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**Quality of life in Hong Kong adolescents with hearing loss**

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### Abstract

Quality of life (QOL) is used in measuring the health of an individual. It helps evaluating the treatment efficacy and cost effectiveness of different therapeutic techniques. However, limited studies were conducted to assess the QOL of hearing impaired (HI) adolescents, especially in Chinese population. This study aims at targeting this research gap. Fifty-seven HI adolescents and their parents were recruited from a deaf school in Hong Kong. Chinese version of KINDL – kiddo and parent questionnaire was used to investigate the generic QOL of the adolescents. Normative data from normal hearing Singaporean adolescents was used for comparison. Result showed that the parent-child agreement on QOL rating was good. Significant difference ( $p < .001$ ) was found only in the school subscale. The self-reported QOL was comparable to the normal hearing norms. Result suggested that HI adolescents in Hong Kong are having QOL comparable to normal hearing peers. Parents are reliable reporter for their QOL and hearing impairment posed little distress on adolescents' QOL.

## Introduction

In 1948, health was defined by the World Health Organization as ‘a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity’ (World Health Organization, 1948). Since then, more and more quality of life (QOL) research were done in the Western culture to assess the health status of hearing impaired (HI) population, ranging from children and adolescents (e.g. Smith-Olinde, Grosse, Olinde, Martin & Tilford, 2008; Huber, 2005; Loy, et al., 2010) to adults (e.g. Mo, Lindbæk & Harris, 2005) and elderly (e.g. Chia et al., 2007). The results from these studies provide a subjective evaluation on how the HI people rate their QOL. This rating on life satisfaction acts as an outcome measure to evaluate aspects beyond the ability to hear, but also how these people function physically, psychologically and socially. The outcome measure can evaluate the efficacy, cost effectiveness and benefit of different therapeutic techniques, for example, the implementation of hearing aids and cochlear implant.

Generally, poorer QOL was found in population with more severe hearing loss (Dalton et al., 2003). However, due to difference in culture and ethnicity, HI people in Hong Kong may not perceive QOL the same as the participants in studies done in Western population. Results of studies in Western countries may not be applicable to Hong Kong HI population. To address this problem, studies were done in recent years to evaluate the QOL of HI population in Hong Kong. Cheng (2008) found that the QOL in Hong Kong HI elderly was poorer than the general population. Ho (2009) also found that HI adults using cochlear implants have lower QOL and

reduced social functioning than the population norm. However, these two studies are both focusing on older population. QOL in HI adolescents in Hong Kong is yet to be found.

### **Definition of quality of life and its measurement**

There is no clear definition of QOL (Bowling, 1995). In early days, scientists measure QOL in terms of morbidity, mortality and service utilization. Recently, the concept of QOL has been extended to include physical, psychological and social functioning. Each of these domains can be measured using objective assessment of functioning, such as the degree of hearing loss, or using subjective perception (Testa & Simonson, 1996). An individual's perception on these domains can be influenced by his/her experiences, beliefs, expectations and perception (Patrick, Bush & Chen, 1973; Brook et al., 1979; Li et al., 1998). This is the reason why two persons can have different QOL even they have the same health status.

In order to measure QOL using quantitative values, researchers often construct questionnaires and ask the individuals to rate the important components (items) in each QOL domain. This method assumes that the true value of QOL can be measured indirectly by integrating score of different items (Lord, 1980). The measurement of QOL can be obtained from physicians, caregivers and the individuals themselves. The QOL rated by other parties (e.g. parents, teachers) is called proxy rating. Proxy rating provides complementary information, such as the academic competence and daily functioning, of the individual from another point of view (Eiser & Morse, 2001).

### **Parent-child agreement in QOL measurement**

Parents' rating as proxy is important in measuring QOL in children as children may not be able to understand and express their perception on QOL. This raises the researchers' interest to investigate the parent-child agreement on QOL.

