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School dropout in primary schools in rural Cambodia: school-level and student-level factors

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ABSTRACT

Reducing dropout rates is a major issue in Cambodia. This study examined the effects of school-level and student-level factors on dropout in rural Cambodian primary schools. We collected data of the same students over 3 years by visiting the same school. We used questionnaires for students and parents, checklists of school facilities, checklists of teacher characteristics and Khmer language and mathematics tests achievement as research tools. We found that the effect size of the school was small: students who dropped out had similar characteristics – even when dropout rates varied among schools. At the school level, teacher absence in both cohorts, mean interaction with teachers in higher-grade cohorts, and mean test achievement in lower-grade cohorts were significantly associated with dropout. At the student level, age at first school entry in both cohorts were significantly associated with dropout. In cohort 1, gender, relative achievement in class, parental educational attainment, economic status, parents' educational aspiration, and school distance were related to dropout. In cohort 2, repetition experience, absence, educational aspiration, teacher interaction, living with parents, and time spent helping the family were related to dropout. Reducing teacher absence and late school entry were key factors of preventing from dropping out of school.

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Dropout; primary school; survival analysis; multi-level model; Cambodia

Introduction

School dropout in primary education is a major issue in many developing countries. Cambodia is no exception. In education of Cambodia, the access to primary education is dissolved. The gross enrolment in primary and lower secondary education was 108.9% and 55.7%, respectively (Ministry of Education, Youth and Sport [MoEYS], 2017). However, many students cannot complete basic education mainly because they dropped out of school. The rates of completion for primary and lower secondary education were 79.9% and 42.6%, respectively, (MoEYS, 2017). The dropout rates for grades 1–6 in primary education were 3.5%–6.8%; for grades 7–9 in lower secondary school, they were 16.9%–19.7% (MoEYS, 2017). Reducing dropout rates is a significant issue in Cambodia.

Using survival analysis, we have conducted several studies into the causes of dropout in basic schools in rural Cambodia (Authors, 2012a, 2012b, 2016). These studies have revealed that late school entry, low achievement in class tests and grade repetition are three major causes of dropout in primary and lower secondary schools. In contrast, poverty, child labour and lack of understanding among parents were not found to be significant predictors of dropout. A recent study by Authors (2016) suggested that dropout is not only a problem of individual students, but may also be related

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to teachers and schools. In their sample, dropout rates varied between schools. However, because of the small sample size of their study, they were unable to identify whether students with similar characteristics dropped out of each school, or if students with different characteristics dropped out because of school-related factors. Thus, it remains unclear whether dropout is primarily an individual student matter or a school matter.

In this study, we extended previous research to investigate the issue more in depth. By obtaining data from a larger sample size, we analysed the effect of school and school-related factors. We addressed three research questions: (1) What is the magnitude of the school effect on dropout in primary schools in rural Cambodia? (2) What school-level factors influence dropout after controlling for student-level factors? (3) What student-level factors influence dropout after controlling for school-level factors?

Literature review

Distinguishing student- and school-related issues

An early report by Coleman et al. (1966) revealed that both individual student and family factors affected student achievement; however, the individual effects were far greater than any school-related factors. This finding disappointed educational policy makers: the result was interpreted as indicating that by their own efforts, schools would be unable to improve student achievement. However, evidence suggests that the situation is different in developing countries. Based on several studies in such countries, Heyneman and Loxley (1983) concluded that schools have a greater impact on improving student achievement in developing than in developed countries. This finding motivated researchers and policy makers dealing with school-related issues in developing countries. A number of researchers have investigated which school factors influence student achievement. For example, using the data for the Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ), Hungi (2011) analysed school factors influencing student achievement in 15 Sub-Saharan African countries. The results showed that the proportion of school-level variance within overall variance were different between countries from 18% in Malawi to 57% in South Africa for reading achievement, and from 9% in Swaziland to 43% in South Africa for mathematics achievement. The proportion of school-level variance within overall variance was high; there is the meaning to investigate school factors influencing student achievement.

On the other hand, it is rate to investigate the proportion of school-level variance within overall variance in the studies of dropout. Many studies in dropout focus on only student individual and their family factors. A study by Author (2016) investigated the proportion of school-level variance within overall variance in developing countries. A study of a sample of 30 public primary schools in rural Malawi revealed that school-related factors contributed substantially to the likelihood of dropout. The results showed that school-level effects accounted for 31.5% of variance in dropout likelihood for grade 5 and 12.5% of variance for grade 7 students. The result suggests that school factors influence dropout in Malawi; it exerts a stronger effect than that observed in developed countries. However, only this study has not provided sufficient evidence for generalizing the patterns towards formulating a standardized theory. Thus, further investigations are needed to clarify the magnitude of the effect of school-related factors on dropout rates in developing countries.

Factors influencing dropout in developed and developing countries

Many studies of dropout have been conducted in both developed and developing countries. In developed countries, most investigations have focused on high school or post-secondary dropout; in developing countries, most reports have examined primary and secondary dropout (Author, 2016).

In developed countries, Witte, Cabus, Thyssen, Groot, and Brink (2013) summarized common predictors of high school dropout found in the literature. He classified them into four factors:

student, family, school, and community factors. Among student factors, there are psychological and behavioural factors (such as academic achievement, grade retention, and absenteeism) and demographic factors (such as gender and race). Among family factors, there are structural characteristics (such as socioeconomic status and family structure) and underlying processes (such as social capital). Among school factors, there are school types, school resources, structural characteristics of schools, and school policies and practices. Among community factors, there are neighbourhood, dropped-out friends, characteristics, employment opportunities, and social discrimination.

