

ACADEMIC AND SOCIAL ADJUSTMENT AMONG
DEAF AND HARD OF HEARING COLLEGE STUDENTS IN TAIWAN

By

Chia-fen Liu
B.A., National Kaohsiung Normal University, 1999
M.S.Ed., University of Kansas, 2005

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Co-Chairperson, Sally Roberts, Ph.D.

Co-Chairperson, Eva Horn, Ph.D.

Matt Reynolds, Ph.D.

Earle Knowlton, Ph.D.

Deborah Griswold, Ph.D.

Date Defended: November 20, 2013

The Dissertation Committee for Chia-fen Liu
certifies that this is the approved version of the following dissertation:

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Co-Chairperson, Sally Roberts, Ph.D.

Co-Chairperson, Eva Horn, Ph.D.

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ABSTRACT

This study was conducted to identify the factors that may influence the academic and social adjustment of college students with hearing loss in Taiwan. These factors included age, gender, degree of hearing loss, primary communication mode, amplification, high school educational experience, and family relationship. The instruments used to address the research questions in this study were the College Student Adjustment Checklist (CSAC-II; Ju, 2008) and the Demographic Information Form.

Three major findings were suggested in the current study. First, family relationship was significantly associated with academic performance, regardless of any demographic, audiological, and communication factors. Students with hearing loss who experienced less family stress tended to have fewer academic difficulties or better GPAs. Second, rather than any personal characteristics, family relationship made a unique contribution to social competence. Students with hearing loss who reported having more family stress were more likely to experience social difficulties. Finally, neither academic nor social adjustment served as a predictor of academic success among college students with hearing loss. How academic and social adjustment impact DHH students' educational performance remains unknown.

These findings can provide practical implications for teachers and college personnel to build a supportive program and environment for DHH students in Taiwan. It is recommended that future studies of this topic include a longitudinal study to further explore the relationship between academic success and social competence as DHH participants age. In addition, exploring how the various developmental and environmental factors impact both hearing and deaf/hard of hearing college students is recommended as well.

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CHAPTER I

Introduction

Background

With the emphasis on Least Restrictive Environment in IDEA, more and more deaf and hard of hearing (DHH) students receive their special education and related services in general education classrooms (Mitchell & Karchmer, 2006, 2011). The U.S. Department of Education, Office of Special Education Programs (2008, 2011), reported that in 2011 the percentage of students with hearing impairments aged 6-21, participating in regular education programs more than 80% of a school day, has climbed from 52% to 61% since 2007. According to another national longitudinal transition study on youth with disabilities by the U.S. Department of Education, the postsecondary enrollment rate of DHH students in 2005 was 72.6%, which was significantly higher than it was in 1990 with an increase of 23.1% (Newman, Wagner, Cameto, Knokey, & Shaver, 2010).

Given the benefits of completing a bachelor's degree, DHH college graduates are more likely to experience stable employment, higher earnings, enhanced job mobility, and independent living than non-graduates (Appelman, Callahan, Mayer, Luetke, & Stryker, 2012; Boutin, 2008; Luft, 2012; Schley et al., 2011; Schroedel & Geyer, 2001; Walter, Clarcq, & Thompson, 2002; Weathers et al., 2007). Welsh and Walter (1987) conducted a study to examine the impact of higher education on three groups of deaf adults: (a) individuals with bachelor's degrees, (b) individuals with associate's degrees, and (c) individuals without bachelor's degrees. Results showed that higher education has a positive economic effect on deaf college graduates, who are more likely to be employed than those with high school degrees. The unemployment rates for deaf college graduates, associate graduates, and high school graduates were 2.4%, 8.9% and

23.9% respectively. Moreover, deaf individuals with bachelor's degrees experience more socioeconomic advantages. Approximately 66.7% of deaf college graduates were employed in managerial and professional positions, while only 6.4% of high school graduates were employed at the same level. Most high school graduates were employed in technical support or menial worker jobs. Furthermore, the average earnings of deaf college graduates were at least twice as much as those for high school graduates.

In a more recent study, Schley et al. (2011) also indicated that DHH college students derive lifetime economic benefits from postsecondary degree attainment. Not only did DHH college graduates with degree experience higher employment rates, they also reported more earnings than high school graduates. At the age of 30, the average employment rates for DHH students with college or high school diplomas were 86% and 78% accordingly. Compared with high school graduates, DHH college graduates earned more income by approximately 2,200 U.S. dollars per year. By age 45, about 78% of DHH college graduates reported being employed, while only 66% of high school graduates reported that they were employed. In addition, the average annual incomes of DHH college graduates were much higher than high school graduates by approximately 7,500 U.S. dollars.

In Taiwan, more than 1,200 DHH college students were enrolled in postsecondary programs in the academic year 2011-2012. These numbers were based on a statistical report by the Special Education Transmit Net (2012), and represented an increase of roughly 200 students since the 2006-2007 school year. Since all DHH students in Taiwan are educated in inclusive settings (i.e., there are no special higher education schools specifically for DHH students such as Gallaudet University in the U.S.), it is critical for educators and personnel in postsecondary programs in Taiwan to understand and identify the needs of those students as they transition to

college. As a result, it is hoped that DHH college students will be more able to complete the degree, and experience the socioeconomic benefits of higher education.

Purpose of the Study

The purpose of this research was to better understand the factors that may influence the academic and social adjustment of DHH students who are currently enrolled in 4-year postsecondary programs in Taiwan. These factors included: (a) Age, (b) Gender: male/female, (c) Degree of Hearing Loss: moderate-severe hearing loss/severe hearing loss/profound hearing loss [Deaf], (d) Types of Amplification: hearing aid/cochlear implants/none, (e) Primary Communication Modes: oral/total communication (a combination of any means of communication, including speech, sign language, lipreading, writing, gestures, and etc.), (f) High School Educational Experience: inclusive/residential, and (g) family relationship.

Research Questions

This study investigated four major research questions. First, does age, gender, degree of hearing loss, primary communication modes, amplification, high school educational experience, and family relationship affect the extent of academic difficulties among DHH college students in Taiwan? Second, does age, gender, degree of hearing loss, primary communication modes, amplification, high school educational experience, and family relationship affect perceived GPA (a 100-point scale used in Taiwan) among DHH college students in Taiwan? Third, does age, gender, degree of hearing loss, primary communication modes, amplification, high school educational experience, and family relationship affect the extent of social difficulties among DHH college students in Taiwan? Fourth, is there a relation between a student's GPA and his/her academic adjustment, social adjustment, or an interaction between the two as indicated by the College Student Adjustment Checklist (CSAC-II; Ju, 2008)?

Hypotheses

In this study, the outcome variables included student GPA (a 100-point scale used in Taiwan), and academic and social difficulties measured by the College Student Adjustment Checklist (CSAC-II; Ju, 2008). The explanatory variables were age (continuous variable), gender (2-level categorical variable: male/female), degree of hearing loss (3-level categorical variable: moderate-severe hearing loss/severe hearing loss/profound hearing loss [Deaf]), types of amplification (3-level categorical variable: hearing aid/cochlear implants/none), primary communication modes (2-level categorical variable: oral/total communication), high school educational experience (2-level categorical variable: inclusive/residential), and family relationship as indicated by the CSAC-II (continuous variable).

In order to address academic and social adjustment among DHH college students in Taiwan, four hypotheses were tested in this study:

Hypothesis 1: There is no relation between academic difficulties and the variables of age, gender, degree of hearing loss, primary communication modes, amplification, high school educational experience, and family relationship in DHH college students across Taiwan.

Hypothesis 2: There is no relation between perceived GPA and the variables of age, gender, degree of hearing loss, primary communication modes, amplification, high school educational experience, and family relationship in DHH college students across Taiwan.

Hypothesis 3: There is no relation between social difficulties and the variables of age, gender, degree of hearing loss, primary communication modes, amplification, high school educational experience, and family relationship in DHH college students across Taiwan.

Hypothesis 4: There is no relation between a student's GPA and his/her academic adjustment, social adjustment, or interaction between the two as indicated by the College Student Adjustment Checklist (CSAC-II; Ju, 2008).

CHAPTER II

Literature Review

Effects of Higher Education on Students

How to optimize student learning and increase success is always a major concern in education. Walberg (1984) proposed a theory of educational productivity, and concluded that student aptitude, instruction, and environment are three essential factors directly influencing students' cognitive, emotional, and behavioral performance in school. Student aptitude consists of ability/achievement, chronological development, and motivation/self-concept. Instructional factors include the amount of time students spend learning and the quality of effective teaching they receive. Other environmental factors that impact student success involve interaction with family, classmates, and peers outside school, and the use of leisure time. Moreover, these three factors not only influence each other, but they are influenced by feedback on students' actual learning performance as well.

Determining the various factors that impact all college students, Pascarella and Terenzini (2005) reviewed multiple studies that described models of student development. They grouped the models into two main clusters: (a) developmental models, and (b) college impact models. Developmental models place emphasis on a student's individual psychological growth. In this model, by completing a sequential series of tasks, college students are able to achieve greater integration in thinking and acting. The reasons for these changes may be due to maturation, personal experience, environmental influence, or person-environment interaction. For example, Chickering and Reisser (1993) identified seven hierarchical vectors of student development in college toward individualization (i.e., the formation of identity). First, college students work on achieving competence in intellectual, physical and manual, and interpersonal areas. As overall

abilities increase in these areas, students need to learn how to manage emotions and release irritations in an appropriate way. Then students focus on developing autonomy in movement toward interdependence without detailed guidance. After students are able to solve problems and fulfill needs on their own, developing mature interpersonal relationships is their next concern, such as respecting differences and increasing capacity for intimacy. This is followed by the fourth vector, which involves establishing their identity. In the fifth vector, students must develop a sense of self and acceptance of self. Developing purpose to guide students in making personal decisions represents major growth along the sixth vector. Finally, students develop integrity, which means their personal values correspond with socially responsible behaviors.

