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Multitasking With Television Among Adolescents

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Abstract

Using Ecological Momentary Assessment, we explored predictors of adolescents' television (TV) multitasking behaviors. We investigated whether demographic characteristics (age, gender, race/ethnicity, and maternal education) predict adolescents' likelihood of multitasking with TV. We also explored whether characteristics of the TV-multitasking moment (affect, TV genre, attention to people, and media multitasking) predict adolescents' likelihood of paying primary versus secondary attention to TV. Demographic characteristics do not predict TV multitasking. In TV-multitasking moments, primary attention to TV was more likely if adolescents experienced negative affect, watched a drama, or attended to people; it was less likely if they used computers or video games.

Adolescents frequently multitask – or attend to other stimuli – while watching television (TV; Jeong et al., 2005; Rideout, Foehr, & Roberts, 2010). Multitasking may inhibit their memory and comprehension of TV content (Jeong & Hwang, 2012; Pezdek & Hartman, 1983; Zhang, Jeong, & Fishbein, 2010; Zhang, Jeong, & Fishbein, 2006), thereby altering TV's behavioral or health effects. For example, adolescents who focus on other stimuli while watching TV have lower body mass indices, perhaps because multitasking inhibits their processing of TV food advertisements (Bickham, Blood, Walls, Shrier, & Rich, 2013). An analysis of TV multitasking trends may help both researchers and TV producers better predict TV effects. Toward this end, the present study used ecological momentary assessment to explore whether demographic viewer characteristics (i.e., age, gender, race/ethnicity, and maternal education) and momentary characteristics of the viewing moment (i.e., affect, TV genre, attention to people, and media multitasking) predict TV multitasking behaviors among adolescents.

Theoretical Framework: Limited Capacity Model

This study is grounded in the limited capacity model (Lang, 2000), which posits that people have finite information-processing resources. To learn from TV content, viewers must devote sufficient cognitive resources to processing it; devoting insufficient resources

reduces one's likelihood of learning (Lang, Bolls, Potter, & Kawahara, 1999). Multitasking reduces the cognitive resources available for TV content, thereby decreasing the likelihood that viewers will learn from TV (Jeong & Hwang, 2012; Pezdek & Hartman, 1983; Zhang et al., 2010; Zhang et al., 2006). Like prior research involving the limited capacity model (e.g., Lang et al., 1999; Lang, Geiger, Strickwerda, & Sumner, 1993; Lang, Potter, & Grabe, 2010), the present study aims to identify characteristics that predict viewers' allocation of cognitive resources to TV. Whereas prior studies have typically explored characteristics of the TV content itself, we explore characteristics of the viewer and viewing context as predictors of attention to TV.

Demographic Characteristics and TV Multitasking

Some viewers may tend to pay *full attention* to TV – that is, to watch without attending to anything else. Others may tend to *multitask*, watching TV while attending to other stimuli. The limited capacity model suggests that, compared with full attention, multitasking increases cognitive load and decreases TV-processing capacity (Lang, 2000). Indeed, multitasking has been found to decrease memory (Pezdek & Hartman, 1983; Zhang et al., 2010) and comprehension of TV content (Zhang, et al., 2006). Demographic characteristics explain about one quarter of the variance in young people's media multitasking tendencies (Foehr, 2006). Understanding demographic predictors of TV multitasking may help researchers to better predict individual differences in TV effects. We therefore asked, which demographic characteristics predict full attention to TV versus TV multitasking?

Age

Multitasking with TV may vary over the lifespan. Visual attention to TV declines from age 12 to adulthood, while TV-viewing time spent in other activities increases during this period (Schmitt, Woolf, & Anderson, 2003). It is therefore likely that media multitasking increases during adolescence. This may occur because adolescents experience increasing role demands as they age (e.g., jobs, social relationships, scholastic responsibilities) and multitask to meet these demands (Kaufman, Lane, & Lindquist, 1991).

H₁: TV multitasking will be more likely among older adolescents than younger adolescents.

