IS SPEECH INTELLIGIBILITY OF DEAF AND HARD OF HEARING PEOPLE A BARRIER FOR OCCUPATIONAL COMPETENCE?

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Abstract

The goal of the study was to evaluate the relationships between Speech Intelligibility (SI) and Occupational Competence (OC) of young deaf and hard of hearing (D/HH) adults. Thirty-six young adults completed SI and OC self-report questionnaires. The results indicated that occupations requiring less communication were considered to be more suitable than those requiring more communication. The level of prestige did not have a significant influence upon the ratings. SI was not found to be related to OC. The results suggest that D/HH young adults did not consider SI to be a barrier in the vocational domain.

Keywords: speech intelligibility, occupational competence, hearing impairment

Introduction

Disability affects development both directly and indirectly. The nature and severity of the condition affect development directly because they impose limitations upon the individual’s functioning. Indirectly, the disabling condition evokes emotional and social responses in the individual as well as in significant others in one’s social environment (Wright, 1983). Others’ perceptions of the disability influence their behavior toward the person, who senses their behavior. Hence, the individual’s development is affected both by their own perceptions and by those of others. These reciprocal perceptions lay the groundwork for the socio-emotional development of the individual with a disabling condition, particularly with regard to self-image and attitude toward self. Self-image and attitudes manifest themselves in self-efficacy with regard to various aspects of life, including career development variables such as occupational competence. One of the leading theoretical frameworks that guide many researchers in their attempts to understand the effects of external and internal barriers on an individual’s career development is Social Cognitive Career Theory (SCCT). This theory is a leading conceptual approach in understanding career development in general, as well as the career development of specific groups (e.g., people
with hearing impairment) (Betz & Hackett, 2006). This theory attends explicitly to the roles of environmental and other contextual variables that can support or hinder the development of career interests, goals and attainment (Lent et al., 1994), and therefore, is particularly relevant for increasing an understanding of career development of underserved populations such as people with disabilities (Betz, 2000). The extent to which hearing-impaired individuals believe they will be capable of succeeding in certain jobs is a powerful determinant in career choice and development (Read, 1994).

As a result of their hearing loss, many individuals with hearing impairment have typical voice and speech characteristics which may affect their speech intelligibility (Bench, 1992; McGarr, 1987; Ling, 1994; Monsen, 1983). Previous research reported on the effect of speech intelligibility upon successful interaction with hearing individuals, as well as on the attitudes towards the speaker (Most, Weisel, & Tur-Kaspa, 1999). Thus, speech intelligibility may affect self-image, as well as competence, with regard to career plans.

The present study examined how deaf and hard of hearing (D/HH) adults evaluated their occupational competence, focusing upon the effect of their speech intelligibility upon these evaluations.

**Speech Intelligibility**

Speech intelligibility (SI) is a main factor in spoken language communication. In addition to affecting one’s ability to communicate ideas, feelings and experiences efficiently and successfully, it has an effect upon interpersonal aspects and on others’ perception of the D/HH persons (Most, Weisel, & Lev Matezky, 1997; Most, Weisel, & Tur-Kaspa, 1999). Most et al. (1999) showed that attitudes towards children with poor SI were significantly less positive than towards children with good SI. As SI increased, peers’ attitudes regarding these children’s cognitive abilities and personality features improved. Some of the earlier research studies reported that SI influences others’ ability to interact with a child. Markides (1989) found that although 27% of D/HH children reported having a hearing friend, only 3% of hearing children reported having a D/HH friend. Hearing children explained that they do not have D/HH friends because they do not understand what D/HH children say. Thus, in the case of D/HH children, the ability to communicate, and especially the ability to use spoken language for...
communication, constitutes a central factor affecting social relationships, particularly with hearing individuals. Most (2007) found that the SI of D/HH students in general education was related to their level of loneliness. The majority of the above studies dealt with young students but their results suggest that SI has a distinct influence upon the individual's level of self-esteem in general, and upon their occupational competence in particular.