On the other hand, college impact models focus more on how environmental change plays a role in student growth. One of the most influential college impact models is represented in Astin's input-environment-outcome model (1970a, 1970b). In this model, higher education outcomes result from the interplay between student inputs, college environment, and student outputs. Student inputs refer to what students bring to college including attributes, background, skills, and previous learning experiences. College environment refers to those college characteristics students experience such as policies, academic cultures, personnel, association with other students, and so on. Student outputs are their performance in the academic, social, psychological, and behavioral areas.

DHH College Students

Based on the literature, academic and social adjustments are two major factors affecting the success of students in postsecondary programs. Tinto (1975) looked at college dropouts, and found that the interactions of the individual, their academic integration, and their social satisfaction influence the level of persistence in college students. Individually, students enter

higher education institutions with different attributes, family backgrounds, and prior schooling experience. Each of these personal factors continually influences student performance in college or university. Academically, Tinto (1987) identified two reasons for leaving college prior to graduation, academic difficulty and disappointment with learning climates and experiences. Without sufficient academic competence, it is difficult for students to fulfill program requirements, and they may be forced to leave the program as a result. Socially, students with limited social skills are less likely to develop social integration and commitment to the college, which increases the possibility of withdrawal.

Applying Tinto's (1987) model to deaf students, Stinson and Walter (1997) reported three important factors affecting college persistence in freshmen at the National Technical Institute for the Deaf (NTID). These included academic proficiency, college integration, and social satisfaction. Students with higher academic proficiency and social skills tended to have better grades and adjusted well to their programs. Researchers also estimated that only 25% of DHH college students complete the degree. Therefore, it is critical to recognize student difficulties early in their college career and provide appropriate interventions in order to improve retention rates among this population (Chute, 2012; Lang, 2002; Stinson, Elliot, Kelly, & Liu, 2009; Stinson & Walter, 1997).

Academic Adjustment. As proposed by Chickering and Reisser (1993), the first developmental task college students accomplish is achieving intellectual competence. Learning in college is a more challenging task, and higher-level literacy and thinking skills are required. In addition, DHH college students still need to effectively use support services, such as interpreting, note-taking, and tutoring, to promote learning and achieve higher attainment of degree completion (Lang, 2002; Stinson & Walter, 1997).

In order to examine how academic competency influences persistence in postsecondary programs, Stinson and Walter (1997) conducted a study of 243 first-year DHH college students. Results showed that students who had higher academic proficiency and course interest tended to experience greater academic success. Also, students with higher grade point averages were more willing to complete their programs. Similarly, Chute (2012) reported that DHH college students' prior academic achievement was highly predictive of attaining a college degree. Also, students with higher literacy skills were more likely to experience academic success and complete the college degree.

To determine significant predictors of academic achievement, Toscano, McKee, and Lepoutre (2002) conducted a study of deaf college students with higher literacy skills, and identified several factors contributing to their academic success: (a) greater parent involvement in education, (b) differing communication modes, (c) early and intensive experience with literacy skills, (d) pleasure in reading, (e) good social life (actually more interested in this factor in high school than in middle school), (f) the importance of TV and assistive technology, and (g) positive self-esteem. However, Convertino, Marschark, Sapere, Sarchet, and Zupan (2009) reviewed 10 previous studies and reported that academic preparation was the only one reliable predictor of college academic success rather than any audiological or communication characteristics (i.e., level of hearing loss or type of communication used).

Thus, the literature has shown that the factors associated with student academic success are numerous and include demographic, aptitude, communication mode, and audiological variables. However, researchers tended to examine several variables in a single study based on their research interests. In order to identify the factors related to successful academic achievement, several studies were reviewed and summarized.

Degree of hearing loss. The American National Standards Institute (1996) has different standards to classify the degree of hearing loss. Based on ANSI standards, the degree of hearing loss is categorized as slight, mild, moderate, moderately severe, severe, and profound. The hearing loss ranges are slight—16 -25 dB, mild—26-40 dB, moderate—41-55 dB, moderately severe—56 -70 dB, severe—71-90 dB, and profound—91 dB and beyond (see Table 1).

On the other hand, as defined by the Department of Health in Taiwan in 2012, degree of hearing loss is categorized as mild, moderate, and severe based on the results of two hearing tests, Pure Tone Audiometry (PTA) and Auditory Brainstem Response (ABR). PTA refers to a behavioral test of identifying the faintest sound an individual can hear at a range of frequencies. ABR refers to a screening test of indicating the hearing functions of the cochlea and auditory pathways in the brain. Individuals with mild hearing loss can detect sound between 55-69 decibels (dB) of loudness, and can understand speech if it is loud enough. People with moderate hearing loss can't perceive a sound softer than 70-89 dB, and may not hear and understand most speech sounds. Individuals with severe hearing loss are considered deaf and can only perceive a sound louder than 90 dB, such as an airplane (Alexander Graham Bell Association for the Deaf and Hard of Hearing, 2005). In their national report, Gallaudet Research Institute (2011) indicated that 26.4% of DHH children and youth are not able to detect a sound softer than 90 dB and are, thus, classified as deaf.

In this study, the classification of degree of hearing loss in Taiwan was converted into the ANSI scale since all the references are from the U.S. As shown in Table 1, college students with mild (55-69 dB), moderate (70-89 dB), and severe (90 dB and beyond) hearing loss in Taiwan would be re-defined as having moderate-severe, severe, and profound hearing loss, respectively.

Table 1

Classification of Degree of Hearing Loss in Taiwan and USA

Classification in Taiwan	Hearing Loss Range in dB		Classification in the U.S.
	Taiwan	USA	
		16-25	Slight
		26-40	Mild
		41-55	Moderate
Mild	55-69	56-70	Moderately Severe
Moderate	70-89	71-90	Severe
Severe	90 and beyond	91 and beyond	Profound

Research has demonstrated that the degree of hearing loss is associated with academic performance at any age. Most, Aram, and Andorn (2006) examined early literacy skills in preschoolers with hearing loss, and they found that there was a negative relation between degree of hearing loss and language performance. Children with better hearing ability had more general knowledge and vocabulary. Wake, Hughes, Poulakis, Collins, and Rickards (2004) investigated literacy performance in deaf and hard of hearing children between the ages of 7 and 8 years and reported that all children with hearing loss had lower scores on literacy performance than hearing children of the same age by nearly 10 months. Similarly, Antia, Jones, Reed, and Kreimeyer (2009) obtained 5-year longitudinal data from 197 DHH students, and reported that degree of hearing loss was only negatively associated with reading achievement, but not with math achievement, writing performance, or academic performance in comparison with peers.

Surprisingly, Davis, Elfenbein, Schum, and Bentler (1986) found that some children still have literacy problems even though their hearing loss is minimal. Findings by Khairi Md Daud, Noor, Rahman, Sidek, and Mohamad (2010) indicated that students with mild hearing loss tend to have poor academic performance in comparison with hearing peers as well. Furthermore, Blair, Peterson, and Viehweg (1985) reported that children with mild hearing loss had lower academic

performance than their hearing peers, and the gap became even wider over the years. However, Gibbs (2004) made a comparison of reading skills in children with moderate hearing loss and their hearing peers, and he reported that there was no significant group difference in reading skills, but children with hearing loss were more likely to have lower phonological awareness and receptive vocabulary.

Amplification. Most children with hearing loss wear hearing aids to improve their hearing, but about 15% of those children have cochlear implants (Gallaudet Research Institute, 2011). In a study conducted by Most, Aram, and Andorn (2006), findings showed that the early literacy skills of all kindergartners with hearing loss were similar no matter what type of amplification they used. Similarly, Convertino et al. (2009) reported that there was no relation between type of amplification and academic performance among college students with hearing loss.

While the success of cochlear implantation is still being debated in the professional deaf education community, as more and more children receive cochlear implants, parents and teachers expect improvement in language learning and interpersonal communication (Archbold & Wheeler, 2010; Gale, 2011). Research has shown that the younger a child receives a cochlear implant, the greater language performance they will achieve. Dettman, Pinder, Briggs, Dowell, and Leigh (2007) indicated that children receiving cochlear implants before 12-months of age would have more significant language growth than those receiving implants between the age of 12- and 24-months, and match the normal growth curve of their hearing peers. Spencer, Barker, and Tomblin (2003) conducted a study of 16 prelingually deaf children (i.e., hearing loss occurred prior to language development—age 3) with cochlear implants to examine their language and literacy performance. The children were receiving their education in general

education settings. The average age of these children was 9.8 years old, and the mean length of using implants was 5.9 years. Researchers reported that the overall language and literacy performance of children with cochlear implants was similar to their hearing peers. However, the cochlear implant users still had difficulties with vocabulary and grammar. Spencer, Gantz, and Knutson (2004) investigated the learning performance of 27 prelingually deaf youth with cochlear implants. All participants received implantation between the ages of 2 and 12 years, and the average length of implant use was 9.9 years. All participants were educated in inclusive settings with interpreting services, and over 50% had enrolled in higher education. The results indicated that the academic performance of the 10 participants who had completed 10th grade compared favorably with their hearing peers. Consistently, findings by Geers and Hayes (2011) revealed the majority of DHH adolescents with cochlear implants developed age-appropriate reading skills, and their reading levels tended to be on grade level. However, the students in this study still had significant delays in writing expression and phonological awareness in comparison with hearing peers.

