Out-of-School Activities on Weekdays and Adolescent Adjustment in China: a Person-Centered Approach

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The present study used a person-centered approach to identify adolescent out-of-school activity profiles and to examine whether academic achievement, cognitive ability and negative emotion vary across different profiles. Data were collected from 9312 adolescents, and four profiles were identified: the "academic tutoring profile", the "moderate time-consuming profile", the "screen profile" and the "low time-consuming profile". These four profiles differed in academic achievement, cognitive ability and negative emotion. The students in the low time-consuming profile had the best performance on all indicators. Those in the academic tutoring profile had high academic achievement but a low level of cognitive ability and a high level of negative emotion. This result indicates that for some students, long-term academic tutoring can improve their academic achievement through emotional costs and that academic tutoring cannot improve their cognitive ability. The students in the screen profile had the worst performance on both academic achievement and cognitive ability, and the large amount of screen time did not even make them happy.

Out-of-school time is an important context for adolescent development because it provides opportunities for youth to select and manage their own experiences (Silbereisen and Eyferth 1986). Out-of-school activities can be categorized in a variety of ways. For example, activities can be classified as organized/unorganized and academic/nonacademic. "Organized" activities have a structure and a leader, while "academic" activities refer to the nature of the activities (Schreiber 2000).

From a developmental perspective, on the one hand, out-of-school activities can provide adolescents with developmentally facilitative interactions with their living environments; on the other hand, they can also provide them with the opportunity to

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engage in activities that may undermine positive development. The ecological framework of human development (Bronfenbrenner 2005) has been used as a guiding framework to capture the rich complexity of out-of-school activities. In this model, the environment is conceived as a set of nested structures containing the microsystem, mesosystem, exosystem and macrosystem. In these subsystems, the mesosystem is special because it focuses on the relationship between different settings rather than a single setting. Out-of-school activities on weekdays provide us with a good chance to explore the interconnections between school, home and tutoring class. The out-of-school time on weekdays reflects the transition of space when, after school, students go home or go to their tutoring class. Out-of-school activities also reflect how different settings work together so that academic tasks are accomplished. For example, homework and tutoring provide additional learning opportunities to support academic development in school.

There is increasing interest in the relationship between the time use of different kinds of out-of-school activities and youth development (e.g., Eccles and Templeton 2002; Thibodeaux et al. 2017). Two approaches have been widely used in this field. The first is the variable-centered approach (e.g., multiple regression or correlational procedures), which focuses on how levels of global out-of-school time use are associated, on average, with different levels of developmental outcomes.

The relationship between different kinds of out-of-school activities and youth development has been examined by many variable-centered studies. A negative relationship has been found between the amount of time spent playing video games and academic achievement in elementary, high school and college students (Anderson and Dill 2000; Gentile et al. 2004). For example, Gentile et al. (2004) explored this relationship in 607 8th-grade and 9th-grade students. They found that the amount of time spent playing violent video games could predict academic achievement directly or indirectly through the mediating role of hostility. Anand (2007) also found that the amount of time that college students spent playing video games was negatively associated with their Scholastic Aptitude Test (SAT) scores and grade point average (GPA). However, for other developmental indicators, the results are more complex. For example, Allahverdipour et al. (2010) found a curvilinear relationship between video game playing and mental health outcomes, with nongamers and excessive gamers showing poorer mental health. Only moderate players (1–10 h per week) fared best.

The relationship between TV viewing and children's poor academic performance, attentional problems, aggressive behavior, and smoking has been reported by many previous studies (Christakis et al. 2004; Cooper et al. 1999a, b; Giammattei et al. 2003; Gidwani et al. 2002). Williams et al. (1982) calculated the average correlations between TV viewing and academic performance based on 23 educational and psychological review articles and found that the overall correlation between the number of hours spent watching TV and achievement was negative but small (−.05). However, other researchers consider the correlation to differ across different ages. Razel (2001) reanalyzed the research by Williams et al. (1982) for different ages and found that at ages 5 and 6, the average correlation is positive; for ages 7 through 9, the average correlation is negative; and at ages 10 through 17, the average correlation is more negative.

