&isAllowed=y

Reeve, J. (1997). *Understanding motivation and emotion.* (2 ed.). Fort Worth, TX: Harcourt Brace College Publishers.

Reinecke, L. (2017). Mood Management Theory. In P. Rössler, *The International Encyclopedia of Media Effects* (pp. 1-13). John Wiley & Sons, Inc. doi:10.1002/9781118783764.wbieme0085

Reinecke, L., Aufenanger, S., Beutel, M. E., Dreier, M., Quiring, O., Stark, B., . . . Müller, K. W. (2017). Digital Stress over the Life Span: The Effects of Communication Load and Internet Multitaskingon Perceived Stress and Psychological Health Impairments in a German Probability Sample. *Media Psychology, 20*(1), 90-115. doi:10.1080/15213269.2015.1121832

Reinecke, L., Hartmann, T., & Eden, A. (2014). The guilty Couch Potato: The Role of Ego Depletion in Reducing Recovery Through Media Use. *Journal of Communication, 64*(4), 1-21. doi:10.1111/jcom.12107

Rideout, V., Foehr, U., & Roberts, D. (2010). *Generation M2: media in the lives of 8–18-year olds.* Menlo Park (CA): The Henry J Kaiser Family Foundation. Retrieved from http://www.kff.org/entmedia/upload/8010.pdf

Roccas, S., Sagiv, L., Schwartz, S. H., & Knafo, A. (2002). The Big Five Personality Factors and Personal Values. *Personality and Social Psychology Bulletin, 28*(6), 789-801.

Rooijen, R. v., Ploeger, A., & Kret, M. E. (2017). The dot-probe task to measure emotional attention: A suitable measure in comparative studies? *Psychonomic Bulletin Review, 24*, 1686-1717. doi:10.3758/s13423-016-1224-1

Rosen, L. D., Carrier, L., & Cheever, N. A. (2013). Facebook and Texting made me do it: Media-induced task-switching while studying. *Computers in Human Behavior, 29*, 948-958. doi:10.1016/j.chb.2012.12.001

Rosen, L. D., Whaling, K., Rab, S., Carrier, L. M., & Cheever, N. A. (2013). Is Facebook creating "iDisorders"? The link between clinical symptoms of psychiatric disorders and technology use, attitudes and anxiety. *Computers in Human Behavior, 29*(3), 1243-1254. doi:10.1016/j.chb.2012.11.012

Russell, E., Woods, S. A., & Banks, A. P. (2017). Examining conscientiousness as a key resource in resisting email interruptions: Implications for volatile resources and goal achievement. *Journal of Occupational and Organizational Psychology, 90*, 407-435. doi:10.1111/joop.12177

Sackett, A. M., Meyvis, T., Nelson, L. D., Converse, B. A., & Sackett, A. L. (2010). You're having fun when time flies: the hedonic consequences of subjective time progression. *Pschological Science, 21*(1). doi:10.1177/0956797609354832

Salomon, K. A., Ferraro, F. R., Petros, T., Bernhardt, K., & Rhyner, K. (2016). Individual Differences in Multitasking Performance. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 59*(1), 887-891. doi:10.1177/1541931215591263

Sana, F., Weston, T., & Cepeda, N. J. (2013). Laptop multitasking hinders classrom learning for both users and nearby peers. *Computers and Education, 62*, 24-31. doi:10.1016/j.compedu.2012.10.003

Sanbonmatsu, D. M., Strayer, D. L., Mederois-Ward, N., & Watson, J. (2013). Who multi-tasks and why? Multi-tasking ability,perceived multi-tasking ability,impulsivity and sensation seeking. *PLoS ONE, 8*(1). doi:10.1371/journal.pone.0054402

Schimmack, U., & Grob, A. (2000). Dimensional Models of Core Affect: A Quantitative Comparison by Means of Structural Equation Modelling. *European Journal of Personality, 14*, 325-345.

