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Multiple media use and multitasking with media among high school and college students: A Diary method

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Authors' Notes.

The project described was supported by Grant Number 5R01HD044136 from the National Institute of Child Health and Human Development (NICHD). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the NICHD. An earlier version of this article was presented at the International Communication Association conference in May 2005 at New York. The authors wish to thank Suzanne Martin for her help in collecting data and creating the database.

Abstract

Based on a media diary method, this study examines the prevalence and patterns of audience behaviors that combine media use with other media (i.e., multiple media use) or non-media activity (i.e., multitasking) among high school and college students. Consistent with previous research conducted with adolescents (e.g., Roberts, 2000), this study found that youth use multiple media (combining two or more media) about 16% of the total time they spend with media. In addition, the study data suggest that total multitasking (combining a medium with a non-media activity) occurs about 76% of the total time that media are being used. Somewhat surprising, only 18% of total media time was focused on one medium to the exclusion of other activities. In addition to identifying the most frequent combination types of multiple media use and multitasking, differences in audience behaviors as a function of respondent type (high school vs. college) and day of the week were examined. This research exemplifies the use of a diary methodology in exploring complex audience behaviors such as multiple media use and multitasking in the new multimedia environment. The implications of these complex audience behaviors for research on media uses and effects are further discussed.

Multiple media use and multitasking with media among high school and college students: A Diary method

Introduction

Given that researchers estimate that youth spend over six hours a day with media (Roberts, Foehr, & Rideout, 2005; Woodard & Gridina, 2000), it is not surprising that the impact of media messages on children and adolescents is of great concern to parents and policy makers. In media effects research, many studies use exposure to a single medium (e.g., television) as the main independent variable, and then examine the effect of this exposure, on one or more outcome variables (e.g., Bartels, 1993; Bissell & Zhou, 2004; Gerbner, Gross, Morgan, & Signorielli, 1980).

Changes in audience behaviors, however, make it difficult to accurately estimate media use or exposure. Butsch (2000) noted that people spend more time being audiences by doubling up on audience activities (e.g., listening to the radio while using the Internet) and by combining their audience time (e.g., TV viewing) with other activities (e.g., eating). Previous research based on survey, observation, and diary methods has documented both types of audience behaviors: using two or more media simultaneously (e.g., Holmes, Papper, Popovich, & Bloxham, 2005; Kaiser Family Foundation, 2006; Papper, Holmes, & Popovich, 2004; Pilotta & Schultz, 2005; Roberts, 2000) and performing a non-media activity while using media (Beentjes et al., 1996; Schmitt, Woolf, & Anderson, 2003; Wober, 1992). In this paper we refer to the former as multiple media use and the latter as multitasking with media.

Definitions of Multiple Media Use and Multitasking with Media

We conceptualize *multiple media use* as using one medium with another medium and *multitasking* as using a medium while performing a non-media activity. There are four distinct audience behaviors: single media use, multiple media use, multitasking, and multiple media use while multitasking. Table 1 presents the definitions and examples of each audience behavior. It is important to note that our definition of multitasking is limited to the use of a medium with a non-media activity, which is contrary to other research that considers the use of multiple media to be multitasking (Roberts, 2000). Thus, we distinguish multitasking and multiple media use based on whether audiences combine the use of a medium with another medium or another non-media activity. We believe this slight but meaningful departure from the literature provides a more accurate and functional description of the context in which audiences receive media messages.

Table 1 about here

Figure 1 illustrates the relations between the four audience behaviors. Total media use includes all four mutually exclusive audience behaviors: single media use; multiple media use; multitasking; and multitasking with multiple media use. Total media use includes any time that media is being used regardless of the context of use. As shown, there is an overlap between multiple media use and multitasking with multiple media. Total multiple media use therefore includes multiple media use and multitasking with multiple media. Total multitasking with media, on the other hand, combines multitasking and multitasking with multiple media.

Figure 1 about here

Multitasking or multiple media use can pose a threat to media researchers because these behaviors make it difficult to measure media use and exposure. Nightingale (2004, p. 228) pointed out that the more media surround us, the less attention audiences pay to any one medium and the harder it becomes to distinguish audience activities from other experiences. Also,

because of limited capacity in human information processing (see Best, 1986; Bourne, Dominowski, & Loftus, 1979), the quality of exposure when audiences use multiple media or when they multitask may be different from that associated with the use of a single medium. Experimental research (e.g., Pool, Koolstra, & van der Voort, 2003; Zhang, Jeong, & Fishbein, 2006) suggests that multitasking can impair processing of media content as well as performance on the accompanying task. By ignoring multiple media use and multitasking, media effects and audience researchers essentially assume that audiences process all of the content presented during the time media are in use, when, in fact, audiences may only be processing some fraction of that content. A number of researchers point out that not only the quantity of exposure (i.e., frequency) but also the quality of exposure (i.e., degree of attention) should be considered when questions of potential effects are at issue (Drew & Weaver, 1990; McQuail, 1997). The present research defines and describes multiple media use and multitasking behaviors among youth by using a diary methodology.