Gender

Among children and adolescents, females are more likely to multitask with media (Foehr, 2006; Rideout et al., 2010). This difference is consistent with the broader finding that women multitask more often than men do (Schneider & Waite, 2005). The explanation for this trend is unclear. Some have argued that women have greater neurological capacities for multitasking, including a larger prefrontal cortex (Fisher, 1999). However, others have found that multitasking skill—the ability to effectively process competing stimuli—is unrelated to an individual's preference for multitasking (Konig, Buhner, & Murling, 2004). Another possible explanation is personality: adolescent females tend to be more neurotic than males (Rettew et al., 2006), and neuroticism is positively associated with media multitasking (Wang & Tchernev, 2012).

H₂: Females will be more likely to multitask with TV than males.

Race and socioeconomic status

Multitasking may also vary by race and socioeconomic status, as these characteristics are associated with other TV viewing tendencies. Children of color watch more TV than White children (Cillero & Jago, 2010; Conners, Tripathi, Clubb, & Bradley, 2007). Likewise, children of lower socioeconomic status (SES)—indicated in the present study by maternal education—watch more TV than their higher-SES counterparts (Conners et al., 2007; McHale, Crouter, & Tucker, 2001). People who consume more media are more likely to multitask, perhaps because multitasking affords more time for all of their media-related interests (Collins, 2008; Foehr, 2006). Thus greater media use among racial minority and low-SES youth may indicate a greater tendency toward media multitasking.

H₃: Racial minority adolescents and those with less-educated mothers will be more likely to multitask with TV.

Momentary Predictors of Primary versus Secondary Attention to TV

Certain types of multitasking may tax TV-processing capacity more than others. When multitasking, viewers may devote their *primary attention* to TV, considering other tasks only peripherally, or they may devote their *secondary attention* to TV, focusing on other tasks while engaging in background viewing (Jeong & Hwang, 2012). Indeed, TV receives children's and adolescents' secondary attention more often than almost any other medium (Foehr, 2006). Viewers may be more likely to comprehend TV when it receives their primary, rather than secondary, attention (Jeong & Hwang, 2012; Lin, Lee, & Robertson, 2011). The limited capacity model asserts that people's attention to TV varies depending on other stimuli competing with TV (Lang, 2000). We therefore asked, which characteristics of the TV-multitasking moment predict primary versus secondary attention to TV?

Affect

According to the limited capacity model, people's goals and interests influence their allocation of cognitive resources to TV (Lang, 2000; Lang et al., 1999). When experiencing negative affect, viewers may turn their attention to TV as a means of emotion regulation. Indeed, people are more likely to use TV when in a negative mood if they do not have access to emotion regulation strategies (Greenwood & Long, 2009). Individuals with depressive symptoms are more likely to watch TV to avoid loneliness, people, or problems (Potts & Sanchez, 1994). Perhaps for this same reason, people tend to watch television longer if they have previously experienced stress (Anderson, Collins, Schmitt, & Jacobvitz, 1996) or received failure feedback (Moskalenko & Heine, 2003). Meanwhile, there is less evidence that positive emotion creates an immediate need for TV.

H₄: When experiencing negative affect, people will be more likely to pay primary attention to TV. Positive affect will not be associated with attention to TV.

Genre

The limited capacity model asserts that viewers devote more cognitive resources to certain TV features (e.g., Lang, 1990; Lang et al., 1993; Lang, Newhagen, & Reeves, 1996). Because TV features vary by genre (Cohen & Weimann, 2000), some TV genres may elicit more cognitive resources. Dramas may be more engrossing and cognitively demanding than comedies. Dramas have a high affective impact on viewers; they elicit fewer off-task viewing behaviors than comedies, which have a lower viewer impact (Hoffman & Batra, 1991). This viewer investment in dramas may draw greater attention to the TV, whereas lower-investment comedies may not affect viewers' attention allocation (Lang, 2000).

H₅: Multitasking adolescents will be more likely to pay primary attention to TV when watching a drama, whereas watching a comedy will not be associated with attention to TV.

