Predictors of Multitasking with Media: Media Factors and Audience Factors

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In this research, multitasking with media is defined as an audience behavior that combines media use with another non-media activity. This study examines (a) the prevalence and patterns of multitasking among 14- to 16-year-olds and (b) the media and audience factors that predict such behavior. Consistent with previous research, this study found that youth frequently multitask with media. Both (a) ownership of media in bedrooms as a media factor and (b) sensation seeking as an audience factor were found to be significant predictors of multitasking with media. The theoretical and practical implications of the study are further discussed.

INTRODUCTION

In the new multimedia environment, audiences' media use behaviors are becoming more complicated. Audiences spend more time with media by combining their media use (e.g., TV viewing) with other activities (e.g., eating), which is referred to as multitasking (Butsch, 2000; Papper, Holmes, & Popovich, 2004; Roberts, 2000; Roberts, Foehr, Rideout, & Brodie, 1999, 2005). Multitasking with media poses a threat to media researchers and advertisers because these behaviors make it much more difficult to assess media use and exposure (Napoli, 2003; Nightingale, 2004). Because of limited capacity in human information processing (see Best, 1986; Bourne, Dominowski, & Loftus, 1979), the quality of exposure (Drew & Weaver, 1990; McQuail, 1997) when audiences multitask may be different from that when they use a single medium. It is, thus, important to understand complicated audience behaviors such as multitasking in media effects research as well as in advertising and media economics research. Although previous research

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on multitasking has explored its prevalence and consequences, we were unable to find studies that have examined the antecedents or predictors of this audience behavior. This study uses survey data to explore the frequency of multitasking behavior among adolescents as well as some of the correlates of this behavior. On the basis of Webster, Phalen, and Lichty's (2000) model of media exposure, both media factors (e.g., access and technology ownership) and audience factors (e.g., sensation seeking) are proposed as predictors of multitasking.

LITERATURE REVIEW

Multitasking as an Audience Behavior

A growing body of research suggests that multitasking (i.e., combining media use with other activities) is prevalent among audiences. For example, based on survey, diary, and observational methods, Middletown Media Studies (Holmes, Papper, Popovich, & Bloxham, 2005; Papper et al., 2004) suggest that almost all audiences (96%) multitask with media in some way, and on average 47% of the media day involved multitasking. There were differences in multitasking across media in that audiences were most likely to multitask with radio (76%) followed by the Internet (59%), television (46%), magazines (40%), and newspapers (32%). Activities such as meal preparation and eating as well as housework were frequently combined with radio and television, whereas work was frequently combined with radio and the Internet. Based on a survey of more than 14,000 respondents, BIG research (Pilotta & Schultz, 2005) also found that most audiences often do something else while they are online (71%), watch TV (68%), and listen to the radio (64%) whereas fewer respondents multitask with newspapers (41%) or magazines (40%).

Multitasking has also been studied with younger populations (e.g., teens and college students). For example, a study (Jeong et al., 2005) based on a diary method found that high school and college students spend a considerable proportion of their media time multitasking (76% of total media use time; about 28 hours a week). The most popular types of multitasking combinations involved the use of: (a) audio media (e.g., music) with traveling, homework, grooming, and social interaction; (b) TV with eating and homework; and (c) the Internet with homework. The study also explored the main activity when respondents multitask. Respondents almost always reported that they devoted more attention to their non-media activity (e.g., doing homework or eating), than to their media activity (e.g., listening to music or watching TV).

Although research on multitasking has been based on different research methods and populations, the findings indicate that audiences, both youth

and adults, spend a substantial proportion of their media time multitasking. In addition, although studies have reported some differences in the prevalence of specific types of multitasking, the studies suggest that audiences are more likely to multitask with broadcast (e.g., radio and television) and online media rather than print media (e.g., newspaper and magazines).

Multitasking and Media Effects

Audiences' multitasking has some important implications for media effects theory. It is important to consider multitasking for accurate measurement of exposure to media which is often the independent variable in media effects research. Cultivation theory, for example, as a theory of television effects, links the amount of television viewing to social reality judgments (see Gerbner & Gross, 1976; Gerbner, Gross, Morgan, Signorielli, & Shanahan, 2002; Morgan & Shanahan, 1997). However, it is important to recognize that when audiences are multitasking with media, the quality of exposure to media content may be lower, that is, audiences pay only some fraction of their attention to media content (Nightingale, 2004). In fact, audience researchers (Drew & Weaver, 1990; McQuail, 1997) 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. Without taking multitasking into account quantity of exposure may be overestimated, which may lead to inaccurate estimation of effects.

