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Juggling with media

The consequences of media multitasking for adolescent development

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Juggling with Media

The Consequences of Media Multitasking
for Adolescent Development



Winneke van der Schuur

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**JUGGLING WITH MEDIA:
THE CONSEQUENCES OF MEDIA MULTITASKING
FOR ADOLESCENT DEVELOPMENT**

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General Introduction

'Multitasking teens may be muddling their brains'

Hamilton, 2008, October 9

*'Most teens think they can multitask while getting screen time.
They can't'*

Woodruff, 2015, November 3

'The dangerous ways too much tech can mess with teens' health'

Holmes, 2015, November 13

Drastic changes in the media landscape typically evoke concerns about its negative impact on society. These concerns mainly focus on youth, as people fear that these new technological advances hinder the healthy development of children and adolescents. Over the past decade, a new development in the media landscape has caught people's attention, namely the increasing omnipresence of media and communication devices. People nowadays use media and communication devices more than ever, which has also resulted in a dramatic rise in media multitasking. Media multitasking encompasses the concurrent use of multiple media, and the usage of media during non-media activities, for example, watching television while concurrently sending text messages or using social networking sites during face-to-face conversations (Baumgartner, Weeda, van der Heijden, & Huizinga, 2014; Jeong & Hwang, 2012).

People particularly worry about the negative consequences of media multitasking on adolescents. The belief that media multitasking hinders adolescent development has not only been stressed by the popular press (e.g., Hamilton, 2008, October 9; Holmes, 2015, November 13; Woodruff, 2015, November 3), but also by parents, educators, and researchers (Wallis, 2010). All have voiced strong concerns that media multitasking negatively affects a variety of aspects of adolescents' development, such as their ability to pay attention, their academic performance, their socioemotional functioning, and their sleep (e.g., Wallis, 2010). But what do we really know about the adverse impact of media multitasking on adolescent development?

Media multitasking is known to be particularly common among adolescents (e.g., Carrier, Cheever, Rosen, Benitez, & Chang, 2009; Voorveld & van der Goot, 2013). In 2010, adolescents spent 29% of their media time engaging in media multitasking, whereas this was 16% in 1999 (Rideout, Foehr, & Roberts, 2010). Moreover, adolescents frequently use media during non-media activities, such as while attending class or during a conversation with their friends or family members (Fulkerson et al., 2014; Lenhart, Ling, Campbell, Purcell, 2010; Rideout et al., 2010). For example, researchers found that 43% of the adolescents who take their cell phone to school reported that they send at least one text message a day while attending class (Lenhart et al., 2010). Additionally, 67% of the adolescents at least sometimes watched television during family meals (Fulkerson et al., 2014).

Not only are adolescents avid media multitaskers, the possible impact of media multitasking could be particularly problematic during this developmental period because it may hinder crucial developments that take place during adolescence (Baumgartner et al., 2014; Wallis, 2010). Adolescence is distinguished by significant developmental changes within the cognitive, emotional, and social domain (e.g., Burnett, Sebastian, Kadosh, & Blakemore, 2011; Steinberg, 2008). If media multitasking interferes with these domains of adolescent development this could also affect them later in life. For example, if adolescents do not sufficiently learn to concentrate during their academic activities due to frequent non-

academic media use during homework, this may be problematic when they are enrolled in jobs that require employees to focus on one specific activity.

Both the high prevalence of media multitasking among adolescents, and the specific developmental changes faced by adolescents explain why the current concerns on the negative influences of media multitasking focus on this particular age group. Although the common assumption is that media multitasking will disrupt adolescent development, it actually is unclear whether these concerns can be supported by empirical studies. A growing body of research is starting to examine the relationship between media multitasking and several domains of adolescent development, such as attention, academic performance, and socioemotional functioning (e.g., Bowman, Waite, & Levine, 2015; Ophir, Nass, & Wagner, 2009; Pea et al., 2012). While these existing studies contribute to our current knowledge of the associations between media multitasking and adolescent development, important questions remain unanswered. There are two main shortcomings in the current scientific literature that require particular research attention.

First, we do not know whether and for which particular developmental domains media multitasking is harmful. Studies on the associations between media multitasking and adolescent development have been largely fragmented (e.g., Kazakova, Cauberghe, Pandelaere, & de Pelsmacker, 2015). Researchers from multiple disciplines, such as psychology, education, and communication, have examined the same or overlapping relationships between media multitasking and adolescent development. However, because these researchers come from different disciplines, both the terminology and the theoretical background often differs. Due to this fragmented research field, it is difficult to really understand media multitasking effects on adolescent development. Therefore, the first aim of this dissertation is to provide an overview of studies that investigated the possible consequences of media multitasking on adolescent development by carefully reviewing the existing literature.