Research studies generally find good agreement of proxy rating and self rating on overall QOL (Eiser & Morse, 2001). Loy et al. (2010) found that adolescents with cochlear implant rated their QOL similar to their parents and the normal hearing peers. However, when consider different domains within QOL, Eiser & Morse (2001) analyzed 14 research studies on parent-child agreement and found that good agreement ( $r > 0.5$ ) was observed in physical activity, functioning and symptoms from six studies, but poor agreement in other domains such as emotions, social functioning, cognitive functioning and compliance from the other eight studies. Besides, Jokovic, Locker & Guyatt (2004) also found that parents gave more 'Don't know' responses in social well-being subscale than in other subscales in QOL. These results agree with Achenbach, McConaughy & Howell (1987)'s hypothesis that parents have more accurate judgment on child's externalizing problem (e.g. aggressiveness, physical functioning) than on internalizing problem (e.g. emotions, social functioning).

### **Health issues in adolescents**

Generally, adolescence refers to the second decade of life, starting from the onset of

puberty (Kazdin, 1993). As a transition from childhood to adulthood, adolescents face significant physical, psychological and social changes. These changes pose challenges on adolescents' well-being in different domains. Biologically, Ernst, Pine and Hardin (2006) suggested that the neuroendocrine changes during adolescence can affect their emotional stability. Besides, social changes during adolescence are suggested by psychologists. Josselson (1994) suggested that the major task of adolescents is to construct their identity and become individualized. As a result, they become more independent from their family and move toward their peers.

In a longitudinal study done by Shek (2008), Hong Kong adolescents' initiative to communicate with their parents was found to decrease from grade seven to grade nine. Their perceived parental behavioral control and perceived parent-child relational qualities also become lower as they progress to upper grades. According to Yon (2000), adolescents' view of own identity is constructed mainly in school life. Thus, family and school functioning are two important aspects in evaluating QOL in adolescents.

### **Quality of life in hearing impaired adolescents**

According to Census and Statistics Department (2008), 204 Hong Kong students were studying in special schools for HI in 2007. The figure was about half of that in 2002, which revealed that more HI students were integrated in mainstream schools. Hearing impairment affects one's language competence, cognitive and social development. This will hinder

adolescents' daily interactions with peers, teachers and family (Schlesinger & Meadow, 1972) and reduce their QOL. As HI adolescents may never achieve normal language development (Mahshie, Moseley, Lee & Scott, 2006), social and affective development (Harris, 1978), it is questionable whether HI adolescents have QOL comparable to their hearing peers.

Although no study was done to address the QOL of HI students in Hong Kong, several studies done on Western countries can give us some insight. These studies compared the performance of HI adolescents and their hearing peers, based on the adolescents' psychological development, social interaction and academic achievement. McCain & Antia (2005) found that American HI students in grade three to five had lower academic competence and reading ability, but comparable classroom participation and social ability when compared with their hearing classmates. Sahli & Belgin (2006) found that adolescents with cochlear implant have similar rating on self-esteem as their normal hearing peers. However, Agrawal & Kaur (2001) found that HI adolescents had higher anxiety and poorer adjustment level than younger HI children. Raymond & Matson (1989) also found that HI adolescents had higher incidence of social withdrawal and aggression.

### **Objective of this study**

This study aimed at finding out the QOL of HI adolescents in Hong Kong. To investigate this, QOL was rated by the HI adolescents and their parents. Result was compared with the QOL ratings of normal hearing peers. It was expected that the overall QOL rating from HI



adolescents and their parents would show no significant different. However, poorer parent-child agreement was expected in less observable domains (e.g. emotional well-being, self-esteem) than in more observable domains (e.g. physical well-being, school functioning). Besides, the effect of demographic variables, such as age of identification and hearing experience, on QOL rating was analyzed.