Deaf Persons' Employment and Occupational Competence

The study of the employment characteristics and occupational competence of D/HH individuals is exceedingly important for two reasons: First, the employment status of D/HH people is very problematic. For example, Punch, Hyde & Creed (2004) reported that in spite of their normal intellectual and cognitive skills, less D/HH individuals continue to study towards higher degrees compared to individuals with normal hearing, and they are hired for less prestigious jobs. They also reported higher rates of unemployment among D/HH individuals.

MacLeod-Gallinger (1992) compared the employment characteristics of 4,917 deaf high school graduates with national data in the United States and found higher rates of unemployment among the deaf sample. Deaf women without college education had higher unemployment rates than comparable deaf men as well as hearing women and men. In addition, deaf employees frequently worked in lower paying occupations than hearing employees. Furthermore, salary disparities were evident between deaf and hearing workers, even in professional positions. In a demographic study of the Israeli deaf population's employment characteristics, Sela and Weisel (1992) found that 37% of their sampling were unemployed. Only a small percentage of those who were employed held prestigious positions which required high levels of professional training, such as in engineering, science or academia. Most of the employed individuals held low prestigious positions and most of them were not promoted in their jobs.

Second, competence is a fundamental determinant of one's career development. A number of research studies examined the occupational competence (OC) of D/HH people and of people who reported their expectations from D/HH individuals (e.g., DeCaro, Evans & Dowaliby, 1982; DeCaro, Mudgett-DeCaro, & Dowaliby, 2001; Hurwitz, Weisel, Parasnis, DeCaro, & Savir, 1997; Maruggi, 1983; Parasnis, DeCaro & Raman, 1996;
Parasnis, Samar, & Mandke, 1996; Weisel, 1998). In these studies, OC was measured by presenting participants with a list of occupations and asking them to indicate whether each occupation was suitable for a deaf person (e.g., Parasnis, Samar, & Mandke, 1996) or whether they would recommend that the target person (deaf or hearing) work in each of the listed occupations (e.g., Hurwitz et al., 1997). The participants in most of these studies included hearing persons such as parents and teachers of deaf students. Several studies in different countries followed these procedures, which consisted of analyzing the number and type of suitable/recommended occupations considered (e.g., DeCaro, Evans, & Dowaliby, 1982; DeCaro et al., 2001; Hurwitz et al., 1997; Maruggi, 1983; Parasnis, DeCaro, & Raman, 1996; Parasnis et al., 1996; Weisel, 1998). DeCaro et al. (2001) noted that these studies generally revealed lower evaluations of the OC of deaf persons than of hearing persons, despite the different cultures in the different countries studied. Specifically, the studies’ participants tended to limit the scope of possible occupations for this population and relegated them to technical jobs, or jobs not requiring communication. When making these evaluations, there was a tendency to ignore the individual’s personal qualities and attributes and concentrate instead upon the hearing impairment (Punch, Creed, & Hyde, 2004).

The few studies that included deaf participants themselves showed similar results. Hurwitz et al. (1997) found that deaf Israeli participants tended to have lower evaluations of competence of deaf individuals in comparison to their evaluations of hearing individuals. Schroedel’s (1992) review of the literature on deaf individuals’ occupational expectations concluded that deaf persons had relatively low expectations; they were often more inclined than hearing persons to specify that “blue-collar” jobs were more suitable. The target in the above-mentioned studies was “a deaf person” in general. The present study, in contrast, focused on the subjective evaluation of the D/HH individual through the use of self-report questionnaire on OC.

Furthermore, most of the research in the area of career development among both people with hearing disabilities and people with normal hearing focused upon working adults or adolescents. Recently, there has been empirical attention paid to a unique period of development of hearing young adults – that of emerging adulthood (Arnett, 2000). During this period of life (ages 18-29) the young people are exposed to a variety of types of jobs. The studies that explored this unique period showed that attitudes and work
experiences during this period influenced the young adults' careers (e.g., Barnet, Garies, James, & Steele, 2003; Cinamon, 2006). Research in this area among young adults with disabilities is sparse.

