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Quality of life and performance with cochlear implants in Hong Kong

by

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## Abstract

With growing population and longer life expectancy, hearing impairment becomes a global issue. An increase of the prevalence of hearing impairment has been observed in Hong Kong in this decade. Cochlear implant is used by patients with hearing impairment who are not benefited by using amplification devices (e.g. hearing aids). Studies from Western countries supported the use of cochlear implant in improving quality of life. However, culture and ethnicity may influence the attitudes towards quality of life. The research findings from Western population may not be applicable to Hong Kong; where Chinese is the main ethnicity. This study aims to investigate the hearing performance and health-related quality of life in cochlear implant Chinese users in Hong Kong. Seventeen participants were recruited from support groups and cochlear implant companies. The Chinese version of Short-Form 36 health survey (SF-36) and Screening version of Hearing Handicap Inventory for the Elderly (HHIE-S) were used to investigate the health-related quality of life of participants. The results suggested that cochlear implant users show better scores in seven out of eight scales of SF-36 than unaided hearing impaired group. However, cochlear implant users perform significantly poorer than general population in Social Functioning and Mental Health ( $p < 0.05$ ). The pattern of quality of life is different from findings in Western countries. This supports culture and ethnicity may influence attitudes towards quality of life.

## Introduction

### **Prevalence of hearing impairment**

With growing population and longer life expectancy, hearing impairment becomes a global issue. An increase of the prevalence of hearing impairment has been observed in Hong Kong in this decade. Based on the survey results of Census and Statistics Department (2001, 2008), the number of people with hearing difficulty in Hong Kong has risen from 69,700 (1% of total population) in Year 2000 to 92,200 (1.3% of total population) in Year 2007.

According to the World Health Organization (2006), around 278 million people over the world had moderate to profound hearing loss.

### **Effect of hearing impairment**

Hearing impairment was suggested to have social and economic burden on individual, family, community and country level (World Health Organization, 2006). Hearing impairment was found to negatively affect speech and language development (Yoshinaga-Itano, et al., 1998), school behavior and educational progress (Bess, Dodd-Murphy & Parker, 1998), communication (Foster, 1998), family life (Morgan-Jones, 2001) and working life (Backenroth-Ohsako et al., 2003). Studies also showed that hearing impairment (especially for severe-to-profound level) has a measureable impact on psychosocial aspect (Foster, 1998) and quality of life (Dalton, et al, 2003). Hearing impaired people have a higher tendency to feel lonely, exhausted, anxious, depressed, less secure, and have lower self-esteem and lower self-efficacy (Kramer et al., 2002).

### **Rehabilitation services for hearing impairment**

Individuals with hearing impairment may experience communication problems that lead to activity limitation and participation restriction. The American Speech-Language-Hearing Association (2006) emphasized the importance of introducing audiologic rehabilitation to enhance the speech-language, cognitive and social-emotional development of

children; and interpersonal, psychosocial, educational, and vocational functioning of adults. Audiologic rehabilitation includes the fitting of amplification devices and assistive technologies. Hearing aid fitting helps individuals to improve the patients' ability to hear sounds in the environment and to improve the audibility of speech (American Speech-Language-Hearing Association, 2001). Cochlear implants are designed to help severely to profoundly hearing impaired adults and children who get little or no benefit from conventional amplification (e.g. hearing aid) for functioning in daily activities (American Speech-Language-Hearing Association, 2004).

### **Overview on working principle of cochlear implant**

A cochlear implant is an implanted electronic hearing device receives and processes sound from outside (Center for Devices and Radiological Health, U.S. Food and Drug Administration, 2004). It can replace the function of damaged hair cells by transducing sound energy into electrical signals. Those electric signals will be transmitted along auditory nerve and finally by brain. A cochlear implant consists of both external and internal components. The external component includes a microphone, speech processor and radiofrequency transmitting coil. And radiofrequency receiver coil, stimulator and multichannel electrode array can be found in the implanted internal part (Balkany et al., 2001).

### **Efficacy of cochlear implant**

Studies were published to investigate the efficacy of cochlear implant in different age group as an audiologic rehabilitation. Improved quality of vocalization (Svrisky et al., 1998), speech recognition ability (O'Donoghue et al, 1999) and speech intelligibility (Allen et al., 1998) were found in pediatric cochlear implant users. Knutson et al. (1997) also pointed out the benefits of cochlear implant on psychological aspect and social skills of children.

The efficacy of cochlear implant was also widely studied in adult. Evidence was found to support the benefit of cochlear implantation on sound localization and speech

intelligibility in noise in adult cases (Litovsky et al., 2004). Study in Hong Kong also revealed comparable improvement in speech perception performance was found in older adults after implantation (Chan et al., 2007). These findings supported the use of cochlear implant can be applicable in various ages.