Academic tutoring is considered one of the most common forms of remedial instruction for improving academic achievement. Although some researchers have

found that the average effect of private tutoring is not significant (Smyth 2008), most studies have shown that tutoring time is positively related to students' academic performance. For example, Zhang (2013) found that although the average effect of private tutoring is not significant, it may have a significant and positive effect on urban students with lower achievement. In the study by Mischo and Haag (2002), more tutoring time could improve academic performance and learning motivation; students whose tutoring time was more than 2 h per week had significantly higher academic performance than those who did not participate in any tutoring. Academic tutoring was also associated with improved self-confidence and reduced test anxiety even after controlling for prior school performance.

Finally, the relationship between homework time and academic performance has shown mixed results. Some studies have found a positive relationship between these two variables (Cooper 1989; Cooper et al. 2006; Paschal et al. 1984). Another study showed that with an increase in homework time, students' math scores decreased (Kitsantas et al. 2011). In addition, a study using a large sample in a German high school found that there was no correlation between homework time and academic performance (Trautwein et al. 2002). A meta-analysis conducted by Cooper (1989) revealed that homework was positively associated with academic achievement (effect size = .21). In the meta-analysis, Cooper also reported that the relationship between the amount of time spent on homework and achievement was positive for all content areas, with an average correlation of .19 for all content areas (with correlations as low as .08 for social studies and as high as .21 for mathematics).

Many variable-centered studies have explored how levels of out-of-school activities are associated, on average, with different levels of developmental outcomes. However, these activities are always correlated with each other and may jointly affect students' development. For example, Cooper et al. (1999a, b) explored five after-school activities and found that the joint effects of these five variables increased the variance explained in achievement measures well beyond that explained by any single activity. Therefore, exploring the combined effect of multiple activity settings in the same sample is more meaningful.

Only a limited number of studies have explored the combined effect of activities using person-centered approaches. For example, Morris and Kalil (2006) explored both structured activities (sports involving teaching; lessons in music, art, or other nonsport activities; clubs, groups, or community programs with adult leadership) and unstructured activities (taking trips to the library, reading for pleasure, doing homework, playing video or computer games, watching TV) in 2127 children. They found five clusters based on these eight kinds of activities: high clubs; high sports; low sports, lessons and clubs; and high sports and clubs. Among these clusters, the cluster of highly structured activities (high sports, lessons, and clubs) showed the highest level of math scores, parent-rated achievement and prosocial behaviors. In the study by Bartko and Eccles (2003), adolescents' involvement in structured and unstructured activities was assessed by 11 items that included sports, reading for pleasure, homework, chores, time with friends, watching TV, school clubs, community clubs, volunteering, religion, and paid work. They found six clusters based on these activities: sports, school, uninvolved, volunteer, highly involved, and work. The results indicated that the adolescents belonging to the school and highly involved clusters reported the highest GPA level and the lowest level of problem behaviors and depression. In contrast,

uninvolved adolescents showed a low level of academic achievement, high self-reported problem behavior, and high levels of internalizing and externalizing problems.

Although a few person-centered studies have attempted to assess these relationships, most of these studies were conducted in Western cultures. In the Chinese context, two important issues remain unaddressed. First, out-of-school time use in China has some specific characteristics. For example, primary and secondary school students in China endure a heavy academic burden. Chinese students had the greatest time use for homework in the world in both the 2009 and 2012 waves of the Programme for International Student Assessment (PISA). In addition, private tutoring is more general in the Asian cultural context (Byun and Park 2012). In China, approximately 65.6% of middle school students and 53.5% of high school students participate in private tutoring (Xue and Ding 2009). Furthermore, in China, many students choose (or parents arrange for their children) some kind of paid interest-oriented tutoring (such as musical instruments and drawing). Therefore, by simultaneously considering various kinds of out-of-school activities, the profiles of students in China may be different.

