# Learning approach and its relationship to type of media use and frequency of media-multitasking

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## Abstract

Research has demonstrated that learning is impaired if students multitask with media while encountering new information. However, some have gone further, and suggested that media-multitasking (as a general activity) may have a negative impact on cognitive control processes. If this were the case, students who are heavy media-multitaskers generally would have difficulties with goal-directed behaviour, and organising their time effectively to meet their learning goals. The study described here explored links between total levels of self-reported media-multitasking, academic achievement and approaches to learning. Well-established measures of media-multitasking and learning approach were given to 307 students. Total levels of media-multitasking did not relate to either learning approach or academic achievement. However, surface learning approach related negatively to academic achievement, and time spent engaging with printed media. Deep learning approach was positively related to time spent using printed media, email and other computer applications. These findings suggest that patterns of media use differ according to current learning approach, and that these patterns may be more relevant for learning than overall tendency to media-multitask.

## Media-multitasking and academic performance

The proliferation of mobile technology presents new opportunities for active learning in higher education. For example, it provides a way for students to interact with their lecturers in class without having to speak out in public. Using mobile phones, they can vote, answer questions, or provide comments and feedback. Tablet computers and laptops can also be used for note-taking. However, the availability of such technology also presents challenges, such as the potential for distraction (Cardoso-Leite et al., 2015). Much research into media use by students has focused on the concept of media-multitasking, where people engage with information streams from two or more media within concurrent or overlapping periods of time (Ophir et al., 2009). The term is also used to refer to a situation where students are meant to be engaging with a course-related information stream (for example, reading a textbook, listening to a lecture), but multitask with another, non-course-related, information stream (for

example, instant messages from friends, sports updates). Experimental studies have established that such media use has the potential to disrupt the learning process, both during a lecture ( Hembrooke and Gay, 2003; Kuznekoff and Titsworth, 2013; Rosen et al., 2011; Sana et al., 2013; Wood et al., 2012) and while studying (Bowman et al., 2010; Lee et al., 2012; Srivastava, 2013). Collectively, these studies demonstrate that multitasking with media can lead to poorer comprehension of incoming information, or cause students to take longer to complete a learning task. Sana et al. (2013) found that using a laptop for unrelated tasks during a simulated lecture impaired the learning of not only the student concerned, but also those sitting nearby.

A different line of enquiry has involved asking students to self-report their frequency of multitasking, either while studying or in class, and relate this to their real-world academic performance (Bellur et al., 2015; Burak, 2012; Clayson and Haley, 2012; Junco, 2012; Junco and Cotten, 2012; Karpinski et al., 2013). Junco and Cotten (2012) found that the grade point average (GPA) of American college students was negatively correlated with self-reports of using Facebook and texting while studying, and Junco (2012) reported this was also the case for in-class multitasking. Bellur et al. (2015) found a negative relationship with GPA for in-class media multitasking (but not for media-multitasking during study time). Other methods used to investigate this issue include experience sampling (Moreno et al., 2012; Wang and Tchernev, 2012), time-logs of computer usage (Judd, 2013, 2014; Judd and Kennedy, 2011), or direct observations of students (Calderwood et al., 2014; Rosen et al., 2013). These survey and observational studies have revealed a high degree of media-multitasking by students. Self-report studies conducted in an educational context have tended to adopt their own questions to quantify media-multitasking and this has varied from study to study. For example, Junco and Cotten (2012) specifically asked students "How often do you do schoolwork at the same time that you are doing the following activities?" followed by a series of choices. Bellur et al. (2015) asked something very similar to this, and in addition asked participant to rate their own efficacy at multitasking (for example, "I can write and do other homework while texting or IM chatting"). Thus, in these studies questions were directly focused on multitasking while studying, rather than total amount of media-multitasking which has been the more common measure in the cognitive literature.


**Media-multitasking and cognitive control in young adults**

The studies reviewed thus far indicate that media-multitasking may be a distraction from studying and learning during class, but others have gone further, and raised the possibility that this type of activity could be fundamentally changing the way the cognitive system processes information (Ophir et al., 2009; Ralph et al., 2014; Yap and Lim, 2013). It has been suggested that the 'ecological change' associated with mobile technology and media use (Yap and Lim, 2013) may be changing cognitive control processes, possibly by 'atrophying' them (Ralph et al., 2014). As cognitive control processes support goal-directed behaviour, there would likely be negative consequences for student learning in higher education if this were the case. Students are expected to manage their own time and their own workload to meet a series of deadlines – exactly the type of behaviour that is challenging for individuals with impairments in cognitive control (Burgess, 2000). Of course, nobody would suggest that media-multitasking could lead to difficulties as profound as those seen with acquired brain injury for example, but evidence has accumulated that demonstrates differences between light and heavy media-multitaskers on a range of cognitive tasks (see Ophir et al., 2009; Moisala et al., 2016; Uncapher et al., 2016).