In sum, the present study focused upon the self-reported OC of D/HH young adults in relation to self-reported SI. We expected that D/HH young adults would feel less competent regarding occupations which require communication and which are relatively more prestigious, particularly when they feel that their speech isn't intelligible enough. Thus, we assumed that better SI would be related to higher reports of occupational competence: If they felt that it was easier to understand them, they would consequently feel more competent.

**Method**

**Participants**

Thirty-six participants (16 males and 20 females) aged 18-36 (M = 26.94) and (SD = 4.48) participated in the study. The participants were recruited through various organizations that serve D/HH individuals in Israel. All participants had a wide range of sensory neural hearing loss, ranging from moderate to profound. For 20 of the participants, the main mode of communication was the spoken language while the other 16 used simultaneous communication (speech and signs). Six of the participants had cochlear implants and the remaining used hearing aids. Twenty-four of the participants had graduated from regular high schools, in which they had all only studied with hearing students. Twelve of the participants were graduates of regular high schools in which they had studied in small special classes with other D/HH students. Most of the participants (N = 25) were college/university students/graduates and the remaining 11 were high school graduates.

**Instruments**

The following instruments were used in the present study: occupational competence scale (OC), speech intelligibility scale (SI) and a questionnaire of background information. Since the purpose of the study was to examine the subjective evaluations of D/HH individuals of their OC and their SI, self reported questionnaires were used.
Occupational Competence Scale (OC).

This scale was developed for the present study and was based on Betz and Hackett’s Occupational Self-Efficacy Scale (1981). It consisted of a list of 20 professions, categorized according to their level of communication and level of prestige. Thus there were four categories: high communication-high prestige (HCHP), high communication-low prestige (HCLP), low communication-high prestige (LCHP), and low communication-low prestige (LCLP) (Weisel & Cinamon, 2005). For the purposes of the present research study, a list of 50 occupations was presented to 16 undergraduate students, in the communication disorders department at Tel-Aviv University, who were asked to assign each of the occupations to one of the four categories. The final list consisted of 20 occupations about which there was at least 80% agreement (i.e., at least 13 judges were in agreement regarding to which category each item/occupation belonged): six items were included in the HCHP scale, five in the HCLP scale, four in the LCHP scale and five in the LCLP scale. The list of occupations for each scale and the scales’ Cronbach alpha coefficients are presented in Table 1. Each participant was asked to mark his/her degree of suitability for each occupation on a 0 to 9 scale, “0” signifying “I’m not competent at all” and “9” signifying “I’m highly competent”. The scores for each of the four scales were calculated for each participant by dividing the sum of the scale by the number of items in the specific scale. Thus, the scores ranged from 0 to 9, with the higher score indicating a higher level of competence.

Table 1: The Four Occupational Subscales

<table>
<thead>
<tr>
<th></th>
<th>HC-HP</th>
<th>HC-LP</th>
<th>LC-HP</th>
<th>LC-LP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician</td>
<td>Receptionist</td>
<td>Engineer</td>
<td>Postman</td>
<td></td>
</tr>
<tr>
<td>School principal</td>
<td>Salesperson</td>
<td>Senior Accountant</td>
<td>Carpenter</td>
<td></td>
</tr>
<tr>
<td>Lawyer</td>
<td>Teacher</td>
<td>Scientist</td>
<td>Maintenance worker</td>
<td></td>
</tr>
<tr>
<td>Owner/manager of a big business</td>
<td>Waiter</td>
<td>Computer programmer</td>
<td>Factory worker</td>
<td></td>
</tr>
<tr>
<td>Psychologist</td>
<td>Secretary</td>
<td>Security person</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior bank consultant</td>
<td></td>
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</table>

\[ A = .84 \quad .74 \quad .87 \quad .79 \]
Speech Intelligibility Scale (SI).