Second, studies on the relationship between media multitasking and adolescent development have been either cross-sectional or experimental. As cross-sectional studies have only one measurement point, these studies do not provide us with information on causal relationships (e.g., Curran & Bauer, 2011). For example, based on these studies we do not know whether media multitasking really causes attention problems. Furthermore, although experimental studies do inform us on causal relationships, these studies solely measure immediate effects and therefore do not capture actual developmental processes that take place during adolescence. Therefore, the second aim of this dissertation is to provide first insights in the causal relationships between media multitasking and adolescent development by using a longitudinal approach.

Conceptualizing Media Multitasking Among Adolescents

Adolescents engage in at least three main types of media multitasking, media-media multitasking, academic-media multitasking, and technological interferences during offline interactions (TIDOC). Media-media multitasking entails the simultaneous use of multiple media or the rapid switching between multiple media (Shih, 2013; Yang & Zhu, 2016). For example, while watching television adolescents concurrently send text messages to friends. Academic-media multitasking refers to using media during academic activities, such as while doing homework and while attending class (e.g., Calderwood, Ackerman, & Conklin, 2014). For example, adolescents may watch videos on YouTube while doing homework. TIDOC refers to the use of media and communication devices that interfere with offline interactions, such as talking with friends or having dinner with family (e.g., Fulkerson et al., 2014; Harrison & Gilmore, 2012). For example, adolescents may use social networking sites during a conversation with a friend.

Why Media Multitasking may be Detrimental to Adolescent Development

In this relatively young field of research and the ever-changing media landscape, theoretical explanations of the possible impact of media multitasking on adolescents are scarce. However, there are three main explanations in the scientific literature for the adverse impact of media multitasking on adolescent development. First, within the field of communication, researchers have argued that the time spent on media multitasking may displace the time spent on activities that are important for adolescent development, such as doing homework, having a conversation with friends, and sleep (e.g., Calamaro, Mason, & Ratcliffe, 2009; Coyne, Padilla-Walker, Fraser, Fellows, & Day, 2014; Fox, Rosen, & Crawford, 2009). For example, when adolescents repeatedly switch between a media activity, such as texting their friends, and a homework task, the time spent on the media activity may displace the time spent on the homework task at hand (e.g., Fox et al., 2009). As a result, adolescents may not spend enough time on their academic activities, which could hinder their academic achievement scores.

Second, media multitasking may disrupt the processing of information during important activities, such as doing homework or having face-to-face conversations with friends. Cognitive learning theories posit that processing multiple sources of information hinders information processing due to people's limited cognitive resources (e.g., Lang, 2000, 2006; Salvucci & Taatgen, 2008, 2010). When adolescents engage in media use during a non-media activity this limits the resources that are available for the non-media activity (e.g., Junco & Cotten, 2011). For example, with respect to media interferences during offline interactions, it is not possible to sufficiently process both the content of the offline interaction and the media content (e.g., Bowman et al., 2010; Ophir et al., 2009). Consequently, adolescents may insufficiently process the information provided by the conversation partner when engaging in media during offline conversations, which is likely to disrupt the offline interaction.

Finally, frequently engaging in media multitasking may result in a cognitive processing style of scattered attention (Baumgartner et al., 2014; Ophir et al., 2009). Adolescents who often engage in media multitasking may eventually habituate to respond to distractions in everyday situations. In particular, adolescents may show more difficulties in filtering irrelevant information and sustaining their attention on the primary activity, because they are accustomed to respond to internal (e.g., boredom) and external (e.g., sounds) cues (Ophir et al., 2009). This dissertation refers to this assumption as the scattered attention hypothesis (van der Schuur, Baumgartner, Sumter, & Valkenburg, 2015). Being able to pay attention is crucial to sufficiently process information, such as academic content (e.g., Ophir et al., 2009; Wallis, 2010). Overall, media multitasking may eventually lead to a cognitive processing style of scattered attention, which may manifest itself predominantly as attention problems in everyday life, but it may also affect other domains of adolescent development, such as academic achievement and social functioning.

