check for updates

HUMAN ECOLOGICAL SYSTEMS SHAPING COLLEGE READINESS OF FILIPINO K-12 GRADUATES: A MIXED-METHOD MULTIPLE CASE ANALYSIS

Jay Emmanuel L. Asuncion[1]

Antonio I. Tamayao[2]

Rudolf T. Vecaldo[3+]

Maria T. Mamba[4]

Febe Marl G. Paat[5]

Editha S. Pagulayan[6]

Jonalyn U. Utrela[7]

[1]*Faculty Member, College of Allied Health Sciences, Cagayan State University, Andrews Campus, Tuguegarao City, Philippines.*
Email: buds122386@yahoo.com Tel: +639278715946

[2]*Professor, College of Teacher Education, Cagayan State University, Andrews Campus, Tuguegarao City, Philippines.*
Email: toni_tamayao@yahoo.com Tel: +639175211198

[3]*Associate Professor, College of Teacher Education, Cagayan State University, Andrews Campus, Tuguegarao City, Philippines.*
Email: 0728rud@gmail.com Tel: +639267609533

[4]*Associate Professor, College of Arts and Sciences, Cagayan State University, Carig Campus, Tuguegarao City, Philippines.*
Email: mariamamba@yahoo.com Tel: +639157044550

[5]*Professor, Graduate School, Cagayan State University, Andrews Campus, Tuguegarao City, Philippines.*
Email: febgpaat@gmail.com Tel: +639175995400

[6]*Dean, Graduate School, Cagayan State University, Andrews Campus, Tuguegarao City, Philippines.*
Email: pagulayaneditha@gmail.com Tel: +639985561989

[7]*Instructor, Quezon Colleges of the North, Ballesteros, Cagayan, Philippines.*
Email: daretok12csu@gmail.com Tel: +639151580478

(+ Corresponding author)

ABSTRACT

How ready are the K-12 graduates in the Philippines? What environmental conditions shape their college readiness? How do these conditions help to prepare them to transition from basic to tertiary education seamlessly and effectively? This study answers these questions by utilizing a mixed-method multiple case study design framed within the Human Ecological Systems Model. The 7,238 respondents and 28 study participants were first-year students enrolled in one state university in northern Philippines. Results revealed that the Filipino K-12 graduates demonstrated less preparedness for college education. The variables under human ecological systems influencing their college readiness include sex, gender, birth order (individual system), parents' monthly income (microsystem), type of senior high school (SHS) graduated and track taken in SHS (mesosystem), parents' location of employment (exosystem); and ethnicity and parents' educational attainment (macrosystem). Such findings prove that college readiness among K-12 graduates is not solely dependent on their cognitive abilities but is a confluence of environmental conditions from the individual to macrosystems. Thus, the human ecological system serves as a functional frame in understanding factors shaping the college readiness of K-12 graduates and it is recommended that the conditions under each system must be considered as valuable inputs for basic education in preparing K-12 students for college life.

Contribution/Originality: This study is an initial effort to explore the college readiness of Filipino K-12 graduates using the lens of the Human Ecological Systems Model. It presents the baseline data that can be used by education stakeholders to make decisive and viable actions to ensure the K-12 graduates' effective transition from basic to tertiary education.

1. INTRODUCTION

The role of education is indispensable in the globalizing world. A conservative functionalist outlook argues that it is an impetus to economic, social and human development leading to societal advancement. At the heart of societal change, education dramatically affects the world in science, technology, economics and culture. It is the reason behind social growth, scientific progress and cultural flourishing (Olaniyan & Okemakinde, 2008; Ozturk, 2001). In this context, educational reforms have been the top priorities of countries in the 21st century. Research on college readiness has been the primary concern worldwide in response to strengthening human resources and preparing society's future labor force (Bakhtiari & Shajar, 2006).

Akin to responding to the educational milieu's challenges, the Philippine government has invested in enhancing its educational sector by implementing the K-12 program. This program aims to provide employment, entrepreneurship, middle-level skills development and tertiary education (Ciriaco, 2018; Seameo Innotech, 2012). Since tertiary education is one of the program's exits, exploring the college readiness of the K-12 graduates is imperative to determine the effectiveness of this curricular reform.

College readiness is a multidimensional construct consisting of knowledge, skills and attitudes acquired by a Senior High School (SHS) student upon college entry, which are the competencies essential in one's seamless transition and success in tertiary education. College readiness constitutes cognitive and non-cognitive factors. Cognitive factors include grade point average (GPA), scholastic achievement tests (SATs) and admission test results. Non-cognitive factors may include key learning techniques, personality traits and other family factors, such as parental involvement and parents' highest educational level (Eccles, Vida, & Barber, 2004; Greenwood & Hickman, 1991; Rumberger & Arellano, 2007).

College readiness is also influenced by other factors that are external to the individual, and these interplaying factors shape every individual. Thus, the study utilized the Human Ecological Systems Model, which allows a deeper understanding of the different factors affecting the K-12 graduates' college readiness from the micro to macro systems. As an integrative frame, the Human Ecological Systems Model helps to explain the interaction of the different internal and external environments in the development of learners' competencies. Moreover, the model also shows the learners' responses to the different environments, which is a primary factor in developing their college readiness (Arnold, Lu, & Armstrong, 2012).

Since college readiness in the Philippines is an emerging construct, only few researchers have investigated the different interwoven factors affecting college readiness other than cognitive factors. Hence, this paper delved into the different factors influencing the college readiness of K-12 graduates. Specifically, it determined the profile of the K-12 graduates, examined the K-12 graduates' college readiness, ascertained the significant relationship between K-12 graduates' individual system, microsystem, mesosystem, exosystem and macrosystem and their college readiness, and explored how the significant human ecological systems variables shape K-12 graduates' college readiness.