### **Concept of Quality of Life (QOL)**

Traditionally, quantifiable indicators such as hearing threshold, speech recognition ability and speech intelligibility were used as outcome measures of hearing rehabilitation. However, the measurement of an individual's functional ability may not be able to tell whether the patients have improvement in their life.

Quality of life (QOL) is another concept used to evaluate the efficacy of health and medical intervention. In the rehabilitation field, quality of life measurements provide a more comprehensive view on how the patients respond to the disability and limitation (Tulsky & Chiaravalloti 2004). Besides objective life status indicators (e.g. hearing threshold), quality of life is also determined by quality of social interaction, psychological well-being, bodily sensation and life satisfaction (Bowling, 1995). Personal beliefs, values, goals and needs were also found to determine the perception and concern about quality of life (Li et al, 1998).

Studies showed improvement on quality of life among users of cochlear implants. Faber & Grontyed (2000) found cochlear implant users in Denmark showed significant improvements in quality of life and daily performance, including self-perceived communication skills, frequency of conversation with others and self-confidence and the impact of hearing impairments on family life. Similar studies also revealed improvement in quality of life after implantation in Netherlands (Hinderink et al., 2000), the United States of America (Cohen et al., 2004) and Belgium (Vermeire et al., 2005). However, relative few studies on quality of life have done on cochlear implant users in Hong Kong.

The World Health Organization (2007) defined health as a state of complete well-being in physical, mental and social aspects and not merely means the absence of infirmity and disease. To study the quality of life of individuals of specific health state (e.g. individuals with hearing impairment), health-related quality of life (HRQOL) can be used to focus on the impact of a perceived health state (e.g. hearing impairment) on the ability to live a fulfilling life (Bowling, 1995). Health-related quality of life of cochlear implant user provides a more specific insight on whether cochlear implant eliminates the negative impacts caused by hearing impairment. Hawthorne et al. (2004) was found cochlear implant brings a large beneficial effect on health-related quality of life of adult patients in Australia and New Zealand.

### **Measurement of HRQOL**

The MOS 36-item short-form health survey (SF-36) (Ware & Sherbourne, 1992) is a published survey used to investigate health-related quality of life. It is assessed in eight scales: physical functioning (PF), role limitation due to physical problems (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role limitation due to emotional problems (RE) and mental health (MH) (Ware & Sherbourne, 1992). The eight standardized scale scores can range from 0 to 100, with higher scores indicating better health-related quality of life. Chinese version is available and was assessed to satisfy psychometric assumptions (Lam et al, 1998).

Apart from the eight scales from SF-36, Hearing handicap inventory for the elderly (HHIE) (Ventry & Weinstein, 1983) can be used to identify the emotion and social functioning of patients with hearing loss. This can address the handicap effect of the hearing impairment on everyday functions (e.g. daily conversation) (Mulrow & Lichtenstein, 1991) and provide insight on health-related quality of life. The screening version of the HHIE (HHIE-S) contains ten questions, with five items assessing emotional effects of hearing loss

and five items exploring social effects of hearing impairment. The emotional scale and the social scale can range from 0 to 20. A lower score in HHIE-S represents better health-related quality of life. HHIE-S was translated into Chinese version and was assessed to satisfy psychometric assumptions (Yuen, 2005)

### **Cultural influence on health-related quality of life**

Assessing quality of life or health-related quality of life involves examining individual's perceptions of life experiences (Flanagan, 1982) and subjective views of satisfaction and happiness (Abbey & Andres, 1986). Cultural factor is an important issue to be addressed. As culture and ethnicity may influence attitudes towards quality of life (Keith, 1996), the previous study findings from Western countries may not be applicable to cochlear implant users in Hong Kong. Therefore, before using quality of life as a measurement of the efficacy of cochlear implant in Hong Kong, the culture values or beliefs should be addressed.

Chinese philosophies and religions strongly influence of living and thinking about health and health care. Chinese is the major ethnic group in Hong Kong, contributing about 95% of total population (Census and Statistics Department, 2007). Main traditional Chinese philosophies, including Confucianism, Buddhism, and Taoism, contribute to a different approach from which Western philosophies on health and life (Phillips & Pearson, 1996).

Traditional Chinese people believed that health was influenced by spirits and fate (McLaughlin & Braun, 1993). Chinese emphasize collectivism which adjusting the attitudes and lifestyles to adapt to changes in nature and health (Sakei & Borrow, 1985). They might rely on more passive forms of coping, such as keeping busy and not thinking too much about issue about health (Huang, 1991). Cheung (1985) suggested this type of endurance and self-directed coping strategy towards health issue was related to the Confucian tradition of self-discipline. In contrast, Western culture advocates individualism and positivism (Phillips &



Pearson, 1996). They prefer to adopt more active and problem-focused attitudes in coping changes on life caused by health problem.