In the study, normative data from normal hearing adolescents was obtained from published studies. However, most normative data are only available from Western population (e.g. QOL of German adolescents reported by Ravens-Sieberer, Görtler & Bullinger, 2000; QOL of American adolescents reported by Zullig, Valois, Huebner & Drane, 2005). These data may not be generalized to the target group of this study due to difference in the perception of “health”, as adolescents from different countries rated their QOL differently (Gilman et al., 2008). In order to minimize the cultural influence on the QOL rating, Wee, Ravens-Sieberer, Erhart & Li (2007)’s QOL data of normal hearing adolescents in Singapore was chosen as comparison in this study. This was because their sample pool consists of 82% of Chinese, and Singapore is a city socio-culturally more similar to Hong Kong than other Western countries.

### **Methodology**

A cross-sectional comparison was made between (1) parent-reported versus self-reported rating of QOL in HI adolescents, and (2) self-reported rating on QOL versus normal hearing adolescents from Singapore, based on data obtained from Wee et al. (2007)’s study.

## **Participants**

Eighty-one students and their parents were invited to participate in the study from January to February 2010. The students were all secondary school students, studying in or receiving special education service from a special school for HI in Hong Kong. They were all diagnosed with hearing loss. Age of identification of hearing loss, age of implantation or first amplification, type of hearing device and mode of communication were not considered as exclusion criteria, in order to form a representative sample of HI adolescents in Hong Kong. The only exclusion criterion was the inability to complete the questionnaire, possibly due to mental retardation, severe language impairment or psychological problems. None of the invited participants was excluded.

The recruitment was on voluntary basis. Among all eighty-one pairs of students and their families, fifty-seven pairs of them responded positively to participate. The demographic characteristics of the sample are showed in Table 1.

Table 1

*Demographic characteristics of study sample*

Characteristics		N	Percentage
Sex of student ( <i>n</i> = 57)	F	36	63.2%
	M	21	36.8%
Age of student (in year, <i>n</i> = 56)	Mean (SD)	16.02 (2.32)	
	12 – 14	14	25.0%
	15-16	21	37.5%
	>16	21	37.5%
Type of education ( <i>n</i> = 57)	Deaf school	49	86.0%
	Inclusive education	8	14.0%
Grade ( <i>n</i> = 57)	Junior secondary (S1 – 3)	32	56.1%
	Senior secondary (S4 – 5)	25	43.9%
Type of amplification ( <i>n</i> = 55)	Hearing aid	28	49.1%
	Cochlear implant	27	47.4%
Age of identification of hearing loss (in year, <i>n</i> = 46)	Mean (SD)	2.70 (3.31)	
	< 3	29	63.0%
	3 – 5	12	26.1%
	> 5	5	10.9%

Age of implantation or first	Mean (SD)	4.57 (2.74)	
amplification (in year, $n = 45$ )	< 3	10	22.2%
	3 – 5	22	48.9%
	> 5	13	28.9%
Hearing experience (in year, $n$	Mean (SD)	11.78 (3.35)	
= 44)	< 10	8	18.2%
	10 – 15	30	68.2%
	> 15	6	13.6%

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## Material

Various QOL questionnaires are available for research purpose. However, there is no QOL assessment tool specific for HI adolescents. As a result, a more generic measure was adopted in this study. The KINDL was selected because it shows good reliability, convergent validity, factorial validity and sensitivity in Western and Asian populations (Ravens-Sieberer & Bullinger, 2000; Rajmil et al., 2004; Wee et al., 2005; Wee et al., 2007; Christophersen, Helseth & Lund, 2008). Besides, the Kiddo version in KINDL was designed specifically to accommodate adolescents' need. Its language and content are relatively simple among other questionnaires available. This favors the HI adolescents to complete the questionnaire because many of them have delayed language ability (Mahshie et al., 2006). In addition, parent questionnaire is available for comparison.

The Kiddo questionnaire was designed for adolescents aged 12 – 16, based on their cognitive, social and developmental levels. The parent questionnaire consists of items corresponding to the Kiddo questionnaires. Both questionnaires consist of six subscales, including physical well-being (PW), emotional well-being (EW), self-esteem (SE), family (FA), friends (FR) and school (SC). Each subscale consists of four items rated using a five-point Likert scale. Subscale score can be obtained and transformed to a 100-point scale, in which 0 indicates the worst QOL and 100 indicate the best QOL.

