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Media Use and School Performance

Jiansheng Li
School of Educational Science, Nanjing Normal University, China
Jianshengli333@163.com

Adolescent media use and school performance have received much attention in recent years. However, there are no generally accepted findings of the media use affecting school performance. One hypothesis about the two is media use can reduce the performance and the other claims media use can stimulate the performance. Based on the two hypotheses, this paper investigates adolescent's media use time and school performance, and then explore the two relations. On the other hand, personality traits and family environment are important factors to the adolescent, so those factors are also explored. Nine hundred and fourteen 7th-, 8th- and 9th-grade students from three schools participated in this study. Based on the hierarchical multiple regressions, the findings showed adolescents who spend more time in media use did more poorly in school performances. Learning anxiety and family income are the important affecting factors in the adolescent's performance. This study implies the reduction hypothesis is more right and media content is one important factor to the adolescent's achievement.

Keywords: Media use time, Personality trait, School performance, Socioeconomic status

Introduction

There are a lot of studies focusing on adolescent's media use and school performance, but they have no agreed findings. For example, Hancox, Milne, & Poulton (2005) showed television viewing was associated with poor educational achievement. Excessive television viewing in childhood might have long-lasting adverse consequences for educational achievement and subsequent socioeconomic status and well-being. However, some researchers think this link is weak, or none at all. Like Bowman, Levine, Waite and Gendron (2010), in an experiment on multitasking, found that students spent longer time in reading a passage if they communicated with others through Instant Messaging at the same time, but Instant Messaging did not affect comprehension. Likewise, the study of Jackson et al. showed Internet use improved cognitive skills, specifically reading skills (Jackson, von Eye, Biocca, Barbatsis, Zhao, & Fitzgerald, 2006).

Thus, there are two main hypotheses on the media use and academic achievement. One is the stimulation hypothesis, which supports that well designed media programs enhance adolescents' academic achievement. The other is the reduction hypothesis, which thinks the adolescents who watched more television tend to spend less time doing homework, studying, and reading (Nary, 2004). The potential mechanism of the reduction hypothesis is the time replacement, the mental effort-passivity, and the impulsiveness.

Beyond the two opinions, some researchers conclude the relation between the media use and academic achievement is curvilinear (e.g., Fetler, 1983; Kubey, Lavin, & Barrows, 2001). An investigation on daily use time on the net and the school performance of Korean adolescents shows Korean adolescents who spend ≤3 hours per day on the Internet are predisposed to an increase in performance levels at school, whereas those who spend over 4 hours per day on the Internet are predisposed to a decrease in school performance (Kim, & So, 2012).

Therefore, exploring the relations between media use and school performance should take into more factors, such as their personality and socioeconomic status (Hornik, 1990). In this research, the relations between the adolescent's school performance and media use time are analyzed. And then, those affecting factors in the adolescent's school performances will be explored.

Based on the above Shin's research, impulsiveness is one important factor to the adolescents' achievement (Nary, 2004). Another factor is anxiety which is often associated with adverse effects on the performance of cognitive tasks. Anxiety impairs efficient functioning of the goal-directed attention system (Eysenck, Derakshan, Santos, & Calvo, 2007). Hence, in this paper, personality traits refer to anxiety and impulsiveness.

On the other hand, most adolescents economically rely on their parents. The key socioeconomic status for the youth is the level of economic resources of a family possesses. Having low levels of economic resources means that families try to meet the most basic needs of food, clothing, and shelter with their limited financial resources (Votruba-Drzal, 2003). So, family economic resources also impact adolescent's media use and media use behavior. Here, the influence of economic resources is defined as family income. Besides, father's educational background and

mother's educational background are included in the teen's socioeconomic status here.

Media use, here refers to using electronic media. Electronic media include e-mail, instant messaging (IM), cellular phone communication, social-networking sites (SNSs), video or online games, and television or movie viewing. This paper focus on the media use time and media habits.