### **Aim of this study**

The difference between Chinese and Western cultures on attitudes towards health and the coping behaviors lead to difference in values and needs, which in turns may affect the perspective towards quality of life.

This principal aim of this study is investigate the hearing performance and health-related quality of life in cochlear implant Chinese users in Hong Kong. It is expected that the cochlear implant users in Hong Kong may hold a different perspective on quality of life with findings from Western countries.

Secondly, comparison between the health-related quality of life ratings between (a) cochlear implant user, (b) hearing impaired individuals (Cheng, 2008) without fitting of amplification devices and assistive technologies and (c) normal hearing individuals (Lam et al., 1999) can confirm whether cochlear implantation bring improvement on quality of life to patients with hearing impairment. And whether cochlear implant user can have a quality of level at approximate level as normal hearing individuals.

The findings may help health-care service providers to set objectives and directions of their services to cochlear implant users in Hong Kong.

## Methodology

### **Participants**

A total of seventeen cochlear implant users (nine male and eight female) were recruited from January to March 2009 in Hong Kong. Convenience sampling was used. Participants were recruited at voluntary basis from support groups of cochlear implant users and cochlear implant companies using the following criteria:

1. Chinese cochlear implant users
2. Age 18 or above
3. Use of cochlear implant for over one year
4. No history of neurological or psychological problems which may affect the reliability of survey answers
5. No history of language problems which may affect the comprehension to the questionnaire questions

The demographic characteristic of the sample of 17 subjects was showed in Table 1.

Table 1 Demographic characteristics of study sample

Characteristics		N	Percentage
Gender	Male	9	52.9%
	Female	8	47.1%
Age	18-40	5	29.4%
	41-60	11	64.6%
	61-80	0	0%
	>81	1	5.9%
Marital status	Married	8	47.1%
	Single	5	29.4%
	Divorced	1	5.9%
	Widow/widower	2	11.8%
	Not answered	1	5.9%
Residential status	Alone	2	11.8%
	With family	14	82.4%
	Elderly home	1	5.9%
Educational level	Nil	1	5.9%
	Primary	4	23.5%
	Secondary	7	41.2%
	Tertiary	5	29.4%
Occupational status	Retired	4	23.5%
	Part time	1	5.9%
	Full time	10	58.8%
	Not answered	2	11.8%

## **Materials and data collection**

Research purpose and procedure were firstly explained to the participants and written consent (see Appendix A) or verbal consent was obtained. The interview was carried out either by phone (10 participants) or mail (7 participants). After the case history (see Appendix B) were collected, the Chinese version of SF-36 (see Appendix C) and HHIE-S (see Appendix D) were used in this study to investigate the health-related quality of life of cochlear implant users.

## **Data analysis**

Eight scale scores of SF-36 were transformed (Ware et al., 2003) for each participant. The emotional and social functioning scale of HHIE-S was also calculated (Ventry & Weinstein, 1982).

Scores of SF-36 and HHIE-S was interpreted by using SPSS Statistics 17.0. The One-way ANOVA will be used to compare the mean SF-36 scores of cochlear implant users obtained in this study with unaided hearing impaired adults (Cheng, 2008) and population norms (Lam et al., 1999) in Hong Kong. Spearman Rho coefficient was used to correlate measures of health-related quality of life from SF-36 and HHIE-S.

## Results

### The SF-36 scale scores

There were no missing data on any of the SF-36 items from all 17 participants.

Table 2 shows the descriptive statistics (mean and standard deviation) of the SF-36 scale scores in two genders respectively. No significant difference ( $p < 0.05$ ) was found in scores between male and female participants. In latter comparison, scores in male and female will be combined as single group.

Table 2 Descriptive statistics of the SF-36 scale scores

SF-36 scales	Male (N=9)		Female (N=8)		t-Test	
	Mean	SD	Mean	SD	t	sig. (2-tailed)
PF	88.89	23.02	84.38	23.21	.402	.693
RP	80.56	39.09	84.38	29.69	-.224	.825
BP	85.11	25.55	94.75	10.08	-.997	.334
GH	58.33	19.69	58.00	16.24	.038	.970
VT	69.44	28.77	69.38	13.21	.006	.995
SF	77.78	29.17	90.63	11.08	-1.170	.260
RM	77.78	37.27	91.67	23.57	-.904	.380

Eight SF-36 scale scores of the cochlear implant participants are compared with unaided hearing impaired individuals (Cheng, 2008) and general population norm (Lam et al., 1999) by one-way ANOVA in Table 3 and mean plots in Figure 1.