To understand the potential role of multitasking in media effects, three theoretical models deserve attention: McGuire's (1985) persuasion model, the information processing approach (see Best, 1986; Bourne et al., 1979; Lang, 2000), and the elaboration likelihood model (ELM; Petty & Cacioppo, 1986). McGuire's (1985) model of persuasion suggests that exposure to persuasive information does not necessarily lead to effects because attention, comprehension, and yielding are necessary steps for effects. Although multitasking can interfere with any of these steps, it is most likely to limit attention or comprehension. How multitasking may limit attention or comprehension can be explained by considering the information processing approach that assumes that human information processing is limited. If some processing resources are used to attend a task (e.g., homework) then there will be fewer resources available to process media content. More complex tasks will require more resources, and thus audiences' attention to and comprehension of the concurrent media content will decrease. Finally, according to the ELM, working on some tasks while using media can serve as a distraction that will reduce one's ability to centrally process the content of the media message, and thus guide the audience to peripherally process messages. This shift from central to peripheral processing will reduce the likelihood that exposure to media content will have longer term effects on attitudes, intentions, and behaviors.

Consistent with the above views, a few studies have specifically focused on the inhibiting role of multitasking in information processing (Pool, Koolstra, & van der Voort, 2003). For example, Zhang, Jeong, and Fishbein (2006) found that compared to participants who focused on a single activity (viewing television or working on a homework-type task), people who viewed a television drama while working on a task (reading articles) a) recalled less of the audio and visual materials comprising the television programming and also b) scored lower on comprehension and recall tests (concerning the information in the articles). In Pool et al.'s (2003) experiment, youths were asked to do a homework task with varying types of media content (radio music, music video, and television soap opera). The results show that youths multitasking with music or music videos had little if any effect on their task performance while multitasking with soap operas on television significantly reduced task performance. On the basis of the information processing approach and related research, it is reasonable to assume that multitasking limits audiences' processing of information received from the media as well as their performance on a simultaneous non-media task.

Factors Influencing Multitasking

Given the prevalence of multitasking as well as its potential effects on audiences' cognitions and behaviors, it is important to understand the factors that increase or decrease the likelihood that one will multitask. The current research focuses on some of the possible antecedents that predict multitasking as an audience behavior. More specifically, this research examines whether Webster et al.'s (2000) model of exposure to media, as a general theory of audience behaviors, also applies to understanding audiences' multitasking behavior. Webster et al.'s model posits two major influences: audience and media factors. Audience factors refer to the characteristics of the media users such as socio-demographic factors and psychological factors that can be associated with media use. Media factors include structural media factors such as the media market or technology availability as well as individual media factors that are related to audiences' access to media such as technologies owned and subscriptions.

It can be argued that this distinction between media and audience facts is analogous to the nature-nurture debate. That is, the nature-nurture debate concerns the roles of innate characteristics (nature) and environmental factors (nurture) on one's behaviors (see Ceci & Williams, 1999). Sherry (2004) extends the framework to understand the biological and socio-environmental influences on media effects. In Webster et al.'s (2000) model, structural media factors as well as some audience factors (e.g., SES) are clearly environmental whereas some audience factors (e.g., sensation seeking) are relatively biological (see Zuckerman, 1994 for the biological basis for sensation seeking).

It would be important to understand the relative influences of these environmental and biological factors on multitasking.

Based on the above framework, the present research posits that both individual audience factors and individual media factors serve as proximal antecedents of multitasking. With regard to individual audience characteristics, sensation seeking as well as audience socio-demographics may be particularly relevant. Sensation seeking is defined as "one's need for varied, novel, and complex sensations and experiences and the willingness to take physical, social, legal, and financial risks for the sake of such experience" (Zuckerman, 1994). Arnett (1994) characterizes the construct as not only a potential for taking risks but also as a quality of seeking intense and novel experiences which are expressed in multiple areas of a person's life.

In the communication literature, a large body of research suggests a relationship between sensation seeking and preferences for various types of media content. From a theoretical perspective, how sensation seeking relates to multitasking may be explained in terms of the uses and gratifications model (Katz, Blumer, & Gurevitch, 1974). The model proposes that social and psychological needs lead to specific patterns of media or content usage. High sensation seekers (HSS), who have a stronger need for varied, novel, and complex experiences, are more likely to use particular media content or engage in certain types of audience behaviors to fulfill their needs. With regard to content use, HSS are found to prefer violent film and website content (Slater, 2003), horror films (Edwards, 1991; Johnston, 1995; Tamborini & Stiff, 1987), sexually explicit television content (Vanwesenbeeck, 2001), televised sports (McDaniel, 2004), and rock music over bland music (Litle & Zuckerman, 1986).