Literature review

Although many advertising and media industry reports on media use and audience behaviors reveal that there is a growing concern with multiple media use and multitasking (Harris Interactive, 2003; Pendleton, 2004; The Media Center at the American Press Institute, 2004), surprisingly little academic research has focused on these phenomena. Based on a literature review of media and adolescents, Mastronardi (2003) recommends that future studies examining the effects of media exposure on an audience's beliefs, attitudes, intentions or behaviors should estimate media use in the contexts of the audience's individual and social behaviors. There are some studies that have examined media use in conjunction with other media or non-media activities. For example, Roberts and his colleagues (Roberts, 2000; Roberts, Foehr,

Rideout, & Brodie, 1999; Roberts, Foehr, & Rideout, 2005) reported that teens often are exposed to several media simultaneously. The researchers estimated that approximately 16% (in 1999) and 26% (in 2005) of total media time was spent using multiple media. Thus, these researchers argued that calculations of total time spent with media, or media exposure, should be adjusted to account for multiple media use to avoid what they believed was an underestimation of total media use time (Roberts, 2000; Roberts et al., 2005). Consistent with this, they suggested that the estimated time youths spend with media should be increased from 6.75 hours to 8 hours to adjust for simultaneous media use (Roberts, 2000). The Middletown Media Studies of adults 18 and above in Delaware County, Indiana (Holmes, Papper, Popovich, & Bloxham, 2005; Papper, Holmes, & Popovich, 2004), also reported that a considerable proportion of total media time was spent with multiple media. Depending upon the methodology used (i.e., a diary study versus direct observation), they reported that there was approximately 12% (diary method) to 24% (direct observation) multiple media use.

Perhaps not surprising, much of the current research on multiple media use has been driven by the media and advertising industries. This is probably because accurate measurement of audience behavior is critical to the functioning of the media marketplace since media organizations and advertisers form their relations based on accurate prediction and measurement of audiences (Napoli, 2003). Most of these studies suggest a large amount of multiple media use. For example, “The Simultaneous Media Usage Survey” conducted by BIG research in 2002-2005 reported that audiences frequently used two or more forms of media at once (Pilotta & Schultz, 2005). The Internet and television, the Internet and radio, and newspaper and television were the most popular combinations when audiences engaged in simultaneous media use. This tendency of multiple media use may be more commonly found in younger populations.

According to a recent Arbitron survey, 80% of teens reported that they regularly use more than one medium at a given time (Pendleton, 2004). The Internet, in particular, may be a medium that accounts for a significant share of the multiple simultaneous media usage among youth. Harris Interactive, in a report for Yahoo and Carat Interactive, concluded that among 13-to 24 -year-olds, 68% listen to CDs/MP3s and 45% listen to the radio while on the Internet (Harris Interactive, 2003). Although these industry findings are far from conclusive, they should spur academic researchers to address the role of multiple media use, especially in younger populations.

In contrast to the work on multiple media use, there has been considerably less attention paid to multitasking. However, there are a number of studies that suggest the existence of multitasking. For example, although Roberts et al. (1999) did not directly study multitasking, they did include two items to distinguish between households where the television was usually playing in the background regardless of whether or not anyone was watching it and households where this was not the case. They found that 42% of the sample reported the television was on for most of the time and 58% reported that it was on during meals. Based on videotape data of in-home television viewing, Schmitt, Woolf, & Anderson (2003) found that people spent 46% of their total TV viewing time with some other activity such as social interaction (e.g., talking to each other), playing, eating, and reading/writing instead of looking at the TV. The Middletown Media Studies (Holmes et al., 2005) further suggest that a large proportion of the time spent reading magazines (40%) and newspapers (32%), as well as time viewing television (46%) was combined with other non-media activities. Moreover, people most frequently multitasked with radio (76%) and the Internet (59%). Meal preparation and eating as well as housework were frequently combined with media such as television and radio, while work was frequently

combined with the Internet and radio. Based on a survey of more than 14,000 respondents, BIG research (Pilotta & Schultz, 2005) also found that most respondents reported that they often do something else while they are online (71%), watching TV (68%), and listening to the radio (64%). Consistent with these results, some educational research studies have documented students' use of background media while doing homework (e.g., Beentjes et al., 1996; Wober, 1992). Based on a survey of teens, Wober found that a quarter of the respondents reported they do homework while watching TV.

Some types of multitasking and multiple media use may be more or less problematic than others. In order to examine the consequences of multitasking, Pool, Koolstra & van der Voort (2003) conducted an experiment to test whether attention to homework was affected if media use was also present. Four conditions were created: soap opera television, music video television, radio music, and silence to test the effect of background media exposure. Students in the soap opera condition had significantly lower performance scores than those in the silence condition. On the other hand, students in the music video and radio conditions performed equally as well as those in the silence condition. This suggests that some media can be easier with which to multitask than others.

From a communication effects perspective however, the critical question may not be whether the presence of media influences task performance, but rather, whether multitasking influences one's ability to process media content. Pezdek & Hartman (1983) suggest that audience behaviors such as multiple media use (watching TV while listening to a record) and multitasking (watching TV while playing with a toy) can be a threat to the recall of TV content. Zhang, Jeong, & Fishbein (2006) also found that multitasking can impair recognition of TV program content as well as inhibit performance on the accompanying task. These studies make it

clear that communication researchers need to devote considerably more attention to the roles of multiple media use and multitasking in media effects.

The present study is an attempt to define and carefully document multiple media use and multitasking in a sample of teens and young adults using a diary methodology. As will be seen below, there are a number of critical decisions that need to be made when one attempts to define multiple media use and multitasking. Moreover, although there have been a few studies that have attempted to estimate the prevalence of one or both of these two types of behaviors, to the best of our knowledge, none of these studies have simultaneously examined (a) single media use, (b) multiple media use, (c) multitasking, and (d) multitasking with multiple media use. In addition, no studies have investigated differences in these behaviors as a function of differences in age or of day of the week. Because of differences in daily schedules, audience behaviors may be different for (a) high school students and college students and for (b) school days and weekend days. Previous research on youth also has not attempted to identify one's primary focus when one engages in multiple media use or multitasking. Since this study is essentially exploratory in nature, rather than formulating hypotheses, we address the following research questions:

RQ1: What percent of their total media time do high school and college students spend using a single medium, multiple media and multitasking?