As the Kiddo questionnaire and parent questionnaire were not available in Chinese. Forward- and backward- translation procedure was implemented based on Maxwell (1996)'s suggestion. The English questionnaires were translated to Chinese by the author of this study. A bilingual language teacher was invited to translate the questionnaires back to English. In order to verify the final version, differences in two language versions were discussed by the translators and more appropriate wordings were adopted. Additional questions concerning the demographic characteristics were also added to the questionnaires.

In order to maintain the parametric property of the Likert scale after translation, a small-scale survey was done. Thirty-two university students who were native Cantonese speakers and started learning English since grade one were invited to participate. Twenty proposed Chinese wordings of the scale were given. Colloquial Chinese descriptors were used instead of literal form, in order to facilitate understanding. The students were asked to (1) give the relative frequency (in percentage) based on the Chinese wording; and (2) match the most

suitable Chinese word with the original English items in the scale. Five Chinese words were chosen based on three criteria: (1) mean of relative frequency closed to the expected frequency; (2) small standard deviation among the frequency given by different students; and (3) matched with the original English items by the largest number of students. Table 2 showed the descriptive statistics of the chosen words.

Table 2

*Descriptive statistics of the translated items in the Likert scale*

Original item (in English)	Expected frequency	Translated item (in Chinese)	No. of matched pairs ( $N=32$ ) and its percentage	Mean of relative frequency ( $SD$ )
Never	0%	從不	28 (87.5%)	0.0% (0.00)
Rarely	25%	很少	25 (78.1%)	15.8% (6.85)
Sometimes	50%	有時	26 (81.3%)	42.8% (9.56)
Often	75%	通常	22 (68.8%)	76.4% (6.87)
Always	100%	任何時候	27 (84.4%)	97.8% (5.38)

### **Data collection**

Ethics application was approved by the Faculty Research Ethics Committee of the Faculty of Education, the University of Hong Kong. Consent was obtained from the school principal, the students and their parents. The adolescents' data was collected at school. They completed the questionnaires and the questionnaires were collected in class. They were allowed to ask questions when they did not understand the questions. The question would be rephrased by the author to facilitate their understanding. Attempts were made to explain the questions in a manner consistent with the meaning of each statement. Among different grades, students from junior secondary school raised more questions during filling out the questionnaire.

The parent questionnaire and consent form were given to the student after the completion of adolescent questionnaire. Parents completed the questionnaire at home and returned it to school for collection. The adolescent questionnaires and parent questionnaires were paired up. Twenty-four adolescent questionnaires were excluded from the study due to the failure to receive parent's consent.

### **Data analysis**

The data was transformed into total score and sub-scale scores in a 100-point scale, using the formulae listed on the KINDL manual (Ravens-Sieberer & Bullinger, 2000). Self-reported and parent-reported scores, as well as the data from Wee et al. (2007) were analyzed using SPSS Statistics 13.0. Pearson's coefficient was used to correlate the demographic data with the total scores. A *p*-value (two-tailed) smaller than .05 was used to determine significance.

Paired-sample Student's *t*-test was used to compare the difference between self-reported and parent-reported mean scores. Independent Student's *t*-test was used to compare the ratings between QOL scores of HI adolescents and normal hearing population norm. In order to minimize the possibility of making type I error after the multiple comparisons, the *p*-value was adjusted. A *p*-value (two-tailed) smaller than .01 was used to determine significance.

### **Results**

Table 3 shows the descriptive statistics of the total score and subscale scores obtained from



HI adolescents in Hong Kong, their parents and the population norm from Wee et al. (2007)'s study done in Singapore. All scores were transformed into 100-points scale according to the formulae provided by the KINDL's authors (Ravens-Sieberer & Bullinger, 2000). Age, grade, the age of identification of hearing loss, age of implantation or first amplification, and hearing experience did not significantly correlate to the self-reported and parent-reported total scores in Pearson's correlation coefficient ( $p > .05$ ).