Significant difference was found in all eight SF-36 scales within three groups. Higher scores indicate better HRQOL.

Table 3 Comparison of SF-36 scales between (1) cochlear implant users, (2) hearing impaired individuals and (3) population norm.

SF-36 scales	Cochlear implant users (N=17)		Hearing impaired (N=67)		Population norm (N=2410)		ANOVA
	Mean	SD	Mean	SD	Mean	SD	Sig.
PF	86.76	22.50	62.84	27.94	91.83	12.89	p<0.001
RP	82.35	33.96	38.06	40.91	82.43	30.97	p<0.001
BP	89.65	19.89	71.21	29.53	83.98	21.89	p<0.001
GH	58.18	17.58	44.33	22.38	55.98	20.18	p<0.001
VT	69.41	22.14	47.31	26.28	60.27	18.65	p<0.001
SF	83.82	22.86	71.83	29.7	91.19	16.57	p<0.001
RE	84.31	31.44	55.72	45.09	71.66	38.36	p<0.001
MH	70.35	19.55	66.09	22.65	72.79	16.57	p<0.001

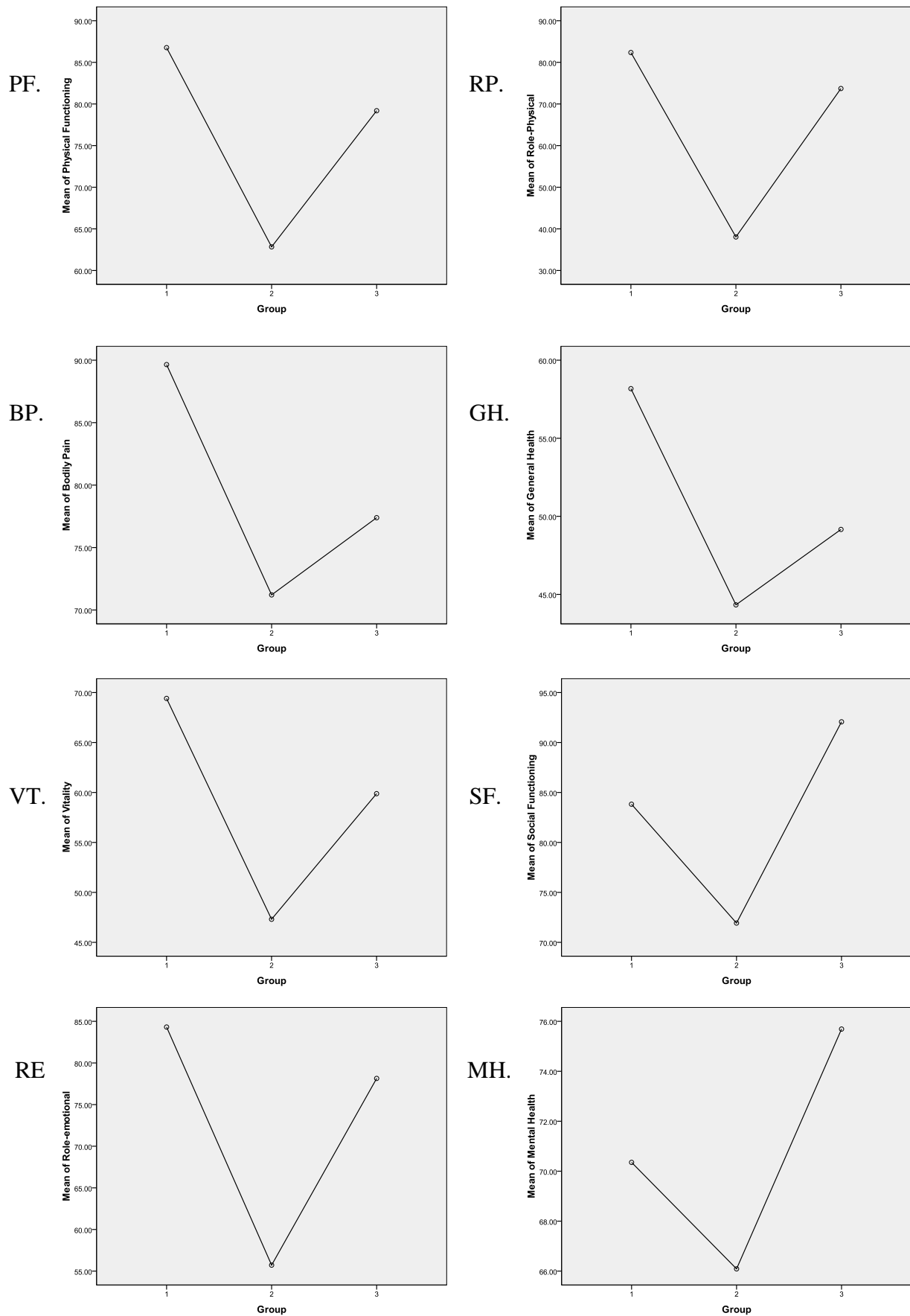


Figure 1. Mean plots of the SF-36 scale scores between (1) cochlear implant users (N=17), (2) hearing impaired individuals (N=67) and (3) population norm (N=2410).