Contrary to expectations, the influence of early implantation on reading performance seems to decrease as the DHH individual ages. Geers, Tobey, Moog, and Brenner (2008) conducted a longitudinal study of 85 students who received cochlear implants at preschool age. They evaluated the language performance of these students when they were in elementary school, and reevaluated it again when they were in high school. The study revealed that early cochlear implantation positively correlated to future oral and hearing performance. Unfortunately, the effect of early implantation appeared to fade as the individual matured since most students did not develop similar levels of reading skills as did their hearing peers. Consistently, Harris and Terlektsi (2010) observed that the majority of DHH adolescents receiving cochlear implants

before 42-months of age did not demonstrate age-appropriate reading levels as they aged.

Moreover, DHH adolescents with cochlear implants showed lower reading performance than those with hearing aids.

A cochlear implant, however, is not a panacea for all hearing-related problems. There are many confounding variables affecting academic achievement in children with cochlear implants including the child's age when surgery occurs, cognitive ability, language proficiency before implantation, consistent post-implantation training, etc. (Marschark, Rhoten, & Fabich, 2007; Marschark, Sarchet, Rhoten, & Zupan, 2010). Still, students with cochlear implants in a variety of educational programs rely on differing support services in order not to miss information in class such as tutoring, interpreting, real-time captioning, and academic advising (Archbold & Mayer, 2012; Chute, 2012; Foster, 1988; Lang, 2002).

Communication modes. Research has shown that communication ease leads to higher motivation in learning among DHH students (Long, Stinson, & Braeges, 1991; Reed, Antia, & Kreimeyer, 2008). In educational settings, 53% of instructors used speech only as the primary communication mode (Gallaudet Research Institute, 2011). Because of communication barriers, however, many DHH students still use different communication modes to interact with others, such as speech, sign language, or total communication (Andrews & Covell, 2006; Christiansen & Leigh, 2002).

Antia et al. (2009) reported that DHH students who preferred to use speech as their primary communication mode were more likely to have academic success. However, Convertino et al. (2009) analyzed data from 10 previous studies done with DHH college students and found that the type of communication modes students used was not related to their academic

performance. Surprisingly, most students reported that they preferred to use speech in class, even though they were satisfied with their sign language skills.

High school educational experience. Approximately 57.1% of DHH children receive education in inclusive settings, and the amount of time they are integrated with hearing peers has an effect on their academic performance. (Antia, Kreimeyer, & Reed, 2010; Gallaudet Research Institute, 2011). A handful of research has shown that less than 5% of the variance in academic performance is explained by educational placements, after accounting for student demographic characteristics (Allen & Osborn, 1984; Kluwin & Moores, 1985, 1989; Stinson & Kluwin, 2003, 2011). However, it still remains unclear whether academic success is a cause or effect of receiving instructions in general education settings (Antia et al., 2009; Easterbrooks & Beal-Alvarez, 2012).

Kluwin and Moores (1985, 1989) reported that DHH adolescents who received education in general education settings tended to have more academic success in mathematics than those in self-contained settings. Holt and Allen (1989) found that full inclusion as opposed to partial inclusion is a significant predictor of higher reading comprehension scores. Holt's (1994) study of DHH students aged 6 through 21 across the United States indicated that placement is positively associated with student achievement. Students who participated in the general education classroom at least 16 hours per week had higher scores in reading comprehension and mathematics computation at all ages. Also, students who were included in a regular education setting only 6-10 hours per week still had higher academic performance than those non-integrated students at the elementary level. Furthermore, Harris and Terlektsi (2010) observed that 46% of DHH students receiving education in general education classrooms developed age-

appropriate reading levels, whereas only 31% of DHH students from separate schools had similar reading levels as their hearing same-age peers.

Family relationship. An estimated 77% of DHH children and youth are born to parents who are hearing, and 71.2% of this population has hearing siblings. As a result, 71.6% of children and youth with hearing loss have family members who do not sign regularly, and American Sign Language is the primary language used at home for only 5.8% of children and youth in America (Gallaudet Research Institute, 2011).

Lack of communication ease makes it difficult for DHH students to maintain good relationships with their hearing family members (Marschark & Hauser, 2011). Shea, a deaf college student interviewed by Whyte and Guiffrida (2008), reported that communication barriers and misconception of deaf capability resulted in a poor family relationship. His parents and brother always used speech and gestures only to communicate with him, which may cause communication breakdowns. Moreover, he always had to work very hard to prove to his father that he compared favorably with hearing people.

In order to examine the effect of family characteristics on the achievement of DHH students, Bodner-Johnson (1986) conducted a discriminate analysis of 120 families who had children ages 9.4 to 13. Results showed that deaf children with high-level reading skills had parents who were more adapted to deafness and had higher expectations for them. Similarly, those children with higher achievement in mathematics concepts and computation had parents who also pressed their children for success. In a more recent study, Luckner and Muir (2001) interviewed 20 deaf adolescents in regular education settings, and reported that family supports and high expectations lead to academic success. Reed and colleagues (2008) also revealed that

family involvement and high expectations are facilitators of academic success among DHH students

Social Adjustment. In Maslow's hierarchy of needs (1943), the third level of human need is family and belonging. At this stage, individuals long for friendship, family, and intimacy. If the desire to love and to be loved is not satisfied, people will experience social anxiety and have lower self-esteem and self-respect later on.

In addition to the pursuit of academic success, college students work on achieving social competence as well (Chickering & Reisser, 1993). As might be expected, social adjustment is another struggle for DHH college students (Lang, 2002). Foster, Long, and Snell (1999) revealed that deaf students in inclusive postsecondary programs experience similar levels of academic engagement and communication ease to hearing students, but did not have as much sense of belonging as did their peers. Whyte and Guiffrida (2008) interviewed a deaf college student who was planning to withdraw from school. As Shea described, interpersonal relationship was his major concern. Due to a negative perception of Deaf culture and limited skills in sign language, Shea experienced interpersonal conflicts with his deaf classmates as well as his hearing peers.

Given the relation between academic and social adjustment in school, Piaget (1970) proposed that same-age peer interactions can create socio-cognitive conflict, which can help children view the world from multiple perspectives and promote their cognitive development. Similarly, Vygotsky (1978) believed that children are able to acquire higher mental functions through interactions with more competent adults and peers. With guidance of more knowledgeable people, children can successfully complete more challenging tasks within their zone of proximal development (ZPD) and eventually use what they learned independently (Ormrod, 2008). Furthermore, research has shown that early social skills are a positive predictor

of future academic performance in hearing students (Moeller, Tomblin, Yoshinaga-Itano, Connor, & Jerger, 2007). Caprara, Barbaranelli, Pastorelli, Bandura, and Zimbardo (2000) conducted a longitudinal study of 294 elementary-aged hearing children and found that early pro social behaviors had a positive effect on later academic functioning. In Malecki and Elliott's (2002) study with 139 hearing elementary students, they demonstrated that students with well-developed social competency tended to achieve higher academic performance in the present and future. Consistently, the work of Flook, Repetti, and Ullman (2005) with 248 hearing children demonstrated that poor peer relationships in 4th graders led to lower academic achievement when they were in the 6th grade.

There is a significantly negative relation between social satisfaction and retention rate among deaf students in higher education (Stinson, Scherer, & Walter, 1987). High satisfaction with social life in college is important for deaf students to develop integrity and to remain in postsecondary programs. Three social issues addressed by researchers are related to successful degree completion. These are acquiring social skills, establishing identity, and developing independence and interdependence (Stinson & Walter, 1997). Polat (2003) also demonstrated that higher academic achievement was positively associated with social adjustment according to a nationwide study of 1,097 deaf students in elementary, middle, and high schools in both inclusive and separate settings.

In order to examine how students' interaction with peers and instructors affect their college learning performance, Lang, Stinson, Kavanagh, Liu, and Basile (1999) administered the Grasha-Riechmann Student Learning Style Scales (GRSLSS) to 100 deaf postsecondary students and their 16 teachers. The result showed that deaf college students had a preference for dependent, participative, and collaborative learning styles accordingly. Defined by Hruska-

Riechmann and Grasha (1982), dependent students like to follow teacher guidance and directions; participative students are more likely to enjoy classroom involvement; and collaborative students prefer to work and share ideas with teachers and peers. In contrast, instructors gave the highest score to using a collaborative approach in the classroom, which emphasized peer learning.

There are many factors that are related to student social adjustment such as demographic, aptitude, communication, and audiological variables. In order to identify the underlying factors related to successful interpersonal relationships, several studies were reviewed and summarized below.

Age. Cappelli, Daniels, Durieux-Smith, McGrath, and Neuss (1995) found that age was a significant predictor of peer rejection among 23 elementary students with hearing loss. Older children experienced higher peer acceptance than younger children. For college students, first-year students tend to have more social difficulties in developing social bonds with peers.