There is also some evidence that sensation seeking is associated with certain audience behaviors such as habitual viewing (HSS) or irregular and passive viewing patterns (low sensation seeker; LSS) (Rowland, Fouts, & Heatherton, 1989). Also, compared to LSS, HSS are more likely to watch television accompanied by distracting activities, to change channels more often, and to change channels to seek arousing content (Perse, 1996). On the basis of the construct of sensation seeking and previous research, it is expected that sensation seeking will be related to multitasking. Specifically, HSS, who have a stronger need for varied, novel, and complex experiences, are more likely to seek other activities while attending to one or more media unless the medium or content is fully engaging.

In addition to audience characteristics, media factors (e.g., media ownership) can also influence multitasking behavior. People may not be able to use a particular medium if it is not available. Although universal availability of radio and television is usually taken for granted in the US, newer forms of media and types of service (e.g., computer and the Internet, cable and HDTV) are not available to all households (Webster et al., 2000).

In addition, not all audiences have access to television or the Internet in their private rooms (e.g., bedroom). Although not focusing on multitasking, a Kaiser Family Foundation report (Roberts et al., 2005) found that adolescents who have more media in their bedrooms spent more time with media in general. For example, those who had a television in their bedrooms viewed television for about 3 and a half hours, and this is about an hour and a half more viewing time than those who do not have television in their bedrooms. It seems reasonable to assume that the more media audiences have access to, the more they are likely to multitask. Audiences who have access to cable TV service and the Internet, such as in their own bedroom or study, can more easily multitask than those who own fewer technologies. In this regard, individual media factors are likely predictors of multitasking behavior. Thus, availability of television and computer with Internet access in one's bedroom are posited as media factors that can lead to increased multitasking.

Media factors may not only have direct influence on multitasking behavior but may also mediate or moderate the impact of audience factors (e.g., sensation seeking) on multitasking. With regard to the mediation relationship, HSS may own more media to fulfill their needs, which can subsequently affect their amount of multitasking. In this case, media ownership (the intervening variable) is referred to as a mediator of the relationship between sensation seeking and multitasking (the dependent variable). On the other hand, it is possible that media ownership can interact with sensation seeking, such that sensation seeking is more strongly related to multitasking when media ownership is high than when media ownership is low. To put this somewhat differently, given limited media ownership, HSS may not be more likely to multitask than LSS. However, when given considerable media ownership, HSS might be much more likely to multitask than LSS. When there is an interaction between sensation seeking and media ownership on multitasking, media ownership is referred to as a moderator of the relationship between sensation seeking and multitasking (see Baron & Kenny, 1986, for a detailed description of mediators and moderators). Thus, there may be three ways in which individual media factors can influence multitasking behavior: (a) media factors (e.g., access) and audience factors (e.g., sensation seeking) have independent (main) effects on multitasking; (b) media factors moderate the effects of audience factors (SS) on multitasking (i.e., there is an interaction); and (c) media factors mediate the relationship between audience characteristics (SS) and multitasking behavior (i.e., when media factors are controlled, the relationship between audience characteristics (e.g., sensation seeking) and multi-tasking is eliminated or greatly reduced).

If audience factors and media factors are unrelated, the first possibility (i.e., media and audience factors having direct effects) and the second possibility (i.e., an interaction between media and audience factors) are plausible.
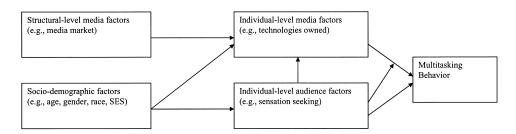
FIGURE 1 Model predicting multitasking behavior.

However, it is also possible that sensation seeking and media ownership are correlated. HSS, all things being equal (e.g., SES or age), may be more willing to purchase and own more personal media in order to have increased access to various media, and this increased ownership allows HSS to multitask more easily and more frequently than LSS. If this is the case, ownership may be the mediator of the relationship between individual audience characteristics and media behaviors. Although it is possible that audience factors (e.g., sensation seeking) may *moderate* the relationship between media factors (e.g., media ownership) and multitasking, sensation seeking should not *mediate* the relationship between media ownership and multitasking. That is, having more media is unlikely to make a person into an HSS.

On the basis of the above review of the literature, a model is presented that suggests the factors predicting multitasking behavior (see Figure 1). Individual psychological factors (e.g., sensation seeking) and individual media factors (e.g., having access to television and/or to a computer with Internet access in one's bedroom) are posited as proximal determinants of audience behaviors such as multitasking. Individual media factors (e.g., having television and computer with Internet access) are, in turn, viewed as a function of both structural media factors (e.g., coverage and content options) and socio-demographic factors (e.g., age, gender, race, and SES). Some of these socio-demographic factors are also likely to be related to sensation seeking. For example, previous research has suggested that Whites are more likely to be HSS than are Blacks (see Zuckerman, 1994, p. 112, for a review). Finally, Figure 1 suggests that the individual media factors may mediate or moderate the relationship between audiences' psychological characteristics and their multitasking behaviors.