Schmahl, C., Herpertz, S. C., Bertsch, K., Ende, G., Flor, H., Kirsch, P., . . . Bohus, M. (2014). Mechanisms of disturbed emotion processing and social interaction in borderline personality disorder: state of knowledge and research agenda of the German Clinical Research Unit. *Borderline Personality Disorder Emotional Dysregulation*, 1-12. doi:10.1186/2051-6673-1-12

Schuur, W. A., Baumgartner, S. E., Sumte, S. R., & Valkenburg, P. M. (2015). The consequences of media multitasking foryouth- A review. *Computers in Human Behavior, 53*, 204-215. doi:10.1016/j.chb.2015.06.035

Scibelli, F., Troncone, A., Likforman-Sulem, L., Vinciarelli, A., & Esposito, A. (2016). How Major Depressive Disorder Affects the Ability to Decode Multimodal Dynamic Emotional Stimuli. *Frontiers in ICT, 3*, 16. doi:10.3389/fict.2016.00016

Setty, S., Husain, M., Beham, P., Gudavalli, J., Kandasamy, M., Vaddi, R., . . . Jawahar, C. V. (2013). India Movie Face Database: A benchmark for face Recognition under wde variations. *Computer Vision, Pattern Recogniton, Image Processing and Graphics (NCVPRIPG)* (pp. 1-5). Jodhur: IEEE.

Sheaffer, B. L., Golden, J. A., & Averett, P. (2009). Facial expression recognition deficits and faulty learning: Implications for theoretical models and clinical applications. *International Journal of Behavioral Consultation and Therapy, 5*(1), 31-55. doi:10.1037/h0100871

Sherman, L. E., Michikyan, M., & Greenfield, P. M. (2013). The effects of text, audio, video, and in-person communication on bonding between friends. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace, 7*(2), 1-12. doi:10.5817/CP2013-2-3

Shih, S.-I. (2013). A Null Relationship between Media Multitasking and Well-Being. *PLoS ONE, 8*(5), 1-10. Retrieved from http://dx.doi.org/10.1371/journal.pone.0064508

Shioiri, T., Someya, T., Helmeste, D., & Tang, S. W. (1999). Misinterpretation of facial expression: A cross-cultural study. *Psychiatry and Clinical Neurosciences, 53*, 45-50. doi:10.1046/j.1440-1819.1999.00469.x

Shrivastava, J., Nakazawa, M., & Chen, Y.-W. (2016). Online, mixed, and offline media multitasking: Role of cultural, socio-demographic, and media factors. *Computers in Human Behavior, 62*, 720-729. doi:10.1016/j.chb.2016.04.040

Snyder, C. R., & Lopez, S. J. (2007). *Positive Psychology: the scientific and practical explorations of human strengths.* California: Sage Publications Inc.

Song, K.-S., Nam, S., Lim, H., & Kim, J. (2013). Analysis of Youngsters' Media Multitasking Behaviors and Effect on Learning. *International Journal of*

Multimedia and Ubiquitous Engineering, 8(4), 191-198. Retrieved from www.sersc.org/journals/IJMUE/vol8_no4_2013/19.pdf

Sorokowski, P., Sorokowska, A., Oleszkiewicz, A., Frackowiak, T., Huk, A., & Pisanski, K. (2015). Selfie posting behaviors are associated with narcissism among men. *Personality and Individual Differences, 85*, 123-127. doi:10.1016/j.paid.2015.05.004

Soto, C. J., & Jackson, J. J. (2013). Five-Factor Model of Personality. In D. S. Dunn, *Oxford Bibliographies in Psychology*. Oxford University Press. doi:10.1093/obo/9780199828340-0120

Statista. (n.d.). Internet usage in India - Statistics & Facts. In Statista - The Statistics Portal. Retrieved from https://www.statista.com/topics/2157/internet-usage-in-india/

Subrahmanyam, K., & Greenfield, P. (2008). Online Communication and Adolescent Relationships. *The Future of Children, 18*(1), 119-146. Retrieved from http://www.jstor.org/stable/20053122

Symons, C. S., & Johnson, B. T. (1997). The self-reference effect in memory: a meta-analysis. *Psychological Bulletin, 121*(3), 371-394. doi:10.1037/0033-2909.121.3.371

Szameitat, A. J., Saylik, R., & Parton, A. (2016). Neuroticism related differences in the functional neuroanatomical correlates of multitasking. An fMRI study. *Neuroscience Letters, 635*, 51-55. doi:10.1016/j.neulet.2016.10.029

Székely, L. (2015). The typology of multitasking activity. *European Journal of Communication, 30*(2), 209-225. doi:10.1177/0267323114567842

Szumowska, E., Popławska-Boruc, A., Kus, J., Osowiecka, M., & Kramarczyk, J. (2018). When frequent media multitaskers perform worse and when they do not: The role of self-regulation ability and strategy manipulation.