Kersting (1997) interviewed deaf college students with little or no exposure to Deaf culture and language before enrolling in universities that are not geared specifically to deaf students. During their college orientation and the first year, feelings of loneliness, isolation, and resentment were the most intensive. Without familiarity with Deaf culture and skills in sign language, the deaf students experienced alienation from their deaf peers. Simultaneously, they were separated from hearing peers because of communication barriers and stereotypes. However, these students' social life had improved during the second and fourth years since more deaf and hearing friends were included in their social networks. The reasons for these changes might be due to improved communication skills and increased participation in social activities.

Degree of hearing loss. Compared with hearing students, more DHH students are rejected by peers as a result of communication breakdowns (Antia, Reed, & Shaw, 2011;

Cappelli et al., 1995; Power & Hyde, 2002). The work of Davis et al.(1986) showed that 20 out of 40 students (50%) with mild to severe hearing loss reported having social difficulties, while only 9 out of 58 hearing students (15.5%) experienced poor peer acceptance. On the other hand, students with mild-moderate hearing losses tend to use speech as the primary communication mode. Due to communication ease, they are more capable of participating in academic activities and interacting with hearing classmates directly than those with severe or profound hearing loss (J. Holt, 1994; Saur & Stinson, 1986).

Amplification. The use of cochlear implants has impact on psychosocial adjustment in DHH students (Archbold & Wheeler, 2010). Schorr (2006) found children receiving cochlear implants earlier in life tended to have lower levels of loneliness in middle and late childhood. Moreover, they experienced similar levels of loneliness compared to their hearing peers. Wheeler, Archbold, Gregory, and Skipp (2007) found that teenagers experienced better communication with family and friends as a result of cochlear implantation. Moreover, Leigh, Maxwell-McCaw, Bat-Chava, and Christiansen (2008) reported that teenagers with cochlear implants were more hearing acculturated (psychological and behavioral identification with the hearing community) and were found primarily in inclusive settings, while those without implants were more Deaf acculturated (psychological and behavioral identification with the Deaf community) and found mostly in specialized classrooms. Both groups experienced similar levels of loneliness. However, children with cochlear implants in a variety of educational programs still use different communication modes to interact with others, and need the same supportive services as those without implants (Andrews & Covell, 2006; Christiansen & Leigh, 2002).

Communication modes. Ease of communication contributes to the quality of social engagement between deaf and hearing people. Deaf and hearing individuals without

communication barriers are more likely to have better social interactions (Antia, Jones, Luckner, Kreimeyer, & Reed, 2011; Antia, Reed, et al., 2011; Foster, 1998; Long et al., 1991; Marschark, Convertino, et al., 2007). Stinson, Liu, Saur, and Long (1996) found that DHH college students' preferences for communication modes played a role in their classroom interactions in inclusive settings. Speech-only students reported that they had more engagement and less communication breakdowns than those with a mixed communication mode (speech and sign language). This might be due to greater English proficiency in the speech-only group. However, all students experienced a sense of separation from classroom participation because there was always a gap between information comprehension and classroom conversation. For example, they may miss important information in discussion, did not catch jokes, or did not feel a part of conversation (Brown & Foster, 1991).

High school educational experience. An estimated 57.1% of children with hearing loss receive education in inclusive settings, and the amount of time they are integrated with hearing peers has an effect on their mutual social relationships (Antia, Jones, et al., 2011; Antia et al., 2010; Antia, Reed, et al., 2011; Gallaudet Research Institute, 2011). Stinson, Whitmire, and Kluwin (1996) found that social integration did not occur even though there was opportunity for DHH students to participate in general education settings. In their study, adolescents with hearing loss who spent more hours participating in general education activities still preferred to interact with DHH students because of the emotional security provided by interaction with their DHH peers. Interestingly, Van Eldik (2005) investigated mental health problems among DHH adolescents and found that adolescents in inclusive settings had fewer social-emotional problems than those in separated settings.

However, the effect of school placement on the social-emotional development of deaf students is yet to be determined and needs further research. Kluwin, Stinson, and Colarossi (2002) reviewed 33 studies that have been reported since 1980 pertaining to the impact of different education settings on deaf students' social outcomes. Researchers concluded that deaf students in public schools demonstrated less age-appropriate social skills than their hearing peers, and they were more likely to interact with deaf classmates rather than hearing ones. On the other hand, they did find that deaf students in inclusive settings had achieved some acceptance from their hearing peers.

Family relationship. The Gallaudet Research Institute (2011) reported that the majority of DHH students 6-21 years of age were born to hearing families who do not sign regularly. With the resulting lack of communication ease, it is difficult for DHH students to maintain good relationships with hearing family members. On the other hand, hearing parents who have DHH children often experience high-levels of stress after the birth of their children (Calderon & Greenberg, 2003; Koester & McCray, 2011; Marschark & Hauser, 2011). In order to examine the relation between parental resources, parental stress, and psychosocial development of these children, Hintermair (2006) surveyed 213 families with DHH children from 4 to 12.9 years of age. Results showed that DHH children whose parents feel highly stressed are more likely to be hyperactive, and have emotional difficulties, behavior problems, and peer rejection. Consistently, Watson, Henggeler, and Whelan's (1990) study with 75 DHH youths and their hearing parents also indicated that family stress accounts for the social competence of DHH youths.

Summary

Today, more and more DHH students in the U.S. enter postsecondary programs in regular colleges and universities rather than institutions of higher education that are primarily for

students with hearing loss (i.e., Gallaudet or the Rochester Institute for the Deaf). As researchers indicated, the two primary challenges for DHH students in higher education are academic and social adjustment (Stinson & Walter, 1997; Tinto, 1975, 1987). Several factors contribute to student academic achievement including demographic, audiological, and communication variables. Social adjustment may be related to age maturation, previous educational placements, family supports, communication devices, or use of amplification. In order to help DHH students have more success as they transition to college, it is critical to identify their difficulties and provide appropriate support services (Lang, 2002; Stinson & Walter, 1997).

Similarly, the number of DHH students enrolled in higher education programs in Taiwan is increasing significantly. However, all postsecondary programs in Taiwan are inclusive; there are no separate postsecondary colleges/universities devoted to the education of students with hearing loss. Due to the lack of language proficiency in many DHH students, it is challenging for them to adjust to college life. Without deaf awareness and support, it is also challenging for teachers, hearing peers, and college personnel to interact with the DHH student. In order to help DHH college students in Taiwan achieve a successful transition to college, it is critical to identify the relevant factors contributing to successful academic and social adjustment among college students with hearing loss. It is hoped that the information gained from this literature review can be applied to DHH undergraduates in Taiwan to see if there are any similarities on which to build a program for these students.

CHAPTER III

Methodology

Recruitment Strategy

For this study, college students with Disability IDs that identified them as having hearing loss were recruited. In 2012, the Department of Health in Taiwan defined the degree of hearing loss in the following categories: mild (55-69 dB), moderate (70-89 dB), and severe (90 dB and beyond). Moreover, college students with Disability IDs are qualified to receive special education services in a Resource Room. Study participants were solicited from among this population.

Participants. This study consisted of 132 DHH college students, male and female, who live in Taiwan. All these students are at least 18 years old, and at different college levels (Freshman, Sophomore, Junior, and Senior). All college students included in the study were identified as having hearing loss only (no additional disabilities). Students use different communication modes (oral or total communication) and different types of amplification (hearing aid or cochlear implants).

Convenience sampling, a statistical method of drawing representative data by selecting people because of their availability and easy access, was used to recruit DHH participants from all four-year institutions of higher education ($N=148$) across Taiwan. With more participants from different postsecondary programs, the study sample was more representative of DHH college students in Taiwan and does represent the population as a whole.

Procedures

In order to protect participants' rights and privacy, permission to conduct this study from the Human Subjects Committee Lawrence Campus (HSCL) was received. Because there is no

anticipated risk to participants in this study and it involves no procedures for which written consent is normally required outside of the research context, HSCL waived the requirement for a signed consent form. As a result, an Information Statement was provided to each participant (see Appendix A).

Invitations to respond to a web-based survey were emailed to all colleges/universities in Taiwan ($N=148$), specifically to the Resource Rooms for students with disabilities. These groups were asked to distribute the invitation to potential participants. Interested participants were instructed to email their contact information to the investigator. All documents (invitation and demographic information survey) were translated into Chinese.

After initial contact with the investigator, participants received a package of information, including (a) a copy of the Information Statement, and (b) a demographic information form (see Appendix B). The participants were asked to answer questions listed on the demographic information form, and return it to the investigator via email as an attachment.

The study was conducted in Chinese with the use of an online survey system created by Psychological Publishing Co., Ltd. in Taiwan. All participants were asked to answer the College Student Adjustment Checklist (CSAC-II; Ju, 2008). The CSAC-II is a norm-referenced test for general college students. The current version, the CSAC-II, was published and renormed in 2008. There are 10 subtests in the CSAC-II, and it has been used in the past in Taiwan for research. Generally, it took approximately 20 minutes to complete the entire survey.

All information gathered about each participant was kept confidential. The investigator used a code number to identify each participant to protect privacy. Also, participants received a copy of results from this study. In addition, participants were free to withdraw from the study at any time even if they originally agreed to participate.

Instruments

The instruments used to address the research questions in this study included the College Student Adjustment Checklist (CSAC-II; Ju, 2008) and the Demographic Information Form. All instruments are provided in the appendices.

College Student Adjustment Checklist. The College Student Adjustment Checklist (CSAC-II; Ju, 2008) was used in this study to help understand the major concerns of DHH college students in Taiwan. Based on the Mooney Problem Check Lists (Mooney & Gordon, 1950), Ju (2008) developed the Chinese version of the CSAC-II especially to allow college students in Taiwan to express their needs, and help them adapt to college life as a result. Moreover, Ju created new norm tables for the CSAC-II using 9,385 college students across Taiwan in 2007-2008.