Method

Participants

Nine hundreds and fourteen 7th-grade (n=402), 8th-grade (n=287) and 9th-grade (n=225) students participated in this study. Participants were recruited from mandatory classes within their schools. The mean age of respondents was 14 years (S.D.=1.093). Fifty point nine eight percent of respondents were male. Participants were treated in accordance with the "Ethical principles of Psychologists and Code of Conduct".

Procedure

Data was collected between March and June 2015. Consent levels were higher than 90% of all classrooms. Each of the participating classrooms was a mandatory class (i.e. not elective) to reduce the likelihood of self-selection bias.

First, each participant completed an anonymous survey to gatherer descriptive data about new media use habits, media use purposes, and media knowledge, as well as school performance and demographic data. Second, the participants filled the Mental Health Test Scale.

The teachers were trained to administer the surveys during one class period. At the end of the process, answer sheets were collected.

Variables

Demographics. The information included gender, age, grade, sibling, family status, parents' educational background, and family income, etc.

Screen Time (ST). Participants were asked to answer the amount of screen time they used during different time periods on weekdays and weekends respectively. The amount of screen time in a week was calculated based on these answers. ST was answered via the following questions: "In the past 3 months, how much time did you generally spend within a weekday (or weekend): ... On a computer, including using the Internet, playing computer games? " "... Playing video games? ...learning through machine, such as mobile, computer, Tablet PC, e-reader, etc.". The choices offered were "no using", "half an hour", "one hour", "two hours", "three hours", "four hours", "five hours", "six hours", and "seven hours or more". Then, screen time was calculated by the equation: the average screen time/day = (the weekdays' screen time *5 + the weekends' screen time * 2) /7.

Answers were summed to give a pre -categorized, total weekly ST, from which an upper cut-off of 14 h/week was used to denote the cut-point of 2 h/day, approximating the ST recommendations in the Canadian Sedentary Behaviour Guidelines for Youth (Tremblay et al., 2011).

Media use habits. Meantime, in order to understand the adolescents' habits in detail, the contents on screen equipment consuming are also required, such as "video viewing", "games playing", "chatting", "e-book reading", "shopping", "micro blog browsing/writing", etc.

Personality traits. In this study, personality traits include learning anxiety and impulsiveness. Learning anxiety and impulsiveness were measured using Mental Health Test Scale, which commonly used reliable instrument. Because the items are taken from the Kurt Suzuki Diagnostic Test Anxiety Tendency Scale, some were inappropriate for Chinese adolescents. The instrument was modified by Zhou Bucheng from East China Normal University. In this revised version, the split-half reliability is between 0.85 and 0.88, and test-retest reliability is between 0.667 and 0.863 ($p<0.01$).

School performance. Participants were asked to report their average school performances, ranging from A to E. Answers were coded and higher scores indicate higher grades in school. Here A refers to the school performance is the top 20% in the class. B refers to the performance is between 20% and 40% and so on. All recruiters came from three middle schools which were commonplace in China.

Statistical Analyses

SPSS software was used for statistical analyses (SPSS (2010) IBM SPSS Statistics 20 Core System User's Guide (SPSS Inc, Chicago, IL). To measure grade differences, the Chi-square Test was used. The associations among screen time, media habit, and academic achievement were examined with analysis of variance (ANOVA) and linear regression analysis. The change in R square for all variables of interest was calculated and tested for significance. Sample characteristics were summarized descriptively, using means and standard deviations for continuous data and frequencies and percentages for categorical data. The level of statistical significance was determined at $p<0.05$.

Results

Descriptive Statistics

Descriptive statistics of media use habits include video viewing, book reading, video game playing and so on, which specific information can be seen in Table 1. Overall, 35.20% and 29.10% of adolescents reported chatting and writing blog on the Internet. 8.00% and 0.50% adolescents play game and read book on the net. There were significant differences in grade in media use habits.

Table 1
Media use habits.