Second, it is also unclear how different kinds of out-of-school activities might interact with each other within individuals to influence Chinese children's academic success and mental health. Academic achievement and mental health are two important indicators for students (OECD 2017). However, in China, academic functioning is prioritized as a more important marker of optimal development than emotional functioning. Academic achievement and emotion do not always "move together". A previous study found a specific group of Chinese students characterized by high academic achievement but a high level of negative emotion (Lv et al. 2019). Most previous studies involving academic activities (such as academic tutoring and homework) have focused on academic outcomes, and mental health has been neglected. Although there is no direct evidence showing that academic tutoring and homework can influence mental health, the negative relationship between academic stress and mental health has been proven by some studies (Ang and Huan 2006; Hilsman and Garber 1995). Therefore, in China, the profile characterized by a high level of academic tutoring or homework may show not only high academic achievement but also a high level of negative emotion.

In the current study, we aimed to identify subgroups of Chinese adolescents based on six kinds of out-of-school activities (homework assignments from parents, homework assignments from teachers, academic tutoring, interest-oriented tutoring, watching TV and playing video games or being online) using latent profile analysis (LPA). To explore the overall effect of these profiles, academic achievement, cognitive ability and negative emotion were chosen as the outcomes. The relationships between the out-of-school activity profiles and these outcomes were then tested.

1 Participants and Procedure

The data for the present study were adopted from the 2013–2014 and 2014–2015 Chinese Educational Panel Survey (CEPS), which is a nationally representative survey conducted by the National Survey Research Center at Ren-min University in China. The design of the data collection procedures consisted of multistage stratified probability proportional sampling (PPS). Four stages were included, and 438 classes in 112

schools from 28 country-level units were sampled with probability proportionality. The database contained 10,279 students in grade 7 (mean age = 15.03, SD = 1.01). In the current study, after excluding incomplete responses (questionnaires with a rate of missing values >50%), the final sample consisted of 9312 students. In this sample, 52.2% were boys. The educational level of the students' fathers and mothers was predominantly a high school education (65.1% and 60.0%, respectively). The mean age of the final sample in wave1 was 15.07 years, SD = 1.04. 46.2% of the students were only child. The CEPS did not report objective family income, and 69.2% of the families had a subjective economic feeling of being middle class (Table 1).

2 Measures

2.1 Out-of-School Activity Time Use on Weekdays

Because there are large differences between weekdays and weekends, it is not reasonable to analyze time use in the entire week. In the current study, we focused on out-of-school activity time use on weekdays. Out-of-school activity time use was measured by 6 items for homework assignments from parents, homework assignments from teachers, academic tutoring, interest-oriented (nonacademic) tutoring, watching TV and playing video games or being online. These six items were rated on a six-point scale (1 = never, 2 = less than 1 h, 3 = 1–2 h, 4 = 2–3 h, 5 = 3–4 h, 6 = more than 4 h). The following are example items: "How long do you spend watching TV on weekdays? How long do you spend doing homework from teachers on weekdays?" Out-of-school activity time use was measured in wave 2 (in wave 1, it was measured in a different way). In the current study, the Cronbach's α of the 6 questions was .91.

2.2 Academic Achievement

Academic achievement across three subjects (Chinese language, mathematics, and English language), as determined by students' performance on their midterm examinations in the 2013 and 2014 semesters, was used. The original scores ranged from 0 to 100. The school was used as the unit, and the scores were transformed into standard achievement scores. Finally, the standard achievement scores in the three subjects were

Table 1 Description of this sample

	Mean	SD	Minimum	Maximum
Gender	1.48	.50	1	2
Age	15.07	1.04	11	18
Father's educational level	4.24	1.97	1	9
Mother's educational level	3.96	1.96	1	9
sibling	.71	.86	0	12

gender: 1 = boy, 2 = girl; parental education level: 1 = uneducated, 2 = primary school, 3 = middle school, 4 = technical secondary school, 5 = vocational high school, 6 = high school, 7 = college for professional training, 8 = undergraduate, and 9 = master's degree or above

averaged and used as the indicator of students' academic achievement (Cheung and Pomerantz 2011).

2.3 Cognitive Ability

Rather than asking students to recall specific knowledge taught in the school curriculum, the CEPS designed a set of cognitive ability test questions to measure students' logical thinking and problem-solving skills. The scores can be compared with international and national standards. The test questions were constructed based on the Taiwan Education Panel Survey (TEPS). Standardized test scores for cognitive ability were computed based on item response theory (IRT) with three parameters (3 PL; the difficulty index, discriminative power index, and guessing index) (for more details, please see Wang and Li 2015). In the current study, cognitive ability was measured in two waves.