In this study, an initial test of some aspects of this model is provided. Structural level media factors are controlled because the study is conducted within a single media market: a large city in the northeastern United States. The study was designed to test the following hypotheses or answer the following research questions:

H1: Sensation seeking will be positively related to multitasking behavior.

H2: Personal media ownership (e.g., having a television or a computer with Internet access in their bedrooms) will be positively associated with multitasking.

RQ1: Are socio-demographic factors and sensation seeking related to adolescents' personal media ownership?

RQ2: Do media ownership and sensation seeking have interaction effects on multitasking?

RQ3: Does media ownership mediate the relationship between sensation seeking and multitasking?

METHOD

Sample

A cross-sectional survey was designed to assess adolescent media use patterns with a sample of 547 adolescents ages 14 to 16 ($M = 15.01$, $SD = .84$). There were 326 females (59%) in the sample, and the racial distribution was Blacks (50%), Whites (44%), and others (6%). Adolescents were recruited through print and radio advertisements, direct mail, and word of mouth to complete the survey. Eligibility criteria included age at the time of the survey (14, 15, or 16 years) and race/ethnicity (White, Black/African-American, or Hispanic). Written parental consent and teen assent were collected for all participants. Of the 601 respondents who agreed to participate in the survey, 91% completed it.

Procedure

All respondents completed the survey on-line. The web-based survey was accessible from any computer with Internet access. Enrolled adolescents were given a password to access the survey, as well as an ID number and personal password in lieu of using any individually identifying information. Those who did not have access to the Internet were invited to a computer lab where participants can fill out the survey. This was to avoid any sampling biases due to lack of Internet access.

The data were collected as part of a larger study designed to determine the extent to which exposure to sexual content in media affects adolescent sexual development. This survey was developed to measure the media use patterns and sexual beliefs, attitudes, and behaviors of adolescents, in order to determine the extent to which exposure to sexual content in media affects adolescents. On average, it took the respondent adolescent one hour to complete the entire survey. When they completed the survey, teens received compensation of $25 for their time.

Measures

The survey questionnaire items relevant to this study include measures of multitasking, media ownership, sensation seeking, and socio-demographic variables.

Multitasking was assessed by asking respondents to report on a 4-point scale (never, rarely, sometimes, often), the frequency with which they combined media use with other activities. More specifically, respondents were asked questions such as: "How often do you do your homework while listening to audio media?" This item was replicated across 13 combination types: audio-doing homework, audio-traveling, audio-interaction with friends, audio-grooming, audio-exercising, audio-eating, TV-eating, TV-interacting with friends, TV-doing homework, TV-exercising, Internet-doing homework, Internet-interaction with friends, and Internet-eating. These multitasking combinations were the 13 most common types identified in a previous media diary study (Jeong et al., 2005). Multitasking with print media (e.g., newspapers) were not included because the previous study indicated that youth spend very little time with print media and thus rarely multitask with these media.

Responses to the 13 items were used to develop four indices: total multitasking (based on all 13 items), multitasking with audio (based on 6 items), multitasking with TV (based on 4 items), and multitasking with the Internet (based on 3 items). Because they are indices rather than scales, high internal consistency is not necessarily expected. However, inter-item consistency was relatively high for total multitasking (including 13 items; $\alpha =$ .75) and audio-based multitasking (six items; $\alpha =$ .72), but only moderate for TV-based multitasking (four items; $\alpha =$ .56) and Internet-based multitasking (three items; $\alpha =$ .63).

Sensation seeking was measured with the following four items: "I would like to explore strange places," "I like to do frightening things," "I like new and exciting experiences even if I have to break the rules," and "I prefer friends who are exciting and unpredictable" ($\alpha =$ .73). Response options were on a 5-point scale ranging from strongly agree to strongly disagree ($M = 3.34$, $SD = .88$). Although the original SSS-V (Zuckerman, 1994) consists of 40 items, Hoyle, Stephenson, Palmgreen, Pugzles-Lorch, and Donohew (2002) introduced the Brief Sensation Seeking Scale (BSSS) which consists of eight items, and Stephenson, Hoyle, Palmgreen, and Slater (2003) further reduced it into a 4-item scale. Stephenson and his colleagues found that the 4-item scale correlated strongly with the BSSS, which has been suggested to have strong construct and nomological validity (Hoyle et al., 2002). A large, national survey of adolescent drug use (Hornik et al., 2002) as well as several other studies (e.g., Zhao et al., 2006) also found that the 4-item scale has both strong reliability and validity.