	Video Viewing	Reading	Game Playing	Chatting	Shopping	Blogging	Visiting Forum
7th-Grade	5.40%	0.30%	9.60%	28.60%	16.00%	27.40%	12.60%***
8th-Grade	0.00%	0.00%	10.50%	36.80%	2.60%	34.20%	15.80%***
9th-Grade	1.40%	1.40%	2.70%	43.20%	8.10%	25.70%	17.60%***
All	2.60%	0.50%	8.00%	35.20%	9.50%	29.10%	150%***

*Note: *P<=0.05 ; **P<=0.01; ***P<=0.001.*

As can be seen in Table 1, Chinese teens reported being more likely to use the Internet for chatting with friends, writing some interesting blog, or visiting forums. They were less likely to use the Internet for reading except they sometimes used the Internet for the instrumental purposes, such as finding educational material and joining learning forums.

Screen Time (ST)

Screen time was investigated respectively by weekday, weekend and a week. Table2 represents that 45.3% teens spent screen time less than 2 hours a day, 27.9% spent between 2 hours and 4 hours, and 26.8% spent more than 4 hours. P-values for the differences in grade (Chi-square Test) is significant and there is a decrease for the users who spent less than 2 hours a day on the net and an increase for the users from grade 7 to grade 9 who spent more than 4 hours.

Table 2
Screen time in a week (hours/day).

	Screen Time in a week (hours/day)					
	<2h		2h-4h		>4h	
7th-Grade	216_a	53.7%	$117_{a,b}$	29.1%	69_a	17.2%**
8th-Grade	126_b	43.9%	63_b	22.0%	98_b	34.1%*
9th-Grade	72_c	32.0%	75_a	33.3%	78_b	34.7%***
All	414	45.3%	255	27.9%	245	26.8%

*Note: *P<=0.05 ; **P<=0.01; ***P<=0.001.*

However, there are different results if the screen time is divided into weekday and weekend. The results were shown in the Table 3. Most teens'(97.5%) spent screen time is less than 2 hours on the weekday, and more than half teens' (58.6%) screen time is between 2 and 4 hours a day on the weekend.

Table 3
Screen time(ST) on the weekday and weekend(hours/ day).

	ST on weekday		ST on weekend	
	<2h	2h-4h	<2h	2h-4h
7th-Grade	98.00%	2.00%	48.80%	51.20%**
8th-Grade	100.00%	0.00%	34.10%	65.90%**
9th-Grade	93.30%	6.70%**	37.30%	62.70%
All	97.50%	2.50%	41.40%	58.60%

*Note: *P<=0.05 ； **P<=0.01； ***P<=0.001.*

Personality traits

Personality traits referred to learning anxiety and impulsively in this study. Learning anxiety and impulsiveness were measured using Mental Health Test Scale, on a 5-point verbally anchored "never" to "always", then calculating the scores which classify by low, medium and high. Seen them in Table 4.

Table 4
Ordinal 3-category : learning anxiety\impulsiveness by grade and overall.

	Learning anxiety			Impulsiveness		
	Low	Medium	High	Low	Medium	High
7th-Grade	9.50%	45.80%	44.80%**	59.20%	35.30%	5.50%***
8th-Grade	7.30%	36.60%	56.10%*	51.20%	39.00%	9.80%*
9th-Grade	5.30%	24.00%	70.70%**	36.00%	48.00%	16.00%***
All	7.80%	37.50%	54.70%	51.00%	39.60%	9.40%

*Note: *P<=0.05 ； **P<=0.01； ***P<=0.001.*

Predicting School Performance from Screen Time and Demographics

Based on the data of screen time, the relation between school performance and media use will be explored. The participants were asked to report their average school performances, ranging from A through E. A indicates very good. B is good, and C\D\E means medium\bad\very bad. Thus, the answers were coded and higher scores indicate higher grades in school. Results are shown in Table 5.

Table 5
Ordinal 5-category school performance by grade and overall.

	School performance				
	A	B	C	D	E
7th-Grade	22.60%***	35.60%	36.60%	4.50%	0.70%
8th-Grade	0.00%***	22.00%	58.50%	19.50%	0.00%
9th-Grade	0.00%***	9.30%	50.70%	33.30%	6.70%
All	10.00%	24.80%	46.90%	16.30%	2.00%

*Note: *P<=0.05 ； **P<=0.01； ***P<=0.001.*

Then, analyses were first examined demographics, screen times and school performances. Hierarchical regression analyses predicted school performances with gender, age, grade and screen time of teens using medias. Results are presented in Table 6. As expected, the variable of screen time can predict school performance and the variable of grade has also been a significant effect. It seems that the reduction hypothesis is right.