2.4 Negative Emotion

Negative emotion was measured by 5 items using the following CEPS question: Have you had the following feelings in the past seven days?" The subquestions included feeling blue, feeling unhappy, not enjoying life and feeling sad. The response options were 1 = never, 2 = a little, 3 = sometimes, 4 = usually, and 5 = daily. This construct has been used in previous study (Sun et al. 2020) In the current study, negative emotion was measured in two waves. The Cronbach's α values of the 5 items in waves 1 and 2 were .85 and .90, respectively.

2.5 Control Variables

The children's gender, number of sibling, their mothers' and fathers' educational levels and the families' subjective economic feeling were also obtained as control variables. Boys were coded as 1, whereas girls were coded as 2. The parents' educational levels were coded for 9 levels as follows: 1 = uneducated, 2 = primary school, 3 = middle school, 4 = technical secondary school, 5 = vocational high school, 6 = high school, 7 = college for professional training, 8 = undergraduate, and 9 = master's degree or above. The CEPS did not report objective family income; therefore, the families' subjective economic feeling was used in the current study. This variable was coded for 5 levels as follows: 1 = very poor, 2 = poor, 3 = middle class, 4 = affluent, 5 = very affluent.

2.6 Data Analytic Strategy

The multiple imputation method was used to deal with missing data. The performance of multiple imputation in a variety of missing data situations has been well studied (Schafer and Graham 2002), and this method has been shown to be appropriate for different patterns of missing values.

The nesting of students in schools was considered via a design-based standard error correction (the analysis option type is complex in Mplus) (McNeish et al. 2017).

To determine the optimal number of latent groups that could be identified based on the continuous indicator variables in the data, we conducted an LPA using Mplus 7.4.

We used several fit statistics to determine which model fit the data best: the Akaike information criterion (AIC), the Bayesian information criterion (BIC), the adjusted BIC (ABIC), the Vuong-Lo-Mendell-Rubin likelihood ratio test (VLMRT), and entropy. For the AIC, BIC, and ABIC, lower values indicate a better-fitting model (Flaherty and Kiff 2012). The VLMRT compares models for k and k-1 classes; if the ratio test results in a significant *p* value, the k class model is a better fit than the k-1 class model (Tofighi and Enders 2008). Higher entropy indicates less classification error (Collins and Lanza 2010), and we confirmed that the classes were large enough to be meaningful and of practical value (Marsh et al. 2009). After determining the number of classes that best fit the data, we applied the Bolck-Croon-Hagenaars (BCH; Bolck et al. 2004) method to test the relationship between these profiles and students' developmental outcomes after controlling for students' gender and their parents' educational level. The disadvantage of the traditional three-step method is that the estimates obtained in the third step are attenuated because of the classification error introduced when assigning individuals to classes (Bolck et al. 2004). The BCH method is recommended for LPAs with continuous distal outcomes (Asparouhov and Muthén 2014). The BCH method involves performing a weighted analysis of variance with posteriori class membership probabilities as weights, similar to the multigroup model in structural equation modeling (SEM) (Asparouhov and Muthén 2014). The differences in profile-specific means for the outcome variables are then tested using Wald chi-square tests (Bakk and Vermunt 2016).

3 Results

Table 2 presents the correlations of the key variables in this study. The time use for homework assignments from teachers was positively associated with academic achievement, but the relationship between homework assignments from parents and academic achievement was not significant. Both academic tutoring and interest-oriented tutoring were negatively associated with academic achievement. Watching TV and playing video games or being online were also negatively associated with academic achievement. In addition, the time use for homework assignments from teachers, academic tutoring, watching TV and playing video games or being online were positively associated with negative emotion. The time use for homework assignments from teachers was positively associated with cognitive ability. Watching TV and playing video games or being online were negatively associated with cognitive ability.