Media ownership was measured using the following items: "Do you have a television in your bedroom?" and "Do you have a computer with Internet access in your bedroom?" (Yes/No). Seventy-seven percent of the respondents had a television and 39% had a computer with Internet access in their bedrooms. Moreover, 23 % of the respondents had both a television and a computer with Internet access, 53% had a television only, 5% had only a computer with Internet access, and 19% of the respondents did not have bedroom access to either of these media. Based on the two items, a measure of number of media in the bedroom was constructed that ranged from 0–2 ($M = 1.05$, $SD = .65$). We did not include a measure of audio media ownership because previous reports such as the Kaiser Family Foundation survey (Roberts et al., 2005) based on national samples indicate that almost all adolescents own some personal audio media such as a radio (86%) or a CD player (88%), and very few did not have any form of audio media.

The response options for *Race* were: American Indian/Alaskan Native, Asian, African American, Hispanic, Native Hawaiian/Pacific Islander, White, and Other race.

Parents' education was assessed as a proxy for socio-economic status (SES) based on the following items. "What best describes your mother's/female guardian's education level?" and "What best describes your father's/male guardian's education level?" Response options were: Did not graduate high school, graduated high school, some college, graduated college, and do not have this person/don't know.

RESULTS

Frequency of Multitasking

Consistent with previous research, the data suggest that youths perform a substantial amount of multitasking. Listening to audio media while traveling, listening to audio media while interacting with friends, and watching television while eating were identified as the most frequently performed media multitasking activities (see Table 1). Most of the respondents reported that they often perform these multitasking activities and very few youths reported that they never multitask with media. Some activities were combined to a lesser extent: watching television while interacting with friends, listening to audio media while grooming, listening to audio media while exercising/playing sports, and listening to audio media while doing homework. Still, more than a third of the respondents reported that they often perform such multitasking activities and very few reported that they never engage in these behaviors. Watching TV or using the Internet while doing homework had relatively low prevalence although about 25% of the respondents reported that they often do so.

TABLE 1 Mean Frequency of Each Type of Multitasking Combination

Combination types	Median frequency of use	Mean frequency of use (*SD*)	Percent of respondents in often category	Percent of respondents in never category
Audio Multitasking				
Audio - traveling	Often	3.74 (.53)	76%	1%
Audio - interaction with friends	Often	3.41 (.79)	55%	4%
Audio - grooming	Sometimes	3.04 (1.05)	44%	13%
Audio - exercising	Sometimes	2.99 (1.07)	41%	15%
Audio - homework	Sometimes	2.99 (.98)	36%	11%
Audio - eating	Sometimes	2.79 (1.04)	30%	14%
TV Multitasking				
TV - eating	Often	3.35 (.90)	57%	6%
TV - interaction with friends	Sometimes	3.07 (.93)	36%	7%
TV - homework	Sometimes	2.60 (1.07)	24%	19%
TV - exercising	Rarely	1.85 (.98)	8%	49%
Internet Multitasking				
Internet - homework	Sometimes	2.65 (1.06)	24%	18%
Internet - interaction with friends	Rarely	2.51 (1.06)	22%	21%
Internet - eating	Rarely	2.23 (1.09)	17%	34%

Total multitasking was strongly correlated with audio-based multitasking (r (567) = .71, p < .001), TV-based multitasking (r (560) = .77, p < .001), and Internet-based multitasking (r (547) = .77, p < .001). Audio-based and TV-based multitasking (r (560) = .44, p < .001), audio-based and Internet-based multitasking (r (547) = .32, p < .001), TV-based and Internet-based multitasking (r (547) = .37, p < .001) were also significantly correlated.

Audiences were more likely to perform multitasking with audio media or television than with the Internet. Three activities (interaction with friends, eating, and homework) that were commonly combined with the three media (audio, television, and the Internet) were selected to ensure comparability across the three media. A three (media) by three (activities) within subject analysis of variance indicated that the effects of media (F(2, 541) = 117.87, p < .001) and activity (F(2, 541) = 25.53, p < .001) on multitasking were significant. Audiences were less likely to multitask with the Internet than with audio media (mean difference = −.59, se = .04, p < .01) or with television (mean difference = −.52, se = .04, p < .01). Frequency of multitasking with audio media was marginally higher than multitasking with television (mean difference = .07, se = .03, p = .051).