A Longitudinal Approach

While the first chapter of this dissertation entails a literature review, the following three chapters are based on a three-wave longitudinal study, conducted among adolescents between 11 and 15 years old. There are two advantages of using a longitudinal design. First, compared to cross-sectional studies, longitudinal studies provide the opportunity to better understand the temporal precedence of variables (Curran & Bauer, 2011). Specifically, by using a longitudinal design we know how often adolescents engage in media multitasking over time and how changes in the frequency of engaging in media multitasking relate to changes in aspects of adolescent development over time. Thus, longitudinal data allow us to provide critical information on the associations between media multitasking and domains of adolescent development.

Second, a longitudinal design allows us to disentangle within-person processes from between-person processes (Curran & Bauer, 2011). Cross-sectional studies solely provide information on the rank order position of an individual in media multitasking and the rank order position of an individual's developmental domain, also referred to as the between-person relationship. However, from a theoretical standpoint we are actually interested in processes that occur within an adolescent rather than between adolescents (Curran & Bauer, 2011; Hamaker, Kuiper, & Grasman, 2015). For example, we assume that if a particular adolescent who engages in media multitasking more frequently will experience more difficulties in social functioning over time. Thus, disentangling within-person processes from between-person processes is imperative. By taking into account that the repeated measures in the longitudinal design are nested within individuals, researchers can examine within-person relationships (Hamaker et al., 2015).

Dissertation Outline

This dissertation aims to examine the relationship between media multitasking and

multiple domains of adolescent development, using a literature review in Chapter 1 and a three-wave longitudinal study in Chapters 2 to 4. In line with the two overarching aims of this dissertation, this dissertation encompasses four studies on the consequences of media multitasking on adolescent development. All chapters are either published, under revision, or submitted.

Chapter 1: Literature Review on Media Multitasking

The media multitasking literature is known to be highly fragmented (e.g., Kazakova et al., 2015). The first chapter of this dissertation therefore provides a detailed overview of studies that have examined the link between media multitasking and three developmental domains: cognitive control, academic performance, and socioemotional functioning. Within each of the three domains, this study starts with a short overview of the current field, followed by the theoretical background underlying each field, and finally a detailed review of previous findings. Overall, the literature review revealed that media multitasking was negatively associated with all three developmental domains. However, to move the field forward, there are important steps that need to be taken to, for example, expand theoretical explanations and understand causality. The identified research gaps and suggested directions for future research have been used as inspiration for chapters 2 to 4 of this dissertation.

Chapter 2: Media Multitasking and Academic Achievement

The literature review in the first chapter clearly showed that most attention has been paid to the impact of academic-media multitasking (i.e., media use during homework and while attending class) on academic achievement including both cross-sectional and experimental studies. However, studies that have examined the longitudinal relationships between academic-media multitasking and adolescents' academic achievement were still lacking. Chapter 2 aims to fill this gap by investigating the relationship between academic-media multitasking and subsequent academic achievement scores. In addition, based on the scattered attention hypothesis, this study investigates whether this expected longitudinal relationship was mediated by academic attention problems. The findings demonstrated that academic-media multitasking did neither directly nor indirectly predict adolescents' academic achievement scores over time. Academic-media multitasking was, however, related to more subsequent academic attention problems. These findings are important, as it suggest the impact of academic-media multitasking on adolescents' academic achievement is likely to be more nuanced than previously expected.

Chapter 3: Media Multitasking and Emotional Problems

A recent development in the media multitasking literature is the increase in studies on the possible impact of technological interferences during offline conversations (i.e., TIDOC) among college students and adults. However, our understanding on TIDOC among adolescents is limited. Moreover, researchers have argued that TIDOC may enhance

people's emotional problems (McDaniel & Coyne, 2016; Roberts & David, 2016). Recent studies have indeed shown that TIDOC was positively related to emotional problems among college students and adults (e.g., McDaniel & Coyne, 2016; Roberts & David, 2016). The aim of Chapter 3 was therefore to examine TIDOC among adolescents and its association with their emotional problems. TIDOC among adolescents was common and adolescents particularly engaged in social TIDOC, which includes text messaging and using social networking sites. Additionally, in line with the findings among college students and adults, our findings demonstrated a small cross-sectional relationship between TIDOC and adolescents' emotional problems. Meaning that adolescent who reported more TIDOC showed more emotional problems. However, there was no evidence for a longitudinal relationship between TIDOC and emotional problems. Thus, although TIDOC was common among adolescents and related to emotional problems, more frequently engaging in TIDOC did not predict emotional problems over time.