2. LITERATURE REVIEW

2.1. Human Ecological Systems Theory

The Ecological Systems Theory (Bronfenbrenner, 2005) presents how different environmental factors influence human development. The theory has the following tenets: First, the individuals and their environments are intertwined because they grow and develop from their contexts; second, the individual–environment interaction is reciprocal because the context influences the individual and vice versa, meaning the environment does not solely define an individual because the individual acts on it causing its continuous evolution; third, individuals develop only through immediate interactions because impactful and meaningful socialization is a vehicle to their progressive change (Arnold et al., 2012). In summary, the Ecological Systems Theory highlights the importance of a functional

interrelationship of the individual with the different systems resulting in healthy and harmonious human ecological development (Ettekal & Mahoney, 2017).

2.2. Individual Factors Influencing College Readiness

Birth order is a significant factor that influences college readiness. The relationship between birth order and academic experiences showed that middle-born and only children were struggling during their college years (Nissenbaum, 2012). The middle-born children felt a lack of uniqueness, which may reduce their perceived sense of value and self-esteem. On the one hand, only children have fewer opportunities to interact, causing isolation when they are forced to socialize with people of their age. Research in the Philippine context showed that students struggling with low self-esteem and feelings of isolation put them at a disadvantage in their efforts to have meaningful college experiences (Sucgang & Fabella, 2018). On the contrary, Reyes-Baybay (2018) concluded that birth order has little to no bearing at all on students' academic achievement.

Aside from birth order, gender also impacts college readiness. In a study by Combs et al. (2010), more boys were college-ready in math compared to girls, the reason being that girls have a more unfavorable attitude toward math and science-related courses (Leahey & Guo, 2001; Nelson & Rogers, 2004). Meanwhile, homosexual men were reported to have a higher GPA than their heterosexual peers (Carpenter, 2008; Pearson, Muller, & Wilkinson, 2007). However, male and female bisexual youths received lower grades than those attracted to the same sex only (Russell, Seif, & Truong, 2001).

2.3. Microsystem Factors Influencing College Readiness

The microsystem with which the individual directly interacts and where primary socialization takes place influences college readiness. Students from low-income families experience difficulties understanding the college application process and navigating the college entrance exam since they lack information and parental support. In contrast, students from high-income families tend to obtain more support and investment from their parents, facilitating their college readiness as they have more material and economic resources to support their educational needs and higher parental interaction (Lara & Mahia, 2019).

Previous studies show that family structure also plays a crucial role in influencing college readiness. Beller and Chung (1992) revealed that children raised by both parents obtained higher readiness scores than children raised in single-parent families. Hence, they concluded that family structure is influential to school readiness.

2.4. Mesosystem Factors Influencing College Readiness

Some researchers agree that college preparedness is influenced by the type of school from which SHS students graduated. Means, Wang, Young, Peters, and Lynch (2016) noted that a high school with a comprehensive science, technology, engineering and mathematics (STEM) have a higher GPA than their counterparts. Similarly, Magbag and Raga (2020) claimed that the SHS strand proved to be a significant predictor for college academic performance. Specifically, in a study by Mamolo (2019), graduates of STEM registered the highest performances among the strands because of curricular exposure to problem-solving, evidence valuation and developing solutions through discovery and innovations, which are effective practices of STEM classes.

Moreover, Young, Hoffman, and Chung (2017) claimed that graduates from private schools are more college-ready because of their exposure to initiatives than those who graduated from public schools. This finding was confirmed by the Study International Staff (2019), reporting that the graduates from private schools tend to have higher admission rates into leading universities and better college and career outcomes than those from public schools. Particularly, graduates from Catholic high schools have higher chances of entering tertiary education (Altonji, Elder, & Taber, 2005).

2.5. Exosystem Factors Influencing College Readiness

Parents' location of employment and students' community involvement are among exosystem factors influencing college readiness. According to Clifton-Sprigg (2019), parental employment abroad has a small and positive, or no impact on students' grades. In terms of community involvement, Grubisich (2017) claimed that students who are actively engaged in community services have higher cognitive processing skills, such as critical thinking and sound decision-making. Furthermore, Hebert and Hauf (2015) proffered that middle school students who engaged in community services have better academic performances than those who were not involved in any community service.

2.6. Macrosystem Factors Influencing College Readiness

The macrosystem is the most outer part of the Human Ecological Systems Model. Culture and social class are significant macrosystems influencing college readiness. Previous research suggest that youth from lower class families are less likely to participate in activities than those from wealthier families, often because they have fewer monetary resources, have more family responsibilities (e.g., child care) and tend to reside in neighborhoods with fewer resources and where safety is a concern (American College Testing, 2015; McDonough, 1997).

Also, studies suggest that parents' highest educational level is related to students' college readiness. Students whose parents have a higher educational level scored higher in the standardized test than their counterparts (Dubow, Boxer, & Huesmann, 2009; Kumar, 2016). As parents' highest educational attainment positively impacts children's educational aspirations, this helps students excel academically (Yamamoto & Holloway, 2010).

Ethnicity has been identified as another variable part of the macrosystem and studies claim that ethnicity is a factor for college readiness. Particularly the minorities and indigenous peoples (IPs) are disadvantaged regarding access to college education. In the Episcopal Commission of Indigenous Peoples, the consolidated study revealed that IPs face discrimination in schools because the focus of the curriculum caters to the mainstream culture. This particular academic scenario poses a threat to IPs' cultural identity. Reyes, Mina, and Asis (2017) found that some IPs in the Philippines had less access to secondary education services. This was due to the lack of physical access to the learning environment.

2.7. Philippine College Readiness Standards (CRS) and the New General Education Courses (GEC)

Since one of the curriculum exits of the K-12 program is tertiary education, major reforms were also implemented in the Philippine higher education institutions (HEIs), one of which was the formulation of the College Readiness Standards (CRS) by CHED and education stakeholders. These standards defined the competencies that students must master in the GEC at college level to ensure the continuity of knowledge, skills and attitudes acquired in the K-12 program. As defined by the Technical Panel on General Education (TPGE), "College Readiness Standards (CRS) consist of the combination of knowledge, skills, and reflective thinking necessary to participate and succeed – without remediation – in entry-level undergraduate courses in HEIs" (Commission on Higher Education, 2011).