Ophir et al. (2009) developed an instrument for measuring the frequency of media-multitasking (the Media Use Questionnaire, used to derive a Media Multitasking Index, MMI) which has become widely used in the cognitive literature. Their findings suggested that, relative to light media-multitaskers, heavy media-multitaskers engage in 'breadth-biased' cognitive control, and have trouble filtering out irrelevant distractors in the environment, or irrelevant representations in working memory. Later studies using visual attention tasks also showed heavy media-multitaskers performing in ways that were consistent with the 'breadth-biased' account (Cain and Mitroff, 2011; Yap and Lim, 2013), and further evidence suggests lower working memory capacity in heavy media-multitaskers (Cain et al., 2016; Uncapher et al., 2016; Sanbonmatsu et al., 2013). Additionally there is now emerging evidence from neuroimaging studies of both structural and functional differences between light media-multitaskers and heavy media-multitaskers. Specifically, Loh and Kanai (2014) found smaller grey-matter volume in the anterior cingulate cortex in heavy media-multitaskers than in light media-multitaskers, while Moisala et al. (2016)

found increased brain activity in the right prefrontal cortex during a task where participants had to ignore distractor stimuli while processing the meaning of sentences.

However, all of this evidence comes from highly constrained and artificial laboratory tasks. Additionally, some evidence suggests that concerns about media-multitasking may sometimes be overstated, and that heavy media-multitaskers could have an advantage in some circumstances. For example, Ralph et al. (2015) found little relationship between media-multitasking and performance on measures of sustained attention across a range of tasks. Lui and Wong (2012) found that heavy media-multitaskers out-performed light media-multitaskers on a test of multisensory integration. Additionally, there have been failures to replicate Ophir et al.'s (2009) initial finding of a higher cost for heavy media-multitaskers when switching between tasks (Alzahabi and Becker, 2013; Minear et al., 2013).

Most of the cognitive studies reviewed above utilised a cross-sectional, 'extreme groups' design to look for differences between heavy media-multitaskers and light media-multitaskers, therefore it could be that pre-existing differences in cognition are behind greater adoption of media multitasking (rather than media-multitasking resulting in changes to cognitive control). Only one study, Kazakova et al. (2015), has used a true experiment to investigate the impact of media-multitasking on cognition (specifically, they demonstrated short-term changes in perceptual processing style), an interesting first step in investigating how media-multitasking behaviour could have consequences for subsequent cognition and behaviour.

**Media multitasking and study approaches**

There are some known individual differences in media-multitasking frequency; for example sensation-seeking has been associated with higher levels of media-multitasking (Foehr, 2006; Jeong and Fishbein, 2007; Roberts and Foehr, 2008; Sabonmatsu et al., 2013), and women report more higher media-multitasking levels than men (Roberts and Foehr, 2008; Cotten et al., 2014). For students, individual differences in their approach to study could be related to propensity to media-multitask. Measures of study approach (or study processes) index the way in which students choose to engage with academic tasks. They are not personality traits, but measures of the way in which the student currently approaches their own learning (see Beattie et al., 1997). They are not thought to be stable over time, and may differ for the same person over different educational contexts. Students can adopt either a 'deep' or a 'surface' learning approach (Bigg and Tang, 2007; Marton and Säljö, 1976). A deep approach is focused on achieving understanding, and tends towards a positive relationship with academic success (Chan, 2016; Newble and Hejka, 1991, cited in Diseth and Martinsen, 2003). A surface approach, on the other hand, is focused on memorising content and tends to negatively correlate with academic success, although these relationships are often weak, and can depend on the type of assessment being used (Diseth and Martinsen, 2003). A surface approach may be suitable for a multiple choice exam that tests knowledge of facts without any need for further elaboration, and therefore this approach is fostered by the assessment choice of the teacher (Biggs and Tang, 2007). It has been shown that students' use of on-line learning technologies can also be characterised as 'deep' or 'surface' (Knight, 2010), and that these approaches are likely to be in line with their more general approach to learning (Ellis, 2016). However, there is little research into the relationships between learning approach and university students' more general media use in their own time. Yilmaz and Orhan (2010) found that Turkish secondary school students who reported a surface approach tended to use the internet more overall (but particularly for non-learning based activities), but it is not known if they would also tend towards a higher degree of media-multitasking.