This six-point scale is based upon Subtelney's (1977) prior work. In this scale, 1 represents very poor intelligibility and 6 represents very good intelligibility. The scale included five questions regarding the level of intelligibility when talking to familiar and unfamiliar people on familiar and unfamiliar topics. The score was calculated by dividing the sum of the scale by the number of items. Thus, each participant's score ranged from 1 (very poor SI) to 6 (very good SI). The scale had had a reliability coefficient of .96.

Background Information Questionnaire.

The background information questionnaire contained demographic details, including the participant's age, gender, type and degree of hearing loss, use of sensory aids, mode of communication, work and academic experience.

Procedure

A research assistant met with the participants in their clubs or their homes. After receiving their agreement to participate in the study, each was presented with the list of 20 occupations and was requested to mark, on a scale of 0-9, the degree of their competence to perform each of the occupations. The SI evaluation and the background questionnaire were administered next. The participants completed all the questionnaires in approximately 15 minutes.

Results

Table 2 presents the OC mean scores and their standard deviations. A repeated measures MANOVA with communication and prestige as two of the factors revealed a significant effect of communication $[F(1, 35) = 13.94, p < .001]$. Occupations requiring more communication received lower scores than those requiring less communication. There was no significant effect with regard to prestige and no significant interaction effect between communication and prestige.

The mean intelligibility score for the group was 5.14 ($SD = 1.09$, $min = 1.66$, $max = 6$). In order to evaluate the relations between SI and the four categories of OC (HCHP, HCLP, LCHP, LCLP), Pearson correlations were
performed. No significant correlations were found \((p > .05)\). The obtained correlation coefficients were \((r = .01, r = .29, r = .27, r = .12,\) respectively).

Table 2: Means and Standard Deviations of Occupational Competence

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCHP</td>
<td>5.36</td>
<td>2.38</td>
</tr>
<tr>
<td>HCLP</td>
<td>4.77</td>
<td>2.26</td>
</tr>
<tr>
<td>LCHP</td>
<td>6.34</td>
<td>2.75</td>
</tr>
<tr>
<td>LCLP</td>
<td>6.29</td>
<td>2.15</td>
</tr>
</tbody>
</table>

No significant relationships were found between OC categories and demographic variables such as age, gender and degree of hearing loss.

Four simultaneous linear regression analyses were conducted to predict the OC in the four categories according to six variables: gender (male/female), type of inclusion in high school (individual/group), mode of communication (spoken/spoken + signs), level of higher education (high school/postsecondary education), work status today (employed/unemployed) and SI. Only the model of high prestige occupations requiring low communication (LCHP) was found to be significant \([F(6,27) = 2.99, p < .05]\). The type of inclusion in high school was the single predictor that significantly contributed to the explanation of the LCHP variance \((F = -2.49, p < .05)\). Participants who had been included individually in regular classes with hearing children had higher evaluations of competence than those who had studied in small classes with other D/HH children.

Discussion

The goal of the present research study was to examine the self-reported occupational competence of young D/HH adults and to assess the relationship between this evaluation and their own assessment of their SI. The occupational competence scale included various occupations that differed with respect to their level of prestige and with respect to the required communication.

The results of the present study supported the hypothesis that occupations requiring more communication receive lower scores than those requiring less communication. This finding reflects the fact that the participants were aware of their difficulties as a result of their hearing loss. Although most of the individuals used spoken language as their main mode of communication,
they may still confront many difficulties, such as communication in the presence of background noise, communication in a group (such as in meetings) or communication over the telephone. These situations remain problematic for the population with hearing loss (Punch et al., 2004). In fact, personal comments in the questionnaires by some of the participants pointed to these types of concerns, such as, “My hearing loss will be an obstacle in communicating with my colleagues as well as with customers, etc.”