Table 6
Predicting school performance from demographics and screen times.

Variables	B	SE	T	R^2
Constant	4.309	0.494	8.717	-
Demographics				
Gender	0.031	0.052	0.595	-
Grade	-0.544***	0.054	-10.168	-
Age	0.005	0.039	0.118	-
Screen time	-0.062***	0.01	-6.156	0.287

*Note: *P<=0.05 ； **P<=0.01； ***P<=0.001.*

Predicting School Performance from Screen Time and Personality Traits

Analyses next examined the relation between personality traits and screen time using hierarchical regression. Results are presented in Table 7. Learning anxiety variable was found to be a significant moderator but impulsiveness did not enter into this regression model. So, this two personality traits partly impact on the school performance in this study.

Table 7
Predicting school performance from personality traits and screen times.

Variables	B	SE	T	R^2
Constant	4.6	0.079	57.931	-
Grade	0.001	0.01	0.12	-
Learning Anxiety	-0.03***	0.008	-3.784	-
Screen time	-0.058***	0.01	-5.673	0.303

*Note: *P<=0.05 ； **P<=0.01； ***P<=0.001.*

Predicting School Performance from Screen Time, Personality Traits and Demographics

Based on the above two results, another analysis of affecting the school performance was completed. Then, the variables such as the screen time, demographic and personality traits are examined. Entering regression model variables are the following: mother's educational background, father's educational background, only-child (a family planning in China), family income, age, gender, grade, learning anxiety, impulsiveness, media use habit and screen time. Results are presented in Table 8. Only media use habit, gender and screen time were found to be significant factors to school performance.

Table 8
Predicting school performance from demographics, personality traits and screen times.

Variables	B	SE	T	R^2
Constant	3.503	0.633	5.537	-
Demographics				
Grade	0.011	0.05	0.224	-
Age	-0.025	0.046	-0.545	-
Gender	0.2**	0.071	2.83	-
Only-child	0.083	0.097	0.856	-
Father educational background	0.042	0.048	0.864	-
Family income	0.017	0.013	1.3	-
Personality traits				
Learning anxiety	-0.002	0.01	-0.182	-
Media				
Screen time	-0.055***	0.013	-4.206	-
Media habits	-0.062**	0.022	-2.782	0.335

*Note: *P<=0.05 ； **P<=0.01； ***P<=0.001.*

Summing up, the screen time is the important factor affecting the school performance.

Predicting School Performance from Screen Time and Media Contents

On the other hand, I want to explore the relation between the media contents and school performance. A further regression was done. In this study, the media contents are referred to TV, computer, e-book, mobile, game console. In this analysis, the screen time is divided into weekday or weekend. Then, all these variables are interacted in consequence of producing ten variables (five media variables times two time variables), such as TV on weekday, computer on weekend and so on. All these variables are entered the regression model to predict school performance. Results can be seen in Table 9. Only weekend screen time, TV on the weekend, mobile on the weekend, game console on the weekend and age were found significant in the regression model. According to Table 1, the purpose of using media was amusement and communication in this study. Therefore, affecting school performances were not only media use time but also media use contents. If the media is used as learning instruments, school performance will improve possibly. In addition, the variable of age has a negative relation with the school performance, which implies the younger teens are more likely to be affected by the media.

Table 9
Predicting school performance from media habits and screen times.

Variables	B	SE	T	R^2
Constant	4.182	0.49	8.543	-
ST on weekday	-0.016	0.047	-0.339	-
ST on weekend***	0.105	0.027	3.888	-
TV on weekend***	-0.03	0.007	-4.079	-
Mobile on weekend**	-0.019	0.02	-0.985	-
Game console on Weekend***	-0.151	0.031	-4.915	-
E-book on weekend	0.002	0.023	0.085	-
Age***	-0.531	0.053	-9.974	0.347

*Note: *P<=0.05 ； **P<=0.01； ***P<=0.001.*

Summary

As can be observed in the above analyses, media use time was a significant predictor of school performance, although those social factors (such as family income, family status) and personality traits moderated the relationship of screen time and school performance. When the screen time is divided into weekday and weekend, the personality traits and social factors are no more significant. Therefore, the affecting performance is media use and media use content. If the media is used as learning instrument, the performance will be possibly improved. Moreover, the younger makes more progress in their learning.