Investigations of the relationship between media-multitasking and academic performance have tended to use ad-hoc questions to obtain information about participants' self-reported frequency of media-multitasking during studying (for example, Karpinski et al., 2013; Junco and Cotten, 2012). This limits comparability across studies both within the educational context, and between the educational and cognitive literatures. There is a need to investigate whether the measure of choice in the cognitive literature, the Media Multitasking Index, is related to academic performance. Additionally, no previous studies have examined media-multitasking in relation to learning approaches. The study described here addresses this gap with the following research questions:
1) What is the relationship between Media Multitasking Index and both deep and surface approach to learning in undergraduate students?
2) Are deep and surface approaches to learning related to different patterns of media use?

3) Can academic achievement be predicted by Media Multitasking Index and approach to learning?
4) Are there gender differences in media use, media-multitasking or approach to learning?

It is hypothesised that academic achievement is negatively predicted by both media-multitasking and by a surface approach to learning. It is also predicted that heavy media-multitaskers tend to achieve higher scores for surface learning, but lower scores for deep learning. Lastly, it is predicted that female students score more highly than male students in terms of media-multitasking.

**Research methods**

The study utilised well-established measures for both study approaches and media-multitasking. Specifically, the revised two-factor Study Process Questionnaire (Biggs et al., 2001), and Ophir et al.'s (2009) Media Use Questionnaire. Adopting the Media Use Questionnaire conferred the advantages that 1) it is a widely used measure in the cognitive literature on media-multitasking, allowing easier comparison with these studies, and 2) it allowed us to examine not only media-multitasking but also self-reported hours of use per week for a number of different media. Academic performance information was obtained from university records, and consisted of the participants' overall grade for the academic year during which their media-multitasking and study approaches were measured.

*Design and procedure*
The study was a cross-sectional on-line survey. Variables measured through self-report were deep and surface approaches to study, Media Multitasking Index (MMI) and hours per week of use for 11 different media (the latter measures were determined from the Media Use Questionnaire). For students who gave their consent, academic performance information was obtained from university records. The main outcome measure was level mean mark for the academic year in which the survey was conducted, but information on previous academic performance was also gathered where available, in the form of entry qualifications (University and College Admissions Service points). Data were collected in the middle of the academic year, giving students enough time to settle into their course of study but to avoid the stressful end-of-year period.

*Participants*
Undergraduate participants were recruited from two English universities.
*University 1*: The on-line questionnaire was advertised both as part of a research participation scheme for first-year Psychology undergraduates and via email lists to students on programmes in the subject areas of Natural Sciences, Law, Art and Design, Nursing, Education, and the Built Environment. Five £10 shopping vouchers were offered as prizes in a draw that participants could opt-in to by leaving their name and email address. There were initially 257 returns from the on-line questionnaire. A number were excluded for missing data, or being unsuitable for participation (for example, 11 were post graduate), leaving 234. Some declined to give permission for us to access their academic records, meaning they could not be included for all analyses, but a full data set was obtained for 174 students. The majority of students in the sample were female (74.4%), and the mean age was 20.76 years (SD = 4.84), ranging from 18 to 53 years. In terms of ethnic background, 87.2% of the sample reported themselves to be White European, 1.7% Black African or Caribbean, 2.1% Asian, 0.4% Latin American, 0.9% mixed and 7.7% declined to answer or gave an unclear response by choosing multiple options.

*University 2*: The on-line questionnaire was advertised to Psychology students as part of a research participation scheme. From an initial 98 returns, 73 participants were retained as being suitable and 50 had a complete data set including academic performance. In terms of gender balance the sample was similar to the sample from University 1 (76.7% female), with 1.4% reporting themselves to be transgender. There was greater ethnic diversity in the sample from University 2: 43.8% of the sample reported themselves to be White European, 12.3% Black African or Caribbean, 21.9% Asian, 6.8% mixed, 5.5% 'other', and the remaining 9.6% either declined to answer or identified with a number of the given options. The mean age was 21.73 years (SD = 4.70), ranging from 18 to 43 years.