## HHIE score

There were no missing data on any of the HHIE-S items from all 17 participants. Table 4 shows the comparison of descriptive statistics (mean and standard deviation) of the HHIE-S scores between cochlear implant users (N=17) and hearing impaired individuals (Cheng, 2008) (N=67). Higher scores indicate greater extent of adverse effects of hearing impairment on emotional or social adjustment (Ventry & Weinstein, 1982)

Table 4. Comparison of the HHIE-S scores between cochlear implant users (N=17) and hearing impaired individuals (N=67).

HHIE-S scales	Cochlear implant users (N=17)		Hearing impaired (N=67)		t-Test	
	Mean	SD	Mean	SD	t	Sig.
Emotion	6.82	4.80	4.96	5.07	3.237	.002
Social	9.65	6.45	8.54	5.64	1.431	.156
Total	16.47	10.50	13.49	9.88	2.366	.020

## Relationship between the SF-36 and HHIE

The relationships among the different scales of the SF-36 and the HHIE-S were explored by using two-tail Spearman's rho correlation. Correlations were found between some scales of SF-36 (RP, VT, SF, RE and MH) and the HHIE-S score with various significance.



Table 5. Spearman's rho correlations between the different scales of the SF-36 and HHIE-S (N=17).

SF-36 \ HHIE-S	PF	RP	BP	GH	VT	SF	RE	MH
Emotional	-0.64	-0.674**	-0.324	-0.224	-0.444	-0.483*	-0.534*	-0.501*
Social	-0.264	-0.625**	-0.313	-0.124	-0.472	-0.469	-0.625**	-0.412
Total	-0.221	-0.704**	-0.344	-0.179	-0.538*	-0.540*	-0.622**	-0.495*

\* Correlation is significant at the 0.05 level (2-tailed)

\*\* Correlation is significant at the 0.01 level (1-tailed)

## Discussion

Hearing impaired older Hong Kong Chinese without hearing instruments (e.g. hearing aids, cochlear implant) was reported to have a lower degree of quality of life than general population (Cheng, 2008). Studies in Western countries (Faber & Grontyed, 2000; Hinderink et al., 2000; Cohen et al., 2004; Vermeire et al., 2005) found that cochlear implant users gain significant improvement in quality of life. The objective of this study is to assess the health-related quality of life of cochlear implant users in Hong Kong.

### **Comparison between cochlear implant users, unaided hearing impaired group and population norm in Hong Kong**

The result of one way ANOVA reveals a significant difference was found in all eight scales of SF-36 across the three groups. Stepwise comparisons, (1) cochlear implant users and unaided hearing impaired group and (2) cochlear implant users and population norm, was made to analyze the assessment findings.

Comparison between the cochlear implant users and unaided hearing impaired group showed that cochlear implant users having significant higher scores ( $p < 0.05$ ) in all SF-36 scales except Mental Health. This revealed that cochlear implantation bring overall improvement of quality of life, which was consistent which previous studies in Western countries (Faber & Grontyed, 2000; Hinderink et al., 2000; Cohen et al., 2004; Vermeire et al., 2005).

The result showed that although cochlear implant generally bring benefits on quality of life, no significant improvement on Mental Health was revealed from cochlear implant users in Hong Kong. A more extreme pattern was shown when comparing findings of SF-36 and HHIE-S. Cochlear implant users have significant higher score in emotion scale of HHIE-S than hearing impaired group. High scale in emotion scale theoretically indicates greater

extent of adverse effects of hearing impairment on emotional adjustment (Ventry & Weinstein, 1982) and thus a poorer emotional or mental health may be revealed. This shows cochlear implant users may have even poorer emotion and mental health than unaided hearing impaired individuals, which is contradictory with results from Western countries (Faber & Grontyed, 2000; Hinderink et al., 2000; Cohen et al., 2004; Vermeire et al., 2005).

Although cochlear implant users showed better quality of life in a majority of aspects than unaided hearing impaired group, discrepancy in quality of life still exists when compared with population norms.