The CRS is composed of seven learning areas, namely, English, literature, Filipino, science, mathematics, social studies and humanities. As major features, content and performance standards were well-articulated in all the learning areas. The content standard refers to the concepts, theories and principles that the students must know, whereas the performance standard refers to the set of competencies that the students must be able to demonstrate in relation to their learning. Clearly, the CRS removes the corrective character of foundation courses and enables HEIs to focus their attention on the undergraduate curricula with emphasis on national and international standards.

In response to the CRS and major changes in the basic education sector, CHED came up with a revised curriculum for GEC that is focused on liberal, learner-centered, inter/cross disciplinary and context-based education (Commission on Higher Education, 2013). This curriculum intends to develop holistic learners by

highlighting the interplay of the Filipino learner's knowledge of himself/herself, Philippine society, the environment and the world as a whole. Specifically, it is composed of 36 units (24 units of core courses, nine units of electives and three units of mandatory courses) that can be taught either in Filipino or English (Geronimo, 2014). The new feature of the GEC is the removal of remedial courses as these had already been downloaded to the SHS curriculum. Thus, public and private HEIs are given the mandate to upgrade the quality of higher education considering GEC as their platform.

2.8. Conceptual Framework

The researchers explored the college readiness of K-12 graduates in the Philippines using the Human Ecological Systems Model comprising of variables from the individual system to the macrosystem. These environments are assumed to be essential in the development of learners, particularly their college readiness.

The variables included in different systems of the Human Ecological Systems Model constitute the independent variables of the study. The model starts with the individual system comprising of the physical and physiological organism, which interacts with and is integrated into other systems, such as sex, gender and birth order. The microsystem is where the primary socialization takes place and includes the family structure and parents' monthly income, which provide an insight into the family environment. Meanwhile, the mesosystem consists of interactions between the microsystems, such as family and school interactions. This includes the type of SHS graduated and SHS track. The exosystem is the link between social environments not involving the children but may influence their experiences. Such examples include students' community involvement and parents' location of employment. Lastly, the macrosystem is the overarching cultural environment that influences the development of children. This constitutes their ethnicity and parents' educational attainment. All of these systems interact and are linked with one another influencing the development of learners, dictating their level of college-readiness.

The dependent variable of the study is college readiness, which is reflected in the CRT results. The CRT measures the seven learning areas defined in the CRS and students who pass the CRT have the ability to master the entry competencies in the CRS, the ability to be accepted into college and the ability to pass the GEC without remediation. Figure 1 shows the conceptual framework of the study.
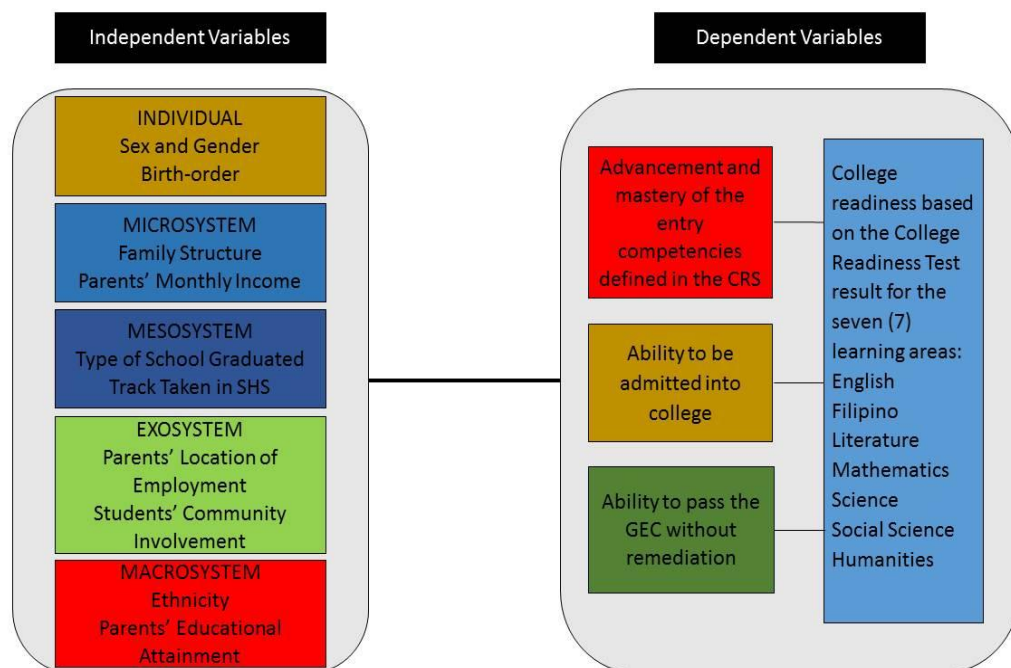

Figure 1. Conceptual framework.

3. METHODOLOGY

3.1. Research Design

The study employed a mixed-method multiple case study design. Since college readiness is a multifaceted construct, a multiple case study was used to explore its in-depth and multi-layered perspectives in a real-life context using quantitative and qualitative data (Yin, 2014). The study was divided into two phases. The quantitative phase used a descriptive correlational design to identify the significant variables that were considered for further qualitative exploration. The qualitative phase employed focus group discussion (FGD) to uncover the study participants' narratives and experiences concerning the different factors that influenced their college readiness (Parker & Tritter, 2006).