In developing countries, a lot of studies investigated factors influencing dropout. The factors can be classified into individual, family, teacher and school factors. In student factors, gender, grade retention, academic achievement, and age to school entry are significant factors. The results of gender are contradicting. Girls are likely to drop out (Keng, 2004; Lloyd, Mensch, & Clark, 2000; Patrick, 2012), while boys tend to drop out (Akhtar, 1996; Sabates, Hossain, & Lewin, 2013). Many studies mentioned that many times of great repetitions lead to dropout (Author, 2016, 2017; Authors, 2012a, 2016; Levy, 1971; Plame, 1993; Wils, 2004). Achievement is a key issue on dropout. Students who have low achievement tended to drop out than those who have high achievement (Authors, 2012a, 2012b, 2016; Hanushek, 2006; Hanushek & Lavy, 1994; Open Society Institute [OSI], 2007; Rwechungura, 2014). Students who entered school lately are likely to drop out (Authors, 2016. 2012a, 2012b; Author, 2017; Branson, Hofmeyr, & Lam, 2013; Jukes, Jere, & Pridmore, 2014; Keng, 2004; Lloyd et al., 2000; Mzuza, Yudong, & Kaputu, 2014; Plame, 1993; Sabates et al., 2013; Wils, 2004). The other factors, absenteeism, pre-school experience, motivation, self-esteem, educational aspiration and health condition, are also considered as important factors influencing dropout. After many absences, students tend to drop out (Authors, 2016). Lack of pre-primary education is likely to connect to dropout (Authors, 2016). Low motivation to school (Mzuza et al., 2014; OSI, 2007), lack of self-esteem (Authors, 2012a, 2016) and educational aspiration (Keng, 2004; Sibanda, 2004) are likely to drop out. Students who have bad health condition tend to drop out (Hussain, Salfi, & Khan, 2011; OSI, 2007; Sabates et al., 2013).

In family factors, parents' educational level and socioeconomic status are often suited to the previous studies. Low parents' educational level is related to drop out (Authors, 2012b; Branson et al., 2013; Goksen & Cemalcialr, 2010; Keng, 2004; Lloyd et al., 2000; Lloyd, Mete, & Grant, 2006). Students from disadvantaged family are likely to drop out than those from advantaged family (Authors, 2012b; Cardoso & Verner, 2007; Goksen & Cemalcilar, 2010; Levy, 1971; Motala, 1995; Mzuza et al., 2014; OSI, 2007; Plame, 1993; Sabates, 2013; UNESCO, 1984). Lack of family also affects dropout (Author, 2016, 2017; Authors, 2016; Lloyd et al., 2006; No, 2012; OSI, 2007; Rwechungura, 2014).

In teacher factors, educational level of teachers and absenteeism of teachers influence dropout. Low educational level of teachers is related to students' dropout (Kim & Rouse, 2011; Lloyd et al., 2000; UNESCO, 1984). Many absences of teachers cause students' dropout (Author, 2016; Author, 2017; OSI, 2007). In school factors, low quality of school (Authors, 2012b; Hanushek, 2006; Hanushek & Lavy, 1994; Lloyd et al., 2006) and lack of school facilities (Hussain et al., 2011; UNESCO, 1984) are related to students' dropout. Comparing to individual and family factors, not many studies have found teacher and school factors; it is significant to find out more teacher and school factors.

Dropout studies in Cambodia

Authors (2016), reviewed dropout studies in Cambodia (Authors, 2012a, 2012b; Edwards, Zimmermann, Sitha, Williams, & Kitamura, 2014; Keng, 2004; Valesco, 2001; Word Bank, 2005). In addition to these reports, Kosal and KinKesa. (2015), Zimmermann and William (2015), Edwards, Zimmerman, Sitha, Williams, and Kitamura (2015), and the Korea International Cooperation Agency [KOICA] Heng, Sok, and No (2016) have conducted research on dropout in Cambodia. Using data from the Cambodia Socio-Economic Survey, Kosal and KinKesa. (2015) determined student dropout rates in both primary and lower secondary schools. They found that across age and work status, students from larger families were more likely to drop out. Zimmermann and William (2015) analysed

the determinants and consequences of parental educational aspirations and potential gender differences among students at the end of primary school in one district. They found that parental educational aspirations differed by student gender. Edwards et al. (2015) conducted interviews with 10 student-parent pairs. They determined that multiple individual factors affected dropout: lack of a school-family connection, costs of basic materials (uniforms and school supplies), absence of accommodation near lower secondary school, lack of awareness of the education required to achieve occupational aspirations, poor infrastructure, health services, and targeted government scholarships.

Based on quantitative and qualitative data for Phnom Penh and Kampong Speu, KOICA et al. (2016) reported that multiple factors contribute to dropout. For example, in a quantitative analysis, researchers compared academic achievement between dropout and non-dropout students. Students who dropped out had lower levels of achievement than non-dropout students. Several individual and family factors were reported; however, the study made a comparison only between dropout and non-dropout students, without using more comprehensive statistical analysis methods, such as regression. Interestingly, qualitative analysis revealed location and school support to be influential factors. Large numbers of dropouts were found for schools in urban areas, such as economically thriving towns or cities; school principals and teachers were found to dedicate little effort to preventing students dropping out. In addition, the researchers found little community awareness of dropout issues.