In terms of non-media activity, audiences were more likely to multitask with media while interacting with friends than while they were doing homework (mean difference = .27, se = .04, p < .01) or eating (mean difference = .23, se = .04, p < .01). The difference between multitasking while eating and while doing homework was not significant (mean difference =

.04, $se = .03$, *ns*). In addition, a significant interaction between media and activity emerged ($F(4, 541) = 113.48, p < .001$). When interacting with friends, audiences were more likely to use audio media ($M = 3.41, SD = .80$) than television ($M = 3.04, SD = .93$) or the Internet ($M = 2.50, SD = 1.06$). When doing homework, audiences were also more likely to use audio media ($M = 2.99, SD = .98$) than television ($M = 2.60, SD = 1.07$) or the Internet ($M = 2.65, SD = 1.06$). When eating, however, audiences were more likely to watch television ($M = 3.32, SD = .90$) than to use audio media ($M = 2.73, SD = 1.04$) or the Internet ($M = 2.21, SD = 1.09$).

Socio-demographic Characteristics, Sensation Seeking, and Media Ownership

The first research question was about the relationships between socio-demographic characteristics, sensation seeking, and media ownership. Gender, race, and parents' education were related to media ownership (see Table 2). Males ($M = 1.18, SD = .65$) had more media in their bedrooms than females ($M = .96, SD = .63; t(540) = 3.82, p < .001$). Males (83%) were more likely than females (73%) to have a television in their bedrooms ($\chi^2 (1, N = 562) = 8.58, p < .01$). Males (35%) were also more likely than females (24%) to have a computer with Internet access in their bedrooms ($\chi^2 (1, N = 562) = 7.95, p < .01$). Compared to Whites ($M = .99, SD = .71$), Blacks ($M = 1.13, SD = .57$) had more media in their bedrooms ($t(495) = 2.44, p < .05$). Blacks (88%) were more likely than Whites (65%) to have television ($\chi^2 (1, N = 511) = 40.65, p < .001$). In contrast, Whites (35%) were more likely than Blacks (24%) to have a computer with Internet access ($\chi^2 (1, N = 511) = 7.52, p < .01$).

Consistent with previous research, compared to Blacks ($M = 3.21, SD = .89$), Whites ($M = 3.52, SD = .84$) reported higher levels of sensation seeking ($t(502) = 4.16, p < .001$). In addition, adolescents were less likely to have media in their bedrooms the higher their mothers' or fathers' level of education (see Table 2). Sensation seeking and age were not related to media ownership. Recall however that the age range was limited; respondents' age only ranged from 14 to 16.

Socio-demographic Characteristics, Sensation Seeking, Media Ownership, and Multitasking

The relationships between socio-demographic characteristics, sensation seeking, and multitasking were examined. Socio-demographic characteristics were associated with total multitasking (see Table 2). Females were more likely than males to multitask. It is interesting to note that females multitasked more than males even though females had fewer media in their bedrooms.

TABLE 2 Zero-order Correlations between Socio-demographic Variables, Sensation Seeking, Media Ownership, and Types of Multitasking

	Age	Female	White	Black	M. Education	F. Education	SS	Ownership[a]
Total MT (13 items)	.039	.156***	.003	−.019	−.003	.001	.241***	.111*
Audio-Based MT (6 items)	.069	.247***	−.070	.045	.034	−.013	.276***	−.010
TV-Based MT (4 items)	.001	.035	−.116**	.118**	−.062	−.068	.101*	.142**
Internet-Based MT (3 items)	−.008	.031	.270***	−.281***	.033	.099*	.171***	.166***
Sensation Seeking	.065	.034	.175***	−.195***	.099*	.079	—	—
Ownership	−.021	−.162***	−.090*	.117**	−.177***	−.127	.002	—
N	541	541	527	527	475	389	537	541

*$p < .05$, **$p < .01$, ***$p < .001$.
[a]Number of media in bedroom.

Thus it is not surprising that females remained more likely than males to multitask after controlling for media ownership (Partial correlation r (539) = .18, $p < .001$). With regard to multitasking with individual media, females were particularly more likely then males to multitask with audio media. Males and females did not differ with respect to multitasking with TV or the Internet. Race was not related to total multitasking, yet there were some racial differences in specific types of multitasking (see Table 2). Whites were more likely than other races to engage in Internet-based multitasking combinations. Blacks were more likely than other races to perform TV-based multitasking. It should be noted however that Blacks were more likely than Whites to have a television in their bedrooms, whereas Whites were more likely than Blacks to have a computer with Internet access in their bedrooms. Although the relationship between Blacks and frequency of TV-based multitasking was not significant after controlling for television access in the bedroom (Partial correlation r (531) = .06, *ns*), Whites remained more likely to engage in Internet-based multitasking even after controlling for Internet access (Partial correlation r (531) = .18, $p < .001$).