3.2. Respondents/Study Participants

For the quantitative phase, 7,238 K-12 graduates enrolled as first-years in a public university in the northern Philippines were the study participants; 39.2% were male and 60.8% were female. In terms of gender identity, 7.4% were non-binary (LGBT) and the rest were heterosexual (non-LGBT). For the qualitative phase, 28 study participants were purposively chosen for the FGD. Among these participants, there was an equal number of males and females. In terms of gender identity, 20% were non-binary belonging to the LGBTQ community and the rest were heterosexuals. The participants also represented various family structures, economic status, birth order and type of SHS graduated as well as SHS tracks. The inclusion criteria are as follows: The participant must be a K-12 graduate, enrolled in first-year, a taker of both the college admission test (CAT) and the college readiness test (CRT) administered by the university, categorized as either a high- or low-performing student in the CAT and CRT and willing to participate in the study.

3.3. Research Instrument

In the quantitative phase of the study, the CRT and the student profile questionnaire (SPQ) were used as instruments. The SPQ was validated by experts and currently utilized to profile the first-year students at the university. Also, the CRT has a discrimination index of 0.22, difficulty index of 65.64, and distractor efficiency of 68.91%. It is a reliable test since it has an inter-item consistency of $r = 0.796$. In the qualitative phase, a semi-structured interview guide was employed specifically for the FGD. Its questions elicited detailed descriptions of the study participants' narratives and experiences regarding the different factors influencing their college readiness. It underwent pilot testing to ensure suitability and clarity of the questions and to determine the required FGD time allotment.

3.4. Data Gathering Procedure

The permission of concerned university officials was sought in administering the CRT and SPQ and in conducting the FGD with the study participants. The quantitative data were gathered through the assistance of eight guidance counselors and eight psychometricians. The test administration was conducted separately in different campuses of the university. The response rate was 100% because of the support and cooperation of the university officials who provided the schedule, orientation and other logistics for the test administration.

For the FGD, three sessions were conducted until data saturation was reached. The data were gathered in conducive rooms and the audio recorders as well as mobile phones were utilized upon permission of the study participants for effective note-taking. The Filipino version of the interview guide was used in the FGD sessions and the participants were encouraged to answer the questions in the language that they were most comfortable using. The FGD sessions lasted for an average of an hour and a half and the researchers personally transcribed the FGD responses. After transcribing the data, the participants were asked to validate the completed transcripts to establish

the data's confirmability. In keeping with the ethical standards, free and prior informed consent (FPIC) was obtained from the study participants before data were elicited.

3.5. Data Analysis

For the quantitative phase of the study, measures of central tendency and interquartile range (IQR) were used. Correlation analyses, such as point biserial, rank biserial, Kendall's Tau-b, and phi coefficient were utilized to determine significant intercorrelations between the human-ecological systems variable and college readiness score. All statistical analyses were tested at a 0.05 level of significance.

Thematic analysis was also employed to make sense of the textual data vis-à-vis the research questions (Baxter & Jack, 2008). The researchers used coding approaches to organize, interpret and analyze the data. These coding techniques helped to determine the major themes and to weave the concepts and categories found to be related and different. The researchers also observed self-reflexivity during the process of data analysis by constantly introspecting on the codes and themes. Personal biases were set aside and study participants' responses were accorded with equal value to ensure objectivity (Dodgson, 2019; Grove, 2017).

4. RESULTS

4.1. Quantitative Results of the Study

In terms of individual system variables, the majority of the respondents were female (60.8%), 92.6% were non-LGBTQ++ members and 39.1% were middle-born. Under the microsystem, 68.9 of the respondents belonged to a nuclear family with a median monthly income of Php 8,000. In the mesosystem, 75.6% of respondents graduated from a public SHS and 73.0% had taken the academic track. In terms of the exosystem, 50.6% of the respondents were involved in one community endeavor and their fathers' and mothers' location of employment was in the Philippines (86.0% and 89.4%, respectively). In the macrosystem, most respondents are non-IPs (74.8%) and their parents' highest educational attainment is secondary education.

Table 2 presents that majority of the K-12 graduates (61.7%) were not college-ready with an average score of 93.93 ± 20.03. This finding means that a greater proportion of the K-12 graduates enrolled in the university had not mastered the different competencies in the seven learning areas of the CRS. This situation implies that most of them encountered difficulties in the GEC.

Table 1. Profile of Respondents.

Human Ecological Systems	Categories	Frequency	Percent
INDIVIDUAL			
Sex			
	Male	2839	39.2
	Female	4399	60.8
Gender			
	Lesbian, Gay, Bisexual, Transgender, Queer ++ (LGBTQ++)	536	7.4
	Non-LGBTQ++	6702	92.6
Birth order			
	First-born	2202	30.4
	Middle-born	2831	39.1
	Last-born	1869	25.8
	Only child	336	4.6
MICROSYSTEM			
Family structure			
	Nuclear	4985	68.9
	Extended	1469	20.3
	Solo parent	781	10.8
	Others	3	0

Monthly income			
	Median	8000	
	IQR	5000 − 15000	
MESOSYSTEM			
Type of SHS			
	Private	1763	24.4
	Public	5475	75.6
Track			
	Academic	5283	73.0
	Technical Vocational	1904	26.3
	Sports	33	.5
	Arts and Design	18	.2
EXOSYSTEM			
Community involvement			
	None	2863	39.6
	One	3663	50.6
	More than one	712	9.8
Father's employment location			
	Not known	156	2.2
	Philippines	6227	86.0
	Abroad	158	2.2
	None (unemployed)	697	9.6
Mother's employment location			
	Not known	96	1.3
	Philippines	6475	89.4
	Abroad	667	9.2
MACROSYSTEM			
Ethnicity			
	Non-IP	5417	74.8
	IP	1821	25.2
Father's highest educational attainment			
	None	134	1.9
	Primary education	1917	26.5
	Secondary education	2666	36.8
	Post-secondary non-tertiary education	307	4.2
	Bachelor's level education or equivalent	1965	27.1
	Master's level education or equivalent	34	.5
	Doctoral level education or equivalent	10	.1
	No response	205	2.8
Mother's highest educational attainment			
	None	37	.5
	Primary education	1473	20.4
	Secondary education	2940	40.6
	Post-secondary non-tertiary education	260	3.6
	Bachelor's level education or equivalent	2322	32.1
	Master's level education or equivalent	54	.7
	Doctoral level education or equivalent	13	.2
	No response	139	1.9
Total		7238	100.0

Table 2. College readiness of the respondents.