We have conducted three studies on this topic: Authors (2012a, 2012b), and Authors. (2016). Unlike previous investigations, we used survival analysis, which involves following cohorts of students for several years. This analysis approach has several important advantages, as summarized by Authors (2016); it enables researchers to analyse data for students who are likely to drop out of school, rather than students who have already dropped out. The method is able to predict which students are likely to drop out, enabling preventive measures to be implemented for high-risk students. Obtaining data for three cohorts (grades 1–4, grades 4–7, and grades 7–9) in five primary and five lower secondary schools in one district, the most recent study by Authors (2016) found that the following factors affected dropout: age at first school entry; absence; interaction with other students; living with parents in grades 1–4; ethnicity; preschool experience; age at first school entry; repetition experience; absence; doing homework; self-esteem, achievement in class; living with parents in grades 4–7; preschool experience; repetition experience; absence; self-esteem; and achievement in class in grades 7–9. However, owing to the small sample size, the study was unable to examine teacher- and school-related factors.

Methodology

Sampling and method used to collect data

We conducted the original survey in Cambodia. We selected a sample of 30 primary schools randomly from three districts of three different provinces: Kampong Cham, Banteay Meanchey, and Battambang. These provinces contain many rural areas, as designated by the government; we selected them because they have similar dropout rates to those of other rural areas around the country (average dropout rate of 8–10% for the academic year 2007–09). In each province, we then chose one rural district with a similar dropout rate to the national level. In each district, 10 primary schools were randomly selected from the list of all the district's primary schools. In the selected school, we chose two cohorts: cohort 1 for grade 1 students; cohort 2 for grade 4 students in the first fieldwork phase in February–March 2011.

As in the study of Authors (2016), we used survival analysis in the sampling. Survival analysis involves associating times with some event of interest. We applied that analysis in the present study by regarding dropout as an event. We counted the number of dropouts for 2011–14 in the two cohorts. We adopted the definition of dropout of No (2012), which was based on Morrow (1987): (1)

individuals who were continuously absent for over 30 days without notice and who were reported by 95% of their classmates to have left school, or (2) individuals who had been continuously absent for 1 year and were reported by their classmates not to be registered in any other officially recognized school, or (3) individuals who had officially left or been expelled from school. However, we did not count students who had died or been transferred to other schools as dropouts.

Cohort 1 students, who were in grade 1 in 2011, were expected to advance to grade 4 in 2014; however, some remained in lower grades because of grade repetition. Therefore, we counted students as dropouts if we could not find them in the schools where they should have been without grade repetition. Cohort 2 students, who were in grade 4 in 2011, were expected to graduate from primary school. However, as with cohort 1 students, some cohort 2 students were still in grades 4–6 owing to grade repetition. We regarded the following as dropout students: (1) when we did not find cohort 2 students in their schools in 2014, and (2) It was not written in the school record that students formally graduated from the schools.

Table 1 presents a summary of the sample numbers. According to the official lists of students provided by the schools, there were 1317 students in cohort 1. However, 147 students (11.2%) could not be identified when we visited the schools in 2011, possibly because they had dropped out before our visit. Therefore, we collected data for 1170 students. By the end of the research period in 2014, data were incomplete for 324 students because they had not completed tests or questionnaires. Thus, 846 students were included in the final analysis. Of those students, 115 dropped out of school, giving a dropout rate of 15.0%. In cohort 2, there were 1321 students in the school lists. However, 171 students (12.9%) could not be identified, leaving 1150 students. When we excluded those with missing or incomplete data, 961 students were included in the final analysis. Of those students, 309 dropped out – a dropout rate of 32.1%.

Research instruments

We used four research instruments in the current study: questionnaires for students and parents; checklists of school facilities; checklists of teacher characteristics; and Khmer language and mathematics tests. The questionnaires for students and parents were developed in a previous study (No, 2012) with minor revisions. To administer the questionnaire to students, research assistants verbally asked questions in Khmer and filled out the questionnaire: all grade 1 students and many grade 4 students were unable to read the questions adequately.

To obtain school information, the research team compiled a checklist of school facilities based on their observations. In addition, to obtain data about teacher characteristics, we employed a checklist based on the official record of teachers. To obtain the number of days of teacher absence, we checked the Khmer notebooks of three students with high achievement in all classes from grades 4 to 6. Teacher absence is a common problem in many developing countries, as addressed in the World Development Report 2018 (World Bank, 2018). It is a serious problem in Cambodia. However, from official school records, we were unable to identify any absences: teachers' signatures appeared for all days. It is difficult to obtain accurate data about teacher absence. Accordingly, we used the students' notebooks for grades 4–6. Students in these grades write information more accurately than those in lower grades. The obtained data suggested that teacher absence was generally not related

Table 1. Number of samples in the analysis.

	Cohort 1			Cohort 2		
	Total	Dropout (2011–14)	Dropout rate (%)	Total	Dropout (2011–14)	Dropout rate (%)
Number of students in the official list	1317			1321		
Number of students obtained	1170			1150		
Number of students completed the tests and questionnaires	846	115	13.6	961	309	32.2

to individual teachers: it was linked to factors affecting the whole school, with relatively strong correlations between teacher absence across two different grades. When in one school there is a high absence rate for grade 4 teachers, there is also a high absence rate for grades 5 and 6. Therefore, we could assume there would be a high absence rate for grades 1–3 if there was a high absence rate for other grades.