Attention to People

Attending to other people while watching TV is another form of TV multitasking. Adolescents often watch TV with others (Sang, Schmitz, & Tasche, 1992), and social interaction is the activity most frequently paired with TV viewing (Schmitt et al., 2003). Social interaction likely reduces the attentional resources available for TV processing; people who co-view are less able to recall the content of a TV advertisement (Bellman, Rossiter, Shweda, & Varan, 2012). Adolescents may consider TV a background activity when interacting with others; when multitasking they report paying greater attention to non-media activities than to media (Jeong et al., 2005).

H₆: Multitasking adolescents will be less likely to report primary attention to TV when attending to others.

Media multitasking

Adolescents often watch TV while using other media, such as phones, computers, and video games (Rideout et al., 2010), a practice known as media multitasking. The presence of other media undoubtedly draws cognitive resources away from TV, but few studies have explored which medium tends to receive the greater share of processing capacity in media multitasking situations. Multitaskers may devote more attention to interactive media than to receptive media, such as TV, because the nature of interactive media demands attention and requires a reaction. Interactive media create a sense of personal involvement, which elicits more cognitive resources than receptive media (Lang, 2000). People allocate more attention to interactive advertising content than to receptive advertising content (Treleaven-Hassard et al., 2010), and college students pay more attention to computers than to the TV when using both (Brasel & Gips, 2011). Qualitative interviews suggest that multitasking adolescents prioritize new media, which tend to be interactive, over traditional media (Bardhi, Rohm, & Sultan, 2010). The limited capacity model might explain this in terms of cognitive resource demands: interactive media elicit more cognitive resources because the user must not only process the content, but also generate a response.

H7: Multitasking with interactive media—computers, video games, and phones—will decrease an individual’s likelihood of paying primary attention to TV. Multitasking with traditional media—reading/homework—will not.

Measuring TV Multitasking and Attention

Attention to TV has traditionally been studied in laboratories, where researchers measure fine-grained, continuous indicators of attention, such as observed gaze (e.g., Hawkins et al., 2005), heart rate variability (e.g., Lang, Zhou, & Schwartz, 2000), and secondary task reaction time (e.g., Bergen, Grimes, & Potter, 2005). Findings on attention to TV in the artificial laboratory context are difficult to generalize to the natural TV viewing environment.

Ecological Momentary Assessment (EMA) provides the opportunity to assess attention allocation in everyday screen media use. In this approach, study participants are signaled at random times throughout the day and asked to complete a short questionnaire about their locations, behaviors, feelings, and other characteristics that vary from moment to moment (Stone & Shiffman, 2002). This procedure has been used to assess adolescents’ activities, including screen media use (Biddle, Gorely, Marshall, & Cameron, 2009) and can be a valuable tool for assessing multitasking and attention to TV.

Given the complexity of “real world” TV-viewing environments, the ecological validity afforded by EMA is especially valuable for examining factors that might influence TV multitasking behaviors. Participants can be asked to report on their attention allocation in real time as multiple stimuli in their everyday environments vie for it. Because questions can probe media content being consumed, companionship, and affective states during the TV-viewing moment, this approach can help reveal how young people multitask with TV.

Additionally, EMA can increase data accuracy over recall measures of attention to TV (e.g., Hawkins et al., 2001; Kim & Rubin, 1997) or TV multitasking (e.g., Collins, 2008). Recall measures (e.g., “In the last two weeks, how much attention did you pay to news?”) are subject to participant memory effects. By contrast, EMA elicits responses in real time, requiring little to no recall, estimation, or summarization. Further, attention to TV varies substantially throughout the viewing of a single program (Reeves & Thorson, 1986), and EMA is better able to capture these natural variations, whereas retrospective self-report methods assume that attention is stable across a given TV genre or program.