3.1 Descriptions of the Five Profiles Based on out-of-School Activity Time Use

To identify the best-fitting model, we tested models varying from a two- to a six-class solution. Currently, there are no clear criteria in the literature for the optimal number of classes. Therefore, we used a combination of theoretical justification, parsimony, and fit indices to decide the number of latent classes. The AIC and BIC decreased continuously from two to six classes. In all these models, the entropy value was also higher than .70. In this situation, we used the scree test to explore the trajectory of the BIC and AIC (Petras and Masyn 2010), and we found that four classes were the

Table 2 Correlations for the key variables

	1	2	3	4	5	6	7	8	9	10	11	12
1.homework assignments from teachers	1											
2.homework assignments from parents	.241**	1										
3.academic tutoring	.157**	.447**	1									
4.interested-oriented tutoring	.079**	.290**	.354**	1								
5.watching TV	−.055**	.031**	.090**	.092**	1							
6.playing video games or online	−.064**	.036**	.117**	.126**	.485**	1						
7.academic achievement in last year	.107**	−.007	−.057**	−.065**	−.138***	−.159***	1					
8.academic achievement in this year	.115**	.005	−.043**	−.054**	−.139***	−.172**	.856**	1				
9. cognitive ability in last year	.134**	.020*	.019	.000	−.164***	−.108***	.377**	.358***	1			
10.cognitive ability in this year	.198***	−.008	−.014	−.048	−.245***	−.176***	.494***	.484***	.554***	1		
11.negative emotion in last year	.017	.006	.003	−.007	.037***	.047***	−.099***	−.114***	−.106**	−.124**	1	
12. negative emotion in this year	.075**	0.13	0.34**	0.11	.041**	.058**	−.048**	−.070**	−.056**	−.080**	.429**	1
M	3.51	1.76	1.61	1.38	2.46	2.23	0	0	.04	.31	2.00	2.17
SD	1.16	1.04	1.24	.91	1.41	1.43	.87	.88	.87	.83	.78	.91

inflection point. After the 4 classes, the BIC and AIC decreased slowly. In addition, the VLMRT-p was not significant after the 4 classes. Therefore, the four-class model was chosen (Table 3).

As shown in Fig. 1, the first profile was characterized by high levels of academic tutoring; thus, we designated it the "academic tutoring profile" (profile 1). This profile represented 5.0% ($n = 476$) of the sample. The second profile was designated the "moderate time-consuming profile" (profile 2) and was characterized by moderate levels of all kinds of time use. This profile represented 13.8% ($n = 1283$) of the sample. The third profile was characterized by high levels of time spent watching TV and playing video games or being online. Therefore, we designated this profile the "screen profile" (profile 3), and it represented 11.5% ($n = 1069$) of the sample. The fourth profile exhibited low levels of all types of time use. Therefore, we designated this profile the "low time-consuming profile" (profile 4); it represented 69.6% ($n = 6484$) of the sample.

3.2 The Relationship between the Time Use Profiles and Developmental Outcomes

Regarding academic achievement, after controlling for students' academic achievement in the last year, the students in the academic tutoring profile ($.04 \pm .02$) showed the highest level of academic achievement among those in the screen profile ($-.08 \pm .02$) and the moderate time-consuming profile ($-.003 \pm .01$, $p = .07$). There were no significant differences between the academic tutoring profile and the low time-consuming profile ($.01 \pm .004$), nor were there differences between the low time-consuming profile and the moderate time-consuming profile. The details are shown in Fig. 2.

Regarding cognitive ability, after controlling for students' cognitive ability in the last year, the students in the low time-consuming profile ($.07 \pm .03$) showed the highest level of cognitive ability compared to all other profiles. The students in the screen profile ($-.25 \pm .04$) showed the lowest level of cognitive ability. There was no significant difference between the academic tutoring profile ($-.05 \pm .04$) and the moderate time-consuming profile ($-.01 \pm .03$). The details are shown in Fig. 3.

Regarding negative emotion, the students in the low time-consuming profile ($-.04 \pm .02$) showed the lowest level of negative emotion compared to the academic tutoring profile ($.14 \pm .05$), screen profile ($.12 \pm .04$) and moderate time-consuming profile ($.05 \pm .03$). There were no differences among these three profiles. The details are shown in Fig. 4.