Cochlear implant users showed significant ( $p < 0.05$ ) higher score than population norm in six scales, including Physical Functioning (PF), Role Functioning (RP), Bodily Pain (BP), General Health (GH), Vitality (VT) and Role-Emotional (RE). It means cochlear implantation bring improvement of quality of life in these six aspects and catch up with normal population.

In contrast, significant ( $p < 0.05$ ) lower scores of Social Functioning (SF) and Mental Health (MH) than population norm were observed in cochlear implant users in Hong Kong. By definition, low score in Social Functioning (SF) reveals extreme and frequent interference with normal social activities while the low score in Mental Health (MH) reveals feelings of nervousness and depression (Ware, 1992).

Studies on the adverse effects of hearing loss have been made in different aspects of their lives, including social and psychological aspects. A high incidence of psychological disturbance among hearing impaired patients was found by Thomas (1984). Feeling of frustration, embarrassment, isolation and stress was identified in the study by Backenroth-Ohsako, Wennberg & Klinteberg (2003).

Hearing impairment leads to hidden problems in daily functioning. Backenroth-Ohsako, Wennberg & Klinteberg (2003) suggested hearing impairment brings problem in one's functionality, such as working life and family life.

Therefore, the significant lower scores of Social Functioning (SF) and Mental Health (MH) than population norm showed cochlear implant was not able to fully eliminate the adverse effect of hearing impairment on these social functioning and mental health.

### **Comparison between cochlear implant users in Hong Kong and Western countries**

The different pattern in mental health and emotional aspect across Chinese and Western cochlear implant users may be explained by the characteristics of Chinese perspectives towards emotion and its expression.

In contrast to Western culture, traditional Chinese belief is relatively preserved in emotion or mental health issues. The Confucianism, Taoism, and Buddhism emphasized the virtues of moderation and self-discipline on emotional expression (Yip, 2005). Therefore, Chinese is less likely to have strong and significant emotional change than Western people. This may indirectly make Chinese cochlear implant users become less responsive to changes and improvement in emotion aspect and mental health.

Besides that, mental health problem may be perceived as insanity in Chinese society in some occasion. People who have emotional problems and seek help from mental health practitioner may be stigmatized. This misconception on mental health makes Chinese cochlear implant users ignore the importance of mental health and do not seek help even when problems exist.

Apart from difference in attitudes towards mental health, the difference in treatment approaches may also make the improvement in mental health and emotional aspect become insignificant in Chinese. Treatment which is short-term and directive is more preferable and

effective in Chinese society (Williams et al., 2006). Somatic complaints (e.g. difficulties in hearing) are the main concern when seeking help from practitioners. In contrast, non-directive person-centered approach (Chu, 1999) has been adopted in health care service in Western countries to cover psychological issues during rehabilitation progress together with somatic treatment. Having a more comprehensive rehabilitation service allows the cochlear implant users in Western countries to have more significant improvement in mental health.

Social functioning is another area which cochlear implant users in Hong Kong facing difficulties. As hearing impairment does not necessarily bring a prominent signs of injury, Backenroth & Ahlner (1997) suggested hearing impairment as a hidden disability. It means that individuals with hearing impairment may deny or conceal the disability. Their concealment behaviors, such as pretending to understand other speech or just ignore other even when communication breakdown occur may be perceived as “unfriendly”, “rude” and “snobbish” (Robertson, 1999) as others do not understand the special needs caused by hearing impairment. This may make hearing impaired individuals become regarded as social incompetent.

The ultimate goals for us should be both hearing and hearing impaired individuals work together to reach successful communication. In Chinese society, shame might be associated with seeking help from others (Kuo and Kavanagh, 1994). They refuse to ask for assistance and pretend as normal in order to avoid being stigmatized or discriminated against. Therefore, Chinese concepts of “loss of face” make some cochlear implant user tend to avoid making unpleasant or embarrassing situations in communication or social functioning by simply refusing participation. Maillet, Tyler & Jordan (1995) pointed out hearing impaired individuals, especially at severe to profound level, usually had fewer social relationships and decreased social activities. In short, the avoidance of interaction makes the cochlear implant users become withdrawn from social activities, thus adversely affects the social functioning.

## **Relationship between SF-36 and HHIE-S**

Both SF-36 and HHIE-S were used to study the health-related quality of life of cochlear implant users in Hong Kong. Spearman's rho correlation was administered between the scores of SF-36 and HHIE-S of cochlear implant users. Correlations were found between some scales of SF-36 (RP, VT, SF, RE and MH) and the HHIE-S score with different level of significance (Table 5). This finding was generally consistent with Cheng (2008) that only small association was found between various scales of the SF-36 and HHIE-S with hearing impaired group (N=67).