RQ2: What are the commonly observed combinations of multiple media use and multitasking?

RQ3: When audiences use multiple media or perform multitasking, what is their primary activity?

RQ4: Do multiple media use and multitasking vary as a function of respondent type (high school vs. college students) and day of the week (e.g. Monday vs. Saturday)?

Methods

Sample

The data presented in this paper are part of a larger study to determine the best way of measuring adolescents' overall use of media and their exposure to different types of media content. In September and October of 2003, a convenience sample of 45 high school students (9th graders) and 57 college students in a large Northeastern city were recruited to complete seven daily media diaries.[1] The 9th graders were 14 or 15 years old (M = 14.22, SD = .42) and predominantly female (62.2%) and Caucasian (71%). In addition, 11.1% were African American, 6.7% were Asian, and 11.1% were classified as other. Of the college students aged 17 to 22 (M = 19.00, SD = .93), 84.2% were female and 80.7% Caucasian. In addition, 1.8% were African American, 14.0% were Asian, and 3.5% were classified as other. Informed consent was obtained from the college students and parents of high school students, and informed assent was obtained from the high school students. This study received approval from the University's institutional review board for the protection of human subjects, and respondents used ID numbers to maintain the confidentiality of their responses.

Data Collection

Respondents filled out a daily time use diary during a one-week period.[2] The diary was designed to assess students' media use and other activities that might accompany media use. The list of activities in the diary was elicited from formative research conducted prior to this study. Participants were given a week's worth of color-coded (by day of the week) diaries with detailed instructions on how to fill out the diary. Consistent with previous diary studies (e.g., Roberts et al., 1999; Roberts et al., 2005) diary days were broken into 30-minute time blocks from 6:00am to 12:00am. Respondents were instructed to indicate all the media and non-media activities they

performed in each 30-minute time period (see Figure 2). In addition, when two or more activities were checked within one time period, respondents were asked to indicate their main activity.

Figure 2 about here

Measures

Data were collected based on 12 media-related categories and 18 non-media categories (see Figure 2). Regarding offline computer use (K in Figure 2), which does not involve receiving messages from external sources, we decided to distinguish it from media use and treat it as a non-media activity. We should note that this decision differs from the classification in Roberts' (2000; Roberts et al., 1999) report of youth exposure to media, which included offline computer use as a distinct type of media activity.

Next, the 11 remaining media categories were collapsed to represent six distinct types of media: (1) print media (A in Figure 2), (2) TV (C, F, and G), (3) movies (D and E), (4) audio media and music (B), (5) Internet (I and J), and (6) games (H). This categorization is based on data from focus group interviews conducted as part of the formative research on youths' perceptions of media use. For example, we found that youth tend to perceive watching anything on TV including movies, non-movie videos or non-movie DVDs as TV viewing. Thus, we combined the activity of watching non-movie content on TV (F), watching a movie on TV (C), and watching non-movie videos and DVDs (G) into a media activity named TV viewing. Interestingly, the youth perceived watching movie videos or DVDs as movie viewing rather than TV viewing. Thus, we arrived at a movie category that combined viewing movies in the theater (D) and watching a movie with videos or DVDs (E).[3] Finally, conventional internet use (i.e. searching for information), as well as instant messaging and chatting, were all combined as internet use, but based on feedback from teens in the aforementioned focus groups, playing

internet games was included in the category of game use. It should be clear that decisions such as the above may significantly influence the estimated prevalence of multiple media use and multitasking. Thus, it is incumbent on investigators to make their decision rules as explicit as possible.

Based on the above six basic media categories, we calculated our four distinct audience behaviors (i.e., single media use, multiple media use, multitasking, and multiple media use with multitasking). If a respondent used only one of the six media types without any other non-media activity, in a given 30-minute time period, it was recorded as single media use. If a respondent combined two or more of the six media categories without any non-media activity in the given time period, it was categorized as a multiple media use. Third, if a respondent combined a medium with one or more non-media activities, in the given time period, it was recorded as multitasking. Finally, if a respondent used two or more media and performed one or more non-media activity, in the given time period, it was categorized as multitasking with multiple media use. Thus, the four categories are mutually exclusive.

Total multiple media use was calculated by adding multiple media use (category 2) and multitasking with multiple media use (category 4). Total multitasking was similarly calculated by adding multitasking (category 3) and multitasking with multiple media use (category 4). We believe that multitasking with multiple media use (category 4) can be considered as both multiple media use as well as multitasking. Total media use is the sum of all four categories: single media use, multiple media use, multitasking, and multitasking with multiple media use.

Analysis

Approximately 25,704 time and respondent units (36 time periods in a day * 7 days a week * 102 respondents) were coded as representing one of the four audience behaviors (i.e.,

single media use, multiple media use, multitasking, and multitasking with multiple media use). These data could then be aggregated in different ways to provide measures of the frequency with which a respondent performed each of the four behaviors on a given day or during the full week. We could also determine whether a given behavior was or was not performed by a given respondent on a given day, or during the one-week time period. In addition, whenever a time by respondent unit was classified as either multiple media use or multitasking, we analyzed the type of multiple media use or multi-tasking that occurred, and we identified which of those activities were reported as *primary* or *secondary*. We analyzed the frequency of combination types of multiple media use and multitasking in two steps. Theoretically, there are 360 possible multiple media use combinations based on the six basic media (6 * 5 * 4 * 3 * 2 / 2) and even more possible multitasking combinations. Thus, we first randomly selected a small subset of the data (54 half- hour time periods) and identified the most frequent types of multiple media use/multitasking combinations in those time periods. In the next step, we computed the frequency of each of the identified combination types across the whole week.