Table 3 Model fit indices

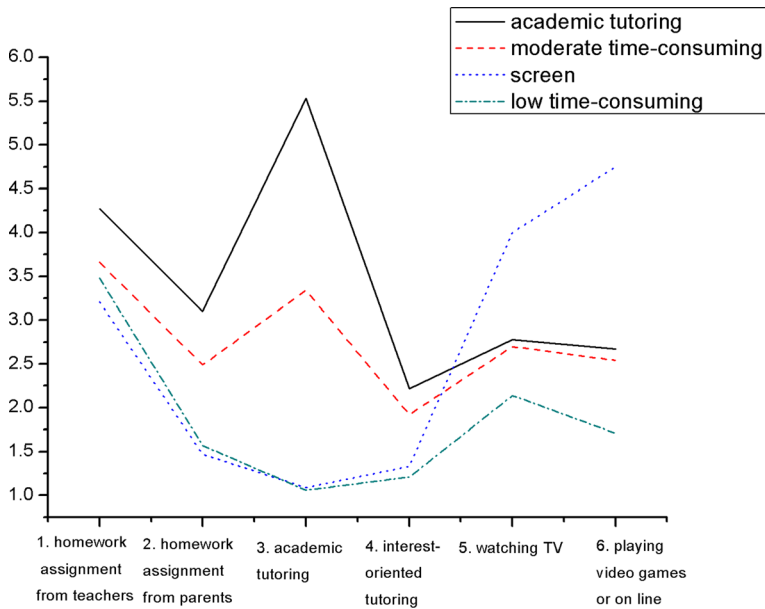| Model	AIC	BIC	Adjusted BIC	VLMRT p value	Entropy	Percentage of students in smallest class
2-class	166905.32	167041.82	166980.43	<.001	0.98	0.18
3-class	162333.45	162523.72	162440.09	<.001	0.97	0.09
4-class	155825.54	156061.21	155956.29	<.001	0.94	0.05
5-class	153905.75	154192.26	154064.34	=.22	0.93	0.02
6-class	153103.55	1534421.25	153292.42	=.27	0.93	0.02

Fig. 1 Profiles of out-of-school activities time use

4 Discussion

In the present study, we used a person-centered approach (LPA) to identify the following four profiles of students' out-of-school activities: the academic tutoring profile, moderate time-consuming profile, screen profile and low time-consuming profile. According to the descriptive statistics, 18% of students spent more than 3 h on their homework from teachers. Approximately 10% of students spent more than 3 h on academic tutoring. For a long period of time, primary and secondary school students in China have been plagued by the burden of schoolwork. As early as July 1955, the Ministry of Education of China issued the first "load reduction order" in the People's
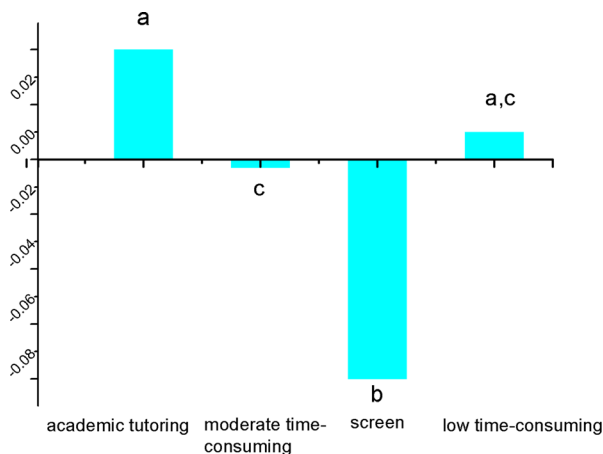

Fig. 2 Academic achievement by the profiles of out-of-school activity time use
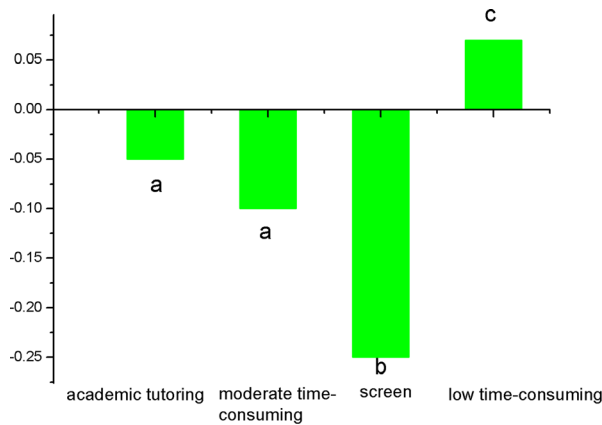
Fig. 3 Cognitive ability by profiles of out-of-school activity time use