A more significant correlation was found between HHIE-S and Role Functioning scale - Role-Physical (RP) and Role-Emotional (RE) in SF-36. This can be explained by the nature of questions that both focusing on the daily functioning.

## **Implications on health-care service providers in Hong Kong**

Although improvement on quality of life was generally observed, adverse effects of hearing impairment still persist on social functioning and mental health after cochlear implantation. Rehabilitation services should be arranged to cover these two areas to improve the quality of life of cochlear implant users in Hong Kong.

One of the main psychosocial issues of hearing impaired patients is the tendency to conceal hearing impairment. Hearing impaired individuals may perceive the impairment as stigma and try all means to conceal it. One prerequisite to the rehabilitation service of is to restore a positive attitude towards the impairment. Propaganda and education should be delivered to both hearing impaired and hearing public. Hearing impaired individuals should acknowledge and disclose the impairment (Robertson, 1999). From the study of Wong (2005), more than 80% of participants believed hearing loss or having unclear hearing was natural and refuses to seek external help. Education should be delivered to the public to build up

better knowledge towards hearing impairment and how communication can be facilitated when communicating with hearing impaired individuals. The public should understand the needs of hearing impaired individuals and create a more enabling environment for their social functioning.

As Chinese tends to be reluctant to seek help for psychological or mental problem, propaganda is recommended to introduce a positive attitude towards mental health. Frontline health-care service providers (e.g. social worker, audiologist, medical practitioner) may take an active role in identification any hearing impaired patients who have risk of psychosocial burden. Referral to appropriate remediation services may be provided.

## Limitations

One limitation of this study is that the findings were drawn from a cross-sectional survey. A further study with a longitudinal repeated measure design (before and after of cochlear implantation) can better illustrate the causal inference of changes of quality of life measure bring by cochlear implant.

.Another limitation is that the effect of demographic characteristics of participants may inference the one's perception towards quality of life. Analysis on the effect and interaction between those factors can be done in future study.

The third limitation is that no hearing testing was administered to examine the hearing level of the participants. The hearing level may be different even after cochlear implantation in different participant. And this may bring effects to daily life functioning and quality of life to different extent.

The last limitation is that the participants are recruited by from members of support groups or cochlear implant companies. Those cochlear implant users who do not participate in any support groups or activities organized by cochlear implant companies may not be reached and participate in this study. The participants in this study may be the more active members and so to be more active in social functioning. This may contribute to bias to the findings on quality of life.



## Conclusions

Cochlear implant brings improvement in quality of life in hearing impaired individuals. Cochlear implant users show significant better quality of life than unaided hearing impaired group. However, there is still significant difference in social functioning and mental health between cochlear implant users and population norms.

The results in this study support the findings from Western countries that cochlear implant bring overall improvement in quality of life. However, cultural factors contribute to different pattern of improvement. Improvement in social functioning and mental health of cochlear implant users in Hong Kong is less significant than those in Western countries.

Given that adverse effect of hearing impairment on social functioning and mental health still persist in cochlear implant users, intervention services should be arranged. Counseling service and education should be delivered to both the public and hearing impaired individuals for the psychosocial issues of hearing impairment. Hearing impaired individuals should acknowledge and disclose the impairment while the public should understand the needs of hearing impaired individuals and create a more enabling communication environment.

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香港大學言語及聽覺科學系  
有關香港人工耳蝸用者之生活質素及表現之研究

同意書

香港大學言語及聽覺科學系邀請您參與由研究員何浩文主理的研究調查。這是一項關於香港人工耳蝸用者之生活質素及表現之研究。旨在探討香港人工耳蝸用者之生活質素及表現。

是項研究過程簡單，相信不會對參加者構成任何不適或風險。閣下需要完成一系列有關社會經濟背景、病歷及生活質素的問卷。問卷約需二十分鐘回答。所有有關資料將加以保密及只會供內部作研究之用。研究工具中會以代號代替參加者的姓名，以確保閣下的身份得以保密。

是次研究並不為閣下提供個人利益，但所搜集數據將提供寶貴的資料，幫助醫護人員為人工耳蝸用者制定更合適的服務目標及方向。是次參與純屬自願性質，閣下可隨時終止參與是項行動，有關決定將不會引致任何不良後果。如閣下對是項研究有任何問題，請現在提出。

如日後閣下對是項研究有任何查詢，請與研究員何浩文聯絡（電話：2859-0599）。如閣下想知道更多有關研究參與者的權益，請聯絡香港大學非臨床研究操守委員會（電話：2241-5267）。

如閣下明白以上內容，並願意參與是項研究，請在下方簽署。

本人 \_\_\_\_\_（姓名）明白上述的相關內容，並願意參與是項有關香港人工耳蝸用者之生活質素及表現的研究。

參加者簽署

日期





Appendix C Short-Form 36 (Chinese version)

說明:

這項調查是詢問您對自己健康狀況的了解。此項資料記錄您的感覺和日常生活情況。請您按說明回答下列問題。如果您對某一個問題不能做出肯定的回答，請按照您的理解選擇最合適的答案。

1 總括來說，您認為您的健康狀況是:

(只選出一個答案)

- 極好 (1)       很好 (2)       好 (3)       一般 (4)       差 (5)

2 和一年前相比較，您認為您目前全面的健康狀況如何?