The CSAC-II is a self-report assessment tool. Students read through the survey, underline items that are disturbing to them, circle items that are highly disturbingly, and write down additional concerns not listed in the checklist. It takes approximately 20 minutes for college students to complete the entire CSAC-II.

The CSAC-II is divided into 10 subscales: (a) Living Conditions & Finances, (b) Time Management, (c) Career, (d) Learning, (e) Family, (f) Interpersonal Relationship, (g) Love Life, (h) Emotional Competence, (i) Mental Health, and (j) Physical Health. There are 20 items in each subscale. The score generated from each subscale is from 0 to a maximum of 40. Higher scores indicate college students have more problems in that area.

This study was designed to better understand the factors, including demographic and family characteristics, that may influence the academic and social adjustment of DHH students who are currently enrolled in 4-year postsecondary programs in Taiwan. As a result, only scores

generated from three subscales were used to investigate DHH college students' needs: (a) Learning (items 16-20, 66-70, 116-120, 166-170), (b) Family (items 21-25, 71-75, 121-125, 171-175), and (c) Interpersonal Relationship (items 26-30, 76-80, 126-130, 176-180).

Ju (2008) established moderate to high reliability and validity for the CSAC-II. With regards to test-retest reliability, the Pearson correlation coefficients between two repeated administrations of the subscales were .77 (Learning), .65 (Family), and .93 (Family Relationship). Cronbach's alpha (α) was used to test internal consistency reliability. Cronbach's alphas for subscale scores in the areas of Learning, Family, and Interpersonal Relationship were .78, .77, and .84, respectively, suggesting acceptable internal consistency of these scores (Field, 2009).

In addition, Ju (2008) established different types of validity: (a) content validity, and (b) criterion validity. The content validity was determined by conducting an interview questionnaire and asking professional counselors for advice to make sure that all test items represent major concerns of college students in Taiwan. The criterion validity of all subscales in the CSAC-II was established with those in the Mooney Problem Check Lists (a valid measure in the Chinese version) with correlation coefficients of .37~.86, indicating the CSAC-II reflects the similar construct being assessed in the Mooney Problem Check Lists.

Demographic Survey. All participants were asked to answer closed-ended questions, including name, age, birth date, gender, college name, major, college level, GPA (a 100-point scale used in Taiwan), age of hearing-loss onset, degree of hearing loss, types of amplification, primary communication modes, high school educational experience, parental hearing status, parental communication modes, and current housing status (see Appendix B). It took approximately 5-minutes to complete the demographic survey.

Data Analyses

All of the data from the 132 DHH college students who responded to email invitations for a web-based survey were entered and analyzed with the use of two statistical programs, including SPSS (Version 17.0 for Windows; IBM, Chicago) and SPSS AMOS (Version 19.0; IBM, Chicago). SPSS 17.0 for Windows was used for data screenings, missing value analyses, and descriptive statistics. Meanwhile, SPSS AMOS 19.0 was used for inferential statistics.

In this study, 114 of 132 DHH college students completed the CSAC-II and demographic form as well. With the presence of missing data, the method of full information maximum likelihood (FIML) estimation was used with SPSS AMOS 19.0 (Enders, 2001; Kelley & Maxwell, 2010). The FIML method assumes that missing data is dependent on all other observed data, or missing at random (MAR). In order to test for the more strict assumption of data being missing completely at random (MCAR), a Little's MCAR test was performed with the use of SPSS 17.0 for Windows. If MCAR is tenable, so is MAR.

Descriptive statistics (frequencies) were used to represent the demographic characteristics of the sample, including age, gender, type of institution, major, college level, age at hearing-loss onset, degree of hearing loss, types of amplification, primary communication modes, high school educational experience, parental hearing status, parental communication modes, and current housing status. Descriptive statistics (mean, minimum, maximum, range, standard deviation, and skewness) were computed for GPA and three subscales in the CSAC-II, including Learning, Family, and Interpersonal Relationship. Additionally, Pearson correlation coefficients were computed to examine the relations among all variables.

Prior to running AMOS analyses, a set of explanatory variables were dummy-coded as follows: (a) Gender: female/male was coded as 0/1; (b) Degree of Hearing Loss: profound hearing loss/moderate-severe hearing loss/severe hearing loss were coded as 0/1/0 and 0/0/1; (c)

Types of Amplification: hearing aid/cochlear implants/none were coded as 0/1/0 and 0/0/1; (d) Primary Communication Modes: total communication/oral was coded as 0/1; and (e) High School Educational Experience: inclusive/residential was coded as 0/1, respectively.

Data analysis using SPSS AMOS 19.0 was used to answer research questions 1, 2, and 3. In the AMOS path diagrams (i.e., multiple regression models), a set of variables was displayed, including the outcome variable, explanatory variables, and the unobserved error variable. After running analyses, the R^2 and associated statistics were interpreted as estimates of the variance explained in the outcome variables by the optimal linear combination of the explanatory variables. The unstandardized and standardized coefficients were calculated to determine the magnitude of effect of each explanatory variable after controlling for the others. The standardized coefficients were especially useful to demonstrate the relative importance of each explanatory variable in the model (Field, 2009; Keith, 2006).

Correspondingly, SPSS AMOS 19.0 was used to answer research question 4. Prior to analyses, both explanatory variables (academic and social adjustment as indicated by the CSAC-II) were mean-centered at first. Second, a new interaction variable (academic * social adjustment) was created by multiplying the centered explanatory variables (academic and social adjustment as indicated by the CSAC-II). Finally, the outcome variable (student GPA), the centered explanatory variables (academic and social adjustment), the new interaction variable (academic * social adjustment), and the unobserved error variable were presented in the AMOS program. As the outcome generated, the R^2 and associated statistics were interpreted as estimates of the variance explained in the outcome variables by the optimal linear combination of the explanatory variables. The unstandardized and standardized coefficients were calculated to determine the magnitude of effect of each explanatory variable after controlling for the others. The

standardized coefficients were especially useful to demonstrate the relative importance of each explanatory variable in the final model (Field, 2009; Keith, 2006).

CHAPTER IV

Results

In this chapter, the method of dealing with missing values is discussed. Moreover, descriptive statistics for demographic variables and outcome variables are both illustrated. Finally, the results as related to the four research questions in this study are reported.

Missing Values

There were complete data for 114 of 132 DHH college students surveyed. Eighteen participants either failed to complete the demographic form or the CSAC-II online survey. Using SPSS AMOS 19.0 for inferential statistics, the method of full information maximum likelihood (FIML) estimation was applied (Enders, 2001; Kelley & Maxwell, 2010). However, the FIML method required that unobserved values are missing at random (MAR). Therefore, a Little's *missing completely at random* (MCAR) test was performed using SPSS 17.0 for Windows in order to meet the assumption of MCAR, which is a stricter assumption than MAR. Results showed that the data were missing completely at random, $\chi^2(10, N=132) = .55, p = .99$. Maximum likelihood procedures were appropriate.

Descriptive Statistics for Demographic Variables

As shown in Table 2, participants in this study consisted of 132 DHH college students from different 4-year postsecondary programs in Taiwan. There were 52 (39.4%) males and 80 (60.6%) females in the study. All participants were aged 18 to 45 years with a mean age of 21.17 years old.

Within the sample of 132 participants, 47 (35.6%) were from public universities, 20 (15.2%) were from private universities, and 65 (49.2%) were from institutes of technology. They were at different college levels: 32 (24.2%) were freshmen, 28 (21.2%) were sophomores, 45

(34.1%) were juniors, and 27 (20.5%) were seniors. Moreover, 73 (55.3%) reported living in residence halls, 26 (19.7%) reported living off campus, 32 (24.2%) reported living at home, and 1 (0.8%) did not respond to the question. With regards to academic majors, 83 (63.4%) chose social science majors, including 14 (10.6%) in business, 16 (12.1%) in education, 11 (8.3%) in liberal arts or social science, 12 (9.1%) in public affairs and law, and 30 (22.7%) were studying visual and performing arts. On the other hand, 48 (36.6%) selected natural science majors instead, including 2 (2.3%) studying agriculture, 2 (1.5%) in engineering, 6 (4.5%) studying health and medicine, 2 (1.5%) studying math, 13 (9.8%) studying recreation and sports, and 23 (17.4%) were majoring in science. Concerning high school educational experience, 114 (86.4%) students received their education in general education settings, while 17 (12.9%) received education in residential schools. One individual (0.8%) did not answer the question.

Pertaining to age of hearing loss onset, 57 (43.2%) college students reported that they were identified as having a hearing loss at birth, 26 (19.7%) reported being identified from birth to 3 years of age, 7 (5.3%) reported identification between 4 to 6 years of age, 3 (2.3%) reported being identified between the ages of 6 and 12 years, and 2 (1.5%) reported hearing loss onset occurred from 13 to 20 years of age. Thirty-seven students (28%) reported that they didn't know the age of hearing loss onset.

Of the 132 undergraduate students, 27 (20.5%) were categorized as having moderate-severe hearing loss, 32 (24.2%) were identified with severe hearing loss, and 73 (55.3 %) had profound hearing loss. In terms of type of amplification, 106 (80.3%) reported wearing hearing aids, 18 (13.6%) reported receiving cochlear implants, and only 8 (6.1%) reported not having any type of amplification. Moreover, 63 (47.7%) reported using speech as the primary

communication mode, while 68 (51.5%) preferred to use total communication as the primary communication mode. Still, 1 (0.8%) did not respond to the question.