The finding of no difference in competence scores for occupations differing in their prestige was not expected, but it was, nevertheless, very encouraging. This finding contradicted previous research which had reported that individuals with hearing impairment had been assessed by either hearing or D/HH individuals themselves as suitable mainly for low prestige jobs that do not necessarily reflect their ability and skills (Weisel & Cinamon, 2005). However, it should be noted that previous research reports were concerned mostly with deaf populations (e.g. Punch et al., 2004; Sela & Weisel, 1992). The sampling of the present research study consisted of both deaf and hard-of-hearing individuals, most of them using spoken language as their main mode of communication. As noted, the participants in the present study considered themselves to be more competent. It is possible that this finding was a result of the fact that most of the participants were graduates of regular educational programs and moreover, many were either college students or college graduates. Their personal experiences in coping with the various difficulties in the hearing world might have been a factor that strengthened their beliefs and expectations with regard to their occupational capabilities. Another explanation for these results might be the fact that technology has improved a great deal in recent years, a fact which may have had an effect on these young people’s self-evaluation of occupational competence. On one hand, sensory aids such as hearing aids, cochlear implants and FM systems provide better audibility, and consequently, better interaction with hearing people. On the other hand, the variety of technologies such as fax, e-mail communication, short message service (SMS) etc., which are common today in many highly prestigious occupations, do not require the use of hearing in communication. Bat-Chava, Deignan, & Martin (2002) reported that, unfortunately, although there are technological solutions for the difficulties facing the D/HH population, these solutions are often not implemented. In fact, personal comments on the questionnaires by some of the participants indicated that “hearing impairment is only an obstacle if the work environment is not open to adaptations or changes that need to be
done.” Future research studies should be carried out to continue examining if, in fact, along with the higher evaluation of occupational competence by the D/HH individuals themselves, there is also an improvement in their employment status.

Along the line of the above discussion, the mean SI of the present sample was high ($M = 5.14$). This high mean may result from a variety of factors: First, 11 of the participants were post-lingually hearing-impaired, i.e., they had acquired their hearing loss after the age of three, and thus, their normal accessibility to the spoken language during their early years allowed for good intelligibility. Second, although the other 25 participants were pre-lingually deaf, i.e., the age of onset of their hearing loss was either at birth or within the first two years of their lives, they had received early and efficient aural-oral intervention which led to an intelligible speech. The results also revealed significant differences in the SI scores of those participants who had been individually enrolled in regular classes with hearing children during their high school years, and those of the participants who had been enrolled in special classes with other D/HH students. The first group had higher SI evaluations ($M = 5.27$) than the latter ($M = 4.43$). This finding is not surprising and conforms to the results of another study (Most, 2007). Students in individual inclusion regularly rely solely on spoken language to interact with their speaking environment, whereas students in group inclusion (special classes) may use simultaneous communication and are not as dependent upon their speech; hence, much more effort must be invested in the former group’s spoken modality. However, these findings should not be interpreted to mean that better SI on the part of the participants who had been enrolled in individual inclusion settings, when compared to that of those in the group inclusion (special classes) settings, was a direct result of the programs themselves. Good SI is one of the factors taken into consideration when placing a child in one setting or another and therefore, cause-effect conclusions cannot be drawn.

Finally, with regard to the relatively high score on SI, it should be noted that the evaluations were based on self-reports. Nevertheless, informal observations and impressions of the participants’ good SI were also made by the research assistant who collected the data. It is recommended that in future research studies, data on SI be collected more formally by objective measures as well.
Based on the above discussion, one might argue that the present sampling is not representative of the population because of the high score of SI. However, it can also be argued that with early detection of hearing loss, and improved and early rehabilitation, such as we are facing today, the characteristics and the accomplishments of this sampling are not unique. Today, with universal hearing screening being implemented in many countries, hearing impairments are even detected in newborn babies (Joint Committee on Infant Hearing, 2000; National Institutes on Deafness and Other Communication Disorders, 1993). This early detection leads to early intervention. For example, in some cases, cochlear implants are already fitted during the child’s first year (James & Papsin, 2004). These early interventions reduce the negative effects of the hearing loss on the development of different aspects of spoken language (e.g. Blamy et al., 2001; El Hakim, Abdolell, Mount, Papsin, & Harrison, 2002; Kirk, Miyamoto, Lento, Ying, Oneill, & Fears, 2002; Miyamoto & al, 2003; Yoshinaga-Itano, Sedey, Coulter, & Mehl, 1998 ). Thus, as a result of these developments, many children with hearing impairments who would previously not have gained much benefit from auditory rehabilitation, can now acquire spoken language and are integrated into regular classes with hearing children, where spoken language is the mode of communication. In fact, the rates of hearing-impaired children who are integrated into regular educational settings are on the rise in many countries (Zandberg, 2005).