	Frequency	Percent
Not ready	4467	61.7
Ready	2771	38.3
Total	7238	100.0

Table 3. Intercorrelations of human ecological systems variables and college readiness.

No.	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Individual																
1	College readiness															
2	Sex	-.078**														
3	LGBTQ++	.054**	.083**													
4	Middle-born	-.042**	.017	.005												
Microsystem																
5	Living together	-.009	.029*	-.022	.051**											
6	Solo parent	-.011	-.011	.007	-.032**	-.702**										
7	Monthly income	.122**	.002	.011	-.068**	.043**	-.060**									
Mesosystem																
8	School type	-.108**	.012	-.015	.093**	.001	.020	-.139**								
9	Academic track	.219**	-.052**	.027*	-.053**	.013	-.007	.102**	-.207**							
Exosystem																
10	Community involvement	-.010	.037**	-.003	-.012	.008	-.016	.004	.011	.022						
11	Father's employment abroad	.029*	.027*	.009	-.052**	-.063**	.041**	.103**	-.030*	.019	-.009					
12	Mother's employment abroad	-.053**	-.011	.034	-.044*	-.074**	.036	.179**	.005	-.089**	-.021	.031				
Macrosystem																
13	Ethnicity	.055**	-.009	.014	.008	.007	-.009	.037**	-.038**	.061**	-.022	.008	-.022			
14	Education (Father)	.108**	.038**	.018	-.090**	-.002	-.031**	.280**	-.181**	.135**	.012	.104**	-.089**	.028*		
15	Education (Mother)	.114**	.041**	-.001	-.105**	-.013	-.017	.295**	-.187**	.124**	-.004	.075**	-.077**	.023	.451**	

Note: *Significant at 0.05; **Significant at 0.01.

The correlation results in Table 3 in terms of the individual system variables show that the college readiness score is significantly associated with sex (r_{pb} = -.078, p < .001), gender identity (r_{pb} = .054, p < .001) and birth order (r_{pb} = -.042, p < .001). This finding implies that females have significantly higher college readiness scores compared to males. Being a member of the LGBTQ++ is also associated with higher college readiness compared to non-LGBTQ++ (masculine and feminine), while being a middle-born is associated with a lower college readiness score compared to other birth orders.

In terms of microsystem variables, family structure is not significantly associated to college readiness (p > 0.05), implying that coming from a nuclear, extended, solo-parent, or other family arrangements does not influence college readiness. Meanwhile, parents' monthly income is significantly related to college readiness (τ_b = .122, p < .001). This means that higher monthly income is associated with higher college readiness scores.

Regarding mesosystem variables, correlation results also show that the college readiness score is significantly associated with the type of SHS (r_{pb} = -.108, p < .001) and track taken (r_{pb} = .219, p < .001). Specifically, those who graduated from a public school have lower college readiness scores compared to those who graduated from private schools. Meanwhile, those who took the academic track are more college-ready compared to those who took other tracks.

With respect to exosystem variables, the location of employment of the respondents' parents is significantly associated with college readiness. Specifically, respondents whose fathers work abroad is associated with higher college readiness compared to those working in the Philippines (r_{pb} = .029, p = .021). Meanwhile, respondents whose mothers work abroad is associated with lower college readiness scores compared to those whose mothers work in the Philippines (r_{pb} = -.053, p = .006). Additionally, community involvement is not significantly associated with college readiness (p > 0.05).

Under macrosystem variables, college readiness is significantly associated with ethnicity (r_{pb} = .055, p < .001), father's educational attainment (τ_b = .108, p < .001) and mother's educational attainment (τ_b = .114, p < .001). This implies that being an IP member is associated with higher college readiness scores compared to non-IPs. Also, K-12 graduates whose parents have higher educational attainment have higher college readiness.

4.2. Qualitative Results of the Study

Perceived College Readiness of the Study Participants

The majority of the study participants claimed to be partially college-ready. Initially, they thought that their SHS program had adequately prepared them for college. However, almost all of them were surprised by the rigorous course requirements, complex teaching strategies and challenging examinations in college. Two of them admitted:

> "I used to think that I was prepared for college. However, when actual classes started, I felt I was not ready to accomplish the requirements and pass the examinations. I encountered many difficulties in adjusting to the lessons. I have learned that college is a different field compared to SHS." (C.A.)

> "I was pressured and stressed to cope with the demands of college life. I never experienced these when I was in SHS." (D.I.)

Several factors may account for the study participants' partial college readiness. First, the K-12 program is in its initial implementation stages therefore making it a work in progress, and the teachers, learners and school administrators are evidently still adjusting. One participant remarked:

> "Since we are the second batch of graduates of the K-12 program, we experienced difficulties in studying and we needed to adapt to the curriculum. Even our teachers experienced the same because the K-12 is a new program and therefore it is imperfect."

Second, the non-alignment of SHS track and strand to students' enrolled degree programs reduces their college readiness. Only those whose tracks and strands were congruent with their enrolled programs in college claimed to be college-ready. For instance, one participant claimed:

"I don't find difficulty in my course because it fits my SHS academic track and strand. Should I have taken another course, I would have experienced difficulties just like some of my classmates." (D.C.)

Table 4. Significant variables shaping the college readiness of the study participants.