Relating to parental hearing status, both parents of 122 (92.4%) students are hearing, 3 (2.3%) students' parents are both deaf, 6 (4.5%) students have one parent who is either hearing or deaf, and 1 (0.8%) did not answer the question. Furthermore, 113 (85.6%) reported their fathers prefer to use speech as the primary communication mode, 3 (2.3%) fathers tend to use Taiwanese Sign Language, 12 (9.1%) fathers are inclined to use total communication, and 4 (3%) students did not answer the question. Similarly, 112 (84.8%) reported their mothers prefer to use speech as the primary communication, 3 (2.3%) mothers tend to use Taiwanese Sign Language, 14 (10.6%) mothers prefer to use total communication, and 3 (2.3%) students did not reply to this question.

Given relations among all demographic variables (see Table 3), greater age was positively correlated with higher college level ($r = .44, p < .01$). Age was also significantly related to current housing status ($r = .19, p < .05$), indicating younger students tended to live in residential halls while older students preferred to live with parents. In addition, gender was positively associated with types of amplification ($r = .21, p < .05$), suggesting females were more likely to wear hearing aids.

With regards to type of institution, it was significantly correlated with primary communication mode ($r = -.29, p < .01$), father's communication mode ($r = -.21, p < .05$), and mother's communication mode ($r = -.23, p < .01$). Concerning primary communication mode, students using total communication as the primary communication mode were more likely to attend an institute of technology, while students using speech as the primary communication mode were more likely to attend public universities. Given father's and mother's communication

mode, fathers or mothers who use total communication were more likely to have their child attend an institute of technology. Similarly, the children of fathers or mothers who used speech as the primary communication mode also tended to attend institutes of technology as well.

It was found that degree of hearing loss was significantly correlated with primary communication mode ($r = -.34, p < .01$) and high school educational experience ($r = .23, p < .01$). It addressed two findings: (a) students having moderate-severe hearing loss were more likely to use speech as the primary communication mode and received secondary education in general education settings, and (b) students having profound hearing loss tended to use total communication as the primary communication mode and received secondary education in residential schools.

Primary communication mode was negatively related to high school educational experience ($r = -.28, p < .01$), but positively related to mother's communication mode ($r = .23, p < .01$). It showed two findings: (a) students using speech as primary communication mode tended to receive secondary education in general education settings, and (b) students and their mothers tended to use the same communication mode (speech or total communication) as the primary one.

Related to parental hearing status, it was positively correlated with father's communication mode ($r = .23, p < .01$), indicating students who have deaf parents tended to have a father using sign language as the primary communication mode. Furthermore, father's communication mode was significantly related to mother's communication mode ($r = .90, p < .01$), specifying students' father and mother tended to use the same communication mode (speech, total communication, or sign language) as the primary one.

Pertaining to current housing status, it was significantly correlated with types of institution ($r = .25, p < .01$), indicating students from public universities were found to live in the residence halls, while students from institutes of technology tended to live at home. Additionally, high school educational experience was significantly associated with current housing status ($r = -.18, p < .05$), suggesting DHH college students receiving secondary education in residential schools preferred to live on campus. However, age of hearing loss onset was negatively associated with current housing status ($r = -.19, p < .05$), suggesting DHH college students who did not know the age of hearing loss onset or those who acquired their hearing loss at older age tended to live in the residence halls.

Table 2

Summary of Demographic Characteristics (N = 132)

Category	n (%)
Age	
18	3 (2.3%)
19	17 (12.9%)
20	31 (23.5%)
21	39 (29.5%)
22	24 (18.2%)
23	13 (9.8%)
24	2 (1.5%)
25	1 (0.8%)
34	1 (0.8%)
45	1 (0.8%)
Minimum~maximum (Range)	18~45 (27)
Mean (SD)	21.17 (2.73)
Gender	
Female	80 (60.6%)
Male	52 (39.4%)
Types of institution	
Public university	47 (35.6%)
Private university	20 (15.2%)
Institute of technology	65 (49.2%)
Major	
Agriculture	2 (2.3%)
Business	14 (10.6%)
Education	16 (12.1%)
Engineering	2 (1.5%)
Health and medicine	6 (4.5%)
Liberal arts/social science	11 (8.3%)
Math	2 (1.5%)
Public affair and law	12 (9.1%)
Recreation and sports	13 (9.8%)
Science	23 (17.4%)
Visual and performing arts	30 (22.7%)
College level	
Freshman	32 (24.2%)
Sophomore	28 (21.2%)
Junior	45 (34.1%)
Senior	27 (20.5%)

Category	n (%)
Age of hearing loss onset	
At birth	57 (43.2%)
Birth~3 years	26 (19.7%)
4 years~6 years	7 (5.3%)
6 years~12 years	3 (2.3%)
13 years~20 years	2 (1.5%)
Unknown	37 (28%)
Degree of hearing loss	
Moderate-severe hearing loss	27 (20.5%)
Severe hearing loss	32 (24.2%)
Profound hearing loss	73 (55.3%)
Types of amplification	
Hearing aid	106 (80.3%)
Cochlear implants	18 (13.6%)
None	8 (6.1%)
Primary communication modes	
Oral	63 (47.7%)
Total communication	68 (51.5%)
Did not report	1 (0.8%)
High school educational experience	
Inclusive	114 (86.4%)
Residential	17 (12.9%)
Did not report	1 (0.8%)
Parental hearing status	
Both hearing	122 (92.4%)
Both deaf	3 (2.3%)
One hearing/deaf	6 (4.5%)
Did not report	1 (0.8%)
Father's communication mode	
Oral	113 (85.6%)
Taiwanese sign language	3 (2.3%)
Total communication	12 (9.1%)
Did not report	4 (3%)
Mother's communication mode	
Oral	112 (84.8%)
Taiwanese sign language	3 (2.3%)
Total communication	14 (10.6%)
Did not report	3 (2.3%)
Current housing status	
On campus	73 (55.3%)
Off campus	26 (19.7%)
Home	32 (24.2%)
Did not report	1 (0.8%)

Table 3

Bivariate Correlations for All Demographic Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Age	1	-.05	.15	.44**	.06	.02	-.03	-.15	.10	.02	-.12	-.09	.19*
2 Gender	-.05	1	-.05	.05	-.11	-.10	.21*	.11	.02	.01	.07	.14	<.01
3 Types of institution	.15	-.05	1	.12	-.02	.16	-.02	-.29**	.12	.02	-.21*	-.23**	.25**
4 College level	.44**	.05	.12	1	.01	.02	-.03	.03	-.01	.12	-.06	.01	-.01
5 Age of hearing loss onset	.06	-.11	-.02	.01	1	-.10	-.01	<.001	.07	-.06	-.03	-.07	-.19*
6 Degree of hearing loss	.02	-.10	.16	.02	-.10	1	.14	-.34**	.23**	-.07	-.08	-.04	-.01
7 Types of amplification	-.03	.21*	-.02	-.03	-.01	.14	1	-.01	-.02	-.09	-.07	.04	-.02
8 Primary communication modes	-.15	.11	-.29**	.03	<.01	-.34**	-.01	1	-.28**	-.11	.20*	.23**	.01
9 High school educational experience	.10	.02	.12	-.01	.07	.23**	-.02	-.28**	1	.003	-.12	-.10	-.18*
10 Parental hearing status	.02	.01	.02	.12	-.06	-.07	-.09	-.11	.003	1	.23**	.11	-.05
11 Father's communication mode	-.12	.07	-.21*	-.06	-.03	-.08	-.07	.20*	-.12	.23**	1	.90**	-.03
12 Mother's communication mode	-.09	.14	-.23**	.01	-.07	-.04	.04	.23**	-.10	.11	.90**	1	-.04
13 Current housing status	.19*	<.001	.25**	-.01	-.19*	-.01	-.02	.001	-.18*	-.05	-.03	-.04	1

Note. * $p < .05$, ** $p < .01$

Descriptive Statistics for Outcome Variables

The outcome variables in this study included college students' GPA (a 100-point scale used in Taiwan), academic adjustment (the Learning subscale in the CSAC-II), family relationship (the Family subscale in the CSAC-II), and social adjustment (the Interpersonal Relationship subscale in the CSAC-II). As shown in Table 3, mean, minimum, maximum, range, standard deviation, and skewness were generated for each variable. Using ± 1.96 as the criterion, the skewness of all outcome variables was at acceptable level (Munro, 2005).

Table 4

Descriptive Statistics of Outcome Variables

Variable	N	Mean	Minimum	Maximum	Range	SD	Skewness
GPA	129	76.00	21.75	90.64	68.89	9.60	-1.82
CSAC_Learning	119	12.61	0	40	40	10.36	.74
CSAC_Family	119	5.96	0	38	38	7.49	1.65
CSAC_Interpersonal	119	10.22	0	38	38	10.02	1.08

Note. GPA = a 100-point scale used in Taiwan; CSAC_Learning, CSAC_Family, CSAC_Interpersonal Relationship = the Learning, Family, and Interpersonal Relationship subscales in the CSAC-II, respectively.