To summarize, currently there is a predominance of individual integration as a result of recent intensive efforts to implement the Special Education Law (Al-Yagon & Margalit, 2001) which calls for maximum inclusion, as well as advanced technological developments in sensory aids. It might, therefore, be concluded that due to the result of changes in the characteristics of the D/HH population, the relatively high evaluations of the SI in the present sample are not necessarily unique and they might represent the future characteristics of D/HH individuals.

No significant correlations were obtained between SI and the OC in the different categories. This finding suggests that the present D/HH sample did not consider SI to be a barrier to OC. It should be noted however that SI explained about eight percent of the HCLP variance ($r = .29$) and about seven percent of the LCHP variance ($r = .27$). These results are quite modest but not negligible, and the lack of statistical significance of these correlations are likely due to the small sample size ($N = 36$). It should also
be noted that the above finding of no correlation between SI and OC in some way contradicts the other findings, where the participants assigned lower scores to occupations requiring high communication skills than to those requiring less communication skills. It seems that communication has a certain effect upon the evaluations of OC but it is not directly related to SI. These somewhat conflicting findings call for further research about the importance of SI for OC.

Future research should also deal with the possible distinction between the perception of a barrier as related to the individual’s SI (i.e., “since my speech is not intelligible enough, some occupations are not suitable for me”, etc.) and the perception of the barrier as related to environmental demands and expectations. A low SI score means that the individual lacks adequate skills. In contrast, a feeling that one is not suitable for a certain occupation means that the social environment’s perception of the demands of that occupation are too high. The total mean score of the SI (M = 5.14 on a 1 to 6 scale) clearly suggests that in general, the participants did not view their speech as not being intelligible. Furthermore, no connection was found between SI and OC in the present study’s results. However, the distinction made by the participants between occupations with high versus low communication may suggest that they viewed the origin of the barrier in environmental demands. In other words, although we (the participants) have intelligible speech, it is the environment that limits us. The identification of the origins of feelings of incompetence, either in the individuals’ shortcomings or in the workplaces’ demands, expectations, bias or discrimination, should be further elaborated and analyzed.

The results of the regression analyses indicated that participants who had been included individually in regular classes with hearing children had higher evaluations of competence on the LCHP scale than those who had studied in small classes with other hearing-impaired children. Apparently, graduates of individual integration evaluated themselves as being competent even when considering high prestige occupations. This relatively high level of evaluation cannot be explained by a high SI level since SI was only slightly associated with OC evaluations, and since SI was not a significant predictor of OC in the regression analyses. It might be suggested that other characteristics exhibited by the graduates of individual integration, such as educational achievements, self-esteem or family background, might have fostered the relatively high evaluations of graduates of individual integration with regard to the LCHP occupations. These intimations, however, require
further investigation, since they were not addressed in the present study.

In sum, the main results of the present study showed that (a) D/HH young adults consider communication to act as a barrier in their career expectations. They see themselves as being less capable of performing well in occupations that require communication. This finding is just as valid for graduates of individual integration who considered themselves capable of performing well in high prestige occupations (b) based upon the results of this study, evaluations of OC cannot be meaningfully explained by SI. In light of these results, it can be suggested that the function of SI in evaluations of OC is, at the very least, questionable. Since the present findings contradict the results of previous studies (e.g., Most, 2007), further research is needed on the function of SI in career development. Such studies should use objective measures of SI in order to establish a firmer basis for the conclusions as well as qualitative measures which may examine why they rate themselves as suitable or not for the different occupations.

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