The Current Study

Exploring predictors of adolescents’ TV multitasking may elucidate the circumstances under which adolescents have the most cognitive resources available to process, learn from, and be affected by TV content. In this study, adolescents completed a demographic survey and an EMA protocol designed to assess characteristics of the viewing moment and their attention to TV. We explored the ways in which demographic characteristics predict multitasking with TV, and how momentary characteristics predict attention to TV while multitasking.

Method

Recruitment—Throughout 2009, recruiters visited public schools, after-school programs, and community programs in a small New England city. Potential participants received informed consent forms for parents to sign. One-hundred twenty-six children between the ages of 12 and 15 years enrolled in the study and completed the Measuring Youth Media Exposure (MYME) methodology. MYME is a multi-method approach for assessing media use and health outcomes. It includes audio computer-assisted self-interviews (A-CASI), time-use diaries, and intensive EMA in the form of questionnaires and participant-created video surveys. The Committee on Clinical Investigation at Boston Children's Hospital approved the protocol, study documents, participant assent, and informed consent.

Procedure—First, participants completed an A-CASI questionnaire to document demographic characteristics. Participants then completed 2 one-week EMA data collection phases separated by an interval of one week. EMA was delivered by Palm Personal Digital Assistants (PDAs) with CERTAS software (PICS, Inc., Reston, VA). The PDAs, carried by participants, prompted responses at random intervals at least 30 minutes apart during participant-identified waking, non-school hours, such that each participant received 4–7 prompts per day. At each prompt, participants completed a 1–4 minute (skip pattern-dependent) onscreen questionnaire about their current activities and environment, including their media use, companionship, and affective state. The questionnaire asked participants to report on the activity or activities to which they were paying attention, ordering them as receiving the most, second most, and third most attention at the time of the signal. If participants did not respond to the signal, they received two additional reminders at 5-minute intervals, then lost access to the questionnaire until the next prompt. When MYME was piloted, 19 trial participants responded to 83% of the signals (Rich et al., 2007). In this study participants responded to 64.17% of signals during the first week of data collection and to 57.37% of signals during the second week. This is comparable to 52% - 80% response rates reported in other EMA studies with adolescents (Shrier, Shih, Hacker, & De Moor, 2007; Whalen, Jamner, Henker, & Delfino, 2001).

Compensation—Participants were compensated on a sliding scale according to their response rate to several MYME measures, including EMA questionnaires. Participants received the maximum compensation—\$140—if they responded to 70% or more of all EMA signals and completed several additional measures. The median compensation rate was \$100. This rate is similar to previous EMA studies (Shrier et al., 2007).

Sample of moments—Because our dependent variable was attention to TV, we included all EMA reports in which participants indicated that TV viewing was among the activities in which they were currently involved, regardless of their degree of attention to TV. We excluded participants who never reported watching television ($n = 13$). This procedure resulted in 1,513 reports from 113 participants.

Measures

Demographic characteristics—Participants' age, gender, race/ethnicity, and maternal education were assessed by A-CASI questionnaire at enrollment. To assess age, we used

participants' date of birth. To assess race, we asked participants to indicate all of the following races/ethnicities with which they identify: Asian, Asian American; Black, African American; White, Caucasian; Latino, Latina; or Other. We then created three dichotomous race/ethnicity variables, reflecting self-report of White/Caucasian, Black/African-American, and Latino/Latina race/ethnicity. There were too few Asian-American participants ($n = 1$) in our sample to constitute a separate race/ethnicity group. As a measure of maternal education, participants answered the question, "How far did your mother get in school?" on a 7-point scale ranging from "no high school" to "finished graduate school," with additional options for "other" and "don't know." We used mean imputation to replace missing values for maternal education.

Momentary characteristics—EMA questions and response options were administered at each assessment moment. Table 1 provides details about the questions asked.

TV Multitasking—Participants responded whether they were paying primary, secondary, or tertiary attention to TV and other activities when signaled. To explore predictors of TV multitasking (vs. sole attention), if participants reported that they were paying primary attention to TV and not attending to anything else, we coded this as full attention to TV. If participants reported that they were paying attention to TV and to something else, regardless of which received primary attention, we coded this as TV multitasking. To explore predictors of primary vs. secondary/tertiary attention to TV while multitasking, if participants reported paying primary attention to TV and secondary/tertiary attention to something else, we coded this as primary attention to TV. If participants reported paying secondary/tertiary attention to TV and primary attention to something else, we coded this as secondary attention to TV.