Discussion and Conclusion

Prior research has presented two hypotheses about the media time and the school performance. One is reduction hypothesis which thinks excessive media utilize leading to poor academic performance. Another is stimulating hypothesis which thinks media use enriching the brain and improving academic performance (Jackson, Von, Eye, Biocca, Barbatsis, Zhao, & Fitzgerald, 2003). Although some researchers' views are beyond these two hypotheses, they think the contents of the media are more important than the media itself. (Schmidt, & Vandewater, 2008).

In this paper, nine hundred and fourteen 7th-, 8th- and 9th-grade students took part in this research. Based on these collected data, hierarchical multiple regressions were conducted by different dimensions. I found media use time was a significant predictor of school performance. However, when the screen time is divided into weekday and weekend, the media use time is replaced by the media use contents. How to explain this finding? Maybe, much of the media content is entertainment and probably of low educational value for the adolescent. Time spent viewing these programs may displace more educational activities such as homework, reading, or creative play. On the other hand, media offers a lot of learning resource, which has the potential for the teens to a much wider range of experiences and ideas (Wiecha, Sobol, Peterson, & Gortmaker, 2001). Thus, the media contents are more important for the adolescents in their school performance (see Table 9). Based on Table 9, age is also an important variable in predicting school performance. The adolescents of different ages have different media habits, which leading to different learning results. The younger adolescent is more affected by the media. Besides, adolescents have different media behavior in weekday and weekend.

Secondly, learning anxiety and family income are important factors to the performance. Numerous studies have

documented the positive relation between family economic resources and cognitive stimulation (Baharudin, & Luster, 1998; Garrett, Ng'andu, & Ferron, 1994; Miller, & Davis,1997; Watson, Kirby, Kelleher, & Bradley, 1996). But, I have not proved this finding (see Table 8), which this link of family income and adolescents' media use is weak. It is the same with learning anxiety. Based on Table 8, learning anxiety is related to school performance, but this relation is not significant. Although Naveh-Benjamin, McKeachie, and Lin (1991) has reported, those who have a higher level of learning anxiety will encounter more performance deficits, specifically while they are preparing for examinations, taking examinations, or both (Cassady, & Johnson, 2002). The reasons for this conflicting phenomenon may attribute our research questions. The importance of this research is media use and media use content. If the media is used as a learning and testing tool, the traits of anxiety and socioeconomic status may be significant for the adolescents' performance.

In all, affecting adolescents school performance is complex and media use is one of affecting factors.

Apart from this, the sample is not big enough and the media contents are not comprehensive in this research. In our findings, media use is an important variable but media use is measured with "stylized measurements" (Juster, Ono, & Stafford, 2003) of time in this paper. Stylized measurements estimate the time spent in a particular activity during a typical period of time, like hours spent watching TV during a "typical day" or a longer period of time (e.g., Jan, 2000; Heim, Brandtzaeg, Kaare, Endestad, & Torgersen, 2007; Flowers, Pascarella, & Pierson, 2000). Such measurements made it easy to distinguish between time spent using and not using electronic media (Jacobsen, & Forste, 2011). But measuring media use requires more precision, such as a time diary. Meantime, in this research, I assumed the adolescents only used one electronic media in a period of time. I did not regard the function of electronic media in multitasking. Adolescents use electronic media simultaneously with other media (e.g., checking Facebook while IMing) or during activities requiring more focused attention, like class. Thus, indicators should allow for simultaneous use. It is increasingly more difficult to distinguish between various types of media use in order to estimate associations with academic performance.

Therefore, all these questions should be examined in future research, including more precise tool, more careful plan and more accurate samples.

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