Human Ecological System	Themes	Responses of Study Participants
Individual System (Birth order, sex and gender)	• First-born carries responsibility • Last-born needs to prove uniqueness • Middle-born struggles in college • Females strive harder than males • Creativity and resiliency of homosexuals	• "As the eldest, I must finish my course to set a good example to my siblings." (C.G.) • "Being the youngest, I need to obtain a degree to prove my uniqueness as I craft my own academic path." (B.F.) • "Being always compared to the eldest and youngest pushed me to be pressured and burdened, affecting my academic performance." (A.H.) • "I think females are more college-ready than males because we work harder compared to them as they are playful and impatient in their studies." (C.E.) • "Being gay makes me more creative, expressive and flexible to prove my worth as a person with this kind of identity." (A.A.)
Microsystem (Parents' monthly income)	• Financial support to schooling	• "I am fortunate that everything is provided for me in order to excel in my studies." (A.C.) • "I come from a poor family that could not provide my educational needs, which greatly affected my academic performance." (B.B.)
Mesosystem (Type of SHS graduated and track/stand)	• Adequate facilities and comprehensive curriculum of private schools • Higher-order thinking skills developed by the STEM track	• "I graduated from a private school where facilities were complete and academic activities were different and interesting. My school has molded me to always strive for excellence in every way possible, being imbued with values and spirituality." (C.B.) • "I took the academic track and STEM strand during SHS. I learned to think scientifically, analytically and critically, which help me in college education." (C.D.)
(Exosystem) Parents' location of employment	• Close monitoring of mothers in the schooling of children	• "I started not to be serious with my studies when my mother went abroad. My father did not monitor my studies as much as my mother did." (D.E.)
Macrosystem (Ethnicity and parents' highest educational attainment)	• Cultural pride to prove one's worth • Role modeling of parents	• "As a Gaddang, I am proud of my ethnicity. This pride of my cultural roots pushes me to do better in my studies." (D.B.) • "My dad, being a medical doctor, is very influential in my studies. He helps and motivates me to study harder and become like him someday." (B.F.)

Third, some teacher-related factors were identified as reasons for the study participants' partial college readiness. These factors include the failure of some teachers to cover the scope and required competencies of the lessons; the lack of required time for classroom instruction due to teachers' attendance at co-curricular and extracurricular activities, such as training sessions, seminars, coaching, journalism and science fairs; and a mismatch of teachers' workloads and professional preparation.

Finally, inadequate educational resources and facilities played a part in the inadequate college readiness of the study participants. The teaching and learning processes were not developed further because there was a scarcity or absence of resources to conduct experiments, research, and skill-based activities. Thus, this situation limits the students' knowledge acquisition. One participant stated:

> "Our teacher could hardly concretize scientific concepts because we don't have laboratory equipment and materials in school. She would always express her disappointment at not being able to do so." (C.E.)

Significant Variables Shaping K-12 Graduates College Readiness.

The qualitative data in Table 4 presents the themes that explain the significant factors shaping college readiness across human ecological systems. Regarding the individual system, being the eldest and youngest in the family positively influences college readiness. Being first-born carries the responsibility of becoming a role model to younger siblings that includes finishing a college degree. On the other hand, being the youngest poses the challenge of proving one's uniqueness, especially in pursuing academic success since all family attention and support are given to them. Meanwhile, middle-born siblings are pressured and burdened in their studies because they are always compared to the academic successes of the eldest and youngest siblings. In terms of sex and gender, females have higher college readiness because they are more conscientious, patient and serious in their studies. Furthermore, the LGBT K-12 graduates have higher college readiness compared to their heterosexual counterparts because they show resiliency and creativity. They perceive their academic success as a way of compensating for the discrimination and stereotyping that they experience.

Regarding the microsystem, the students coming from high-income families have higher college readiness because they are provided with more material resources essential to their studies. On the other hand, participants from lower-income families are less college-ready since they do not have the resources, such as books and utensils.

In the mesosystem, the type of SHS from which the participants graduated and their tracks taken significantly shape their college readiness. The participants claimed that those who came from private schools have adequate facilities and comprehensive curriculum, which are integral in their preparedness to endure the rigors of tertiary education. Moreover, those who took academic tracks and STEM have developed higher-order thinking skills compared to their counterparts. Accordingly, with this track and strand, they were molded to think scientifically, analytically and critically, which are necessary for them to be college-ready.

With respect to the exosystem, parents' location of employment was significant to the students' college readiness. The study participants whose mothers were working abroad encountered difficulty in their studies. This situation occurs because mothers are absent and therefore cannot closely monitor their children's studies, which may not be conscientiously done by the fathers.

Regarding the macrosystem, ethnicity was shown to have an impact on the college readiness of the study participants because cultural pride and proving one's worth inspires them do better in their studies. Meanwhile, parents' highest educational attainment also significantly influences college readiness because parents serve as role models and motivators to their children when it comes to academic achievement.

5. DISCUSSION

The Human Ecological Systems Model unveiled rich insights on the different factors influencing college readiness among Filipino K-12 graduates. The results affirm the reciprocal interactions of the learners with the different environments that shape their college readiness (Arnold et al., 2012). From the individual system, birth order, sex and gender significantly influence college readiness. The first and last-born are more college-ready compared to middle-born because they act as models and they prove their uniqueness, respectively. This result affirms the significant relationship of birth order to academic performance (Nissenbaum, 2012; Sucgang & Fabella, 2018).

In terms of sex and gender, females are more college ready because they strive harder than males. This result negates the previous finding that males are more college ready than females, particularly in a standardized examination (Adelman, 2006; Combs et al., 2010). Moreover, college readiness is higher among LGBT students than their heterosexual counterparts because they are exploratory, eager to seek and learn more, and open to inquiry, thus preparing them more academically. This supports the findings of Pearson et al. (2007) and Carpenter (2008) who revealed that LGBT students academically perform better than heterosexuals.

Under the microsystem, parents' income influences children's college readiness because of the financial support they receive for their schooling. This finding confirms earlier claims that students from low-income families are less college-ready than those from high-income families because of less investment in education (McDonough, 1997). Furthermore, students from high-income families have higher parental interaction, which enhances their academic achievements (Lara & Mahia, 2019).