Affect—To assess affect, we used a measure derived from the short form of the positive and negative affect scale (PANAS; Thompson, 2007). The instrument consists of 2 four-item subscales assessing positive and negative affect, respectively, as presented in Table 1. The positive-affect subscale assesses happiness, excitement, interest, and relaxation. The negative affect subscale assesses sadness, anger, boredom, and anxiety. Cronbach's alpha was .80 for the positive affect subscale and .59 for the negative affect subscale.

Genre—Previous research has found that adolescents can categorize media content (e.g., violence) reliably and accurately (Anderson & Dill, 2000; Gentile, Lynch, Linder, & Walsh, 2004). Participants were asked what genre they were watching on TV. While participants could and did select many genres (i.e., drama, comedy, reality, other, and news/sports), each moment was coded only for the presence (1) or absence (0) of the two genres most relevant to our theoretical framework: comedy and drama. We coded each genre as a separate, dichotomous variable.

Attention to people—Question 1 on Table 1 was used to identify attention to people. We coded attention to people dichotomously, coding it as present (1) if participants reported that they were attending to people, whether people received their primary, secondary, or tertiary attention. If people did not report attending to people, we coded it as absent (0).

Media multitasking—Questions 1 and 2 shown on Table 1 were used to identify media used in conjunction with TV viewing, including a computer, a phone, a video game, or reading/doing homework. Because multitasking activities are not mutually exclusive (e.g., a participant could report watching TV, using a computer, and using a phone simultaneously), each moment was coded for the presence (1) or absence (0) of each medium.

Analyses

We tested our hypotheses using Generalized Estimating Equation (GEE) analyses in SPSS v. 20 (IBM) to correct for the non-independent data structure inherent in EMA, since each participant contributes multiple data reports. GEE allows the analyst to specify the covariance among repeated EMA observations by the same participant, increasing the efficiency and accuracy of results (Ballinger, 2004). We used an exchangeable correlation matrix, as we did not expect an orderly pattern of change in participants' responses over time.

Because our outcome variables were dichotomous (i.e., TV multitasking vs. full attention; or primary vs. secondary attention to TV while multitasking), we specified a binary distribution with a logit link function. To test our first three hypotheses, our analyses modeled the log odds of a participant multitasking or paying full attention to TV given his or her demographic characteristics. To test hypotheses 4 through 7, our analyses modeled the log odds of a participant paying primary versus secondary/tertiary attention to TV when multitasking in a particular context (e.g., when attending to people), controlling for sociodemographic characteristics.

We conducted analyses using two equations. To explore our first four hypotheses, we entered four demographic characteristics (i.e., age, gender, race/ethnicity, and maternal education) as potential predictors of full attention to TV (i.e., vs. TV multitasking, $n = 1522$ moments, 112 participants). To explore our remaining hypotheses, we predicted primary attention to TV vs. secondary/tertiary attention to TV in multitasking moments ($n = 710$ moments, 100 participants), using four momentary characteristics (i.e., affect, TV genre, attending to people, and media multitasking) in addition to our four demographic characteristics.

Results

Descriptive Characteristics

Participants' ages ranged from 12 to 15 years ($M = 14.02$, $SD = .78$). Mothers' highest completed level of education was high school for 42.2% and college for 40.2% of the sample. Males comprised 51.3 % of our sample. Sixty-five percent of participants were White or Caucasian, 14.8% Black or African-American, and 19.3% Hispanic or Latino/Latina.

Adolescents reported multitasking in 47.6% of TV-viewing moments. Among these TV-multitasking moments, adolescents reported that TV received their primary attention 42.9% of the time. Momentary characteristics of TV multitasking moments are detailed in Table 2. When multitasking with TV, adolescents reported attending to people 42.8% of the time and

watching a comedy 37.2% of the time. Of the media used with TV, phones were most common and video games least common. Adolescents typically reported greater positive than negative affect while TV multitasking.