Chapter 4: Media Multitasking and Sleep-Related Problems

Although the majority of media effect studies on sleep have focused on the relationship between electronic media use and sleep-related problems, studies have indicated that media-media multitasking was adversely related to several aspects of sleep (e.g., Pea et al., 2012; Calamaro et al., 2009). Chapter 4 aims to advance our current knowledge of this relationship by investigating the reciprocal relationships between media-media multitasking and sleep-related problems. Moreover, in this chapter, we examine whether this relationship is moderated by important individual factors, particularly age and sex. The findings showed that media-media multitasking was related to more subsequent sleep-related problems among early adolescents and girls. No evidence was found for the reversed relationship between sleep-related problems and subsequent media-media multitasking. Together, these findings suggest that it is important to consider media multitasking behaviors when examining the influence of media use on adolescents' sleep, particularly among early adolescents and girls.

REFERENCES

- Baumgartner, S. E., Weeda, W. D., van der Heijden, L. L., & Huizinga, M. (2014). The relationship between media multitasking and executive function in early adolescents. *The Journal of Early Adolescence, 34*, 1120-1144. doi:10.1177/0272431614523133
- Bowman, L. L., Levine, L. E., Waite, B. M., & Gendron, M. (2010). Can students really multitask? An experimental study of instant messaging while reading. *Computers & Education, 54*, 927-931. doi:10.1016/j.compedu.2009.09.024
- Burnett, S., Sebastian, C., Kadosh, K. C., & Blakemore, S. J. (2011). The social brain in adolescence: Evidence from functional magnetic resonance imaging and behavioural studies. *Neuroscience & Biobehavioral Reviews, 35*, 1654-1664. doi:10.1016/j.neubiorev.2010.10.011
- Calamaro, C. J., Mason, T. B., & Ratcliffe, S. J. (2009). Adolescents living the 24/7 lifestyle: Effects of caffeine and technology on sleep duration and daytime functioning. *Pediatrics, 123*, e1005-e1010. doi:10.1542/peds.2008-3641
- Calderwood, C., Ackerman, P. L., & Conklin, E. M. (2014). What else do college students "do" while studying? An investigation of multitasking. *Computers & Education, 75*, 19-29. doi:10.1016/j.compedu.2014.02.004
- Carrier, L. M., Cheever, N. A., Rosen, L. D., Benitez, S., & Chang, J. (2009). Multitasking across generations: Multitasking choices and difficulty ratings in three generations of Americans. *Computers in Human Behavior, 25*, 483-489. doi:10.1167/10.7.260
- Coyne, S. M., Padilla-Walker, L. M., Fraser, A. M., Fellows, K., & Day, R. D. (2014). "Media time = family time" Positive media use in families with adolescents. *Journal of Adolescent Research, 29*, 663-688. doi:10.1177/0743558414538316
- Curran, P. J., & Bauer, D. J. (2011). The disaggregation of within-person and between-person effects in longitudinal models of change. *Annual Review of Psychology, 62*, 583-619. doi:10.1146/annurev.psych.093008.100356
- Fox, A. B., Rosen, J., & Crawford, M. (2009). Distractions, distractions: Does instant messaging affect college students' performance on a concurrent reading comprehension task? *CyberPsychology & Behavior, 12*, 51-53. doi:10.1089/cpb.2008.0107
- Fulkerson, J. A., Loth, K., Bruening, M., Berge, J., Eisenberg, M. E., & Neumark-Sztainer, D. (2014). Time 2 tlk 2nite: Use of electronic media by adolescents during family