*Measures*
*The Media Use Questionnaire:* A Media-Multitasking Index (MMI) was derived from Ophir et al.'s (2009) Media Use Questionnaire. Participants first indicated how many hours per week they spent using each of 11 primary media: print media, television, computer video, music, non-music audio, video/computer

games, phone calls, instant messaging, email, web surfing and 'other computer applications'. They indicated hours per week by entering a number as a free-text response. They then filled in a grid that asked them to rate how often they combined pairings of these media, and also how often they combined each of these media with texting. Texting is omitted from the first section of the Media Use Questionnaire as Ophir et al. (2009) found that people were not able to reliably estimate how many hours they spent on this activity. Participants rated each pairing as 0 (never), 1 (a little of the time), 2 (some of the time) or 3 (most of the time). The MMI was calculated according to the formula provided by Ophir et al (2009):

$$MMI = \sum_{i=1}^{11} \frac{m_i \times h_i}{h_{total}}$$

First, the ratings in the grid were converted to the following proportion scores 0 (never), 0.33 (a little of the time), 0.67 (some of the time) or 1 (most of the time). For each of the 11 primary media (not including texting), the scores for all possible combinations with other media were added. This score ($m_i$) was then multiplied by the number of hours the participant reported using that primary medium ($h_i$), and then divided by the total number of hours spend using all media ($h_{total}$). The 11 scores were summed to create the MMI where higher values indicate a greater degree of media-multitasking.

*The Revised Two-Factor Study Process Questionnaire (R-SPQ-2F)*: Biggs et al. (2001) developed this 20-item questionnaire to assess the learning approaches of students within particular teaching contexts. It has two main scales (deep and surface) assessed by 10 items. Participants rate statements as 'never or only rarely true of me', 'sometimes true of me', 'true of me about half the time', 'frequently true of me' or 'always or almost always true of me'. An example of a statement from the Deep scale is "I find that at times studying gives me a feeling of deep personal satisfaction", and an example statement from the Surface scale is "My aim is to pass the course while doing as little work as possible". Biggs et al. (2001) reported that the Cronbach's Alpha value for the Deep Approach was 0.73, while it was 0.64 for the Surface Approach, and the values for the current study were .83 and .81 respectively.

*Data analysis*
As data were collected from cohorts at two universities, t-tests were used to confirm that there were no significant differences between the two groups in terms of the key variables.  For the Media Multi-tasking Index (MMI), $t(302) = -.557$, $p = 0.578$, for level mean mark, $t(219) = .1.239$, $p = .217$, for deep approach, $t(289) = 1.424$, $p = .155$, and for surface learning, $t(292) = -1.317$, $p = .189$. Therefore, the data from the two samples was combined. To address the first research question, Pearson correlations were used to examine the relationships between MMI and both deep and surface approach to learning. To address the second research question, data from the first part of the media use questionnaire, asking about hours of use for 11 different media types, were correlated against both deep and surface scores. Spearman's correlations were used for these analyses due to high levels of positive skew in the media use variables, and to reduce the risk of a Type 1 error (due to the large number of comparisons being made at once) a Bonferroni correction was applied to the Alpha level. To address the third research question, a multiple regression was conducted, with the MMI and the two types of learning approach as predictors of level mean mark. Gender differences in all variables were investigated (research question 4), using either t-tests or Mann-Whitney tests depending on whether the data were normally distributed.

**Results**

Descriptive statistics for males and females are shown in Table 1.

[Insert Table 1 near here please]

*Relationships between learning approach and MMI*
The data from the MMI were normally distributed, with a mean of 4.03 and standard deviation of 1.91. It had been predicted that MMI would correlate positively with a surface learning approach, and negatively with a deep approach. Neither of these predictions were supported, with $r(297) = -.021$ and $r(294) = .031$ respectively, both at $p > .05$.

*Relationships between learning approach and hours of media use*
Hours of print media use correlated positively with deep score, $r$ (294) = .254, p < .001, but negatively with surface score, $r$ (297) = -.208, $p$ < .001. Deep score also correlated positively with time spent using Email, $r$ (294) =.220, $p$ < .001, and time spent using 'other' computer applications (for example, word processing), $r$ (294) =.232, $p$ < .001. No other correlations with learning approach were significant at the adjusted Alpha level. The full matrix of these correlations can be viewed in Table 2.