In addition, as indicated above, we analyzed the respondents' reports of their primary or secondary activities when multitasking or using multiple media (see the media diaries; Figure 2). Respondents that did not report their main activity or reported multiple main activities were coded as "other" (see Tables 3 and 4).

Finally, we analyzed differences in multitasking and multiple media use by respondent type (i.e., high school and college). Differences in the two groups' total amount of media use required the creation of a new variable of relative multitasking and multiple media use, that is the proportion of one's total media use devoted to multitasking or multiple media use. T-tests and analyses of covariance were conducted to test respondent type and day of the week differences.

Results

Time Spent Using Multiple Media and Multitasking

The data indicate that respondents spent a total of about 3746 hours using media during the week. Each respondent, on average, spent 37 hours per week with media (i.e., about 72 half-hour time periods). This represents about 26 percent of the 126 hours (18 hours a day * 7 days) recorded in the diaries for a week. Table 2 shows, per week, the mean number of hours and percentage of time spent for each type of audience behavior. Respondents spent about 193 total hours (1.99 hours per respondent) using multiple media, 2414 hours multitasking (24.05 hours per respondent), and 680 hours using single media (6.67 hours per respondent). The proportion of the time that the respondents focused on only one medium is relatively low (18%), and the least frequent type of media use is multiple media use (5%). Instead, respondents frequently multitasked (66%) and the remaining 11% of their time was spent performing non-media activities while using multiple media (i.e., using multiple media with multitasking).

Table 2 about here

Analysis of the number of respondents that performed each audience behavior indicated that single media use and multitasking were more commonly performed than multiple media use. All respondents used single media and performed multitasking at least once (i.e., one 30-minute time period as a unit) during the one-week period of data collection. For each day of the week, almost all respondents used media for at least one time period: Monday (100%), Tuesday (96%), Wednesday (100%), Thursday (100%), Friday (99%), Saturday (97%), and Sunday (97%). In addition, almost all respondents performed multitasking on each day: Monday (93%), Tuesday (96%), Wednesday (99%), Thursday (97%), Friday (96%), Saturday (93%), and Sunday (89%). Fewer respondents, however, used multiple media at least once a week and those that did were

more likely do so from Monday through Thursday compared to Friday through Sunday: Monday (51%), Tuesday (52%), Wednesday (61%), Thursday (61%), Friday (43%), Saturday (48%), and Sunday (38%). These data suggest that almost all youth spend some time with media and multitask at least once a day, yet only about 40% to 60% of the youth use multiple media on a given day.

Types of Multiple Media Use and Multitasking Combinations and Primary/secondary Activities

The most frequent multiple media use and multitasking combination types are shown in Table 3. We present only two common types of multiple media use because these two types account for 83% of the total multiple media use time. In marked contrast, multitasking combinations are much more heterogeneous, with the seven most popular types accounting for only 40% of the total time spent multitasking. Each of the other multitasking combinations accounted for less than 3% of the total multitasking time, thus the primary activity was not analyzed for these minor multitasking activities.

As shown in Table 3, both of the most common multiple media patterns involve Internet use. However, when using the Internet and listening to audio media simultaneously, the Internet was the primary medium most of the time (77%) and audio media was rarely so (6.2%). In contrast, when the Internet was used simultaneously with TV viewing, watching TV was more likely to be the main focus (56%) compared to the Internet (39%).

In considering the primary activity while multitasking, it is interesting to note that respondents' almost always focused on the non-media activity (e.g., homework or traveling) rather than on the media activity (e.g., television, the Internet). To put this somewhat differently, in multitasking, media were almost always in the background rather than in the foreground. The

only exception to this pattern is the combination of viewing TV while eating, where one is about as likely to focus primarily on TV as on eating.

Table 3 about here

Respondent Type and Day of the Week Differences in Audience Behaviors

Finally, we examined how total media use, multitasking and multiple media use differed as a function of respondent type (high school vs. college student) and day of the week (e.g. Monday through Sunday). Since high school and college students differed somewhat in gender and ethnicity, we controlled for these variables in our analyses. For all three dependent variables, 2 x 7 mixed analyses of covariance were conducted with gender and ethnicity as covariates. Neither covariate was significantly related to the audience behaviors. In contrast, both main effects as well as their interaction were statistically significant for all three dependent variables. Figures 3, 4, and 5 illustrate the respondent type and day of the week differences for total media use, multitasking, and multiple media use, respectively. More specifically, analyses revealed that the average amount of time for total media use (F (6, 76) = 2.74, $p < .05$), multitasking (F (6, 76) =3.44, $p < .01$), and multiple media use (F (6, 76) = 3.39, $p < .01$) were significantly different by the day of the week. Similarly, there were also significant main effects of respondent type (i.e., high school versus college) for total media use (F (1, 81) = 12.74, $p < .01$), multitasking (F (1, 81) = 11.82, $p < .01$), and multiple media use (F (1, 81) = 12.34, $p < .01$). The interaction effects between day of the week and respondent type were also significant for all three dependent variables (total media use, F (6, 76) = 5.87, p < .001; multitasking, F (6, 76) = 4.42, p < .01; and multiple media use, F (6, 76) = 2.27, p < .05).

On average, college students spent more time on total media use (t (85) = 4.30, $p < .001$), multiple media use (t (85) = 3.11, $p < .01$) and multitasking (t (85) = 2.01, $p < .05$) than did high

school students. However, on Saturday, there were no significant differences between high school students and college students in the amount of time they spent using media, multiple media, and multitasking. College students, compared to high school students, also spent a larger proportion of their media use time in multitasking and in using multiple media. Multiple media use occurred about 21% of the total time college students used media, but only about 13% of the time high school students used media (t (85) = 3.11, p < .01). Similarly, multitasking occurred about 81% of the total time college students used media, while high school students multitasked about 73% of their total media time (t (85) = 2.01, p < .05).