Regarding the mesosystem, the academic track and type of SHS graduated are related to college readiness. The students whose academic track is congruent with their enrolled college programs showed more college readiness than their counterparts. This finding confirms the assertion that the SHS track and strand is a significant predictor of college academic performance (Magbag & Raga, 2020; Means et al., 2016). Specifically, graduates of the academic track and STEM strand are more college-ready because they are more prepared to think scientifically, critically and analytically, which are prerequisite competencies for college education. It was also shown that those who graduated from private schools are more likely to be college-ready, which is consistent with the claim that private schools provide better skills and values that are necessary for students to overcome academic rigors in tertiary education (Study International Staff, 2019; Young et al., 2017).

With respect to the exosystem, the parents' location of employment influences college readiness. The employment of mothers abroad adversely affects their children's college readiness because parents, specifically mothers, act as primary agents of educational socialization and emotional support for their children, thus leading to higher college preparedness. This finding negates the claim by Clifton-Sprigg (2019), who stated that parents' employment abroad has little or no significant effect on students.

Where the macrosystem is concerned, the parents' highest educational attainment shapes college readiness since a higher level of schooling means more economic, social and material resources as well as support for children's education. This finding confirms the assertion that students whose parents have higher educational levels scored higher in standardized tests than their counterparts (Dubow et al., 2009; Kumar, 2016) contributing to their college readiness. Moreover, parents act as role models and motivators to their children; consequently, this increases their children's level of educational aspiration. Interestingly, IPs have a higher college readiness, which can be attributed to their assertion of cultural pride and self-worth. As marginalized groups, they tend to excel in their academic lives as a way of generating pride for themselves and their communities.

6. CONCLUSION

The Filipino K-12 graduates demonstrated less preparedness for college education. This calls for education stakeholders to act immediately and decisively to ensure the K-12 graduates' effective transition from basic to tertiary education. As a lens, the Human Ecological Systems Model serves as a functional frame in understanding factors that shape the college readiness of K-12 graduates. It proves that their college readiness is not solely dependent on their cognitive abilities but it is a confluence of environmental conditions emanating from the individual to macrosystems. These conditions play the roles of enablers or inhibiters in determining the college preparedness of the graduates. Hence, they must be considered as valuable inputs for basic education in preparing K-12 students for college life. As an implication to research and practice, the results of this study may be advanced by future researchers and consider other variables under the Human Ecological Systems Model to further examine college readiness.

7. LIMITATIONS OF THE STUDY

The data emanated from one public university in the northern Philippines and college readiness was limited to the respondents' scores in the CRT. Also, the variables used in the Human Ecological Systems Model were limited to the profiles elicited in the SPQ. Lastly, only the variables with significant relationships to college readiness were further explored in the qualitative analysis.

REFERENCES

Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college*. Washington, DC: U.S. Department of Education.

Altonji, J. G., Elder, T. E., & Taber, C. R. (2005). Selection on observed and unobserved variables: Assessing the effectiveness of Catholic schools. *Journal of Political Economy, 113*(1), 151-184.Available at: https://doi.org/10.1086/426036.

American College Testing. (2015). The condition of college and career readiness: Students from low income families. Retrieved from: https://www.luminafoundation.org/wp-content/uploads/2017/08/cccr-low-income.pdf.

Arnold, K., Lu, E., & Armstrong, K. (2012). The ecology of college readiness. *ASHE Higher Education Report, 38*(5), 1-138.

Bakhtiari, S., & Shajar, H. (2006). Globalization and education: Challenges and opportunities. *International Business & Economics Research Journal (IBER), 5*(2), 95-102.Available at: https://doi.org/10.19030/iber.v5i2.3461.

Baxter, P., & Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. *The Qualitative Report, 13*(4), 544-559.

Beller, A. H., & Chung, S. S. (1992). Family structure and educational attainment of children. *Journal of Population Economics, 5*(1), 39–59.Available at: https://doi.org/10.1007/BF00160328.

Bronfenbrenner, U. (2005). *Making human beings human: Bioecological perspectives on human development*. Thousand Oaks, CA: Sage.

Carpenter, C. S. (2008). Sexual orientation and outcomes in college. *Economics of Education Review, 28*(1), 693–703.Available at: https://doi.org/10.1016/j.econedurev.2007.10.010.

Ciriaco, C. (2018). DepEd defends SHS graduates' competence for employment. Business Mirror. Retrieved from https://businessmirror.com.ph/2018/01/22/deped-defends-shs-graduates-competence-for-employment.

Clifton-Sprigg, J. (2019). Out of sight, out of mind? The education outcomes of children with parents working abroad. *Oxford Economic Papers, 7*(1), 73–94.Available at: https://doi.org/10.1093/oep/gpy060.

Combs, J., Slate, J., Moore, G., Bustamante, R., Onwuegbuzie, A., & Edmonson, S. (2010). Gender differences in college preparedness: A statewide study. *The Urban Review, 42*(5), 441–457.Available at: https://doi.org/10.1007/s11256-009-0138-x.

Commission on Higher Education. (2011). Commission En Banc Resolution No. 298-2011. College readiness standards. Retrieved from: http://www.digigogy.com/uploads/4/5/6/7/4567766/cmo-20s-2013_appendix_c.pdf.

Commission on Higher Education. (2013). CMO 20 s. 2013. General education curriculum: Holistic understandings, intellectual, and civic competencies. Retrieved from https://ched.gov.ph/wp-content/uploads/2017/10/CMO-No.20-s2013.pdf.

Dodgson, J. E. (2019). Reflexivity in qualitative research. *Journal of Human Lactation, 35*(2), 220-222.

Dubow, E., Boxer, P., & Huesmann, L. (2009). Long-term effects of parents' education on children's educational and occupational success: Mediation by family interactions, child aggression, and teenage aspirations. *Merrill-Palmer Quarterly, 55*(3), 224–249.Available at: https://doi.org/10.1353/mpq.0.0030.