[Insert Table 2 near here please]


*Predictors of academic performance*
When the MMI and the two types of learning approach were entered as predictors of level mean mark, this model accounted for just 2.3% of variance, but did approach significance, $F$ (3, 202) = 2.612, $p$ = .05. Counter to our prediction, MMI was not negatively predictive of academic performance, Beta = .02, $t$ < 1, and deep learning also was not a significant predictor, Beta = -.07, $t$ < 1. Surface learning however was, as expected, a significant negative predictor, Beta = -.21, t = -2.75, $p$ < .01. Information on previous academic performance, in the form of entry qualifications (University and College Admissions Service points), was available for a sub-set of the participants. However, it did not correlate with current level mean mark, $r$ (184) = 0.068, $p$ = 0.356, N = 184.

*Gender differences*
As predicted, females achieved a higher media-multitasking score on average ($M$ = 4.14, $SD$ = 1.92) than males ($M$ = 3.66, $SD$ = 1.82), $t$ (304) = -1.925, $p$ < .05. Males spent longer playing video/computer games compared to females, Mann-Whitney $U$ = 4090.00, $p$ < .001. However, females spent longer instant messaging, $U$ = 4951.50, $p$ < .001 and making phone calls, $U$ = 6450.00, $p$ = 0.001. No other differences were significant at the corrected Alpha level. The small difference between males and females on level mean mark did not reach statistical significance ($p$ = .09), and there was no difference between males and females on either deep or surface score ($p$s > .2).


**Discussion**

Contrary to expectations, there was no relationship between media-multitasking and either academic performance, or approaches to study. However, academic performance was negatively predicted by a surface approach to learning, which is supportive of the findings by Diseth and Martinsen (2003). Also supported was the prediction of a gender difference in media-multitasking, with females achieving higher scores. This is also in support of previous findings (for example, Roberts and Foehr, 2008; Cotten et al., 2014).

The lack of relationship between self-reported media-multitasking and academic performance in this study appears to conflict with other studies (for example, Bellur et al., 2015; Junco and Cotten, 2012). The findings reported here contribute to the debate on media-multitasking by showing that for young people in higher education, media-multitasking did not relate to an outcome variable that is of real importance to their lives. This finding is consistent with a study by Shih (2013), which did not find any relationship between measures of well-being in university students and either their media-multitasking scores or media-multitasking as assessed by a diary method. Like Shih, we hope that our results 'may offer some general reassurance to those who are apprehensive about negative impacts of MMM [media-multitasking]' (Shih 2013: 1).

Although we found no association between approach to learning and overall levels of media-multitasking, we also examined the relationship between learning approach and number of hours spent using specific types of media. The study described here asked about 11 different types of media (only some of which would be accessed through the internet). Participants with high scores on the deep learning sub-scale reported more time reading printed media, using email and 'other' computer applications (Microsoft Word was given as an example on the questionnaire). It is tempting to conclude that these activities mainly related to their course, which would be in line with the finding that students demonstrating a deep approach to learning also engage more deeply with learning technologies (Ellis, 2016), but we must caution that the Media Use Questionnaire does not discriminate between work/study and leisure use. The future development of a more specialised tool for the higher education context

would be of benefit, by allowing clearer comparisons across multiple studies from both cognitive and educational literatures. Of course, all such self-report measures are limited, in that they rely on participants to be able to accurately recall and report the amount of time spent engaged with media. Another limitation in the study is the narrow range of the sample, from two English universities, meaning that the findings cannot be generalised to other cultures or to other stages of education such as high school or postgraduate. As the study was only advertised to students in particular university departments, the findings cannot be said to represent the whole range of subject disciplines.

As well as the gender difference in overall media-multitasking, the study found a different pattern of media use between men and women. Men reported spending significantly more time playing computer/video games, while women reported more time spent on phone calls and instant messaging. This is broadly consistent with research (for example, Bellur et al., 2015; Cotten et al., 2014) and certain stereotypes about the way men and women use media. However, we think that responses to the Media Use Questionnaire may underestimate women's gaming if it is accessed through a social-networking site such as Facebook (for example, Words with Friends, Candy Crush), and also that respondents may not have considered instant messages that take place within on-line gaming environments with multiple players (for example, World of Warcraft).