Hypotheses Testing Results

Hypothesis 1. *There is no relation between academic difficulties and the variables of age, gender, degree of hearing loss, primary communication modes, amplification, high school educational experience, and family relationship in DHH college students across Taiwan.*

Multiple regression analysis in AMOS was performed to examine the relation between academic difficulties and various explanatory variables. With the use of the AMOS program, each explanatory variable (age, gender, degree of hearing loss, primary communication modes, types of amplification, high school educational experience, and family relationship), the outcome

variable (the CSAC_Learning score), and an unobserved error variable were displayed in the path diagram, and then unstandardized and standardized estimates were generated.

As shown in Table 5, all the explanatory variables combined accounted for 46% of the total amount of variability in academic difficulties among DHH college students. The CSAC_Family score ($\beta = .65, p < .001$) made a unique contribution to predicting academic difficulties, indicating students with higher CSAC_Family scores (i.e., more family problems) were expected to have more academic difficulties (higher scores in the CSAC_Learning subscale). An interpretation of the standardized coefficient indicates that a one standard deviation increase in Family is associated with a .65 standard deviation increase in perceived academic difficulties. Age, gender, degree of hearing loss, primary communication mode, types of amplification, and high school educational experience did not contribute uniquely to the model.

Table 5

Summary of Multiple Regression Analysis for Variables Predicting Academic Difficulties among All DHH College Students (N=132)

Variable	<i>b</i>	SE <i>b</i>	β
Age	.14	.27	.04
Gender			
<i>Male(1) vs. Female(0)</i>	-1.67	1.54	-.08
Degree of Hearing Loss			
<i>Moderate-severe(1) vs. Profound(0)</i>	-1.37	2.08	-.05
<i>Severe(1) vs. Profound(0)</i>	-3.16	1.87	-.13
Primary Communication Mode			
<i>Oral(1) vs. Total communication(0)</i>	1.70	1.56	.08
Types of Amplification			
<i>Cochlear implants(1) vs. Hearing aid(0)</i>	-2.24	2.22	-.07
<i>None(1) vs. Hearing aid(0)</i>	-3.30	3.06	-.08
High School Experience			
<i>Residential(1) vs. Inclusive(0)</i>	.37	2.30	.01
CSAC_Family	.90	.10	.65***

Note. Dependent Variable= academic difficulties= the Learning subscale in the CSAC-II; 0 as the referent group; CSAC_Family= the Family subscale in the CSAC-II; $R^2 = .46$; *** $p < .001$.

Hypothesis 2. *There is no relation between GPA and the variables of age, gender, degree of hearing loss, primary communication modes, amplification, high school educational experience, and family relationship in DHH college students across Taiwan.* Multiple regression analysis in the AMOS program was used to examine the relation between GPA and various explanatory variables. Each explanatory variable (age, gender, degree of hearing loss, primary communication modes, types of amplification, high school educational experience, and family relationship), the outcome variable (the GPA score), and an unobserved error variable were displayed in the path diagram, and then unstandardized and standardized estimates were calculated.

As shown in Table 6, all the explanatory variables combined accounted for 11% of the total amount of variability in GPA among DHH college students. The CSAC_Family score (β

= .20, $p < .05$) made a unique contribution to predict GPA, indicating students with lower CSAC_Family scores (i.e., fewer family problems) were expected to have higher GPA scores. An interpretation of the standardized coefficient indicates that a one standard deviation increase in Family is associated with a .20 standard deviation increase in GPA scores. Age, gender, degree of hearing loss, primary communication mode, types of amplification, and high school educational experience did not contribute uniquely to the model.

Table 6

Summary of Multiple Regression Analysis for Variables Predicting GPA among All DHH College Students (N=132)

Variable	<i>b</i>	SE <i>b</i>	β
Age	.09	.30	.03
Gender			
<i>Male(1) vs. Female(0)</i>	-3.37	1.77	-.17
Degree of Hearing Loss			
<i>Moderate-severe(1) vs. Profound(0)</i>	-2.16	2.39	-.09
<i>Severe(1) vs. Profound(0)</i>	.23	2.15	.01
Primary Communication Mode			
<i>Oral(1) vs. Total communication(0)</i>	1.97	1.78	.10
Types of Amplification			
<i>Cochlear implants(1) vs. Hearing aid(0)</i>	-3.42	2.55	-.12
<i>None(1) vs. Hearing aid(0)</i>	1.48	3.50	.04
High School Experience			
<i>Residential(1) vs. Inclusive(0)</i>	.69	2.65	.02
CSAC_Family	-.26	.12	-.20*

Note. Dependent Variable= GPA; 0 as the referent group; CSAC_Family= the Family subscale in the CSAC-II; $R^2 = .11$; * $p < .05$.

Hypothesis 3. *There is no relation between social difficulties and the variables of age, gender, degree of hearing loss, primary communication modes, amplification, high school educational experience, and family relationship in DHH college students across Taiwan.*

Multiple regression analysis was performed to examine the relation between social difficulties and various explanatory variables. With the use of the AMOS path diagram, each explanatory variable (age, gender, degree of hearing loss, primary communication modes, types of amplification, high school educational experience, and family relationship), the outcome variable (the CSAC_ Interpersonal Relationship score), and an unobserved error variable were displayed in the model, and then unstandardized and standardized estimates were generated.

As shown in Table 7, approximately 54% of total variance of social difficulties among DHH college students was explained by all explanatory variables included in the model. The CSAC_Family score ($\beta=.72, p < .001$) played a unique role to predict social difficulties, indicating students with higher CSAC_Family scores (i.e., more family problems) were expected to have more social difficulties (higher scores in the CSAC_ Interpersonal Relationship subscale). However, variables of age, degree of hearing loss, primary communication mode, and high school educational experience did not contribute to the overall model.

Table 7

Summary of Multiple Regression Analysis for Variables Predicting Social Difficulties among All DHH College Students (N=132)

Variable	<i>b</i>	SE <i>b</i>	β
Age	-.13	.24	-.04
Gender			
<i>Male(1) vs. Female(0)</i>	1.20	1.37	.06
Degree of Hearing Loss			
<i>Moderate-severe(1) vs. Profound(0)</i>	.67	1.84	.03
<i>Severe(1) vs. Profound(0)</i>	.16	1.67	.01
Primary Communication Mode			
<i>Oral(1) vs. Total communication(0)</i>	-1.58	1.38	-.08
Types of Amplification			
<i>Cochlear implants(1) vs. Hearing aid(0)</i>	-.88	1.97	-.03
<i>None(1) vs. Hearing aid(0)</i>	-1.91	2.71	-.05
High School Experience			
<i>Residential(1) vs. Inclusive(0)</i>	-.20	2.01	-.01
CSAC_Family	.16	1.66	.72***

Note. Dependent Variable= social difficulties= the Interpersonal Relationship subscale in the CSAC-II; 0 as the referent group; CSAC_Family= the Family subscale in the CSAC-II; $R^2 = .54$; *** $p < .001$.

Hypothesis 4. *There is no relation between a student's GPA and his/her academic adjustment, social adjustment, or interaction between the two as indicated by the College Student Adjustment Checklist (CSAC-II; Ju, 2008).* Multiple regression analysis was performed to examine the relation between GPA and two explanatory variables (academic and social adjustment). Each explanatory variable, the outcome variable (the GPA score), and an unobserved error variable were displayed in the path diagram, and then unstandardized and standardized estimates were calculated. As shown in Table 8, all the explanatory variables combined accounted for 7% of the total amount of variability in GPA among DHH college students. Neither the CSAC_Learning score nor the CSAC_Interpersonal Relationship score did contribute uniquely to the model. In addition, the interaction variable (academic * social adjustment as indicated by the CSAC-II) was tested and it was not statistically significant.

Table 8

Summary of Multiple Regression Analysis for Variables Predicting GPA (N=132)

Variable	<i>b</i>	SE <i>b</i>	β
CSAC_Learning	-.14	.11	-.16
CSAC_Interpersonal Relationship	-.12	.12	-.13

Note. Dependent Variable= GPA; CSAC_Learning, CSAC_Interpersonal Relationship = the Learning and Interpersonal Relationship subscales in the CSAC-II, respectively; $R^2 = .07$.

CHAPTER V

Discussion

This chapter presents a summary of the results in terms of the four major research questions. In sum, the explanatory variable of family relationship plays a uniquely significant role in predicting academic success and social competence among DHH college students in Taiwan. However, how academic and social adjustment impact DHH students' educational performance remains unknown. Finally, limitations of the present study and directions for future research are both discussed.

Summary of Study Results

Relations between academic performance (academic difficulties and perceived GPA scores) and the variables of age, gender, degree of hearing loss, primary communication modes, amplification, high school educational experience, and family relationship in DHH college students across Taiwan. Research has shown that factors associated with student academic success are numerous, including demographic, aptitude, communication, and audiological characteristics (Convertino et al., 2009; Toscano et al., 2002). The main finding of this study indicated that family relationship plays a unique and significant role in predicting academic success. DHH college students in Taiwan who reported having more problems in the area of family relationship were more likely to experience more academic difficulties and have lower GPA scores.

The current finding is supported by several studies, which suggested that positive family characteristics (e.g., good family relationships, parental supports, and higher expectations) result in higher academic achievement among DHH students (Bodner-Johnson, 1986; Luckner & Muir, 2001; Marschark & Hauser, 2011; Reed et al., 2008; Toscano et al., 2002; Whyte & Guiffrida,

2008). On the other hand, DHH college students in Taiwan reported that too much pressure and expectations from parents may result in lower academic performance as well. With respect to family issues, DHH college students in Taiwan reported that it is difficult to maintain good relationships with hearing family members due to lack of communication ease, which is consistent with Marschark and Hauser's (2011) research. Statistically, it indicated that 122 (92.4%) students have hearing parents in the current study. However, only 2.3% of this population uses Taiwanese Sign Language as the primary communication mode at home. Furthermore, communication barriers and misconception of deaf capability may cause poor family relationships. In the long run, lack of family support may influence educational achievement as a result.