To obtain data on achievement levels, we implemented Khmer and mathematics tests developed by the researchers to grade 4 students. The Khmer and mathematics tests were based on those reported by Soeung, No, Ang, and Hirakawa (2012). Cambodian primary students in grades 1–3 are taught those two subjects every day; 95% of the Cambodian population belongs to the Khmer ethnic group and speaks Khmer at home. Khmer is the primary language of instruction in schools. The majority of children in our sample were Khmer; 1.9% in cohort 1 and 1.0% in cohort 2 belonged to another ethnic group (Cham). We developed the framework of the Khmer test based on Uwezo's framework: letter, word, paragraph, and story levels (Uwezo, 2013). The test aims to measure basic skills of writing and reading. The Khmer test comprised three parts: spelling a word based on pictures; writing a sentence; and reading comprehension of a passage. The questions for writing the sentence task were created by the researchers. The questions for the other parts were selected from textbooks used by students in grades 2 and 3; grade 4 students would have already learned the content for grades 2 and 3. In Cambodian classes, most teachers rely almost entirely on the use of textbooks. There were 21 questions in total; the test was found to be highly reliable, with a Cronbach's α of 0.918. We also developed the mathematics test based on Uwezo's framework. However, that measures only simple calculations. Therefore, we added other parts with reference to Cambodia's national curriculum. The mathematics test comprised four parts: calculation; word problems; unit change; and geometric figures. Questions were also selected from textbooks for students in grades 2 and 3. There were 22 questions in total; the reliability coefficient α of the test was 0.863. We obtained the data for test achievement from grade 4 students. However, we believe it appropriate to interpret those data as the accumulated efforts made by teachers from grades 1 to 3: we developed the tests based on textbooks used in grades 2 and 3. In general, in Cambodian primary schools, teachers do not transfer from one school to another and they continue to teach the same grade for many years. It is likely that cohort 1 students were taught by the same teachers who taught cohort 4 students 3 years earlier. The mean test achievement may be regarded as an indicator of school effectiveness, not just an indicator of the cohort in which the grade 4 students were included.

Analyses

Table 2 shows the student- and school-level factors included in the analysis. From the obtained data, we created fifteen individual factors, seven family factors and seven school factors. Descriptive statistics appear in Table 3.

At the student level, students' educational aspirations and test achievement could not be included in cohort 1. The rate of non-response to that question was high in cohort 1, and the tests were not implemented for grade 1 students.

At the school level, we created 21 school factors in the initial stage of analysis. After conducting correlation analysis and calculating the mean and standard deviation, we selected seven factors (Table 2).

Firstly, we conducted t-test to analyse the difference in the student-and school-level factors between non-dropout and dropout. Then, we employed two-level analysis: Level 1 for student-level and Level 2 for school-level factors. The dependent variable of the research was dropout (a dichotomous variable); thus, we applied a non-linear model with the logit link function. We created three models: Model 1 for the null model; Model 2 for student level; Model 3 for school level. Model 1 for the null model refers to a model in which no factors were included. Model 2 for the student-level signifies a model that includes individual and family factors. Model 3 for the school level refers to a model that includes individual, family, and school factors.

Table 2. Student- and school-level factors used in the analysis.

Variable	Scale
Individual student factors	
Gender (Dummy male)	0 = Female; 1 = Male
Health condition	0 = Bad; 1 = Normal; 2 = Good
Preschool experience (Dummy)	0 = No; 1 = Yes
Age at first school entry	Age calculated by twelve horary signs, years of repetition and grade
Repetition experience	Times of repetition before academic year 2011
Repetition during research	Times of repetition from academic year 2011 to 2013
Absenteeism (Last two weeks)	0 = Never; 1 = Once; 2 = Twice; 3 = Three times; 4 = Four times or more
Participation in extra class (Dummy)	0 = No; 1 = Yes
Frequency of doing homework	0 = Never; 1 = Rarely; 2 = Sometimes; 4 = Always
Interaction with other students	Regressed score for three questions: "I can make friends easily" 1 = Strongly disagree; 2 = Disagree; 3 = Agree; 4 = Strongly agree, "Class mates are kind to me" 1 = Strongly disagree; 2 = Disagree; 3 = Agree; 4 = Strongly agree, "How many friends do you have in class?" 0 = 0; 1 = 1–5; 2 = 6–10; 3 = 11–20; 4 = 21-
Interaction with teachers	Regressed score of four questions: "We get along with him/her." 1 = Strongly disagree; 2 = Disagree; 3 = Agree; 4 = Strongly agree, "He/she listen to what I say." 1 = Strongly disagree; 2 = Disagree; 3 = Agree; 4 = Strongly agree, "If I need extra help, I will receive it from him/her." 1 = Strongly disagree; 2 = Disagree; 3 = Agree; 4 = Strongly agree, "He/she treats everyone fairly." 1 = Strongly disagree; 2 = Disagree; 3 = Agree; 4 = Strongly agree
Students' educational aspiration	0 = Stop as soon as possible; 1 = Graduate primary school; 2 = Lower secondary school; 3 = Upper secondary school; 4 = University
Self- esteem	Sum of the questions, "I can do things as well as the others can:" 1 = Strongly disagree; 2 = Disagree; 3 = Agree; 4 = Strongly agree and "I feel I am a useless person": 4 = Strongly disagree; 3 = Disagree; 2 = Agree; 1 = Strongly agree
Relative achievement in class	Z-score of monthly class test score in three months, November 2010 – January 2011
Test achievement	Average of Khmer and mathematics test score
Family factors	
Living with both parents (Dummy)	1 = Living with both parents; 0 = Living with one or no parents
Parental educational attainment	Sum of educational attainment for father and mother, 0 = No schooling; 0 = Some primary; 1 = Primary; 2 = Lower secondary; 3 = Upper secondary; 4 = University
Economic status	Regressed scores of the number of 6 items at home (Bicycle, CD player, television, motorbike, cellular phone, car) (Each item: 0 = No; 1 = Yes)
Parents' educational aspiration	0 = Stop as soon as possible; 1 = Graduate primary school; 2 = Lower secondary school; 3 = Upper secondary school; 4 = University
Family concern	0 = Never; 1 = Rarely; 2 = Sometimes; 3 = Often; 4 = Always
Time for helping family	0 = Never; 1 = 0–0.5 hour; 2 = 0.5–1 hour; 3 = 1–2 hours; 4 = 2–3 hours; 5 = 3–5 hours; 6 = More than 5 hours
Distance from home	0 = Less than 1 km; 1 = 1–2 km; 2 = 2–3 km; 3 = 3–4 km; 4 = 4–5 km; 5 = More than 5 km
School factors	
Student teacher ratio	Data for academic year in 2011
Teacher absence[1]	Mean of number of days for grades 4–6 teachers' absence
Mean interaction with other students	
Mean interaction with teachers	
Mean parent educational attainment	
Mean test achievement	
Mean of family economic status	

Note. 1. To obtain the number of days of teacher absence, we checked the Khmer notebooks of three students with high achievement in all classes from grades 4 to 6.