In terms of the implications for practice within the higher education sector, the weight of available evidence appears to suggest that media-multitasking in the classroom is a bigger (and perhaps more tractable) problem than media-multitasking in general. Evidence from both survey and experimental studies shows classroom media-multitasking is harmful for students' learning (for example, Bellur et al., 2015; Kuznekoff and Titsworth, 2013; Junco, 2012; Wood et al., 2012) and may disrupt nearby peers (Sana et al., 2013). Attempts to 'ban' mobile devices are likely futile (not to mention harmful to student satisfaction) but there are ways of harnessing the power of these devices to more positive and task-focused ends such as voting, asking questions, or providing feedback on the session. Nothing in our data challenges or undermines such an approach to using technology to promote active learning in the classroom. Educators may also wish to confront the issue of off-task technology use directly with their students, by informing them about the evidence for the disruptive impact of media-multitasking on learning. Arming students with this information might be enough to change behaviour, at least in some cases. This approach has not been examined directly, and could be an interesting manipulation in future research studies. Other avenues for future exploration include a more detailed exploration of how technology use differs according to current learning approach, the relationship to academic motivation and self-efficacy, and the role of anxieties surrounding media use such as 'Fear of Missing Out' (Przybylski et al., 2013). Future research should also remain open to the possibility of heavy media-multitaskers having an advantage in some situations (see Lui and Wong, 2012).

In summary, it is clear from experimental work that it is harmful for students to multitask while they are taking in information during a class or while studying (for example, Sana et al., 2013; Lee et al., 2012). However, the null results of the study described in this article, and the mixed findings in the cognitive literature on media-multitasking, suggest that extreme concern about carry-over effects from too much media-multitasking *in general* may be unwarranted at this stage. Our finding of a significant negative relationship between surface learning approach and academic performance suggests it is more important for educators at all levels to tackle the lack of student engagement and/or teaching practices that lead to a surface approach to learning.

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Table 1: Mean scores for males and females (standard deviation in parentheses).

|  | Male | Female |
|---|---|---|
| Level Mean Mark (%) | 60.65 (8.45) | 62.61 (8.45) |
| Deep Total Score | 30.49 (6.42) | 31.67 (7.04) |
| Surface Total Score | 24.22 (7.38) | 23.70 (6.60) |
| Media-multitasking Index | 3.66 (1.82) | 4.14 (1.92) |
| **Hours per week using:** |  |  |
| Print Media | 5.55 (6.98) | 6.96 (9.50) |
| TV | 11.57 (12.61) | 14.28 (13.89) |
| Computer video | 13.82 (13.13) | 11.73 (15.20) |
| Music | 18.90 (17.83) | 17.50 (19.61) |
| Non-music audio | 1.46 (3.67) | 0.75 (2.46) |
| Video/computer games | 8.27 (9.82) | 2.10 (6.18) |
| Phone calls | 3.21 (4.57) | 6.41 (15.42) |
| Instant messaging | 6.82 (10.82) | 19.63 (26.02) |
| E-mail | 2.41 (3.20) | 6.35 (16.30) |
| Web surfing | 13.59 (12.00) | 17.85 (26.13) |
| Other computer applications | 10.38 (13.77) | 12.56 (17.83) |

Table 2: Spearman correlation coefficients for relationships between learning approach and hours per week of media use

| | Deep Total | Print Media | TV | Computer Video | Music | Non – Music Audio | Video Games | Phone | Instant Message | Email | Web | Other | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Surface Total** | **-.350** | **-.208*** | **.118** | **.053** | **-.038** | **-.015** | **-.028** | **-.071** | **.001** | **-.092** | **.007** | **-.133** | **-.037** |
| **Deep Total** | | **.254*** | **-.156** | **-.091** | **.103** | **.101** | **-.073** | **.106** | **.011** | **.220*** | **-.045** | **.232*** | **.052** |
| Print Media | | | .032 | .194 | .239*** | .187 | .087 | .158 | .084 | .224*** | .192 | .314*** | .337*** |
| TV | | | | -.011 | .100 | -.096 | .021 | .128 | .171 | .143 | .093 | .098 | .320*** |
| Computer Video | | | | | .367*** | .271*** | .281*** | .275*** | .178 | .184 | .423*** | .164 | .542*** |
| Music | | | | | | .172 | .149 | .191 | .263*** | .202*** | .417*** | .289*** | .641*** |
| Non-Music Audio | | | | | | | .185 | .061 | .009 | .076 | .175 | .055 | .205*** |
| Video Games | | | | | | | | -.094 | -.052 | -.018 | .162 | .048 | .259*** |
| Phone | | | | | | | | | .359*** | .435*** | .243*** | .247*** | .385*** |
| Instant Message | | | | | | | | | | .480*** | .407*** | .279*** | .591*** |
| Email | | | | | | | | | | | .405*** | .456*** | .500*** |
| Web | | | | | | | | | | | | .340*** | .679*** |
| Other | | | | | | | | | | | | | .530* |

***Significant at the corrected Alpha level of p = 0.0005