In terms of educational placements, more and more DHH students receive education in inclusive settings. Antia and colleagues (2010) further suggested that the amount of time they are integrated with hearing peers has an effect on their academic performance. Consistent with a handful of previous studies (Allen & Osborn, 1984; Antia et al., 2009; Easterbrooks & Beal-Alvarez, 2012; Kluwin & Moores, 1985, 1989; Stinson & Kluwin, 2003, 2011), the present study indicated that less than 5% of variance in academic performance is explained by educational placements, and the relation between educational placement and academic success remained unclear.

Relations between social adjustment and the variables of age, gender, degree of hearing loss, primary communication modes, amplification, high school educational experience, and family relationship in DHH college students across Taiwan. The current study revealed that family relationship was a significant predictor of social adjustment, rather than any demographic, aptitude, communication, or audiological characteristics. DHH college

students in Taiwan who reported having more problems in the area of family relationships were more likely to experience more social difficulties. This result is similar to what was found in previous research (Hintermair, 2006; Watson et al., 1990), which indicated that family stress impacts the social competence of DHH students.

With regard to family stress, DHH college students in Taiwan reported that it is difficult to maintain good relationships with hearing family members due to lack of communication ease, which is consistent with Marschark and Hauser's (2011) research. The Gallaudet Research Institute (2011) reported that a majority of DHH students in the 6-21 age range were born to hearing families who do not sign regularly. Without communication ease, it is difficult for DHH students to maintain good relationships with hearing family members.

Relations between a student's academic performance (perceived GPA scores) and his/her academic adjustment, social adjustment, or interaction between the two as indicated by the College Student Adjustment Checklist (CSAC-II; Ju, 2008). The current study results suggested that neither academic adjustment nor social adjustment accounted for Taiwanese DHH college students' educational achievement. This finding is contrary to prior studies (Polat, 2003; Stinson et al., 1987; Stinson & Walter, 1997), which showed that well-developed social competence is a positive predictor of future academic success. However, the interpretation of the present study should be made with caution since it may not reveal the complexity of DHH participants' academic and social adjustment, as it only relied on self-report data of DHH participants.

Limitations

There are some limitations that need to be taken into consideration in the current study. First, self-reported data may not truly reveal the DHH participants' perception of academic and

social difficulties as indicated in the CSAC-II. Participants may have wanted to answer questions in a socially acceptable manner. On the other hand, students may have been forced to answer questions that do not entirely relate to their personal experience, since all test items in the CSAC-II were determined by conducting an interview questionnaire and asking professional counselors for advice. Another concern is participants' level of literacy. DHH college students may misunderstand the abstract concepts of particular questions without the help of interpreters. Second, generalization to the entire DHH population is restricted due to the use of convenience sampling in the current study. Finally, more DHH participants need to be surveyed, especially those with mild or moderate hearing loss (26-55 dB on the ANSI scale). In this study, only college students with hearing loss at the level of 55 dB and beyond in Taiwan were recruited. Therefore, the lack of participants with mild or moderate hearing loss may restrict the interpretation of results, and impact generalization to the entire DHH population as well.

Directions for Future Research

There are some directions for future research based the current findings. First, qualitative research methods such as interviews might be included in future studies. The self-reported data of the study may not truly reveal DHH participants' perception of academic and social difficulties as indicated in the CSAC-II. In order to entirely reflect DHH students' perception of academic and social adjustment, it is practical to include interviews for future studies.

Second, future studies might include the online dictionary of Taiwanese Sign Language to break down communication barriers. Another concern in the current study is the level of literacy among DHH participants. Research has shown that the average reading performance of DHH students is lower than their high school-aged hearing peers (Allen, 1986; Traxler, 2000). In the current study, DHH college students may have misunderstood the abstract concepts of

particular questions without the help of interpreters. Therefore, the online dictionary of Taiwanese Sign Language may be included for future research.

Third, future studies should include multiple data sources such as teachers, parents, siblings, and peers. The data of the current study relied only on self-reported data of DHH college students, which may restrict the interpretations of results. In addition, present findings suggested family relationships play a unique role either in DHH college students' academic performance or their social adjustment. Future studies may especially include family members as another critical data source.

Fourth, a longitudinal study could be conducted to further explore the relations between academic success and social competence as a DHH participant ages. Research has indicated that DHH students with higher educational achievement and social competence are more willing to complete their postsecondary program (Stinson et al., 1987; Stinson & Walter, 1997). Moreover, Kersting's (1997) suggested that DHH college students might experience more alienation as freshmen, but found their social life had improved during the second and fourth years due to better communication skills and increased participation in social activities. As a result, conducting a longitudinal study may help discover whether improved social skills lead to lower retention rate problems and future academic success.

Finally, hearing participants might be included as the comparison group for future studies. The present study indicated difficulties DHH college students experienced in the areas of academic performance, social competence, and family relationships. Still, the difference in coping with life struggles between DHH and the hearing population remains unclear. Therefore, hearing college students could be included in future studies to further explore how the various developmental and environmental factors impact all college students.

Conclusions

This study provides a better understanding of how factors may influence the academic and social adjustment of DHH college students in Taiwan. These factors included age, gender, degree of hearing loss, primary communication mode, amplification, high school educational experience, and family relationship. Since previous researchers tended to examine several factors in a single study based on their research interests, the current study is unique in putting all the factors together to find out relations among these factors.

Three major findings were suggested in the current study. First, family relationship was significantly associated with academic performance, regardless of any demographic, audiological, and communication factors. DHH students who experienced less family stress tended to have fewer academic difficulties or better GPAs. Second, family relationship made a unique contribution to social competence, rather than any person characteristics. DHH students who reported having more family stress were more likely to experience social difficulties. Finally, neither academic nor social adjustment served as a predictor of academic success among DHH college students.

These findings of the current study can provide practical implications for teachers and college personnel to build a supportive program and environment for DHH students in Taiwan. For future studies, conducting a longitudinal study to further explore the relations between academic success and social competence as DHH participant ages is suggested. In addition, examining exploring how the various developmental and environmental factors impact both hearing and DHH college students is recommended for future research as well.

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Appendix A

Information Statement

Dear Students,

My name is Chia-fen Liu, a doctoral student in the Department of Special Education at the University of Kansas. I am recruiting deaf and hard of hearing college students in Taiwan for my dissertation research under the supervision of Sally Roberts, Ph. D. The purpose of this study is to understand several factors influencing school adjustment in deaf and hard of hearing students in Taiwan. If you currently are a college student with hearing loss who is at least 18 years old, I would like to invite you to participate in the study.

The study will be conducted using an online survey system created by Psychological Publishing Company in Taiwan. You will be asked to answer the College Student Adjustment Checklist (2nd edition). It will take approximately 20 minutes to complete the entire online survey. All information gathered about you will be kept anonymous and confidential. There are no anticipated risks to you in the study. Your name will not be associated in any way with the research findings. It is possible, however, with internet communications, that through intent or accident someone other than the intended recipient may see your response. Afterwards, you will receive a copy of results of this study.

If you agree to participate in this study, please answer questions listed on the following pages (the Demographic Information Form), and return it to me via email as an attachment. Please feel free to contact me or my advisor listed below if you have any questions about this study. If you have any questions about your rights as a research participant, please contact mdenning@ku.edu.

Thank you for your time and consideration.

Sincerely,

Chia-fen Liu
Doctoral Student
Special Education
1122 W. Campus Rd.
Joseph R. Pearson Hall, 5th Floor
University of Kansas
Lawrence, KS 66045
Phone: (785) 304.0886
Email: nunuliu0820@gmail.com

Sally Roberts, Ph. D.
Associate Dean
School of Education
1122 W. Campus Rd.
Joseph R. Pearson Hall, Room 214J
University of Kansas
Lawrence, KS 66045
Phone: (785) 864.0553 Fax: (785) 864-7030
Email: sroberts@ku.edu

Appendix B**Demographic Information Form**

1. Name: _____.
2. Age: _____.
3. Birth Date: _____ (mm/dd/yy)
4. Gender: Male Female
5. College Name: _____.
6. Major: _____.
7. College Level: Freshman Sophomore Junior Senior
8. GPA: _____.
9. Age of Hearing-Loss Onset:
 at Birth at the Age of _____ Unknown
10. Degree of Hearing Loss:
 Hard of Hearing Loss/ Mild-Moderate Loss
 Hard of Hearing Loss/ Severe Loss
 Deaf/ Profound Loss
11. Types of Amplification:
 Hearing Aid Cochlear Implants
12. Primary Communication Modes:
 Oral
 Taiwanese Sign Language
 Total Communication (oral, sign language, written language, gestures, and etc.)

13. High School Educational Experience:

- General Classroom
- Resource Room (_____ hours per week)
- Self-Contained Classroom
- Special School

14. Parental Hearing Status:

- Father: Hearing Deaf or Hard of Hearing
- Mother: Hearing Deaf or Hard of Hearing

15. Parental Communication Mode:

- Father: Oral Taiwanese Sign Language Total Communication
- Mother: Oral Taiwanese Sign Language Total Communication

16. Current Housing Status:

- On Campus Off Campus Home