Consistent with the first hypothesis, sensation seeking (SS) was positively associated with total multitasking as well as with audio-based multitasking, internet-based multitasking, and television-based multitasking (see Table 2). Note that SS was more strongly associated with audio-based multitasking than with either television-based ($z = 2.87$, $p < .01$) or Internet-based multitasking ($z = 1.71$, $p < .08$).

In sum, the frequency of total multitasking varied as a function of media ownership and sensation seeking (see Table 3). Consistent with the above univariate analyses, multivariate analyses, controlling for other socio-demographic characteristics, found that gender was a significant predictor of total multitasking such that females were more likely than males to engage

TABLE 3 Regression of Multitasking onto Socio-demographic, Media, Audience Factors

	Total Multitasking	Audio-based Multitasking	TV-based Multitasking	Internet-based Multitasking
Background R^2 (R^2 change)	.042*	.097***	.042**	.079***
Age β	.030	.057	.019	−.020
Female β	.202***	.289***	.094	.033
White β	.009	−.019	−.173**	.277***
Mother Education β	−.008	.077	−.054	−.053
Father Education β	.011	−.027	.004	.046
Media & Audience Factors R^2 (R^2 change)	.119 (.077***)	.158 (.061***)	.078 (.036**)	.132 (.053***)
SS β	.228***	.246***	.121*	.145**
Ownership β	.161**	.054	.151**	.177**
Interaction R^2 (R^2 change)	.131 (.012*)	.168 (.010*)	.080 (.020)	.142 (.010*)
Female * White β	.116*	.106*	.041	.104*

*$p < .05$, **$p < .01$, ***$p < .001$.

in multitasking. None of the other socio-demographic characteristics was a significant predictor of total multitasking. More important, after controlling for various socio-demographic characteristics, both sensation seeking and number of media in one's bedroom continued to contribute significantly to multitasking. In addition, a significant interaction between gender and race emerged; White females were particularly more likely to multitask. However, the interaction between sensation seeking and number of media in the bedroom on multitasking was not significant.

With regard to multitasking with individual media (see Table 3), females were more likely than males to engage in audio-based multitasking, but not in television-based or Internet-based multitasking. Whites were significantly more likely than Blacks to multitask with the Internet even after controlling for access. On the other hand, Blacks were more likely to multitask with television; however, this relationship did not hold after controlling for access to television in their bedrooms. Sensation seeking was a positive predictor of audio-based multitasking as well as television-based and Internet-based multitasking. Media ownership was positively related to television-based multitasking and Internet-based multitasking but not with audio-based multitasking. In addition, a significant interaction between gender and race on audio-based multitasking and Internet-based multitasking emerged. Consistent with total multitasking as an outcome, White females were particularly more likely to multitask with audio media and the Internet, but not television media.

DISCUSSION

Consistent with previous research on multitasking (e.g., Beentjes, Koolstra, & Van der Voort, 1996; Holmes et al., 2005), this study found that young audiences perform a substantial amount of multitasking. Yet there was some variation in the frequency of multitasking by medium. Audio media were frequently used when adolescents were traveling, interacting with friends, grooming, and doing homework. Television media were frequently combined with eating, hanging out with friends, and homework.

When performing activities such as doing homework, eating, and interacting with friends, the data show that audiences are more likely to combine these activities with audio media or television than with the Internet, and this may be because of the differences in cognitive demand across the media. Listening to audio media or viewing television may be more passive audience behaviors compared to using the Internet, and thus it may be easier to multitask with audio media or television than with the Internet. In other words, the Internet may be a more "selfish" medium than audio or television media. However, the types of media with which it is easier or more difficult to multitask need to be further examined.

The results of this study provide some support for the application of Webster et al.'s (2000) model of media exposure to understand the audience behavior of multitasking. As expected, sensation seeking, as a characteristic of the audiences, was positively associated with total multitasking. In addition, the data indicate that sensation seeking is more strongly associated with audio-based multitasking than with television-based or Internet-based multitasking. With regard to the role of individual media factors, the data suggest a weak but significant association between owning technologies and multitasking. In this study, most respondents (77%) had a television in their bedrooms. This percentage is fairly consistent with the findings of other reports based on nationally representative samples. For example, a Kaiser Family Foundation survey (Roberts et al., 2005) reported that 65% of teens had TV in their bedrooms. The percentage of television ownership in bedrooms was slightly higher in our sample than the Kaiser report. This may be due to fact that, in our study, there are more African-American adolescents, who are more likely to have television in their bedrooms. Moreover, within our sample, 23% had both a television and a computer with Internet access, whereas only 19% had neither a television nor a computer with Internet access. Consistent with expectations, compared to adolescents without access to media in their bedrooms, those with access are significantly more likely to multitask, particularly with television and the Internet. This may be because our measure of media ownership included only television and computer with Internet access.