Computers in Human Behavior, 83, 184-193. doi:10.1016/j.chb.2018.01.043

Thayer, R. E. (1989). *The Biopsychology of Mood and Arousal.* New York: Oxford University Press.

Todorov, I., Missier, F. D., & Mantyla, T. (2014). Age-Related Differences in Multiple Task Monitoring. *PLOS One, 9*(9), e107619. doi:10.1371/journal.pone.0107619

Tokan, F., Mattila, P., & Sihvonen, A. (2012). *Media as Multitasking: Rise of Media Simultaneity.* Next Media-a Tivit Programme. Retrieved from virtual.vtt.fi/virtual/nextmedia/Deliverables-2011/D1.4.1.4_MOBIME_Media as multitasking-Rise of Media Simultaneity.pdf

Torro, A. N. (2013). Recognition of static and dynamic facial expressions: A study review. *Estudos de Psicologia, 18*(1), 125-130. doi:10.1590/S1413-294X2013000100020

Turkle, S. (2015). *Reclaiming Conversation: The power of talkin a igital age.* New York: Penquin Press.

Uhlsa, Y. T., Michikyanb, M., Morrisc, J., Debra Garciad, b., Smalle, G. W., Zgourouf, E., & Greenfielda, P. M. (2014). Five days at outdoor education camp without screens improves preteen skills with nonverbal emotion cues. *Computers in Human Behavior, 39*, 387-392. doi: doi:10.1016/j.chb.2014.05.036

Uncapher, M. R., Lin, L., Rosen, L. D., Kirkorian, H. L., Baron, N. S., Bailey, K., . . . Wagner, A. D. (2017). Media Multitasking and Cognitive, Psychological, Neural, and Learning Differences. *Pediatrics, 140*(Supplement 2), S62-S66. doi:10.1542/peds.2016-1758D

Uncapher, M., Thieu, M., & Wagner, A. (2016). Media multitasking and memory: Differences in working memory and long-term memory. *Psychonomic Bulletin Review, 23*(2), 483-90. doi:10.3758/s13423-015-0907-3

Van der Schalk, J., Hawk, S. T., Fischer, A. H., & Doosje, B. (2011). Moving Faces, looking places:Validation of the Amsterdam Dynamic Facial Expression Set (ADFES). *Emotion, 4*, 907-920. doi:10.1037/a0023853

Verduyn, P., Lee, D. S., Park, J., Shablack, H., Orvell, A., Bayer, J., . . . Kross, E. (2015). Passive Facebook usage undermines affective well-being: Experimental and longitudian evidence. *Journal of Experimental Psychology: General, 144*(2), 480-488. doi:10.1037/xge0000057

Voorveld, H. A., & Goot, M. v. (2013). Age Differences in Media Multitasking: A Diary Study. *Journal of Broadcasting & Electronic Media, 57*(3), 392-408. doi:10.1080/08838151.2013.816709

Voorveld, H., Seijn, C., Ketelaar, P., & Smit, E. (2014). Investigating the Prevalence and Predictors of Media Multitasking Across Countries. *International Journal of Communication, 8*, 2755-2777.

Wallis, C. (2010). *The impacts of media multitasking on children's learning and development: report from a research seminar.* New York, NY: The Joan Ganz Cooney Center at Sesame Workshop. Retrieved from https://multitasking.stanford.edu/MM_FinalReport_030510.pdf

Walther, J. B., & Parks, M. R. (2002). Cues Filtered Out, Cues Filtered in: Computer Mediated Communication and Relationships. In G. Miller, *The Handbook of Interpersonal Communication* (pp. 529-563). Thousand Oaks: Sage.