Table 3. Descriptive statistics.

	Cohort1 (Grade 1)		Cohort 2 (Grade 4)	
Variable	M	SD	M	SD
Individual student factors				
Gender (Dummy male)	0.507		0.465	
Health condition	1.289	0.707	1.452	0.640
Preschool experience (Dummy)	0.496		0.398	
Age at first school entry	6.443	1.326	6.873	1.213
Repetition experience	0.387	0.605	0.550	0.710
Repetition during research	0.274	0.522	0.032	0.175
Absenteeism (Last two weeks)	1.238	1.442	1.290	1.478
Participation in extra class (Dummy)	0.165		0.489	
Frequency of doing homework	3.156	1.518	4.318	1.005
Interaction with other students	0.000	0.998	0.000	1.000
Interaction with teachers	0.000	0.994	0.000	1.000
Students' educational aspiration			2.953	0.915
Self- esteem	1.810	0.756	2.030	0.645
Relative achievement in class	0.000	0.983	0.000	0.985
Test achievement			35.694	23.403
Family factors				
Living with both parents (Dummy)	0.794		0.713	
Parental educational attainment	3.291	2.039	3.421	2.234
Economic status	0.000	1.000	0.000	1.000
Parents' educational aspiration	3.053	0.912	3.065	1.000
Family concern	1.302	1.156	1.259	1.119
Time for helping family	2.144	1.635	2.936	1.571
Distance from home	1.424	0.630	1.864	0.960
School factors				
Student teacher ratio	43.455	15.609	44.431	15.360
Teacher absence	10.151	4.081	10.113	4.224
Mean interaction with other students	0.000	0.129	−0.006	0.499
Mean interaction with teachers	0.000	0.180	−0.004	0.483
Mean parent educational attainment	3.252	0.911	3.421	0.942
Mean test achievement			35.694	11.677
Mean of family economic status	0.001	0.441	−0.001	0.506

Results

Difference in student- and school-level factors between non-dropout and dropout

Table 4 shows the difference in the mean of student- and school-levels factors between non-dropout and dropout. In grade 1, age at first school entry, economic status, teacher absence, mean interaction with other students, mean parent educational attainment and mean of family economic status showed significant at the 0.001 level. Late entry to school, low economic status, high frequency of teacher absence, high mean interaction with other students, low mean parent educational attainment and low mean of family economic status were a high risk of dropout. Gender, absenteeism, relative achievement and student teacher ratio showed significant at the 0.01 level. Boys, high absenteeism, low relative achievement in class, and low student teacher ratio were a risk of dropout.

In grade 4, many factors indicated significant at the 0.001 level: Age at first school entry, repetition experience, absenteeism, participation in extra class, interaction with other students, interaction with teachers, students' educational aspiration, parental educational attainment, economic status, parents' educational aspiration, teacher absence, mean interaction with other students, mean interaction with teachers, mean parent educational attainment and mean of family economic status. Also, preschool experience, family concern and student teacher ratio showed significant at the 0.01 level. Multivariable factors were a high risk of dropout.

Table 4. Difference in the mean of the student- and school-level factors between non-dropout and dropout.

	Grade 1				Grade 4			
Variable	Non-dropout	Dropout	Difference	sig	Non-dropout	Dropout	Difference	sig
Individual student factors								
Gender (Dummy male)	0.491	0.600	−0.109	**	0.456	0.507	−0.051	
Health condition	2.072	3.006	−0.934		1.445	1.483	−0.038	
Preschool experience (Dummy)	0.591	0.565	0.026		0.417	0.308	0.109	**
Age at first school entry	6.370	6.871	−0.501	***	6.639	7.975	−1.336	***
Repetition experience	0.381	0.424	−0.043		0.499	0.791	−0.292	***
Repetition during research	0.264	0.335	−0.071		0.028	0.050	−0.022	
Absenteeism (Last two weeks)	1.311	2.535	−1.224	**	1.226	1.595	−0.369	***
Participation in extra class (Dummy)	0.173	0.118	0.055		0.522	0.330	0.192	***
Frequency of doing homework	3.682	4.571	−0.889		4.345	4.189	0.156	*
Interaction with other students	−0.009	0.055	−0.064		0.074	−0.351	0.425	***
Interaction with teachers	−0.004	0.024	−0.028		0.068	−0.319	0.386	***
Students' educational aspiration					3.034	2.572	0.462	***
Self- esteem	2.892	4.024	−1.132		2.045	1.955	0.090	
Relative achievement in class	0.036	−0.212	0.248	**	0.075	−0.356	0.431	***
Test achievement					37.655	26.436	11.219	***
Family factors								
Living with both parents (Dummy)	0.806	1.300	−0.494	*	0.727	0.647	0.080	*
Parental educational attainment	17.079	20.712	−3.633		3.540	2.819	0.721	***
Economic status	0.060	−0.351	0.411	***	0.065	−0.309	0.374	***
Parents' educational aspiration	18.536	20.341	−1.805		3.144	2.653	0.491	***
Family concern	3.859	4.653	−0.794		1.293	1.100	0.193	**
Time for helping family	7.290	8.906	−1.616		2.886	3.173	−0.286	*
Distance from home	3.193	5.371	−2.178		1.862	1.875	−0.013	
School factors								
Student teacher ratio	43.999	40.256	3.742	**	43.829	47.272	−3.443	**
Teacher absence	9.974	11.196	−1.222	***	9.818	11.502	−1.683	***
Mean interaction with other students	−0.005	0.030	−0.035	***	0.025	−0.151	0.176	***
Mean interaction with teachers	−0.003	0.017	−0.020		0.022	−0.126	0.148	***
Mean parent educational attainment	3.296	2.996	0.300	***	3.466	3.205	0.261	***
Mean of family economic status	0.020	−0.112	0.132	***	0.026	−0.128	0.154	***