Figure 3 about here

Figure 4 about here

Figure 5 about here

Discussion

Summary of Findings

Our study was primarily designed to examine the utility of a diary method to explore complex media use behaviors such as multiple media use and multitasking among youth. The diary data suggest that the 14 to 22-year-olds in our sample spend 37 hours a week using media – a number that accounts for approximately one quarter of their waking time.[4] The first key question addressed by this study focused on the extent to which youth combine media use with other media or non-media activities. The data indicated that 16% of the total time youth spend with media involves multiple media use (total multiple media use in table 2). This finding is comparable to the 15% multiple media use among youth reported by Roberts et al. (1999), and the 12% to 24% of multiple media use among adults reported by Holmes et al. (2005). In addition, we found that multitasking occurs about 76% of the total time that media are being

used, and that only 18% of total media time was focused on one medium to the exclusion of other activities.

A second purpose of the present study was to identify common patterns of multiple media use and multitasking among youth. Within our sample, the two most frequent multiple media patterns are combining the Internet with audio media or with TV. These multiple media use combinations that were found to be most prevalent within our sample turn out to be among the most prevalent combinations reported by the Middletown Media Studies (see e.g., Holmes et al., 2005; Papper, Holmes & Popovich, 2004) as well as BIG research (Pilotta & Schultz, 2005). It is interesting to note that when using the Internet and listening to audio media simultaneously, the Internet was the primary medium to which audiences paid attention, whereas when using the Internet along with TV viewing, TV was more often the main focus. Previous studies comparing radio and TV use suggest that the two media may vary in the amount of cognitive load because radio appeals only to hearing while TV appeals to two modes of cognitive activities, namely, visual and auditory (Leigh, 1991). Thus the Internet can be the primary medium when combined with a less demanding audio medium, but less cognitive resources may be left to process the information on the Internet when combined with a more demanding medium such as television.

In contrast to the relatively homogeneous nature of multiple media use, multitasking is much more heterogeneous. As shown in the list of most common types of multiple media use and multitasking, these audience behaviors involved media such as audio media, television, and the Internet but not print media, movies, and games. This may be because the latter type of media requires higher levels of involvement than the latter type of media. What is most striking however, is that of the seven most common types of multitasking identified our study, the primary activity analyses showed that non-media activities (e.g., traveling, grooming) were

almost always more likely to be the main activity; the combination of TV viewing and eating was an exception. These results have important implications for media effects research. In particular, the results further suggest consideration of the context surrounding the use of a medium to fully understand the extent to which exposure to media content will have an impact on the audience. If attention to the medium is the secondary activity when multitasking, the extent to which the messages are processed when multitasking needs to be carefully examined.

Finally, we examined differences in media use by respondent type and days of the week. The data indicated that college students, on average, spend significantly more time with media compared to high school students. College students, compared to high school students, were also more likely to multitask and use multiple media. Moreover, after controlling for total media use, college students, compared to high school students, spent a significantly greater percentage of their total media use time multitasking (81% vs. 73%) and using multiple media (21% vs. 13%). Further research is necessary to determine if these differences are lifestyle (i.e. different daily schedules) or generational. In addition, the day of the week interacted with respondent type (i.e. high school vs. college students) on media consumption. While trends held constant across Sunday through Thursday such that college students used significantly more total media, multiple media, and performed more multitasking, differences between the two student groups mostly disappeared on Friday and Saturday. The finding suggests that, at least within this age group, lifestyle differences (e.g., the daily schedule of college and high school students), rather than generational differences, seem to have greater influence on media use.

It is also interesting to note that audiences' media use patterns on Friday were more similar to those on Saturday (a weekend day), and those on Sunday were more similar to those on Monday through Thursday (a weekday). These results may have important implications for

media research. In media use surveys, researchers often group Monday through Friday as "weekday" and Saturday and Sunday as "weekend." Our data suggest that these groupings may not be appropriate for high school and college students. Indeed, if one cannot assess daily media use, it may be more valid to ask students to report their media use on, for example, "an average Tuesday" and on "an average Saturday" than on "an average weekday" and "an average weekend day".

Limitations

There are several limitations to this study. Perhaps most critical, because our study is based on a small convenience sample, the findings are not necessarily generalizable beyond those students who participated in the study. However, our findings concerning the proportion of time 14 to 22 year-olds spend in various audience behaviors (e.g., in multiple media use and multitasking) as well as those concerning the types of multiple media use and multitasking these teens and young adults engage in, are quite consistent with other research (Holmes et al., 2005; Papper, et al., 2004; Pilotta & Schultz, 2005; Roberts, 2000; Roberts et al., 1999;). Thus, our findings further document the magnitude of these new audience behaviors that must be taken into account by media effects researchers.

One purpose of the present paper was to demonstrate how diary data can be used to investigate these complex behaviors. Although the diary methodology is often treated as a "gold standard" in time use research because it does not rely on recall as much as traditional self-report surveys, the diary method also has some limitations. First, students may not necessarily fill out the diary as they move through the day. For example, at the high school, students were observed filling out the diary right before it was collected, and at the university, students reported that they sometimes filled it out at the end of the day. Second, there is a possibility that the half-hour time

frame, which is often used in media diary research (e.g., Roberts et al., 1999, 2005), resulted in overestimation of media use. For example, media use for a fraction of the half-hour period (e.g., 15 minutes) was recorded as 30 minutes of media use. In addition, there is a possibility of overestimating multiple media use and multitasking because, for example, the use of two or more media within the half-hour time frame is coded as multiple media use. It is assumed that multiple activities performed within the 30-minute time frame are performed simultaneously, yet they may, in fact, be performed consecutively. Although this issue represents one limitation of using a diary method, it is interesting to note that studies comparing diary data to survey data found that survey estimates of time spent with media (based on self-reports) are often higher than the estimates based on diary data (e.g., Greenberg, Eastin, & Skalski, 2005). In addition, the findings of this study concerning multiple media use are quite consistent with the results of survey research (e.g., Roberts et al., 1999, 2005) that directly probes respondents' use of multiple media. It is worth noting, however, that there is an alternative to using 30-minute or other fixed time frames in media diaries—namely, using open-ended diaries that allow respondents to record the start and stop time of media use (see Papper et al., 2004). We, however, acknowledge that open-ended diaries are also prone to errors in reporting because they are even more obtrusive than close-ended diaries.