Republic of China. According to statistics, in the past 60 years, "burden reduction" has been promoted 11 times by the Ministry of Education of China (Hu and Yin 2015). However, this result indicates that some secondary school students in China still suffer from a heavy academic burden. Our results also found that approximately 20% of secondary school students spent more than 2 h per day watching TV and that approximately 17% of secondary school students spent more than 2 h per day playing video games or being online. According to the latest Chinese time use survey (Du 2018), Chinese people's time use for recreation has improved significantly. This phenomenon may reflect rapid economic development and the need for an improved life quality.

The LPA found that the time usage was balanced for each kind of activity in the moderate time-consuming profile and the low time-consuming profile. There were no obvious characteristics in these two profiles. However, we found two profiles with obvious characteristics. The first is the screen profile, in which students spend large amounts of time watching TV and playing games. The other is the academic tutoring profile, in which students spend large amounts of time on academic tutoring. These two profiles have rarely been found in previous studies. Students in the academic tutoring
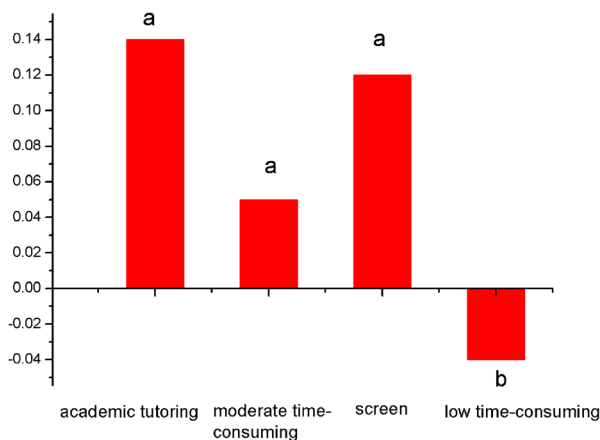

Fig. 4 Negative emotion by profiles of out-of-school activity time use

profile spent more than 4 h per day on academic tutoring. According to the latest Chinese time use survey (Du 2018), the average amount of time that adolescents spend on academic tutoring is approximately .22 h. Therefore, the students in this profile spent much more time than the average amount of time spent on academic tutoring in China. The students in the screen profile spent more than 2 h watching TV and approximately 3 h playing video games or being online.

In addition, we examined the relationship between these time use profiles and students' academic achievement, cognitive ability and negative emotion. Regarding academic achievement, after controlling for previous academic achievement, the results showed that the academic tutoring profile had the highest level of academic performance and that the screen profile had the lowest level of academic performance. Academic tutoring can fill gaps in knowledge, and previous knowledge can promote the use of appropriate information-processing, organizational and control strategies (Baron 1985). However, there were no differences between the academic tutoring profile and the low time-consuming profile. The students in the low time-consuming profile may use a more efficacious learning strategy and have higher learning efficiency. Mischo and Haag (2002) found that although tutoring can improve academic performance, long-term tutoring does not require self-regulating strategies; hence, it does not improve executive control. The students in the screen profile had the lowest level of academic achievement. According to previous studies, the mechanism of the negative relationship between watching TV and playing video games and academics could be as follows: physical symptoms, such as sleep quality and headaches, can negatively affect social function, and the large amounts of time spent looking at screens may lead students to drop out of other social groups; in addition, the large amounts of time spent looking at screens lead to a decrease in the amount of time spent on learning (Anand 2007).