Wang, Z., & Tchernev, J. M. (2012). The "Myth" of Media Multitasking: Reciprocal Dynamics of Media Multitasking, Personal Needs, and Gratifications. *Journal of Communication, 62*(3), 493-513. doi:10.1111/j.1460-2466.2012.01641.x

Wanga, Z., David, P., Srivastava, J., Powers, S., Brady, C., D'Angelo, J., & Moreland, J. (2012). Behavioral performance and visual attention in communication multitasking:A comparison between instant messaging and online voice chat. *Computers in Human Behavior, 28*, 968-975. doi:10.1016/j.chb.2011.12.018

Ward, A. F., Duke, K., Gneezy, A., & Bos, M. W. (2017). Brain Drain: The Mere Presence of One's Own Smartphone Reduces Available Cognitive Capacity. *Journal of the Association for Consumer Research, 2*(2), 140-154. doi:10.1086/691462

Warriner, A. B., Kuperman, V., & Brysbaert, M. (2013). Norms of valence, arousal, and dominance for 13,915 English lemmas. *Behavior Research Methods, 4*, 1191–1207. doi:10.3758/s13428-012-0314-x

Watson, D., Clark, L., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063-1070.

Watson, L. A., Dritschel, B., Jentzsch, I., & Obonsawin, M. (2008). Changes in the relationship between self-reference and emotional valence as a function of dysphoria. *British journal of psychology, 99*(1), 143-152. doi:10.1348/000712607X248689

Waugh, R. (2017, September 27). *Metro.* Retrieved from Too much Facebook can give you 'virtual autism', researcher warns: https://metro.co.uk/2017/09/27/too-much-facebook-can-give-you-virtual-autism-researcher-warns-6958809/

Weinstein, S. M., & Mermelstein, R. (2007). Relations between daily actiities and adolescent mood: The role of autonomy. *Journal of clinical child and adolescent psychology, 36*(2), 182-194. doi:10.1080/1537441070127

Widyahastuti, R., & Anwar, Z. (2018). Effect Of Personality (Big Five Personality) To Multitasking. *Advances in Social Science, Education and*

Humanities Research, Proceedings of the 3rd ASEAN Conference on Psychology, Counselling, and Humanities (ACPCH 2017) (pp. 230-235). Atlantis Press.

Williams, K. (1992). An analogue study of panic onset. *Unpublished Doctoral Dissertation*. Department of Psychology, American University, Washington, DC.

Williams, K., Chambless, D., & Ahrens, A. (1997). Are emotions frightening? An extension of the fear of fear construct. *Behaviour research and therapy, 35*(3), 239-248. Retrieved from https://doi.org/10.1016/S0005-7967(96)00098-8

Wilme, H. H., Sherman, L. E., & Chein, J. M. (2017). Smartphones and Cognition:A Review of Research Exploring the Links between Mobile Technology Habits and Cognitive Functioning. *Frontiers in Psychology, 8*, 605. doi:10.3389/fpsyg.2017.00605

Winter, D. (2016). Attention to emotional stimuli in borderline personality disorder – a review of the influence of dissociation, self-reference, and psychotherapeutic interventions. *Borderline Personality Disorder and Emotion Dysregulation, 3*(11), 1-12. doi:10.1186/s40479-016-0047-z

Wood, E., Zivcakova, L., Gentile, P., Archer, K., Pasquale, D. D., & Nosko, A. (2011). Examining the impact of off-task multi-tasking with technology on real-time classroom learning. *Computers and Education, 58*, 365-374. doi:10.1016/j.compedu.2011.08.029

Woolston, C. (2018, January). *Multitasking and Stress.* Retrieved from Health Day: https://consumer.healthday.com/encyclopedia/emotional-health-17/emotional-disorder-news-228/multitasking-and-stress-646052.html

Wortham, J. (2011, April 9). Feel Like a Wallflower? Maybe It's Your Facebook Wall. The New York Times. Retrieved from

http://archive.nytimes.com/www.nytimes.com/2011/04/10/business/10ping.html

Xu, S., Wang, Z., & David, P. (2016). Media multitasking and well-being of university students. *Computers in Human Behavior, 55*, 242-250. Retrieved from http://dx.doi.org/10.1016/j.chb.2015.08.040