Finally, another limitation of this research is that recording only a single week of data collection may be problematic. When being monitored, users, at first, may alter their media use. Thus, if possible, it would be preferable to have respondents fill out the diary for at least a few days prior to actual data collection in order to allow them to settle back into their normal media use patterns. Unfortunately, it is difficult to know whether the effects of being monitored ever

dissipate and it must be noted that such a procedure is costly and may involve throwing out valuable data.

Theoretical Implications

Despite the above limitations, our study makes it clear that multitasking and multiple media use frequently occur when audiences use media. Multitasking and multiple media use have important implications for media effects theory. In media effects research, it has been assumed that audiences pay full attention to the content when they use media. However, audiences may pay only some fraction of their attention to television when they are multitasking. Audience researchers (Drew & Weaver, 1990; McQuail, 1997), thus, have noted that it is important to consider the quality of exposure (i.e., degree of attention) as well as quantity (e.g., frequency or amount of exposure) especially when questions of potential effect are at issue.

The potential role of multitasking as a factor necessary for understanding media effects also follows from McGuire's (1985) persuasion model and the information processing approach (see Best, 1986; Bourne, Dominowski, & Loftus, 1979; Lang, 2000). McGuire's (1985) model of persuasion posits that attention is the stage of media effects that follows exposure. From this perspective, media may influence audiences only when they actually attend to the media content. The information processing approach, on the other hand, assumes that human information processing is limited. Due to this limited capacity of audiences, multitasking serves as a distraction that can reduce the processing of information contained in messages (Bergen, Grimes, & Potter, 2005; Lang, 2000; Pool, Koolstra & van der Voort, 2003; Zhang, Jeong, & Fishbein, 2006). Since multitasking will often limit attention, media effects should be smaller when audiences are multitasking then when they are not.

Multiple media use and multitasking are not only relevant to information processing theory and media effects research, but also theories of media enjoyment and entertainment media. Theoretical models of entertainment experience suggest a number of psychological states including suspension, empathy, parasocial interaction, presence, and interest (see Vorderer, Klimmt, & Ritterfeld, 2004) as well as transportation (Green, Brock, & Kaufman, 2004) as contributors to enjoyment. Although little research examined the effects of multitasking on enjoyment, multitasking may limit enjoyment experiences in response to entertainment media.

When developing estimates of media use and conducting research on media effects or media enjoyment, audience behaviors (e.g., single media use, multiple media use, and multitasking), should be taken into account as important contexts of media exposure. By ignoring such context, researchers essentially assume that the impact of exposure to a given medium is a constant irrespective of what other media may be simultaneously in use or what other activities are taking place. This assumption is perhaps seen most clearly in Roberts' (2000) recommendation that the time youth spend with media be increased from 6.75 to 8 hours a day in order to take simultaneous media use into account. However, if we are interested "media effects" rather than mere exposure, it may not be appropriate to simply add up the time spent with each medium when audiences use multiple media (or multitask). Instead, it may be useful to assign differential weights to the amount of time spent with a specific multitasking or multiple media use combination when estimating total time of media use. While there is general agreement that multitasking interferes with information processing, little is known about the types of tasks or media combinations that are most or least likely to reduce the recall or recognition of media content. We see this relatively new area of research—concerning the relationship between

quality of exposure and effects—as both a challenge and an opportunity for researchers interested in the impact of media on audiences.

Notes

1. Previous research (e.g., Holmes et al., 2005; Papper et al., 2004) has examined multiple media use and multitasking in adult populations but not in younger populations. The 9th graders were students at a local high school while the college students were students from an undergraduate communication class. The study was described as a class project for the 9th graders and as an extra-credit research project for the college students. All participants were volunteers, with almost all students in the two classes volunteering to take part in the study.

2. Data were collected from Monday through Sunday. From Monday to Thursday, diaries were collected on the next day. From Friday to Sunday, diaries were collected on the following Monday.

3. As one of our reviewers pointed out, an alternative categorization would put watching movies on videos or DVDs (E) with television viewing (C, F, G) instead of with movie viewing in the theater (D). This categorization would recognize that watching a movie in the theater is a different experience than watching one at home. However, as mentioned above, our categorization reflects the distinction adolescents in our focus groups made between a) watching a movie on TV as "watching TV" and b) watching a movie on a video or DVD as "watching a movie".

4. This research reports that respondents, on average, use 37 hours of media in a week (i.e., approximately one quarter of adolescents' waking time). This is somewhat smaller than 55 hours a week (or a third of their total available time) reported by Roberts et al. (1999, 2005). This difference, however, may be due to sample characteristics. For example, their study sample

included a much larger proportion of African American adolescents and their study also indicates that African Americans spend more time with media than do other racial groups (see Roberts et al. 1999, 2005).

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Table 1.