From the statistics, it is found that both HI adolescents from Hong Kong and normal hearing Singaporean adolescents rated lowest in SE and SC when compared with other domains. Parent also rated SE as the lowest, followed by FR and SC.

Table 3

*Descriptive statistics of the KINDL result from the HI adolescents, their parents and from Wee et al. (2007)'s study.*

	HI adolescent ( <i>n</i> = 57)	Parent ( <i>n</i> = 57)	Population norm ( <i>n</i> = 1026)
KINDL Sub-scales	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>
Total score	58.02 (9.26)	59.50 (9.57)	56.6 (11.92)
Physical well-being (PW)	73.36 (15.78)	69.30 (14.09)	61.4 (16.66)
Emotional well-being (EW)	63.16 (15.43)	60.64 (13.87)	66.8 (17.36)
Self-esteem (SE)	41.78 (17.60)	47.92 (16.93)	39.7 (22.69)
Family (FA)	62.28 (16.95)	66.23 (12.82)	68.3 (20.93)
Friends (FR)	60.20 (15.25)	55.48 (17.32)	62.2 (17.53)
School (SC)	47.37 (14.36)	57.46 (11.66)	41.4 (16.57)

Table 4 shows the paired-samples *t*-test result of the ratings made by the HI adolescents and their parents, as well as the independent *t*-test result of the ratings made by the HI adolescents and the population norm. Results showed that the total score of HI adolescents was not significantly different from their parents or the population norm. However, significant difference was found between self-reported rating and parent-reported rating in subscale SC ( $p < .001$ ), that is, HI adolescents tended to rate the school functioning more negatively than their

parents. Difference was also found between HI adolescents and normal hearing peers in PW ( $p < .001$ ). The HI adolescents rated their PW more positively than the normal hearing adolescents.

Table 4

*Comparison between (1) mean scores obtained from HI adolescents and their parents using paired-sample t-test; (2) mean scores obtained from HI adolescents and normal hearing Singaporean adolescents using independent t-test.*

KINDL Subscales	HI adolescents ( <i>n</i> = 57) versus parent ( <i>n</i> = 57)		HI adolescents ( <i>n</i> = 57) versus population norm ( <i>n</i> = 1026)	
	Mean difference	<i>t</i> value	Mean difference	<i>t</i> value
Total score	-1.48	-.991	1.42	.885
PW	4.06	1.629	11.96	5.290 **
EW	2.52	1.034	-3.64	1.549
SE	-6.14	-2.106	2.08	.681
FA	-3.95	-1.531	-6.02	2.133
FR	4.71	1.590	-2.00	.844
SC	-10.09	-4.809**	5.97	.027

Note. Significant level (two-tailed): \*\*  $p < .001$ ; \*  $p < .01$

## Discussion

### Ratings made by hearing impaired adolescents and their parents

HI adolescents rated their QOL similar to their parent. This finding is congruent to the results obtained from American HI adolescents in Loy et al. (2010)'s study and from Austrian

HI adolescents in Huber (2005)'s study. Both of these studies were done in population with cochlear implant. However, the current study include adolescents with cochlear implant ( $N= 27$ ) and hearing aids ( $N = 28$ ). The current result suggested that HI adolescents' QOL might not be affected by type of amplification chosen. Parents of HI adolescents are reliable proxy reporter as they were able to rate their child's overall QOL comparable to their child.

When looking into different domains in QOL, HI adolescents rated similarly with their parents in most domains. Significant difference was found only in SC ( $p <.001$ ). This does not support the assumption made by Achenbach, McConaughy & Howell (1987) that low agreement is expected in EW and SE. To investigate the reason, we could look into the items in these domains. In the Kiddo questionnaire, the "less observable" EW and SE subscales actually include items that are externalizing, such as "I had fun and laughed a lot" (item 5) and "I had lots of good ideas" (item 12). These "more observable" items possibly raise the parent-child agreement in these domains. On the other hand, when we consider the domain of SC, parents might have fewer chance to understand their child's functioning and satisfaction at school due to the increased independence and reduced initiative to communicate with parents during adolescence (Shek, 2008). Adolescents might seldom tell their worries about academic achievement and school works to their parents, which leads to discrepancy in ratings. Extra information (i.e. parent-child agreement on normal hearing adolescent's QOL) is needed to further investigate this assumption.