Which Demographic Characteristics Predict Full Attention to TV versus Multitasking?

Contrary to our first three hypotheses, we found no significant association between TV multitasking and age, gender, race/ethnicity, or maternal education (Table 3).

Which Characteristics of the TV-Multitasking Moment Predict Primary versus Secondary Attention to TV?

Findings, presented in Table 3, control for demographic characteristics and include only TV-multitasking moments. Supporting H4, adolescents were more likely to pay primary attention to TV when experiencing negative affect, and positive affect was not associated with primary attention to TV. As we predicted in H5, adolescents were more likely to pay primary attention to TV when watching a drama, and comedy viewing was not associated with primary attention to TV. Contrary to H6, participants were *more* likely to pay primary attention to TV when attending to people. We found partial support for H7: As we predicted, participants were less likely to pay primary attention to TV when using computers or video games. However, phone use was not associated with primary attention to TV. As we expected, reading or homework was not associated with primary attention to TV.

Discussion

The limited capacity model implies that TV multitasking may alter TV processing. We therefore used ecological momentary assessment to explore individual and contextual predictors of adolescents' TV-multitasking behavior. We found that when multitasking, adolescents more often focus on TV if experiencing negative affect, watching a drama, or attending to other people. Multitasking adolescents are less likely to focus on TV when using computers or video games. Prior limited-capacity-model research has identified TV-content characteristics that elicit cognitive resources (e.g., Lang et al., 1993; 1999; 2010); this study suggests that characteristics of the viewing context may also influence attention.

Demographic Predictors of TV Multitasking

Our hypotheses regarding age, gender, race/ethnicity, and maternal education were not supported. Although TV multitasking increases between age 12 and adulthood (Schmitt et al., 2003), this shift may be so gradual as to appear nonsignificant between ages 12 and 15, as in our sample. A broader participant age range—perhaps ages 12 to 21—might better reflect this change. Whereas previous studies reported that girls more frequently multitask with media in general (Foehr, 2006; Rideout et al., 2010), our findings specify that girls are no more likely to multitask with TV. Finally, while lower-SES and racial-minority adolescents watch more TV overall (Cillero & Jago, 2010; Connors et al., 2007), in our sample this did not translate into more TV multitasking. Television receives adolescents' undivided attention similarly across demographics. To predict adolescents' TV-processing capacities, therefore, it may be more helpful to consider other individual traits (e.g., cognitive abilities) and the contexts in which adolescents multitask with TV.

Momentary Predictors of Primary versus Secondary Attention

Contextual predictors of primary attention can reveal the settings in which TV receives more cognitive resources and has greater potential to influence viewers (Jeong & Hwang, 2012; Lin et al., 2011). We therefore explored contextual predictors of adolescents' attention allocation during TV-multitasking moments.

Affect—The limited capacity model suggests that people's desires may influence their allocation of attention (Lang, 2000). Our results indicate that negative affect increases adolescents' likelihood of focusing on TV, perhaps by creating a desire to avoid or regulate emotions using TV (Greenberg, 1974; McQuail et al., 1972). Television programs might draw attention by targeting adolescents' needs for emotional escape. Because it can attract those experiencing negative emotions, TV may be a good vehicle for mental health interventions (Barker, Pistrang, Shapiro, Davies, & Shaw, 1993; Muñoz, Glish, Soo-Hoo, & Robertson, 1982). Additional studies should use EMA to test temporal relationships between affective states and TV viewing.

TV Genre—Multitasking adolescents were more likely to pay primary attention to TV when watching drama, but not a comedy. This supports the notion that dramatic TV programs elicit viewer involvement, whereas comedies do not (Hoffman & Batra, 1991). Researchers have suggested that media messages should be aired on the target audience's most-watched genres (Dsilva & Palmgreen, 2007); our work suggests that educational messages for adolescents should be targeted to dramatic programs, rather than comedies.