Operational definitions of media use, multiple media use, multitasking, and multiple media

Type of audience behavior	Operational definitions
Single media use (1)	The act of using a medium without using any other media or performing any non-media activities
Multiple media use (2)	The act of using two or more media without performing any other non-media activities (e.g., using the internet while listening to the radio)
Multitasking (3)	The act of using a medium while performing any other non-media activities (e.g.,. watching TV while eating)
Multiple media use while multitasking (4)	The act of using two or more media while performing any other non-media activities (e.g., using the internet and watching television while doing homework)
Total multiple media use (2+4)	The act of using two or more media
Total multitasking (3+4)	The act of using media while performing some other non-media activities (e.g., eating or doing home work)
Total media use (1+2+3+4)	The act of using mass media (either with or without a combined activity)

Figure Caption

Figure 1. Diagram of total media use, multiple media use, and multitasking categorization

Note. All the four variables are mutually exclusive. Total media use = (1) + (2) + (3) + (4); Total Multiple media use = (2) + (4); Total Multitasking = (3) + (4).

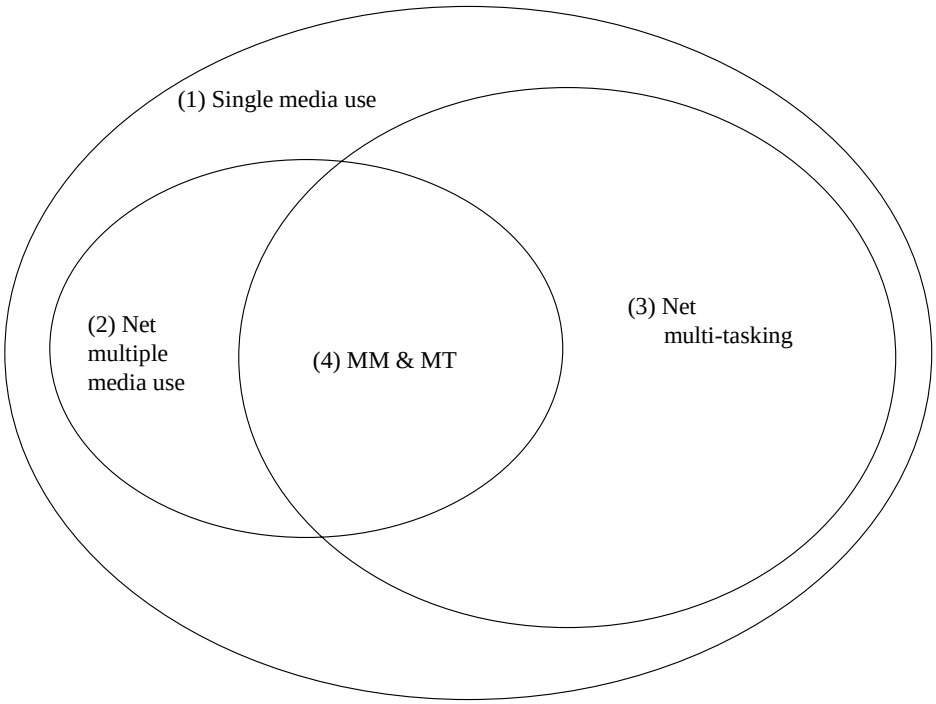

(1) Single media use
(2) Net multiple media use
(4) MM & MT
(3) Net multi-tasking

Figure Caption

Figure 2. Sample media diary

6 – 6:30 a.m.	MONDAY		
Fill in circles for all activities during this half hour.			
A Reading magazine or newspaper	◯		
B Listening to music (not music videos)	◯		
C Watching a movie on television	◯		
D Watching a movie in the theater	◯		
E Watching a movie – Video/DVD/computer	◯		
F Watching non-movie - Video/DVD/computer	◯		
G Watching television (not a movie)	◯		
H Playing video, computer or internet game	◯		
I IMing, emailing or chatting on Internet	◯		
J Other internet activities	◯		
K Offline computer use (writing papers, etc)	◯		
L I wasn't using any media	◯		
M Nothing else	◯	V Arts or Crafts	◯
N Sleeping	◯	W Reading a book	◯
O Household tasks	◯	X Childcare/babysitting	◯
P Homework	◯	Y Shopping	◯
Q Grooming (showering, dressing, etc.)	◯	Z Traveling	◯
R Eating	◯	AA In school	◯
S Exercising or playing sports	◯	BB At work	◯
T Talking to someone	◯	CC Participating in hobby or club	◯
U Hanging out with friend(s)	◯	DD Something else	◯

Table 2.

Time spent for each type of audience behavior per week

Type of audience behavior	Time of use in hours in a week [a]	Percentage of time relative to total time spent with media
Total media use	*M* = 36.74 (*SD* = 14.36)	100%
Single media (1) [b]	*M* = 6.67 (*SD* = 5.44)	18.2%
Multiple media (2)	*M* = 1.99 (*SD* = 2.48)	5.4%
Multitasking (3)	*M* = 24.05 (*SD* = 11.04)	65.5%
Multiple media use while multitasking (4)	*M* = 4.02 (*SD* = 5.24)	10.9%
Total multiple media use (2+4)	*M* = 6.02 (*SD* = 6.56)	16.4%
Total multitasking (3+4)	*M* = 28.07 (*SD* = 14.43)	76.4%

[a] Average time spent for each type of audience behavior in a one-week period. *N* = 86.

[b] See Table 1 and Figure 1 for definitions of (1), (2), (3), & (4)

Table 3.