The multivariate relationship between audience characteristics (i.e., sensation seeking), media factors (i.e., technology ownership), and multitasking seems to be that audience factors and media factors both have independent influence on multitasking behavior. Neither an interaction effect nor a mediating effect of media ownership was found. Although sensation seeking was moderately related to multitasking, data suggest that this relationship is not mediated by access to media because sensation seeking and number of media in one's bedroom were unrelated. In other words, although greater media ownership and high sensation seeking are both related to greater multitasking, HSS do not necessarily have more media in their bedrooms, which would allow them to engage in multitasking. This may be due to the fact that a number of other factors (e.g., structural and socio-demographic) influence media ownership.

With regard to socio-demographic characteristics, females were more likely than males to engage in multitasking, particularly audio-based multitasking. White females were particularly more likely to engage in multitasking. Gender differences in multitasking and explanations for those differences should be examined in future research. Black adolescents were more likely to engage in television-based multitasking, but this relationship disappeared after controlling for television ownership in their bedrooms. In contrast, White adolescents were more likely to engage in Internet-based

multitasking even after controlling for Internet access in their bedrooms. These results suggest that Black audiences may be more likely to multitask with TV because they have more access to TV, whereas Whites multitasking with the Internet appears to be over and above Internet access.

Multitasking has important implications for media effects theory and research. As described earlier, multitasking—as a distracting context of media use—may reduce information processing and inhibit central processing of messages. The role of multitasking in media effects also pertains to enjoyment of entertainment media. 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 previous research has not examined the role of multitasking in entertainment media use, it is reasonable to expect that multitasking may limit enjoyment experiences in response to entertainment media. Because multitasking may have an impact on information processing and enjoyment of entertainment media, it is important to consider the multitasking context within which audiences use media. This research suggests that the amount of multitasking may vary as a function of audience factors and media factors. Thus, future research should question whether media effects, including information processing and enjoyment experiences, are reduced among audiences who are more likely to multitask (e.g., high sensation seekers and those who have greater access to media in their bedrooms).

The study has some limitations. For example, this study did not include use of mobile media (e.g., cell phones). Audiences may use a substantial amount of mobile media while they travel, do various tasks, or use other media. This is because mobile media can be considered as an interpersonal medium rather than a mass medium that contains mass messages. However, in some countries such as South Korea, Japan, the United Kingdom, and Germany, the cell phone is used as a mass medium in which broadcast messages are transmitted, and this broadcasting service is referred to as Digital Multimedia Broadcasting. Thus, studies conducted in these countries should include the cell phone as another medium with which users may multitask. The characteristics of the sample of this study may limit the generalizability of the study results. Although this study uses a convenience sample, the respondents of this study were sampled based on a quota sampling method, which insures balance across various demographic characteristics including age (between 14 to 16), gender, and race (Whites and Blacks). This sample, thus, allowed for comparisons among age, gender, or racial groups. Given the possible response biases typically found in convenience samples, future research should attempt to replicate the findings of this research with nationally representative samples of both youth and adults. Finally, we recognize that self-reported media use in surveys may not be the most valid measure

of assessing audiences' multitasking behavior. Nevertheless, it is important to note that the findings of this study are quite consistent with those of other studies based on diary method or observational method (e.g., Holmes et al., 2005).

Despite the above limitations, it is clear that young audiences frequently consume media while engaging in other activities. In addition, those who have greater access to media in their bedrooms and audiences who are characterized as HSS are more likely to multitask with media. Future research should further explore whether the relationship between sensation seeking and multitasking holds in adult populations because for some behaviors such as smoking, the relationship between sensation seeking and smoking disappears in adult populations (Zuckerman, 1994).

This study has practical implications for media economics and audience valuation. Young audiences are often highly valued and media organizations (e.g., television stations) produce content designed to appeal to highly valued audience segments (Napoli, 2003, p. 124). For instance, programmers present violent programming to attract and sell young audience segments to advertisers. However, young audiences, particularly HSS, may be more likely to be exposed to media content in distracting contexts of exposure (e.g., multitasking), and thus pay less attention to media content, including advertising messages. Thus, young audiences may not necessarily be the most valued audiences due to the low quality of their exposure to advertising messages. As audience researchers (Drew & Weaver, 1990; McQuail, 1997) have emphasized the importance of the quality of exposure, future research on audience valuation should consider the quality of exposure to media for accurate evaluation of audiences.

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