Genre selection and viewer affect may be related. Viewers experiencing strong negative affect are more likely to attend to TV, and sad viewers are more likely to watch dramas (Greenwood, 2010). Thus negative affect may influence both attention to TV and genre selection.

Attending to People—Adolescents are more likely to focus on TV when attending to others than when engaging in other forms of multitasking. By their presence, co-viewers may implicitly endorse TV content, signaling that it is worthy of cognitive resources. This is consistent with prior findings that co-viewing with parents improves young children's TV processing (Collins, Sobol, & Westby, 1981; Salomon, 1977; Watkins, Calvert, Huston-Stein, & Wright, 1980). Further, in a co-viewing context, TV viewing is a social activity; multitasking with other activities may be discouraged as a sign of social disengagement. Therefore coviewing, unlike some other forms of TV multitasking (e.g., with computers or video games), may increase adolescents' receptivity to and acceptance of TV messages. For example, parent co-viewing of violent TV increases the likelihood that adolescents will emulate TV aggression (Nathanson, 1999).

Media multitasking—When adolescents multitask with media, their attention to TV varies by competing medium. As we predicted, adolescents were less likely to focus on TV when multitasking with computers or video games than when engaging in other forms of multitasking. This may occur because viewers prioritize interactive media over traditional receptive media (Bardhi et al., 2010; Treleaven-Hasard et al., 2010). Thus TV programs

targeting adolescents might receive more viewer attention if they do not encourage simultaneous computer use, such as advertising a program-relevant website or computer game.

Contrary to our prediction, multitasking with phones did not affect adolescents' attention to television. Adolescents in this sample mainly reported using phones to exchange text messages. We likely captured fewer moments of primary attention to phones because text messaging is sporadic, unlike computer or video game use. As predicted, reading or homework was not significantly associated with attention to TV in multitasking moments. Whether homework receives adolescents' primary or secondary attention, simultaneous TV use will likely decrease adolescents' homework performance (Pool, Koolstra, & van der Voort, 2003).

Limitations

These findings are correlational and do not allow us to discern causality or directionality of influence (e.g. we do not know whether negative affect was guiding attention to TV or if TV attention was stimulating negative affect). Our EMA data were limited by dependence on the accuracy and reliability of adolescents' self-reports. When compared with the precision of objective external measures like eyes-on-screen time and heart rate variability, EMA provides a more subjective, experiential assessment of orientation toward television content. The accuracy of our primary-vs.-secondary-attention-to-TV variable relies on each participant's ability to assess his or her allocation of attention. Different participants might define primary attention differently—reporting, for instance, on visual, auditory, or overall attention allocation. Because it provides only a single self-reported measure of attention for each assessment moment, EMA is less precise over time than more continuous lab-based measurements. Further, participants might report only on their primary—and not secondary—attention to reduce response time.

The relatively low reliability of our negative affect measure (Cronbach's $\alpha = .59$) may threaten the interpretability of results associated with that measure. A more internally consistent measure might reveal a clearer picture of the relationship between affect and attention to TV while multitasking. EMA necessitates brief measures, which may be less reliable than longer ones. A final limitation is our relatively small sample of participants. We may have lacked sufficient power to detect small effects of viewer demographics.

A strength of this study is our use of ecological momentary assessment. The EMA methodology eliminates recall bias, likely making it the best way to assess attention in field-based studies. Further, it may yield more ecologically valid data, as assessments are conducted in the natural viewing environment and can probe many aspects of the viewing moment (e.g., location, co-viewers, affective state).

Conclusion

The limited capacity model posits that viewers who devote more cognitive resources to TV can learn more from it (Lang, 2000). One factor that may influence TV-processing capacity is multitasking (Jeong & Hwang, 2012; Pezdek & Hartman, 1983; Zhang et al., 2006; 2010).