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Cohort 1 (grades 1–4)

Effect of school

We developed a null model to determine the proportion of overall variance explained by school-level factors. We calculated the intraclass correlation (ICC) using the formula $\frac{\tau_{00}}{\tau_{00}} + \pi^2/3$. The ICC for cohort 1 was 0.05 {0.016/(0.016 + 3.29)}. School-level factors accounted for 5% of variance; student-level factors accounted for 95% of variance. This result suggests that regardless of the different dropout rates among schools, students with similar characteristics tended to drop out.

Results of two-level analysis

Table 5 shows the results of the two-level model. In that model, deviance indicates model fit, and lower deviance indicates better fit. The findings indicate that Model 3 had the best fit for all variables.

At the school level, two variables exhibited significant increases in the odds of dropout: number of days of teacher absence and mean test score. A large number of days of teacher absence increased the risk of dropout. Students in schools with many days of teacher absence were more likely to drop out than those in schools with few days of teacher absence ($OR = 1.119$, $p < 0.05$). Mean test scores were a significant factor for dropout. Students in schools with higher mean test scores were more likely to drop out than those in schools with lower mean test scores ($OR = 1.030$, $p < 0.05$).

At the student level, we found seven factors to be associated with significant increases in the odds of dropout. Age at first school entry was observed to be the strongest predictor of dropout ($OR = 1.346$, $p < 0.001$). Students who enrolled in grade 1 later were more likely to drop out than

Table 5. Two-level analysis for cohort 1.

	Model 1 (null model)	Model 2 (Student-level)		Model 3 (Student-level and School-level)		
	B	*B*	SE	*B*	SE	OR
Level 1: Student-level						
Individual student factors						
Gender (Dummy male)		0.529*	0.232	0.555*	0.243	1.743
Health condition		0.001	0.205	0.016	0.213	1.016
Preschool experience (Dummy)		0.036	0.166	0.046	0.173	1.047
Age of first school entry		0.295***	0.063	0.297***	0.065	1.346
Repetition experience		0.251	0.155	0.259	0.154	1.296
Repetition during research		0.083	0.242	0.08	0.236	1.083
Absenteeism (last two weeks)		0.019	0.056	0.014	0.06	1.014
Participation in extra class (Dummy)		0.147	0.347	0.169	0.396	1.184
Doing homework		−0.086	0.078	−0.093	0.08	0.911
Interaction with other students		−1.235	0.68	−0.657	0.627	0.519
Interaction with teachers		0.093	0.146	0.099	0.146	1.104
Self- esteem		0.183	0.112	0.216	0.124	1.241
Relative achievement in class		−0.340**	0.12	−0.359**	0.122	0.698
Family factors						
Living with both parents (Dummy)		−0.468	0.247	−0.477	0.25	0.621
Parental educational attainment		−0.093*	0.04	−0.101*	0.043	0.904
Economic status		−0.255*	0.103	−0.284*	0.112	0.753
Parents' educational aspiration		−0.244*	0.097	−0.251*	0.1	0.778
Family concern		0.054	0.105	0.054	0.11	1.055
Time for helping family		0.017	0.065	0.017	0.069	1.017
School distance		−0.536***	0.159	−0.568**	0.185	0.567
Level2: School-level						
School factors						
Intercept				−2.138***	0.114	0.118
Student teacher ratio				−0.016	0.009	0.984
Number of days for Teacher absence				0.112*	0.041	1.119
Mean interaction with other students				−1.06	0.523	0.346
Mean interaction with teacher				0.389	0.886	1.476
Mean relative achievement in class				0.030*	0.012	1.03
Mean parent educational attainment				−0.112	0.275	0.894
Mean socioeconomic status				−0.39	0.413	0.677
Deviance	3559.13	2674.6		2665.11		

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

those who enrolled in grade 1 early. Relative achievement in class and school distance were also significant factors: students with low achievement in class tests were more likely to drop out ($OR = 0.698$, $p < 0.01$). Unexpectedly, students who commuted to school near their homes were at higher risk of dropout ($OR = 0.567$, $p < 0.01$). The dropout studies conducted in Cambodia by Edwards et al. (2014) and Edwards et al. (2015) revealed that a longer distance from school to home is connected to dropout. However, the findings are opposed to these studies. One possible reason is the influence of early entry. This result can be explained by the fact that children living less than 1 kilometre from school tended to enter school earlier – at age 5 years or less. Finally, gender, parental educational attainment, economic status, and parental educational aspirations were weakly related to dropout. Boys were more likely to drop out than girls in the early grades of primary school.