Common types of multiple media use and multitasking and the primary versus secondary activities when using multiple media or multitasking

Multiple media type	Proportion relative to total multiple media use	Primary medium	Secondary medium	Others
Internet & Audio	59%	Internet (77%)	Audio (6%)	17%
Internet & TV	24%	TV (56%)	Internet (39%)	5%
Multitasking type	**Proportion relative to total multitasking**	**Primary activity**	**Secondary activity**	**Others**
Internet & Homework	10%	Homework (75%)	Internet (19%)	6%
Audio & Traveling	7%	Traveling (86%)	Audio (10%)	5%
Audio & Homework	7%	Homework (84%)	Audio (9%)	7%
TV & Eating	5%	TV (49%)	Eating (47%)	4%
Audio & Grooming	4%	Grooming (82%)	Audio (7%)	11%
Audio & Hanging out with friends	4%	Hanging out with friends (78%)	Audio (21%)	1%
TV & Homework	3%	Homework (61%)	TV (33%)	6%

Figure Caption

Figure 3. Average hours of total media use by age group and by day of the week

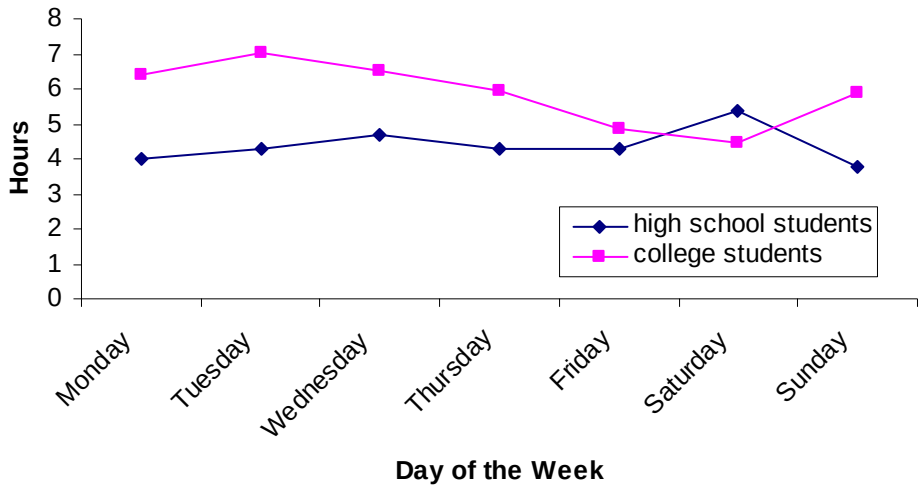
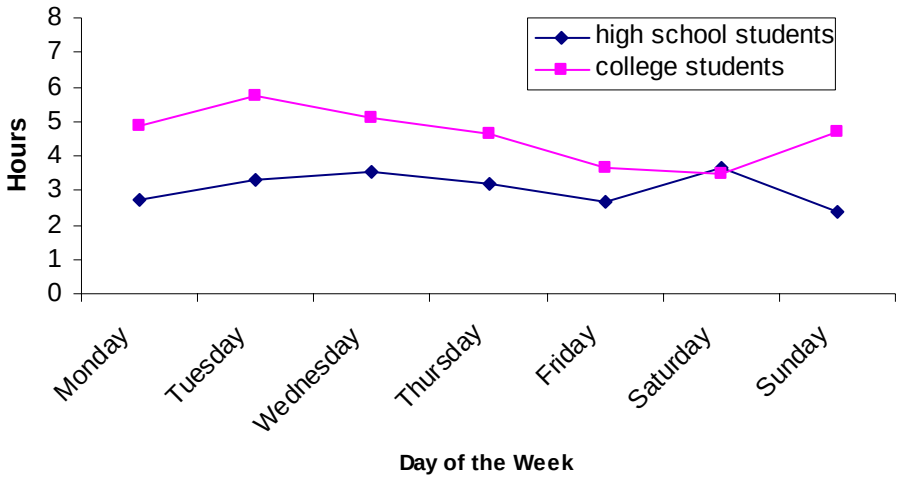

8
7
6
5
4
3
2
1
0
Hours
high school students
college students
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
Day of the Week

Figure Caption

Figure 4. Average hours of multitasking by age group and by day of the week


high school students
college students
Hours
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Monday
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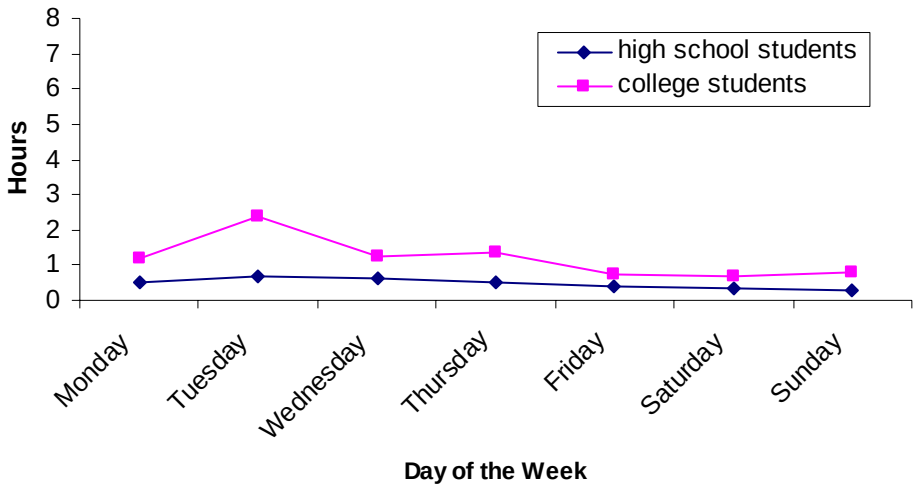
Wednesday
Thursday
Friday
Saturday
Sunday
Day of the Week

Figure Caption

Figure 5. Average hours of multiple media use by age group and by day of the week


8
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Hours
high school students
college students
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
Day of the Week