Regarding cognitive ability, the low time-consuming profile showed the highest level of cognitive ability compared to all other profiles. Although the students in the academic tutoring profile have the best performance on academic achievement, they do not have the highest level of cognitive ability. Cognitive ability generally refers to the ability to learn, and it largely constitutes intelligence. According to a previous study, cognitive ability could explain half of the variability in academic performance (Walberg 1984). Although there is a high correlation between cognitive ability and academic achievement, they are absolutely two different constructs. In contrast to academic achievement, cognitive ability emphasizes logical thinking and problem-solving skills rather than specific knowledge taught in the school curriculum. This result indicates that although academic tutoring can improve academic achievement by improving specific knowledge, it cannot improve cognitive ability (Mischo and Haag 2002). The screen profile had the lowest level of cognitive ability. The negative relationship between cognitive ability and watching TV and playing games, even during infancy, has been proven by many studies (Aishworiya et al. 2019; Shams et al. 2015).

Regarding negative emotion, the low time-consuming profile had the lowest level of negative emotion. In contrast, the academic tutoring profile and screen profile had the highest level of negative emotion. This result indicates that the high level of academic performance in the academic tutoring profile may be

accompanied by certain emotional costs. Long-term tutoring may lead to high student pressure. Emotional development and school achievement not only mutually affect each other but also affect themselves individually within the learning process (Lv et al. 2019). This result is consistent with those of previous studies that also found that some factors (such as maternal monitoring) could improve academic achievement through emotional costs (Lv et al. 2019). Surprisingly, the students in the screen profile also had a high level of negative emotion. This result indicates that the large amount of screen time does not make these students happy. Indeed, the academic difficulties caused by this large amount of screen time may lead to a high level of negative emotion among these students. Combined with the indicator of academic achievement, we found that the low time-consuming profile had the best performance on both academic achievement and negative emotion. Although academic tutoring can improve academic achievement by improving the knowledge base for further learning, it does not improve intelligence. Students in the low time-consuming profile may use a more efficacious learning strategy and have higher learning efficiency. In addition, these efficient students may spend more time on other social activities, and many previous studies have found that students' social competence is positively associated with the development of their academic and emotional functioning (Obradović et al. 2009; Guo et al. 2018).

To the best of our knowledge, this study is the first to explore the relationship between out-of-school activity profiles and multiple kinds of developmental outcomes using a national representative sample in China. In particular, previous studies involving academic activities (such as academic tutoring and homework) have focused only on academic achievement, and cognitive ability and mental health have been neglected. The most important finding is that long-term academic tutoring can improve academic achievement but not cognitive ability, which is more meaningful for student learning in the future. Furthermore, the high level of academic performance in the academic tutoring profile may be accompanied by certain emotional costs. This study also contributes to the mesosystem in the ecological framework of human development. The results indicate that the quality and efficiency of the interconnection between different microsystems is more important than the quantity, as the low time-consuming profile has the best performance on all the outcomes in the current study.

4.1 Limitations

These results should be interpreted with a few limitations in mind. First, although six kinds of activities were involved in the current study, other important activities, such as social activities and sports, were not explored. Second, this study primarily relied on adolescent self-report measures of time use. Future studies should employ multiple methods (e.g., parental reports) to obtain more diverse and comprehensive information about students' out-of-school activities. Finally, although this study examined the processes linked to student out-of-school activities, the issue of time use fell beyond the scope of this study. As an important direction for future research, studies can investigate the contextual and psychological factors that lead to the different out-of-school activity profiles identified in the current study.

4.2 Implications

The current study suggests that although long-term academic tutoring can promote academic achievement to some extent, it is harmful to mental health and the development of cognitive ability. Long-term academic tutoring should be intervened in due to its huge cost. In addition, teachers and parents should pay more attention to students who spend a considerable amount of time looking at screens, as the students in the screen profile had the worst performance on both academic achievement and cognitive ability and the large amount of screen time did not even make them happy. Finally, the low time-consuming profile had the best performance on all indicators, indicating that a high time use efficiency is beneficial for the all-round development of students.

Compliance with Ethical Standards

Ethical Approval   All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. All procedures in this study were approved by Institutional Review Board of Faculty of Education, Northeast Normal University.

Informed Consent   Informed consent was obtained from all individual participants included in the study.

Conflict of Interest   Author Bo Lv declares that he has no conflict of interest. Author Lijie Lv declares that she has no conflict of interest.

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