Yang, X., & Zhu, L. (2015). Predictors of media multitasking in Chinese adolescents. *International Journal of Psychology*, 1-9. doi:10.1002/ijop.12187

Yang, X., Xu, X., & Zhu, L. (2015). Media multitasking and psychological wellbeing in Chinese adolescents:Time management as a moderator. *Computers in Human Behavior, 53*, 216-222. Retrieved from http://dx.doi.org/10.1016/j.chb.2015.06.034

Yap, J. Y., & Lim, S. W. (2013). Media multitasking predicts unitary versus splitting visual focal attention. *Journal of Cognitive Psychology, 25*(7), 889-902. doi:10.1080/20445911.2013.835315

Yevkelis, L., Cummings, J. J., & Reeves, B. (2014). Multitasking on a Single Device: Arousal and the Frequency, Anticipation, and Prediction of Switching Between Media Content on a Computer. *Journal of Communication, 64*(1), 167-192. doi:10.1111/jcom.12070

Yiend, J. (2010). The effects of emotion on attention: A review of attentional processing of emotional information. *Cognition ad Emotion, 24*(1). doi:10.1080/02699930903205698

Young, S. G., Bernstein, M. J., & Hugenberg, K. (2010). When do own-group biases in face recognition occur? encoding versus post-encoding. *Social Cognition, 28*(2), 240-250. doi:10.1521/soco.2010.28.2.240

Zamanzadeh, N. N. (2016). The Effects of Mood as a Mediator of Media Multitasking on Cognitive Performance (Masters thesis). Retrieved from

https://search.proquest.com/openview/f9bf4e0f38290d9b2c7e8141ac03026a/1?pq-origsite=gscholar&cbl=18750&diss=y

Zhang, W., & Zhang, L. (2012). Explicating multitasking with computers: Gratifications and situations. *Explicating multitasking with computers: Gratifications and situations*, *28*(5), 1883-1891. doi:10.1016/j.chb.2012.05.006

Zhang, Y., & Rau, P.-L. P. (2015). Field Study on College Students' Uses and Gratifications of Multitasking Interaction with Multiple Smart Devices. In P. Rau (Ed.), *CCD 2015, Part II, LNCS 9181* (pp. 407-416). Los Angeles: Springer International Publishing. doi:10.1007/978-3-319-20934-0_38

Zhang, Y., & Rau, P.-L. P. (2016). An Exploratory Study to Measure Excessive Involvement in Multitasking Interaction with Smart Devices. *Cyberpsychology, Behavior And, Social Networking*, *19*(6), 397-403. doi:10.1089/cyber.2016.0079

Zhong, B., Hardin, M., & Sun, T. (2011). Less effortful thinking leads to moresocial networking? The association between the use of social network sites and personality traits. *Computers in Human Behavior, 27*(3), 1265-1271. doi:10.1016/j.chb.2011.01.008

Zhou, G., Pu, X., Young, S. G., & Tse, C.-S. (2014). Effects of divided attention and social categorization on the own-race bias in face recognition. *Visual Cognition, 22*(9-10), 1296-1310. doi:10.1080/13506285.2014.998324

Zhou, H., Guo, J., Ma, X., Zhang, M., Liu, L., Feng, L., . . . Zhong, N. (2017). Self-reference emerges earlier than emotion during an implicit self-referential emotion processing task: event-related potential evidence. *Frontiers in Human Neuroscience*, *11*, 451. doi:10.3389/fnhum.2017.00451

Zillmann, D. (1988). Mood Management Through Communication Choices. *American Behavioral Scientist, 31*(3), 327-340. doi:10.1177/000276488031003005

Zuniga, H. G., Diehl, T., Huber, B., & Liu, J. (2017). Personality Traits and Social Media Use in 20 Countries:How Personality Relates to Frequency of Social Media Use, Social Media News Use,and Social Media Use for Social Interaction. *Cyberpsychology, Behavior and Social Networking, 20*, 540-552. doi:10.1089/cyber.2017.0295