When multitasking, adolescents are more likely to focus on TV if experiencing negative affect, watching a drama, or attending to people. They are less likely to focus on TV when multitasking with computers or video games. Media effects researchers and TV producers should consider viewing contexts and competing activities when predicting TV effects.

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Biographies

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Table 1

Assessing Momentary Characteristics of TV Viewing Using Ecological Momentary Assessment (EMA)

Variable	Question	Response Options	
Full Attention, Primary Attention, Media Multitasking, Attention to People	1. Among the things you were doing when the PDA beeped, what were you paying the [MOST/2 nd most/3 rd most] attention to?	<ul style="list-style-type: none"> • People • Reading/Homework • Sports/Activities 	<ul style="list-style-type: none"> • Media (goes to Question 2) • Something else
	2. Among the media you were using when the computer beeped, which were you paying the [MOST/2 nd most/ 3 rd most] ^a attention to?	<ul style="list-style-type: none"> • Computer • Video Games • Phone 	<ul style="list-style-type: none"> • Music • TV/Movies (goes to Question 3)
	3. Which were you watching?	<ul style="list-style-type: none"> • A movie on TV • A movie in a theater • A movie on the DVD/VCR 	<ul style="list-style-type: none"> • A movie on the DVD/VCR • A TV show (goes to Question 4)
Genre	4. What was on the TV?	<ul style="list-style-type: none"> • Comedy • Drama • News/Sports 	<ul style="list-style-type: none"> • Reality • Talk/Game Show/Other
Positive Affect	6. When the computer beeped, to what extent did you feel [happy/excited/interested/ relaxed]?	<ul style="list-style-type: none"> • Not at all • A little • Moderately 	<ul style="list-style-type: none"> • Quite a bit • Extremely
Negative Affect	7. When the computer beeped, to what extent did you feel [sad/angry/bored/ anxious]?	Same as above	Same as above

Note. Numbers do not indicate EMA order. Brackets = several questions with identical response options—each includes one listed phrase;

^aCorresponds to previous answers (e.g., If the answer to #1/most is “media,” #2 asks which media received most attention).

Table 2

Momentary Characteristics of TV-Multitasking Moments

Characteristic	Percent of TV-Multitasking Moments ^a
TV Genre	
Drama	11.0%
Comedy	37.2%
Attending to People	42.8%
Media Multitasking	
Computer Present	15.5%
Video Game Present	7.0%
Phone Present	22.8%
Reading/homework present	10.8%
Affect ^a	
Positive	12.05 (3.82)
Negative	6.61 (2.74)

Note.

^a Values for affect represent mean scores with standard deviations in parentheses; all other values represent percentage of total TV-viewing moments.

Table 3**Predictors of Adolescents' TV Multitasking Behaviors**

Predictor	Full Attention to TV (vs. TV Multitasking)			Primary Attention to TV while Multitasking		
	Odds Ratio	Lower CI	Upper CI	Odds Ratio	Lower CI	Upper CI
Age	0.69	0.47	1.01	0.85	0.63	1.16
Gender (female)	0.82	0.52	1.29	1.01	0.66	1.53
Race (reported vs. not reported)						
White/Caucasian	0.69	0.42	1.13	1.08	0.72	1.60
Latino/Latina	1.14	0.65	2.00	0.71	0.43	1.16
African-American	0.88	0.45	1.71	0.52*	0.27	0.97
Maternal Education	1.05	0.88	1.26	1.12	0.92	1.35
TV Genre (presence vs. absence)						
Drama				2.00*	1.31	3.07
Comedy				1.05	0.78	1.41
Attention to People				2.40*	1.53	3.78
Media Multitasking (presence vs. absence)						
Computer				0.31*	0.17	0.58
Video Game				0.30*	0.10	0.85
Phone				1.20	0.73	1.97
Reading/homework				0.99	0.51	1.93
Affect						
Positive				1.01	0.96	1.06
Negative				1.09*	1.02	1.16

Note. Grey cells indicate that a variable was excluded from analyses. All estimates are adjusted for all other listed variables.

* Significant at $p < .05$