Parental educational attainment and economic status have often been discussed as risk factors for dropout in previous investigations. In the current study, we found that students whose parents had a lower level of education and lower economic status were more likely to drop out. Parental educational aspirations were also related to dropout: students whose parents had lower educational aspirations were more likely to drop out. However, the effect sizes here were relatively small. For example, one standard deviation increases in economic status reduced the probability of dropout by 24.7%, or 0.753 times (Table 4). This means that if a poor family in the 16.7th percentile was as

wealthy as an average family (one in the 50th percentile), one of four (24.7%) dropout children would remain in school, but three (75.3%) would still drop out despite their improved economic status.

Cohort 2 (grades 4–7)

Effect of school

The ICC for cohort 2 was 0.10 {0.356/(0.356 + 3.29)}. School-level factors accounted for 10% and student-level factors 90%. Although the effect size for school-level factors was greater than in cohort 1, it was still relatively small. This result suggests that regardless of different dropout rates among schools, students with similar characteristics were more likely to drop out of each school.

Results of two-level analysis

Table 6 presents the results of the two-level analysis for Cohort 2. As with Cohort 1, deviance indicated that Model 3 exhibited the best fit.

At the school level, the number of days of teacher absence and mean interaction with teachers showed a significant positive association with the likelihood of dropout. The number of days of teacher absence was strongly related to dropout (OR = 1.120, p< 0.001). Many days of teacher absence was associated with increased likelihood of dropout. Mean interaction with the teacher was

Table 6. Two-level analysis for cohort 2.

	Model 1 (Null model)	Model 2 (Student-level)		Model 3 (Student-level and School-level)		
	B	*B*	SE	*B*	SE	OR
Level 1: Student-level						
Individual student factors						
Gender (Dummy male)		−1.062	0.209	−1.104	0.237	0.77
Health condition		−0.223	0.109	−0.184	0.128	0.977
Preschool experience (Dummy)		−0.294	0.154	−0.279	0.19	0.948
Age of first school entry		12.673***	0.071	13.132***	0.075	2.676
Repetition experience		5.069***	0.129	5.056***	0.139	2.015
Repetition during research		0.53	0.617	0.462	0.724	1.397
Absenteeism (last two weeks)		1.727	0.067	2.108*	0.069	1.157
Doing homework		0.998	0.113	0.956	0.126	1.128
Educational aspiration		−4.026***	0.09	−3.973***	0.101	0.668
Interaction with other students		−1.967*	0.097	−1.917	0.106	0.816
Interaction with teachers		−2.189*	0.096	−2.140*	0.105	0.799
Self- esteem		0.119	0.105	−0.061	0.121	0.993
Relative achievement in class		−1.559	0.192	−1.301	0.225	0.746
Test achievement		0.115	0.008	−0.042	0.01	1
Family factors						
Living with parents (Dummy)		−2.403*	0.228	−2.164*	0.278	0.548
Parental educational attainment		0.582	0.045	0.316	0.058	1.019
Economic status		0.321	0.107	0.312	0.136	1.043
Parents' educational aspiration		−0.979	0.112	−0.984	0.131	0.879
Family concern		1.268	0.064	1.209	0.072	1.091
Time for helping family		2.079*	0.058	1.981*	0.067	1.143
School distance		0.333	0.092	0.165	0.121	1.02
Level2: School Factors						
Intercept				−15.943***	0.14	0.107
Student teacher ratio				−0.918	0.018	0.984
Number of days for teacher absence				3.813***	0.03	1.12
Mean interaction with other students				0.166	0.511	1.089
Mean interaction with teacher				−2.225*	0.371	0.438
Mean test achievement (z score)				−0.451	0.014	0.994
Mean parent educational attainment				−1.341	0.215	0.749
Mean socioeconomic status				−0.238	0.401	0.909
Deviance	3559.13	2674.6		2665.11		

*p< 0.05, **p< 0.01, ***p< 0.001.

significantly associated with dropout ($OR = 0.438$, $p < 0.05$). Students in schools with poorer interaction with teachers were more likely to drop out than those in schools with better interaction with teachers.

At the student level, seven factors showed significant associations with the likelihood of dropout: age of first entry; repetition experience; absenteeism; educational aspirations; interaction with teacher, living with parents; and time spent helping the family. The age of first entry, repetition experience, and educational aspirations were strongly related to dropout. Students who entered school late, repeated grades more times, and had low educational aspirations were more likely to drop out. Regarding educational aspiration, the parents of students with lower class achievement tended to hope that their children would soon stop schooling. In such cases, the students and parents appeared to have low aspirations because they were realistic about the possibility of advancing to higher education, rather than because they did not understand importance of education.

Absenteeism, self-esteem, living with parents, and time spent helping the family were also associated with dropout. Students who were more frequently absent in the previous 2 weeks were more likely to drop out. Students who had good interactions with teachers were less likely to drop out. Students who lived with their parents were also less likely to drop out. Students who spent more time helping their families were more likely to drop out.

Discussion

Effect of school factors

In this study, the effects of school and school factors were significantly related to dropout. The effect sizes were 5.0% for cohort 1 and 10.0% for cohort 2; that was small for both – contrary to our expectations. The proportion of variance accounted for by school-related factors in cohort 1 was below 10.0%, similar to the figure reported by Coleman et al. (1966). The proportion of variance accounted for by school-related factors in cohort 2 was also similar to that of Coleman et al. As noted in literature review, in the study of the SACMEQ, the proportion of school-level variance within overall variance were from 18% in Malawi to 57% in South Africa for reading achievement, and from 9% in Swaziland to 43% in South Africa for mathematics achievement (Hungi, 2011). In rural Malawi, Author (2016) reported that 31.5% of variance for grade 5 and 12.5% of variance for grade 7 students was accounted for by school-level factors. Compared with these findings, the values of 5.0% and 10.0% in the present study were relatively low. Taken together, these results indicate that students with similar characteristics tended to drop out of schools in Cambodia; in Malawi, the characteristics of students who dropped out differed from school to school.