- meals and associations with demographic characteristics, family characteristics, and foods served. *Journal of the Academy of Nutrition and Dietetics*, 114, 1053-1058. doi:10.1016/j.jand.2013.10.015
- Hamaker, E. L., Kuiper, R. M., & Grasman, R. P. (2015). A critique of the cross-lagged panel model. *Psychological Methods*, 20, 102-116. doi:10.1037/a0038889
- Hamilton, J. (2008, October 9). Multitasking teens may be muddling their brains. *NPR*. Retrieved from <http://www.npr.org/templates/story/story.php?storyId=95524385>
- Harrison, M. A., & Gilmore, A. L. (2012). U txt WHEN? College students' social contexts of text messaging. *The Social Science Journal*, 49, 513-518. doi:10.1016/j.soscij.2012.05.003
- Holmes, L. (2015, November 13). The dangerous ways too much tech can mess with teens' health. *Huffington Post*. Retrieved from http://www.huffingtonpost.com/entry/teen-smartphone-use-dangerous_us_56391ee7e4b0307f2cab061e
- Jeong, S. H., & Hwang, Y. (2012). Does multitasking increase or decrease persuasion? Effects of multitasking on comprehension and counterarguing. *Journal of Communication*, 62, 571-587. doi:10.1111/j.1460-2466.2012.01659.x
- Junco, R., & Cotten, S. R. (2011). Perceived academic effects of instant messaging use. *Computers & Education*, 56, 370-378. doi:10.1016/j.compedu.2010.08.020
- Kazakova, S., Cauberghe, V., Pandelaere, M., & de Pelsmacker, P. (2015). Can't see the forest for the trees? The effect of media multitasking on cognitive processing style. *Media Psychology*, 18, 425-450. doi:10.1080/15213269.2015.1006789
- Lang, A. (2000). The limited capacity model of mediated message processing. *Journal of Communication*, 50, 46-70. doi:10.1111/j.1460-2466.2000.tb02833.x
- Lang, A. (2006). Using the limited capacity model of motivated mediated message processing to design effective cancer communication messages. *Journal of Communication*, 56, 557-580. doi:10.1111/j.1460-2466.2006.00283.x
- Lenhart, A., Ling, R., Campbell, S., & Purcell, K. (2010). *Teens and mobile phones: Text messaging explodes as teens embrace it as the centerpiece of their communication strategies with friends*. Pew Internet & American Life Project.

- McDaniel, B. T., & Coyne, S. M. (2016). "Technoference": The interference of technology in couple relationships and implications for women's personal and relational well-being. *Psychology of Popular Media Culture*, 5, 85-98. doi:10.1037/ppm0000065
- Ophir, E., Nass, C., & Wagner, A. D. (2009). Cognitive control in media multitaskers. *Proceedings of the National Academy of Sciences*, 106, 15583-15587. doi:10.1073/pnas.0903620106
- Pea, R., Nass, C., Meheula, L., Rance, M., Kumar, A., Bamford, H., . . . Yang, S. (2012). Media use, face-to-face communication, media multitasking, and social well-being among 8-to 12-year-old girls. *Developmental Psychology*, 48, 327-336. doi:10.1037/a0027030
- Rideout, V. J., Foehr, U. G., & Roberts, D. F. (2010). *Generation M [superscript 2]: Media in the lives of 8-to 18-year-olds*. Menlo Park, CA: Henry J. Kaiser Family Foundation.
- Roberts, J. A., & David, M. E. (2016). My life has become a major distraction from my cell phone: Partner phubbing and relationship satisfaction among romantic partners. *Computers in Human Behavior*, 54, 134-141. doi:10.1016/j.chb.2015.07.058
- Salvucci, D. D., & Taatgen, N. A. (2008). Threaded cognition: An integrated theory of concurrent multitasking. *Psychological Review*, 115, 101-130. doi:10.1037/0033-295X.115.1.101
- Salvucci, D. D., & Taatgen, N. A. (2010). *The multitasking mind*. New York: Oxford University Press.
- Steinberg, L. (2008). A social neuroscience perspective on adolescent risk-taking. *Developmental Review*, 28, 78-106. doi:10.1016/j.dr.2007.08.002
- Shih, S. (2013). A null relationship between media multitasking and well-being. *PLoS One*, 8, e64508. doi:10.1371/journal.pone.0064508
- van der Schuur, W. A., Baumgartner, S. E., Sumter, S. R., & Valkenburg, P. M. (2015). The consequences of media multitasking for youth: A review. *Computers in Human Behavior*, 53, 204-215. doi:10.1016/j.chb.2015.06.035
- Voorveld, H. A., & van der Groot, M. (2013). Age differences in media multitasking: A diary study. *Journal of Broadcasting & Electronic Media*, 57, 392-408. doi:10.1080/08838151.2013.816709

- Wallis, C. (2010). *The impacts of media multitasking on children's learning and development: Report from a research seminar*. New York, NY: The Joan Conney Center at Sesame Workshop.
- Woodruff, J. (2015, November 3). Most teens think they can multitask while getting screen time. They can't. *PBS newshour*. Retrieved from <http://www.pbs.org/newshour/bb/teens-think-can-multitask-getting-screen-time-cant/>
- Yang, X., & Zhu, L. (2016). Predictors of media multitasking in Chinese adolescents. *International Journal of Psychology*, 51, 430-438. doi:10.1002/ijop.12187