Generally speaking, parents of HI adolescents are able to rate their child's QOL reliably. In

order to further improve parents' understanding on HI adolescents' QOL, it is suggested that parents can communicate with their child in the area of school functioning. Schools can also provide more opportunities for parents to understand their child's performance in school.

### **Ratings made by hearing impaired adolescents and normal hearing peers**

The overall QOL of HI adolescents and normal hearing peers showed no significant difference. The result suggests that hearing impairment does not pose great impact on overall QOL in adolescence. HI adolescents perceived their QOL comparable to normal hearing peers.

Both HI adolescents in Hong Kong and normal hearing Singaporean adolescents rated lowest in SE and SC when compared with other domains. Their ratings on these two domains showed no significant difference. This phenomenon was also observed in normal hearing adolescents from Western countries like Germany (Ravens-Sieberer et al., 2000), America (Loy et al., 2010) and Spain (Serra-Sutton et al., 2009). This suggested that self-esteem and school functioning are typical sources of anxiety during adolescence, regardless of hearing ability.

Significant difference ( $p < .001$ ) was found in PW. HI adolescents in Hong Kong rated their PW more positively than the normal hearing Singaporean adolescents. The high rating of PW by HI adolescents suggested that hearing impairment does not distress them in terms of physical functioning. Besides, the large discrepancy might possibly due to the low rating made by Singaporean adolescents (Mean: 61.4, *SD*: 16.66) when compared with other normative data from American adolescents (Mean: 72.86, *SD*: 15.31; Loy et al., 2010) and Spanish adolescents

(Mean: 76.9, *SD*: 16.9; Serra-Sutton et al., 2009). Thus, further study measuring local normative data is suggested.

### **Limitation of study**

The current study does have limitations. The HI adolescents were invited by convenience sampling from one deaf school in Hong Kong. The sampling size is small and the HI adolescents were not included if they (1) study in other deaf school, (2) study in mainstream school and do not receive special education service from the target school, (3) have ended their study already, or (4) are with additional handicap such as mental retardation. The sample population might not be representative enough and, thus, generalizability reduces. Besides, the participation was totally voluntary and parental consent was needed. Adolescents with less family support might be excluded from the study and lead to a bias sampling. Besides, normative data from Singaporean adolescents was used for comparison. Result might be affected by cultural difference between Singapore and Hong Kong. Lastly, the measuring instrument was translated from English to Chinese for administration. The psychometric properties of the original version might not be preserved after translation.

### **Further study**

In order to evaluate the QOL in HI Hong Kong adolescents, further study obtaining QOL data from normal hearing Hong Kong adolescents and their parents is suggested. Researchers

should include adolescents from different settings to obtain a better sampling. This provides data to investigate whether HI adolescents in Hong Kong are having QOL comparable to their hearing peers from the same society. During the investigation, more explanation should be provided to the HI students in junior secondary school to facilitate their understanding of items in the questionnaire.

### **Conclusion**

To sum up, HI adolescents in Hong Kong perceived their QOL comparable to normal hearing Singaporean adolescents. Hearing impairment does not pose great impact on their QOL. Both HI and normal hearing adolescents showed relative difficulty in self-esteem and school compared to other domains within QOL. Parents of HI adolescents had good understanding of their child's QOL, as revealed by a good parent-child agreement in QOL rating. In order to improve parents' understanding on their child's QOL, parents are suggested to communicate more with their child in the area of school functioning. Further study should be made to compare data obtained from normal hearing adolescents and their parents.

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