School factors influencing dropout

Previous studies examining dropout in Cambodia did not statistically analyse the effect of school-level factors. The present investigation analysed which school-level factors influenced dropout in that country. Owing to the small number of schools and low effect of school factors on dropout, we were unable to analyse many school-level factors. However, we could determine seven factors (Tables 5 and 6). Among these factors, we identified three factors that influenced dropout: teacher absence; the mean interaction with teacher and the mean level of achievement.

First, teacher absence significantly affected dropout rates in both cohorts 1 and 2. The longer teachers were absent, the more likely students were to drop out. As evident in Table 3, the average rate of teacher absence was 10.7%. The lowest teacher absence rate of any school was 4.8%; the highest rate was 22.9%. Those odds were sufficiently large to explain the variance in dropout rate by schools of 0%–40% in cohort 1 and 12%–63% in cohort 2. Our findings suggest that the government

and schools could take effective action to prevent dropout. Teacher absence should be examined in greater depth in future research and be considered in policy making.

Second, we found that the mean interaction with teacher to be a significant factor in cohort 2. Thus, if teachers were more liked and respected by more students, the school dropout rate was likely to be lower. The questions used to define that variable appear in Table 2. Teachers listening to students, helping students, and treating students fairly were associated with lower dropout rates in higher grades.

Finally, we determined the mean level of achievement to be a significant positive factor in cohort 1. Thus, under the same conditions, schools where children achieved basic skills more effectively were associated with higher dropout rates. The effect size was relatively small: an increase of one standard deviation (12.47%, Table 5) in mean test achievement raised the odds of dropout to 103%. This effect size was smaller than that of teacher absence and was not present in cohort 2. This result suggests that better achievement in each school was partially due to school policy, making poorly achieving students repeat grades or dropping out. Another possible interpretation is that because teacher absence showed quite a strong correlation with student achievement, student achievement appeared significant – even after controlling for teacher absence. It would be fruitful to discuss ways in which improving educational quality and preventing dropout could be compatible: the tests employed in the present study revealed that student achievement was not satisfactory in many schools.

Comparison with previous studies in Cambodia

Several dropout studies have been conducted in Cambodia. Based on different methodologies, such as interviews, focus group discussions, and survival analysis, the findings indicate that several factors affected dropout. Among our team, the studies of Authors (2012a, 2012b), and Authors (2016), employed survival analysis. Compared to the findings of Authors (2016), some variables were found to be significant in both studies. Age at school entry was significant in both studies. Similarly, both reported that repetition experience was significant for students in higher grades. Relative achievement in class is a significant factor. It was found to be related to different grade levels in both studies; it exhibited a significant association for students in higher grades in Authors (2016); it was found to be associated with students in lower grades in the present study. Absence was determined to be a significant factor in all cohorts in Authors but only in higher grades in the current study. Living with parents was a significant factor for students in grades 1–4 and grades 4–7 in the study of Authors (2016); it was significant only for students in grades 4–7 in the present study. Thus, these factors are strong predictors of dropout in rural Cambodia.

Conclusions

The present study examined the strength of the effects of school and school-level factors related to dropout rates in primary schools in rural Cambodia; it also assessed student-level factors. First, the effect of school-level factors was relatively small, accounting for 5.0% of variance in dropout rates in cohort 1 and 10.0% in cohort 2. These results suggest that students with similar characteristics dropped out of school. Second, we found three factors to be predictors of dropout: number of days of teacher absence in both cohorts; mean relative achievement in class in cohort 1; and mean interaction with teacher in cohort 2. Number of days of teacher absence was observed to have a very strong influence: each additional day of teacher absence increased the dropout rate of a school by 12% in both cohorts.

Finally, we analysed student-level factors that influenced dropout. We found age at first school entry to be a significant factor in both grades. In cohort 1, we identified six significant factors: gender; relative achievement in class; parental educational attainment; economic status; parents' educational aspiration; and school distance. In cohort 2, we found five significant factors: repetition

experience; absence; educational aspiration; teacher interaction; living with parents; and time spent helping the family.

Although the results of this study showed multiple factors influenced school dropout, reduction teacher absence and late school entry were critical factors of preventing from dropping out of school. These factors were strongly related to school dropout. The headteacher in each school needs to monitor teachers' attendance. The headteacher and class teachers need to discuss how to reduce late entry to primary school with the community. One of the significant ideas is to maintain pre-primary education. Pre-school fosters and supports a smooth transition for children to primary school. Only 49.6% of the cohort 1 and 46.5% of the cohort 2 students have preschool experience.

The limitation of this study is a small sample size. This study collected the data from 30 schools in three provinces.

Despite this limitation, survival analysis is one of the most powerful methods for analysing the causes of dropout in Cambodia and other developing countries. The current findings provide educational policy makers and educators with constructive suggestions for reducing dropout rates. Future studies should be conducted with larger samples and more diverse areas in Cambodia.

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Yukiko Hirakawa was an associate professor in Hiroshima University. Her interest is educational development, especially causes of school dropout and literacy acquisition in primary schools in developing countries.

Kyoko Taniguchi is an associate professor in Hiroshima University. My major is educational development in low and middle income countries, especially in Sub-Saharan Africa. I am interested in investigating school effectiveness, which is input - process - output model. My interest topics are the followings: Achievement, achievement growth, grade repetition, dropout, student mobility, school management, community participation.

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