Eccles, J. S., Vida, M. N., & Barber, B. (2004). The relation of early adolescents' college plans and both academic ability and task-value beliefs to subsequent college enrollment. *The Journal of Early Adolescence, 24*(1), 63–77.Available at: https://doi.org/10.1177/0272431603260919.

Ettekal, A., & Mahoney, J. (2017). Ecological systems theory. *The SAGE Encyclopedia of Out-of-School Learning.*

Geronimo, J. (2014). What college courses are in the new GE curriculum? Rappler. Retrieved from https://www.rappler.com/nation/61485-ched-new-general-education-curriculum.

Greenwood, G., & Hickman, C. (1991). Research and practice in parent involvement: Implications for teacher education. *The Elementary School Journal, 91*(3), 279-288.Available at: https://doi.org/10.1086/461655.

Grove, J. (2017). Researching a marginalised group: Reflections on being an outsider. *Counselling and Psychotherapy Research, 17*(3), 176–180.Available at: https://doi.org/10.1002/capr.12120.

Grubisich, K. (2017). *The relationship between participation in community service and students' academic success.* M.A. Thesis, Eas. Ill. Univ. Illinois, USA, 2017.

Hebert, A., & Hauf, P. (2015). Student learning through service learning: Effects on academic development, civic responsibility, interpersonal skills and practical skills. *Active Learning in Higher Education, 15*(1), 37-49.Available at: https://doi.org/10.1177/1469787415573357.

Kumar, N. (2016). Impact of parental socio-economic factors on the performance of students. *Current Science, 110*(1), 2079-20181.Available at: https://doi.org/10.18520/cs/v110/i11/2079-2081.

Lara, L., & Mahia, S. (2019). The effect of parental involvement on children's academic achievement in Chile. *Frontiers in Psychology, 10,* 1464.Available at: https://doi.10.3389/fpsyg.2019.

Leahey, E., & Guo, G. (2001). Gender differences in mathematical trajectories. *Social Forces, 80*(1), 713–732.Available at: https://doi.org/10.1353/sof.2001.0102.

Magbag, A., & Raga, R. (2020). Prediction of college academic performance of senior high school graduates using classification techniques. *International Journal of Scientific & Technology Research, 9*(4), 2104-2109.

Mamolo, L. (2019). Analysis of senior high school students' competency in general Mathematics. *Universal Journal of Educational Research, 7*(9), 1938-1944.Available at: https://doi.org/10.13189/ujer.2019.070913.

McDonough, P. (1997). *Choosing colleges: How social class and schools structure opportunity.* Albany: State Univ. of New York Press.

Means, B., Wang, H., Young, V., Peters, V. L., & Lynch, S. J. (2016). STEM-focused high schools as a strategy for enhancing readiness for postsecondary STEM programs. *Journal of Research in Science Teaching, 53*(5), 709-736.Available at: https://doi.org/10.1002/tea.21313.

Nelson, D., & Rogers, D. (2004). A national analysis of diversity in science and engineering faculties at research universities.

Nissenbaum, J. (2012). Birth order and the academic and social success of college students. *Syracuse University Honors Program Capstone Projects. 185, 5*(1), 1-78.

Olaniyan, D. A., & Okemakinde, T. (2008). Human capital theory: Implications for educational development. *Pakistan Journal of Social Sciences, 5*(5), 479-483.

Ozturk, I. (2001). The role of education in economic development: A theoretical perspective. *Journal of Rural Development and Administration, 1*(Winter 33), 39-47.

Parker, A., & Tritter, J. (2006). Focus group method and methodology: Current practice and recent debate. *International Journal of Research & Method in Education, 29*(1), 23–37.Available at: http://doi.10.1080/01406720500537304.

Pearson, J., Muller, C., & Wilkinson, L. (2007). Adolescent same-sex attraction and academic outcomes: The role of school attachment and engagement. *Social Problems, 54*(1), 523–542.Available at: http://doi:10.1525/sp.2007.54.4.523.

Reyes-Baybay, M. (2018). The relationship of birth order and academic achievement of PUP Santa Rosa Campus second year students. *KnE Social Sciences, 3*(6), 939–946.Available at: https://doi.org/10.18502/kss.v3i6.2431.

Reyes, C. M., Mina, C., & Asis, R. (2017). Inequality of opportunities among ethnic groups in the Philippines. Discussion Paper Series No. 2017-42.

Rumberger, R. W., & Arellano, B. (2007). *Student and school predictors of high school graduation in California.* Santa Barbara: California Dropout Research Project, University of California.

Russell, S. T., Seif, H., & Truong, N. L. (2001). School outcomes of sexual minority youth in the United States: Evidence from a national study. *Journal of Adolescence, 24*(1), 111–127.Available at: https://doi.10.1006/jado.2000.0365.

Seameo Innotech. (2012). K TO 12 toolkit: Resource guide for teacher educators, school administrators and teachers. Retrieved from: https://www.seameo-innotech.org/wp-content/uploads/2020/05/k-12-toolkit.pdf.

Study International Staff. (2019). The pros and cons of private school education. Retrieved from https://www.studyinternational.com/news/benefit-private-school.

Sucgang, M. C., & Fabella, F. E. (2018). Relationship between the academic performance and birth order of grade 10 Students from Nuestra Señora De Aranzazu Parochial School, Academic Year 2017-2018. *Proceedings of the Ascendens Asia Journal of Multidisciplinary Research Conference, 2*(4), 27-29.

Yamamoto, & Holloway, S. (2010). Parental expectations and children's academic performance in sociocultural context. *Educational Psychology Review, 22*(1), 189–214.Available at: https://doi.org/10.1007/s10648-010-9121.

Yin, R. K. (2014). *Case study research: Design and methods.* Los Angeles, CA: Sage.

Young, D. G., Hoffman, D. E., & Chung, J. K. (2017). Exploring college and career readiness in South Carolina secondary schools. National Resource Center Working Paper No. 2. Columbia, South Carolina: University of South Carolina, National Resource Center for the First-Year Experience and Students in Transition.