(只選出一個答案)

- 比一年前好多了 (1)  
 比一年前好一些 (2)  
 比一年前差不多 (3)  
 比一年前差一些 (4)  
 比一年前差多了 (5)

3 下列各項是您日常生活中可能進行的活動。以您目前的健康狀況，您在進行這些活動時，有沒有受到限制？如果有的話，程度如何？  
(每項只選出一個答案)

有很大限制 (1)      有一點限制 (2)      沒有任何限制 (3)

- |                                     |                          |                          |                          |
|-------------------------------------|--------------------------|--------------------------|--------------------------|
| a 劇烈活動，比如跑步，搬重物，或參加劇烈的體育活動          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b 中等強度的活動，比如搬桌子，使用吸塵器清潔地面，玩保齡球或打太極拳 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c 提起或攜帶蔬菜，食品或雜貨                     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d 上幾層樓梯                             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e 上一層樓梯                             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| f 彎腰，跪下，或俯身                         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| g 步行十條街以上 (一公里)                     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| h 步行幾條街 (幾百米)                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| i 步行一條街 (一百米)                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| j 自己洗澡或穿衣服                          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

8 在過去四個星期裏，您身體上的疼痛對您的日常工作（包括上班和家務）有多大影響？（只選出一個答案）

- 毫無影響 (1)
- 有很少影響 (2)
- 有一些影響 (3)
- 有較大影響 (4)
- 有極大影響 (5)

9 下列問題是有關您在過去四個星期裏您覺得怎樣和您其它的情況。針對每一個問題，請選擇一個最接近您的感覺的答案。

在過去四個星期裏有多少時間：  
(每項只選出一個答案)

常 常 如 此 (1)	大 部 分 時 間 (2)	相 當 多 時 間 (3)	有 時 (4)	偶 爾 (5)	從 來 沒 有 (6)
-------------------------	------------------------------	------------------------------	---------------	---------------	-------------------------

- |                          |                          |                          |                          |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 您覺得充滿活力?                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 您覺得精神非常緊張?               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 您覺得情緒低落，以致於沒有任何事能使您高興起來? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 您感到心平氣和?                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 您感到精力充足?                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 您覺得心情不好，悶悶不樂?            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 您感到筋疲力盡?                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 您是個快樂的人?                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 您覺得疲倦?                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

10 在過去一個星期裏，有多少時間由於您的身體健康或情緒問題妨礙了您的社交活動（比如探親、訪友等）？

(只選出一個答案)

- 常常有妨礙 (1)
- 大部分時間有妨礙 (2)
- 有時有妨礙 (3)
- 偶爾有妨礙 (4)
- 完全沒有妨礙 (5)

11 如果用以下的句子來形容您，您認為有多正確？  
(每項只選出一個答案)

肯定對 (1)	大致對 (2)	不知道 (3)	大致不對 (4)	肯定不對 (5)
------------	------------	------------	-------------	-------------

您好像比別人更容易生病

您好像所有您認識的人一樣健康

您覺得您自己的身體狀況會變壞

您的健康極好

Appendix D Hearing Handicap Inventory for the Elderly (Chinese Screening version)

請在適當空格內填上勾號。

- |                                 | 有                        | 間中有                      | 沒有                       |
|---------------------------------|--------------------------|--------------------------|--------------------------|
| 1. 在遇見新相識的人時，聽力問題有否讓你感到尷尬？      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. 在和家人交談時，聽力問題有否讓你感到受挫折？       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. 當別人囁囁細語時，你有否感到聆聽困難？          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. 聽力問題有否令你感到殘缺？                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. 聽力問題有否令你在探望朋友,家人或鄰居時感到困難？    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. 聽力問題有否令你參加宗教或其他活動較你希望能參加的為少？ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. 聽力問題有否引至你和家人或朋友吵架？           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. 聽力問題有否令你聆聽電視或收音機時感到困難？       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. 你認為任何的聽力問題有否影響你的個人或社交生活？     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. 和家人或朋友在餐廳時，聽力問題有否令你感到困難？    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |