

ECHO

***E-Journal for Black and Other Ethnic Group Research
and Practices in Communication Sciences and Disorders***

***ECHO is the Official Journal of the
National Black Association for Speech, Language and Hearing***



ECHO

*E-Journal for Black and Other Ethnic Group Research and Practices
in Communication Sciences and Disorders*

Table of Contents

Volume I, Number I

Spring 2005

To navigate through this document use the scroll bar in the right hand column and observe the page indicator at the bottom of the screen.

	Page
Cover page.....	1
Table of Contents.....	2
Editorial Board.....	3
Editor's Notes.....	4
About the Journal.....	5
Manuscript Submissions.....	6
Copyrights and Permissions.....	7
Sponsoring Organization.....	8
Abstracts and Authors.....	9
Current Issue.....	10
<i>Judgments of the intelligibility of American English heard by non-native English speakers (Abstract)</i>	11
<i>(Article).....</i>	13
<i>Application of a monolingual-bilingual continuum to research and clinical practice in neurogenic communication disorders (Abstract)</i>	20
<i>(Article).....</i>	22
<i>Race-ethnicity, socioeconomic status and cognitive-communicative functioning in individuals with neurogenic communication disorders: Clinical implications and research directions (Abstract)</i>	30
<i>(Article).....</i>	32
<i>Increasing minority representation in the health professions (Abstract)</i>	40
<i>(Article).....</i>	42

ECHO

*E-Journal for Black and Other Ethnic Group Research and Practices
in Communication Sciences and Disorders*

Editorial Board

Executive Editor

Robert Mayo, Ph.D., CCC-SLP

Dr. Mayo is the former Associate Editor of Echo: The Journal of the National Black Association for Speech-Language and Hearing. He has served as an editorial consultant for journals published by the American Speech-Language-Hearing Association such as Journal of Speech-Language-Hearing Research and Language, Speech, and Hearing Services in Schools.

Managing Editor

Ronald Jones, Ph.D., CCC-A

Dr. Jones is a professor in the Department of English and Foreign Languages at Norfolk State University. He is also Coordinator of the Department's Communication Sciences and Disorders program and Director of the University's Speech, Language, Hearing and Literacy Center. Dr. Jones served as Editor (of Letters) for the former ASHA magazine and is the current managing editor for Resound)), NBASLH's e-newsletter.

Associate Editor for Content

Sheila J. Bridges, Ph.D., CCC-SLP

Dr Bridges is an Associate Professor in the Department of Communication Disorders at North Carolina Central University. A former co-editor of ECHO, Dr. Bridges has also served as an invited consulting editor for the Journal of Augmentative and Alternative Communication (AAC) and reviewer for USSAAC Continuing Education and RESNA.

Associate Editor for Content

Constance Qualls, Ph.D., CCC-SLP

Dr. Qualls is an Associate Professor and Professor-In-Charge of the graduate program in the Department of Communication Sciences and Disorders at the Pennsylvania State University. The recipient of an editorial award (CICSD), Dr. Qualls publishes widely in the field's top journals, and she serves as editorial consultant for the Journal of Speech-Language-Hearing Research and Language, the Journal of Medical Speech Pathology, and Experimental Aging Research.

ECHO

*E-Journal for Black and Other Ethnic Group Research and Practices
in Communication Sciences and Disorders*

Editor's Notes

As an electronic journal ***ECHO*** provides a no to low cost vehicle for disseminating relevant and timely articles addressing the interests and concerns of CSD professionals serving Black and other ethnic group populations. This endeavor, however, cannot be accomplished alone.

Over the next several months, as ***ECHO*** positions itself in the emerging digital publishing arena, you are invited to submit your suggestions, comments and criticisms. We, the editors, are convinced that ***ECHO*** is needed; but it will take your participation and dedication to insure that it becomes viable.

Ronald Jones, Ph.D., Managing Editor

ECHO

ECHO

E-Journal for Black and Other Ethnic Group Research and Practices in Communication Sciences and Disorders

About the Journal

ECHO: E-Journal for Black and Other Ethnic Group Research and Practices in Communication Sciences and Disorders is a professional publication that hosts scientific articles on research and clinical practice patterns, which impact racially, culturally and linguistically diverse populations in America. ***ECHO*** welcomes submissions from any communication science and disorders specialist, researcher and/or scholar, regardless of their race or ethnic background.

Although the National Black Association for Speech, Language and Hearing (NBASLH) has adopted ***ECHO*** as its official journal and will sponsor its publication, the journal remains ecumenical. ***ECHO*** invites submissions from other organizations whose members represent the communication interests and concerns of other racial, ethnic and/or linguistically diverse populations. Submissions to ***ECHO*** may include such topics areas as:

- Scientific research
- Assessment procedures
- Treatment & Prevention techniques
- Cultural, social, professional issues
- Professional issues
- Supervision & Administration
- Other related topics

Contributed manuscripts may take the form of

- Clinical forums
- Clinical reviews
- Scientific research reports
- Case studies
- Position papers
- Digital presentation
- Letters to the editor
- Other related formats

ECHO

*E-Journal for Black and Other Ethnic Group Research and Practices
in Communication Sciences and Disorders*

Manuscript Submissions

All manuscripts should be accompanied by a cover letter (e-mail) in which the corresponding author:

- Requests that the manuscript be considered for publication;
- Affirms that the manuscript has not been published previously, including in an electronic form;
- Affirms that the manuscript is not currently submitted elsewhere;
- Affirms that all applicable research adheres to the basic ethical considerations for the protection of human or animal participants in research;
- Notes the presence or absence of a dual commitment,
- Affirms that permission has been obtained to include any copyrighted material in the paper; and
- Supplies his or her business address, phone and fax numbers, and e-mail address.

All manuscripts must be submitted electronically and should follow the style and preparation presented in the *Publication Manual of the American Psychological Association* (fifth edition, 2001; see Journal for exceptions to APA style). Particular attention should be paid to the citing of references, both in the text and on the reference page. Authors requesting blind review must specify and prepare their manuscripts accordingly. Manuscript submissions and inquiries should be addressed to: ECHOEditor@nbaslh.org

ECHO

***E-Journal for Black and Other Ethnic Group Research and Practices
in Communication Sciences and Disorders***

Copyrights & Permissions

All rights are reserved. Written permission must be obtained from the ***ECHO*** Editorial Board for copying or reprinting text of more than 1,000 words. Permissions are normally granted contingent upon similar permission from the author.

All copyrights and permissions which apply to printed copies of ***ECHO*** also apply to all electronically published materials simultaneously.

ECHO

*E-Journal for Black and Other Ethnic Group Research and Practices
in Communication Sciences and Disorders*

Sponsoring Organizations

Volume 1, Number 1

Spring 2005

National Black Association for Speech, Language and Hearing
www.nbaslh.org

The National Association for School Nurses
<http://www.nasn.org/>

ECHO

***E-Journal for Black and Other Ethnic Group Research and Practices
in Communication Sciences and Disorders***

Current Issue

Volume 1, Number 1

Spring 2005

Judgments of the intelligibility of American English heard by non-native English speakers

Robert Mayo University of North Carolina at Greensboro, Dana W. Bunker, Burlington, NC,
Diane M. Scott, North Carolina Central University, Carolyn M. Mayo, University of North
Carolina at Chapel Hill

***Application of a monolingual-bilingual continuum to research and clinical practice in
neurogenic communication disorders*** Maria L. Muñoz, The University of Tennessee,

Knoxville, Constance Dean Qualls, Pennsylvania State University, University Park

***Race-ethnicity, socioeconomic status and cognitive-communicative functioning in individuals
with neurogenic communication disorders: Clinical implications and research directions***

Constance Dean Qualls, The Pennsylvania State University, University Park, Maria L. Muñoz,
The University of Tennessee – Knoxville

[Invited Article](#)

This article was originally published in the *Journal of School Nursing*, February 2005,
<http://www.nasn.org/josn/journal.htm> It is republished here with permission from the National
Association for School Nurses. <http://www.nasn.org/>

Increasing minority representation in the health professions Robin Fleming, University of
Washington, Seattle, Bobbie Berkowitz, University of Washington, Seattle, Allen D. Cheadle,
Dept. of Health Services University of Washington School of Public Health & Community
Medicine, Seattle

**JUDGMENTS OF THE INTELLIGIBILITY OF AMERICAN
ENGLISH HEARD BY NON-NATIVE ENGLISH SPEAKERS**

Robert Mayo, Ph.D.

University of North Carolina at Greensboro

Dana W. Bunker, M.Ed.

Burlington, NC

Diane M. Scott, Ph.D.

North Carolina Central University

Carolyn M. Mayo, Ph.D.

University of North Carolina at Chapel Hill

ABSTRACT

The purpose of this study was to examine the judgments of adult speakers of English as a second language (ESL) of the intelligibility of American English spoken under four different conditions. These conditions included (1) speaking at a normal or typical rate, (2) a faster than normal or typical speaking rate (3) a slower than normal speaking rate, and (4) an exaggeratedly slower than normal speaking rate. Twenty Ethiopian males served as listeners for this study. One American male participated as the speaker for this investigation. The listeners heard a total of 44 sentences generated using the Sentence Intelligibility Test and repeated the sentences to the examiners. Their responses were recorded on audiotape. Listeners also indicated their preferences for one of the speaking styles. The results revealed significantly greater performance in the areas of total intelligible words and percent intelligibility when listeners heard the sentences spoken at either of the two slower-than-normal rates. However, listeners indicated a preference for hearing speech produced at a normal or typical rate. The implications of these findings for the assessment, training, and counseling of adult communicators for whom English is a second language are discussed.

KEY WORDS: speech intelligibility, English as a second language, assessment

Author Biographies:

Robert Mayo, Ph.D., CCC-SLP, is Associate Dean of the School of Health and Human Performance and a Professor in the Department of Communication Sciences and Disorders at the University of North Carolina at Greensboro.

Dana W. Bunker, M.Ed., CCC-SLP, is a speech-language pathologist in private practice in Burlington, NC.

Diane M. Scott, Ph.D., CCC-A, is Associate Dean of the School of Education and a Professor in the Department of Communication Disorders at North Carolina Central University in Durham, NC.

Carolyn M. Mayo, Ph.D., CCC-SLP, is Director of the North Carolina Health Careers Access Program and an Adjunct Associate Professor in the Division of Speech and Hearing Sciences in the Department of Allied Health Sciences at the University of North Carolina at Chapel Hill.

Please address correspondence to:

Robert Mayo, Ph.D., 401 HHP Building,
University of North Carolina - Greensboro,
E-mail: mailto:r_mayo@uncg.edu

JUDGMENTS OF THE INTELLIGIBILITY OF AMERICAN ENGLISH HEARD BY NON-NATIVE ENGLISH SPEAKERS

Robert Mayo

University of North Carolina at Greensboro

Dana W. Bunker

Burlington, NC

Diane M. Scott

North Carolina Central University

Carolyn M. Mayo

University of North Carolina at Chapel Hill

INTRODUCTION

The United States population (consisting of natural born citizens, documented and undocumented immigrants) is one of the most linguistically diverse peoples in the world. African immigration to the United States, which increased dramatically during the 1990s, has added to this rich diversity. According to the U.S. Census Bureau, between 1991-1994, 117,700 Africans relocated to this country with 18,900 individuals alone arriving from Ethiopia (U.S. Bureau of the Census, 1996). Some 31,505 persons residing in the United States speak Amharic, the official language of Ethiopia. Amharic is the 50th most frequently spoken language in the United States. Census data also indicate that approximately 36% of Ethiopian immigrants state that they do not speak English very well (U.S. Bureau of the Census, 2000), but they are highly motivated to learn the language.

Although Ethiopians may be considered among some of the newer immigrants to the U.S., they face many of

the same dilemmas as past émigrés. Many of these challenges, such as unemployment and underemployment among Ethiopian adults, are often tied to their limited facility in speaking American English or language interference. Language interference refers to intrusion of one language system upon another (Brière, 1966; Carlson, 2003; Christ, 1964; Flege, 1991). Evidence of such intrusion is heard as differences in phonology, grammar, and meaning to the norms of speech in either language. To these difficulties we would add the paralinguistic features of a language (i.e., stress, rhythm, intonation, rate, etc.).

Language interference can exist not only at the level of production but also at the level of comprehension. Thus, non-native speakers of American English or speakers of English as a second language may experience little difficulty understanding native English speakers from the standpoint of phonology, grammar, and meaning yet have significant difficulty decoding spoken English because of interference in the paralinguistic domain. Paradoxically,

alterations in the paralinguistic features of speech, factors that are controlled by the speaker, have often been suggested as a way of facilitating the comprehension of English by non-native listeners (Schmidt, 1997; Torrens, 1995). These suggestions as to how to communicate with the non-native listener include altering the rate of speech (e.g., 'speaking slowly') and stressing specific words (e.g., use of 'emphasis'). However, to our knowledge, no objective analysis of the validity of these techniques has been published. Few measures other than intelligibility of connected speech allow the clinician to evaluate the sum of the interacting processes that are involved in speech production (Yorkston, Beukelman, & Bell, 1988). In the typical intelligibility-assessment format, a speaker produces a message that is transmitted to a listener who in some way judges that speech sample, i.e., provides an overall measure of the understandability of the message. This measure can be expressed in terms of total intelligible words or percent intelligibility. Other intelligibility-related measures include the intelligibility rate, i.e., the rate of intelligible words per minute, and the communication efficiency ratio, i.e., the rate of intelligible speech produced by a speaker divided by the normal rate of intelligible speech (i.e., 190 wpm) (Yorkston et al. 1988). In this fashion, a quantitative judgment of speech intelligibility can be obtained.

The purpose of this study was to examine Ethiopian males' judgments of the intelligibility of American English spoken under four different conditions. These conditions included speaking at (1) a normal or typical rate, (2) faster than a normal or typical speaking rate (3) slower than a normal speaking rate, and (4) an exaggeratedly slower than normal speaking rate.

METHOD

Participants

Participants for this study were 20 Ethiopian adult males (μ age = 32.2 yrs., $SD \pm 6.2$, range = 20-53 yrs.) who served as listeners. One 25 year-old African American adult male served as the speaker for the study. The Ethiopian participants spoke Amharic as their primary language, spoke English as a second language and had resided in the United States for an average length of 7.4 years ($SD \pm 1.1$) at the time of their participation in the study. The educational backgrounds of the Ethiopian participants ranged from high school graduates to those having earned a doctoral degree. All subjects passed a speech screening and a hearing screening examination at 20 dB HL for the frequencies .5 kHz, 1 kHz, 2 kHz, and 4 kHz. The American speaker for this investigation was judged to use Standard American English as his primary mode of oral communication by three speech-language pathologists familiar with American cultural and regional dialects and certified by the American Speech-Language-Hearing Association.

Procedure

The speech samples used in this study consisted of four sets of sentences randomly generated from the Sentence Intelligibility Test (Yorkston, Beukelman, & Tice, 1996). The Sentence Intelligibility Test is a computer-based program designed to measure speech intelligibility whose reliability with speakers of English as a second language has been established (Wolf & Royal-Evans, 2000). The short format of the test was used. In this format, each set contained 11 sentences ranging in length from five to 15 words. The length of the sentences increased in number of words as the test progressed. Thus, the first sentence

in each set contained five words and the eleventh sentence contained 15 words.

Prior to recording the speech sample, the speaker for this study was trained to speak at the faster and slower rates using the Pacer Tally software system (Yorkston, Beukelman, & Tice, 1997). The Pacer Tally system allows the user to set the speaking rate of a set of sentences at a predetermined tempo (e.g., 190 words per minute). Thereafter, an illuminated cursor appears on the monitor of the computer at timed intervals beneath each word in the sentence and the speaker is instructed to read each word aloud. There were four speaking conditions that our speaker was required to model. For the first speaking condition, he was instructed to talk at his normal or typical rate. Analysis revealed that the speaker's normal speaking rate averaged 183 words per minute, which fell within the range of existing adult norms (Walker, 1979; Payne, 1981). The second condition required him to speak at a faster than typical rate---290 words per minute. During the third condition, the speaker was directed to talk at a slow rate---90 words per minute. For the fourth condition, the speaker was told to talk at a rate slower than condition three. The pace for the fourth condition was set at 70 words per minute. The speaker practiced talking in the three altered styles until he could produce each speech form with 100 percent accuracy independent of the Pacer/Tally feedback and stated that he was comfortable talking in each of the styles.

The sentences were audiotape recorded in a sound-treated room as the speaker sat with a condenser microphone positioned six inches from his mouth. The microphone was connected to an audiocassette tape recorder (Optimus, Model 14-1123). The final stimulus tape consisted of a total of 44 sentences. Additionally, four

sentences produced by the speaker and representing the four speaking conditions were added to the stimulus tape to examine listeners' preference for speaking style.

The listening task was conducted individually in a quiet room. The recorded sentences were presented one at a time to each listener. After hearing each sentence, the listener was asked to repeat the sentence exactly as he heard it. If needed, listeners were allowed to hear the sentences again up to three times. The listeners' responses were audiotape recorded. After hearing all of the sentences, participants were asked to listen to four additional sentences representing the four speaking styles produced by the speaker. When they had listened to the four sentences they were asked to indicate which speaking style they preferred. The researchers made note of their preference and this information was included in the data analysis. The listener's responses were entered verbatim into the Sentence Intelligibility Test, which calculated intelligibility scores. The variables analyzed were (a) total intelligible words, (b) percent intelligibility, (c) intelligibility rate, and (d) communication efficiency ratio.

Reliability Analysis

Reliability measurement was performed two weeks after the listeners' judgment task. The researchers randomly selected audiotape recorded sentences for 20% of the Ethiopian males. They listened to the sentences until they arrived at a consensus on what was actually said by each speaker. Then, they independently retrieved the stored data for the same subjects and using the Sentence Intelligibility Test system, analyzed total intelligible words, percent intelligibility, intelligibility rate, and communication efficiency ratio. Interjudge reliability was 100%.

RESULTS

The data were analyzed using a mixed factorial and repeated measures analysis of variance (Bruning & Kintz, 1997). Table 1 provides the means and standard deviations for total intelligible words, percent intelligibility, intelligibility rate, and communication efficiency ratio for each speaking condition. Analysis of the data by speaking condition revealed that there was a statistically significant main effect of speaking condition on total intelligible words ($F_{3,76} = 15.0, p < .001$). Tukey's post-hoc testing revealed that the total intelligible words out of 110 values were greatest for the slow speaking condition compared to the normal and fast rates. Likewise, the listeners understood more total words when they heard the speaker use the exaggeratedly slow rate compared to the normal and fast rates. No statistical difference in total intelligible words was seen between the slower-than-typical speaking rate and the exaggeratedly slow speaking rate.

A significant effect of speaking condition on percent intelligibility was found ($F_{3,76} = 25.3, p < .0001$). Post-hoc testing revealed that intelligibility was better under the slow speaking rate compared to the normal and fast rate. Additionally, listeners understood more total words when the speaker used the exaggeratedly slow compared to the normal and fast rates. No difference was found between the slow rate and exaggeratedly slow speaking rate. No significant effects of speaking condition on either intelligibility rate or communication efficiency ratio were found.

Finally, an analysis of the listeners' preferences for speaking style revealed that 95 percent of the Ethiopian participants preferred the normal speaking rate. The remaining five percent indicated a

preference for the exaggeratedly slower speaking rate (Condition four).

DISCUSSION

As the number of residents of the United States who do not speak English or whose English is limited has increased, the demand for placement in English-as-a-Second-Language (ESL) classes has grown each year (U.S. Department of Education, 1998). Bliss (1990) notes that with this heightened demand, there are long waiting lists for ESL classes in many parts of the country. Thus, a growing number of these individuals are seeking the services of speech-language pathologists to improve the clarity and fluency of their spoken English and enhance their ability to comprehend the language (American Speech-Language-Hearing Association, 1997; Schmidt & Sullivan, 2003). Limited information is available about the efficacy of techniques for facilitating the comprehension of spoken American English among this population.

The findings of this investigation appear to support the heretofore-anecdotal contention that a speaker of American English can facilitate comprehension of the language on the part of a listener for whom English is a second language by slowing down the rate of speech. Conversely, it was found that these listeners' comprehension of spoken American English could be limited by use of a faster-than-normal speaking rate.

One population in which the relationship of speaking rate and perceived intelligibility has been examined is hearing-impaired persons. Picheny, Durlach, and Braida (1985, 1986) have shown that speaking rates as slow as 91 words per minute, produced with clear articulation by normal speakers, significantly improved receptive intelligibility of hearing-impaired

listeners in comparison with casually articulated speech at conversational rates. Parkhurst and Levitt (1978) speculated that altering the paralinguistic features of speech such as rate and pausing, if appropriately used, might improve receptive intelligibility by allowing the listener more processing time. Our findings suggest that listeners for whom English is a second language can benefit similarly from these paralinguistic alterations.

The results of this study have implications for speech-language pathologists and teachers who work with adults for whom English is a second language. It has been demonstrated that significantly faster speaking rates are evident in some varieties of English compared to other forms of the language (Robb, Maclagan, & Chen, 2004). Assessment of adults enrolled in ESL training programs should involve determining which speaking rates optimize as well as interfere with receptive intelligibility as well as discovering a client's preferred listening style. These assessment activities could be carried out using live voice or recorded speech samples representing a range of speaking rates, styles, and speakers. The training component of ESL programs should focus the initial part of teaching activities on presenting spoken materials of increasing length to clients using a slower speaking rate to facilitate comprehension. Thereafter, speaking rate would gradually be increased as the client progressed, culminating at the point where he/she is able to listen to speech delivered at a normal rate and understand what is being said by a variety of speakers.

The goal of hearing and understanding speech presented at a normal rate appeared to be an important one for the listeners in this sample. Whereas, the listeners' receptive intelligibility was greater

when hearing speech at either of the slower rates, their preference was to hear speech at normal rates. This fact leads to a third suggested component of an ESL training program. That is, professionals may need to include an educational counseling portion to their program wherein ESL clients would be taught to request, when necessary, that a native speaker of American English slow down their rate to facilitate comprehension.

Finally, it is recommended that practicing professionals continue to validate ESL training techniques and programs routinely offered. In addition to validating approaches to facilitating clients' comprehension of American English, efforts must be directed toward examining the efficacy of approaches designed to improve their spoken English. Ultimately, these efforts will help to improve service delivery and bridge the communication gap between people from various cultures.

REFERENCES

- American Speech-Language-Hearing Association. (1997). *Omnibus survey results*. Rockville, MD.
- Bliss, W. (1990). Meeting demand for ESL instruction: a response to demographics. In F. Chrisman (ed.), *Leadership for literacy*. San Francisco, CA: Jossey-Bass, p. 171-197.
- Brière, E. (1966). An investigation of phonological interference. *Language*, 42, 769-796.
- Bruning, J.L., & Kintz, B.L. (1997). *Computational handbook of statistics, 4th edition*. Glenview, IL: Allyn and Bacon.
- Carlson, H.K. (2003). Effect of accent and dialect on employability. Paper presented at the annual convention of the American Speech-Language-Hearing Association. Chicago, IL.
- Chreist, F.M. (1964). *Foreign Accent*.

- Englewood Cliffs, NJ: Prentice-Hall.
- Flege, J.E. (1991). Perception and production: The relevance of phonetic input to L2 phonological learning. In T. Hueber and C. Ferguson, (eds.), *Crosscurrents in Second Language Acquisition and Linguistic Theories*. Amsterdam: John Benjamins (pp. 249-289).
- Parkhurst, B. & Levitt, H. (1978). The effect of selected prosodic errors on the intelligibility of deaf speech. *Journal of Communication Disorders, 11*, 249-256.
- Payne, J.A. (1981). A study of speaking and reading durations of young black adults. Unpublished doctoral dissertation, The Florida State University.
- Picheny, M.A., Durlach, N.I., & Braida, L.D. (1985). Speaking clearly for the hard of hearing I: Intelligibility differences between clear and conversational speech. *Journal of Speech and Hearing Research, 28*, 96-103.
- Picheny, M.A., Durlach, N.I., & Braida, L.D. (1986). Speaking clearly for the hard of hearing II: Acoustic characteristics of clear and conversational speech. *Journal of Speech and Hearing Research, 29*, 434-446.
- Robb, M.P., Maclagan, M.A., & Chen Y. (2004). Speaking rates of American and New Zealand varieties of English. *Clinical Linguistics and Phonetics, 18*, 1-15.
- Schmidt, A.M. (1997). Working with adult foreign accent: Strategies for intervention. *Contemporary Issues in Communication Disorders, 24*, 53-62.
- Schmidt, A.M. & Sullivan, S. (2003). Clinical training in foreign accent modification: A national survey. *Contemporary Issues in Communication Disorders, 30*, 127-135.
- Torrens, J. (1995). Communication development: Gaining perspective on foreign accents. *Business Journal Serving Southern Tier, 9*, 15.
- U.S. Department of Education. (1998). *Issue Brief: Adult Participation in English-as-a-Second-Language (ESL) Classes*. NCEES 98-036. Washington, D.C.
- U.S. Bureau of the Census. (1996). *Statistical Abstract of the United States, 116th edition*. Washington, D.C.: U.S. Department of Commerce.
- U.S. Bureau of the Census. (2000). *Profiles of General Demographic Characteristics, 2000 Census of Population and Housing*. Washington, D.C.: U.S. Department of Commerce.
- Walker, V.G. (1979). Speech durations of young adults during speaking and reading. Unpublished doctoral dissertation, The Florida State University.
- Wolf, T.L. & Royal-Evans, C. (2000). Interjudge reliability: Measuring speech intelligibility of ESL speakers. Paper presented at the annual convention of the American Speech-Language-Hearing Association, Washington, D.C.
- Yorkston, K., Beukelman, D., & Bell, K. (1988). *Clinical Management of Dysarthric Speakers*. Austin, TX: Pro-Ed.
- Yorkston, K., Beukelman, D., & Tice, R. (1996). *Sentence Intelligibility Test for Windows*. Lincoln, NB: Tice Technology Services, Inc.
- Yorkston, K., Beukelman, D., & Tice, R. (1997). *Pacer/Tally for Windows*. Lincoln, NE: Tice Technology Services, Inc.

Table 1. Means of Sentence Intelligibility Test measures for four conditions judged by Ethiopian listeners. Total intelligible words represent a possible total of 110 words. Intelligibility rate is reported in intelligible words per minute. Standard deviations are in parentheses.

Intelligibility Measure	Normal Rate (183 wpm)	Fast Rate (290 wpm)	Slow Rate 1 (90 wpm)	Slow Rate 2 (70 wpm)	Overall
Total Intelligible Words	83.1 (± 19.3)	74.3 (± 9.2)	97.8 (± 9.1)	94.1 (± 8.0)	88.4 (± 12.7)
Percent Intelligibility	79.6 (± 9.4)	67.6 (± 8.3)	89.1 (± 8.2)	85.5 (± 7.3)	80.5 (± 11.6)
Intelligibility Rate	146.8 (± 29.4)	149.0 (± 30.6)	153.3 (± 44.5)	134.4 (± 32.6)	145.9 (± 34.8)
Communication Efficiency Ratio	.774 (± .155)	.785 (± .161)	.807 (± .235)	.709 (± .173)	.760 (± .18)

**APPLICATION OF A MONOLINGUAL-BILINGUAL
CONTINUUM TO RESEARCH AND CLINICAL PRACTICE IN
NEUROGENIC COMMUNICATION DISORDERS**

Maria L. Muñoz, Ph.D.
The University of Tennessee, Knoxville

Constance Dean Qualls, Ph.D.
Pennsylvania State University, University Park

ABSTRACT

Individuals with neurogenic communication disorders have historically been treated as monolinguals or balanced bilinguals. Bilingualism is more common than monolingualism, and speakers of multiple languages acquire and use each language for different purposes so balanced bilinguals are rare. Increasing cultural diversity in research and clinical practice and interpretation of performance on experimental and clinical tasks require the characterization of individual language experiences. The purpose of this article is to explore the limitations of the monolingual assumption, examine how bilingualism can impact the understanding of neurogenic communication disorders, and describe a framework with which language background can be formalized.

KEY WORDS: bilingualism, aphasia, neurogenic communication disorders

Author Biographies:

Dr. Maria L. Muñoz is an Assistant Professor in the Department of Audiology and Speech Pathology at the University of Tennessee, Knoxville. Dr. Muñoz is a certified speech-language pathologist who conducts research in the areas of aphasia, with specific interest in Spanish-English bilingual speakers with aphasia. Her work has been published in *Brain and Language*, *Aphasiology*, *Language, Speech, and Hearing Services in the Schools* and the *Journal of Multilingual Communication Disorders*.

Dr. Constance Dean Qualls is an Associate Professor of Communication Sciences and Disorders at The Pennsylvania State University. Dr. Qualls is a certified speech-language pathologist and cognitive neuroscientist, with clinical and research experience spanning the areas of aphasia, dementia, dysarthria, dysphagia, traumatic brain injury, and cognitive-linguistic aging. Her work is published in the *American Journal of Speech-Language Pathology*, *Language, Speech, and Hearing Services in the Schools*, *Journal of Speech, Language, and Hearing Research*, *Journal of Communication Disorders*, *Aphasiology*, *Journal of Medical Speech Pathology* and *Journal of Allied Health*.

Correspondence to:

Maria L. Muñoz, PhD
Dept. Audiology and Speech Pathology
The University of Tennessee
E-mail: mmunoz2@utk.edu
<http://web.utk.edu/~aspweb/faculty/munoz/default.shtml>

**APPLICATION OF A MONOLINGUAL-BILINGUAL
CONTINUUM TO RESEARCH AND CLINICAL PRACTICE IN
NEUROGENIC COMMUNICATION DISORDERS**

Maria L. Muñoz

The University of Tennessee, Knoxville

Constance Dean Qualls

Pennsylvania State University, University Park

INTRODUCTION

The ability to speak multiple languages is not a unique or isolated phenomenon. Given immigration patterns, college requirements, the ease of travel, and the influence of the internet and telecommunications, it is likely that very few individuals have absolutely no experience with a second language. These patterns suggest that speech-language pathologists are more likely to encounter individuals who have some degree of exposure to multiple languages than individuals who are purely monolingual.

Unfortunately, the abundance of multiple language experiences is not reflected in the typical research and clinical practice within the field of neurogenic communication disorders. Generally, clinical practice and research methodologies are disease specific (dementia, aphasia, TBI) with monolingualism inferred. The adjective 'bilingual' is attached by the subset of clinicians and researchers who are addressing disease related outcomes unique to speakers of multiple languages (Fabbro, 1999). While both traditional and bilingual endeavors are vital within the field of neurogenic communication disorders, the

dichotomy between monolingual and bilingual practices is problematic for a variety of reasons that will be addressed in detail in the following sections. First, the assumption of monolingualism in traditional investigations is unsupported by the available data, making interpretation of research and clinical outcomes problematic. Additionally, there is currently no standard definition of bilingualism applied within neurogenic communication disorders. Commonly utilized definitions limit consideration of bilingualism to a subset of bilinguals who demonstrate high proficiency in both languages (Fabbro, 1999; Paradis, 1987). Additionally, the concept is ill defined in reference to when someone is sufficiently bilingual to warrant special consideration separate from monolinguals (Ardila, 1998). The question of definitional parameters for bilingualism leads naturally to the related need to define when someone is sufficiently monolingual to be considered a true representative of independent language processing.

It is unclear the extent to which the representation of a single language changes as additional languages are learned. However, the need to control independent

and combined use of the two languages appears associated with unique processing demands (Hernandez, Bates, and Avila, 1994). The point at which an individual crosses from monolingual language processes to bilingual language processes is undetermined, and possibly undeterminable. As will be demonstrated in the following discussion, research inclusion-exclusion criteria do not clearly define monolingual or bilingual status. It is critical to systematically capture multiple language experience in research and clinical populations in order to accurately interpret outcomes and promote inclusion of culturally and linguistically diverse populations. The purpose of this article is to explore the limitations of the monolingual assumption, examine current limitations in assumptions made about bilingualism, and describe a framework with which language background can be accounted for in research and clinical settings.

THE MONOLINGUAL ASSUMPTION

Clinical practice in neurogenic communication disorders is intended to characterize the nature of the impairment and to establish appropriate and effective treatment protocols. Research endeavors address and expand on these issues to provide theoretical, biological, and situational rationales for the observed impairment and outcomes. Traditional research and clinical practice conducted in neurogenic communication disorders have assumed a population of monolingual speaking patients. Commonly utilized textbooks minimally address issues related to how language impairment may manifest differently for speakers of multiple languages (Brookshire, 1997; Davis, 2000), though data indicate specific influences of each factor (Fabbro, 1999). Limited consideration of multiple language

experiences is of concern due to the lack of specificity in defining the language experiences of participants in research studies, the results of which can then be utilized to inform clinical practice.

Defining a sample of interest in experimental design is critical to establishing a relatively homogenous group in order to define the population to whom the results can generalize. Within the traditional aphasia research, it has been assumed that participants are monolingual, unless stated otherwise. Therefore, minimally, the population to whom results generalize are monolingual, or more specifically native speakers of a given language. However, given the abundance of individuals with exposure to multiple languages, this assumption is difficult to accept without supporting data. Additionally, difficulty in defining the term native speaker limits its utility as a defining parameter.

Limited data regarding language experience are available in the existing literature. In his review of research articles published in English over 10 years in several journals important within the field, Brookshire (1997) found that few subject descriptors were considered with any consistency, and suggested variables that should be regularly reported (education, source of subjects, gender, lesion location, handedness, etiology, time post-onset, severity of aphasia, and type of aphasia). One variable that he explored in his analysis but did not include in his list of important descriptors was that of native speaker (e.g. a statement indicating whether or not the participant's first language was English). Of the articles reviewed, only 15% identified the participants' first language as English. The assumption of the population to which results generalize is clearly made by default, in effect, unless stated otherwise participants are monolingual English speakers.

However, there is insufficient data to support this assumption and no indication if the authors failed to report or failed to control for multiple language experiences.

In a comparable review, Obler, Goral, and Albert (1995) analyzed 30 articles published in *Brain and Language* to identify descriptive criteria reported for subjects. In comparing an early (1974-76) and a late period (1992-1993), the authors found an increase over time in the number of studies reporting "native proficiency" (from 6 to 12) and minimal change in those confirming "monolingual status" (from 3 to 2). The review provides evidence that the majority of published manuscripts fail to adequately address the issue of bilingualism in subject selection. Experience with multiple languages may potentially be a confounding variable that has gone unrecognized due to failure to ask the right questions.

Researchers most frequently determine if an individual is a "native speaker". However, the use of "native English speaker" as a descriptive variable is limited in the extent to which it reflects language experience. Palij and Aaronson (1992) explored the use of the term native English speaker within the field of psychology by surveying the participant pool at New York University over a four-year period. No more than 10%, and as little as 1%, of NYU students in a given year reported no systematic exposure to a language other than English, though the majority of them were considered native English speakers. Palij and Aaronson (1992 p. 64) concluded that "the notion of a homogeneous class of Native Speakers can be seriously misleading." In fact, they identified 13 subclassifications of language experience that would still be consistent with the classification of individuals as native speakers of English given that native does not equal monolingual. They

demonstrated that it is possible to be considered a native speaker of one language, while demonstrating greater skill in a language other than the first language.

Additionally, the extent to which the term native English speaker equates with only English speaker has not been addressed within traditional aphasia research, an issue that is problematic given the unique processing demands associated with knowledge of multiple languages. As indicated by Brookshire (1983), 85% of the studies reviewed failed to indicate native language status, even fewer studies confirmed monolingual status. As a gross indicator of current practice, a cursory review of 30 randomly selected studies was conducted. The articles spanned a twenty-year period, and were chosen from a literature search for articles on aphasia. The review indicated that only 9% of articles clearly identified participants as monolingual English speakers, 32% identified participants as native English speakers, and 45% did not specify language use. Unfortunately, when the monolingual assumption is made, assessment is incomplete and the nature of the population under investigation is unspecified. For example, Italian researchers have treated aphasic patients as monolingual speakers of Italian, when in fact the majority of Italians speak a regional dialect as a first language (Fabbro, 1998). Fabbro indicates that the assumption in part stems from the fact that Italian is the only language spoken by the vast majority of neuropsychologists. In clinical and academic settings in the United States, less than one percent of speech-language pathologists are considered bilingual (ASHA, 1996), giving English both more saliency and more convenience.

The current practice of assuming the monolingualism of research participants and clinical patients is inadequate, given that most of world is bilingual, and native

speaker as a descriptor is inadequate. Data are required to support an understanding of language skill and experience and avoid a failure in recognizing additional language influences and needs (Paradis, 1977). However, it is not the intent of the authors to argue that every person with some second language experience should be treated as bilingual. Unfortunately, the definite division between monolingual and bilingual issues in neurogenic communication disorders does not allow for a determination of when someone is sufficiently bilingual to warrant special consideration.

THE BILINGUAL ASSUMPTION

The treatment of bilingualism as a unique phenomenon is evident in the field of aphasiology which historically has maintained a theoretical and clinical division between aphasia and bilingual aphasia. Aphasia, by implication has referred to acquired language impairment in monolinguals, whereas bilingual aphasia has referred to issues unique to speakers of multiple languages. Both branches of aphasiology address issues of underlying neurological representation and recovery, although from different perspectives. Standard recommendations for assessment of language following stroke generally assume monolingual status and focus on the language structures and functions to be assessed, such as naming, repetition, grammatical structure, and auditory comprehension (Kertesz, 1982; Goodglass and Kaplan, 1983; Brookshire, 1997). Researchers in bilingual aphasia use the information on language structure to understand how one language recovers in relation to another and to make inferences regarding neurological representations for multiple languages (Paradis, 1977; 1987).

Researchers in the field of bilingual aphasia have defined a population of interest

characterized primarily by individuals who are 'real' bilinguals. True bilingualism is defined in various manners including: mastery of verbal language skills (Fabbro, 1999), use of two or more languages in one's daily life (Grosjean, 1998), or high though potentially unequal fluency in both languages (Paradis, 1987). The definition of bilingualism is critical because skill can vary as a function of time, modality, context, and method of acquisition (Grosjean, 1998).

The underlying expectation that bilingualism implies near-native skill in both languages has influenced the interpretation of research findings. Language history and skill variables are often reported descriptively; however, they may not be taken into account when interpreting the assessment and experimental outcomes. Specifically, direct comparisons of performance across languages, apart from specific consideration of language background, may lead to potentially erroneous conclusions (cf. Gomez-Tortosa, Martin, Gaviria, Charbel, and Ausman, 1995; Kohnert, Hernandez, and Bates, 1998; Muñoz and Marquardt, in press). Level of skill in each language can differ as a function of various sociocultural issues, such as age and sequence of acquisition, method of acquisition, language of schooling, contexts and patterns of use, and personal factors (Ardila, 1998). Given these influences on language skill, it is likely that differences in language skill existed prior to injury, making post-morbid comparisons of performance difficult. Results and interpretations made regarding bilingual aphasia in which language background is not accounted for make interpretation regarding nature of impairment and recovery difficult (Pecman, 1984; Gomez-Tortosa et al., 1995; Stadie, Springer, de Bleser, and Burk, 1995). Assumption of equivalency in skill leads to attribution of differences to neurological and disease process that may

actually reflect pre-existing differences in language skill.

The dichotomous treatment of monolingualism and bilingualism has resulted in several problems. Traditional aphasia research is characterized by a lack of specificity in language skill that makes it difficult to fully identify the population to which the research applies. There is a lack of guidance for clinical and experimental practice for individuals who are neither pure monolingual nor highly proficient bilinguals. Additionally, no procedures have been established for determining how much skill is required in a set of languages to consider someone bilingual. The lack of guidelines makes it difficult to determine when someone is sufficiently bilingual to warrant assessment and/or treatment in multiple languages or for whom performance in experimental protocols must be considered within the context of a system processing multiple languages. At least two solutions to these problems are possible. One approach is for monolingual status to be confirmed and controlled for when one is defining the population of interest. However, this solution would continue to limit the inclusion of culturally and/or linguistically diverse individuals in research paradigms, and negatively impact the determination of best clinical practice across cultures. A better solution may involve foregoing the artificial dichotomy that currently exists between monolingualism and bilingualism in neurogenic communication disorders. Instead, a framework to characterize the extent of bilingualism on a systematic level across participants could be utilized. The following arguments for including bilinguals in standard research protocols can be made: without them, generalization is limited and results may be distorted, they support the identification of new phenomena, they serve

as research tools, and they can facilitate applied research (Palij and Aaronson, 1992).

CHARACTERIZING A MONOLINGUAL-BILINGUAL CONTINUUM

Healthy individuals have an innate capacity to learn multiple languages, suggesting that an understanding of language impairment and language processing must account for the neurological underpinnings demanded by varying degrees of fluency in multiple languages. Researchers need to systematically evaluate the language background of experimental subjects because the numbers of bilinguals are increasing, and bilingualism can affect linguistic processing in a manner that is qualitatively different from monolinguals (Paradis, 1985; Palij and Aaronson, 1992). For example, bilingual speakers process and understand syntactically ambiguous sentences in ways that reflect the integrated use of strategies from both languages, while monolinguals use strategies specific to their language (Hernandez, et al., 1994). The same issues can also impact research in neurogenic communication disorders. One way to account for bilingualism is to systematically characterize language experience by interpreting monolingualism and bilingualism as a continuum rather than as two discrete characteristics.

Valdés and Figueroa (1994), in addressing the issue of bilingualism and testing in school age children, suggest a framework that can prove useful to researchers and clinicians in characterizing the language experiences of individuals with neurogenic communication disorders. They define bilingualism with an emphasis on experience with multiple languages rather than level of skill in each language. Specifically, Valdés and Figueroa (1994 p. 8) suggest 'it is important to view bilingualism as a continuum and bilingual

individuals as falling along this continuum at different points relative to each other, depending on the varying strengths and cognitive characteristics of their two languages.’ Determinations of bilingualism are task, context, and modality specific.

Valdés and Figueroa (1994) define bilingualism based on relative proficiency in the two languages, with monolingual skill in a language at each end of the continuum, and relatively balanced skill in the middle. Additional points along the continuum reflect varying degrees of skill in both languages. Relative strength, or the point along the continuum at which an individual perceives her skills, varies as a function of task and context demands. The continuum also can be utilized to capture differences in language skill between participants. The continuum captures the well recognized notion of bilingual dominance, in effect that bilinguals tend to be stronger in one language than another (Baker, 2000), while incorporating monolingualism as points in the range of language skill. Valdés and Figueroa (1994) acknowledge that this model is an oversimplification of bilingualism. However, we believe it can be a useful framework for characterizing the language experiences of any individual with neurogenic communication disorders, in order to determine the need for language assessment and/or treatment in multiple languages.

Every individual can be assigned a point on the continuum. If researchers and clinicians seek to gather information regarding each patient’s position on the continuum, then the risk of failing to recognize a bilingual is minimized and populations of interest are more clearly defined. Additionally, accumulation of this information across research studies can lead to the determination of the point along the continuum at which specific protocols need to be implemented to evaluate both

languages. In the context of neurogenic communication disorders, the model can be used to estimate pre-morbid language skill as metric for interpreting post-morbid communicative impairment. If perception of relative proficiency has changed, languages may be differentially impaired. If perception of relative skill is consistent with pre-morbid skill but performance of a given set of tasks differs across languages, these differences may reflect pre-existing differences in language skill rather than the nature of the impairment.

Determination of language skill, as defined by a continuum, can be made utilizing a variety of variables. First and foremost, is simply determining if the individual has any multiple language experiences. An affirmative response should lead to efforts to characterize that experience along various parameters. Language history data should be collected to evaluate age, method, and sequence of acquisition (Paradis, 1987; Muñoz, Marquardt, and Copeland, 1999). Language ability can then be explored within the context of currently available models of bilingualism. Domains of language use (Fishman, 1972) can be probed to examine the social contexts in which a language is spoken (work, home, school) and how that influences language choice and communicative style. Language use data can be collected to explore the contexts of use, such as frequency of use, conversational partners, and situational factors (Paradis, 1987; Muñoz et al., 1999). Additional data can be collected regarding modality of use, in effect comprehension and production for verbal and written language (Paradis, 1987).

Experimenters and clinicians should be mindful of the language mode (Grosjean, 1998) in which they are conducting these interviews and attempting to determine skill in each language. Grosjean’s continuum of language mode refers to the level of

activation in each language as dictated by multiple contextual and individual variables. Language mode may vary from monolingual (full deactivation of one language) to fully bilingual (high activation of both languages). Monolingualism, or minimal skill in another language, may be assumed based on observed use patterns when in fact use may reflect the language demands of the environment rather than the skill of the individual.

A model presenting monolingualism and bilingualism as a continuum captures the dynamic nature of language experience, and language acquisition and attrition across the lifespan (Hyltenstam and Obler, 1989). Additionally, it allows for a more logical integration of bilingualism within the field of traditional endeavors in neurogenic communication disorders. Most importantly, it allows for the identification of the complete language needs, experiences, and influences of individuals from culturally and linguistically diverse populations seen clinically and as part of experimental protocols.

REFERENCES

- American Speech Language and Hearing Association (1996). *Highlights and Trends: ASHA Members and Certificate Holders Semiannual Counts for Midyear 1996*. (Rockville, MD: Author).
- Ardila, A. (1998). Bilingualism: a neglected and chaotic area. *Aphasiology*, 12, 131-134.
- Baker, C. (2000). *The Care and Education of Young Bilinguals: An Introduction for Professionals*. Buffalo, NY: Multilingual Matters LTD.
- Brookshire, R. H. (1997). *Introduction to Neurogenic Communication Disorders*. St. Louis: Mosby.
- Davis, G. A. (2000). *Aphasiology: Disorders and Clinical Practice*. Boston: Allyn & Bacon.
- Fabbro, F. (1998). Bilingual aphasia research is not a tabula rasa. *Aphasiology*, 12, 138-141.
- Fabbro, F. (1999). *The Neurolinguistics of Bilingualism*. UK: Psychology Press.
- Fishman, J. (1972). *Language in Sociocultural Change*. Stanford, CA: Stanford University Press.
- Gomez-Tortosa, E., Martin, E. M., Gaviria, M., Charbel, F., and Ausman, J. I., (1995) Selective deficit of one language in a bilingual patient following surgery in the left perisylvian area. *Brain and Language*, 48, 320-325.
- Goodglass, H., and Kaplan, E. (1983). *The Boston Diagnostic Aphasia Examination*, Philadelphia: Lea and Febiger.
- Grosjean, F. (1998) Studying bilinguals: Methodological and conceptual issues. *Bilingualism*, 1, 131-149.
- Hernandez, A., Bates, E., and Avila, L. X. (1994). On-line sentence interpretation in Spanish-English bilinguals: what does it mean to be "in between"? *Applied Psycholinguistics*, 15, 417-446.
- Hyltenstam, K., and Obler, L. K. (1989). Bilingualism across the lifespan: An introduction. In: K. Hyltenstam and L. K. Obler (Eds). *Bilingualism Across the Lifespan: Aspects of Acquisition, Maturity, and Loss*. New York: Cambridge University Press, pp. 1-12.
- Kertesz, A. (1982). *Western Aphasia Battery*. New York: The Psychological Corporation.
- Kohnert, K. J., Hernandez, A., and Bates, E. (1998) Bilingual performance on the Boston Naming Test: Preliminary norms in Spanish and English. *Brain and Language*, 65, 422-440.
- Muñoz, M. L., Marquardt, T. P., and Copeland, G. (1999). A comparison of the codeswitching patterns of aphasic and neurologically normal bilingual

- speakers of English and Spanish. *Brain and Language*, 66, 249-274.
- Obler, L. K., Goral, M., and Albert, M. L. (1995). Variability in aphasia research: Aphasia subject selection in group studies. *Brain and Language*, 48, 341-359.
- Palić, M., and Aaronson, D. (1992). The role of language background in cognitive processing. In R. J. Harris (Ed), *Cognitive Processing in Bilinguals*. San Diego: Elsevier Science Publishers, pp. 63-87.
- Paradis, M. (1977). Bilingualism and aphasia. In H. Whitaker and H. A. Whitaker (Eds), *Studies in Neurolinguistics*. New York: Academic Press, Inc, pp. 65-121.
- Paradis, M. (1985). On the representation of two languages in one brain. *Language Sciences*, 7(1), 1-39.
- Paradis, M. (1987) *The Assessment of Bilingual Aphasia*. Hillsdale, New Jersey: Lawrence Erlbaum Associates.
- Perecman, E. (1984). Spontaneous translation and language mixing in a polyglot aphasic. *Brain and Language*, 23, 43-63.
- Stadie, N., Springer, L., de Bleser, R., and Burk, F. (1995) Oral and written naming in a multilingual aphasic patient. In M. Paradis (Ed), *Aspects of Bilingual Aphasia*. New York: Elsevier Science, Inc., pp. 85- 99.
- Valdés, G., and Figueroa, R. A. (1994) *Bilingualism and Testing: A Special Case of Bias* Norwood, New Jersey: Ablex Publishing Corp.

**RACE-ETHNICITY, SOCIOECONOMIC STATUS, AND
COGNITIVE-COMMUNICATIVE FUNCTIONING IN
INDIVIDUALS WITH NEUROGENIC COMMUNICATION
DISORDERS: CLINICAL IMPLICATIONS AND RESEARCH
DIRECTIONS**

Constance Dean Qualls

The Pennsylvania State University, University Park

Maria L. Muñoz

The University of Tennessee – Knoxville

ABSTRACT

As the U.S. population becomes more and more diverse, researchers in communication sciences and disorders are faced with the challenge of appropriately and responsibly integrating cultural aspects in the clinical and research process. In this paper, we propose that both race-ethnicity and socioeconomic status (SES) be considered when providing clinical services to individuals from culturally diverse backgrounds. We further suggest that race-ethnic background and SES be used as co-independent factors when investigating cognitive-communicative functioning following brain damage in individuals from diverse backgrounds. Clinical implications and future research are provided.

Key Words: Race-ethnicity, SES, neurogenic communication disorders

Author Biographies:

Dr. Constance Dean Qualls is an Associate Professor of Communication Sciences and Disorders at The Pennsylvania State University. Dr. Qualls is a certified speech-language pathologist and cognitive neuroscientist, with clinical and research experience spanning the areas of aphasia, dementia, dysarthria, dysphagia, traumatic brain injury, and cognitive-linguistic aging. Her work is published in the *American Journal of Speech-Language Pathology*, *Language, Speech, and Hearing Services in the Schools*, *Journal of Speech, Language, and Hearing Research*, *Journal of Communication Disorders*, *Aphasiology*, *Journal of Medical Speech Pathology* and *Journal of Allied Health*.

Dr. Maria L. Muñoz is an Assistant Professor in the Department of Audiology and Speech Pathology at the University of Tennessee, Knoxville. Dr. Muñoz is a certified speech-language pathologist who conducts research in the areas of aphasia, with specific interest in Spanish-English bilingual speakers with aphasia. Her work has been published in *Brain and Language*, *Aphasiology*, *Language, Speech, and Hearing Services in the Schools* and the *Journal of Multilingual Communication Disorders*.

Editorial Correspondence to:

Constance Dean Qualls, Ph.D.
Department of Communication Sciences and Disorders
The Pennsylvania State University
Email: cdq2@psu.edu
http://csd.hhdev.psu.edu/faculty/qualls_c.html

**RACE-ETHNICITY, SOCIOECONOMIC STATUS, AND
COGNITIVE-COMMUNICATIVE FUNCTIONING IN
INDIVIDUALS WITH NEUROGENIC-COMMUNICATION
DISORDERS: CLINICAL IMPLICATIONS AND RESEARCH
DIRECTIONS**

Constance Dean Qualls

The Pennsylvania State University, University Park

Maria L. Muñoz

The University of Tennessee – Knoxville

INTRODUCTION

An important aspect of cultural diversity for the communication sciences and disorders involves intercultural client-clinician relationships. The most recent omnibus survey of the members of the American Speech-Language-Hearing Association (ASHA; 2005) shows that, of the 115,925 affiliates, fewer than 10% identify themselves as belonging to a racial-ethnic group other than white, including African American, American Indian/Alaska Native, Asian, Hispanic or Latino, Native Hawaiian/Other Pacific Islander, or Multi-racial. ASHA (2005) notes further that information on the general incidence or prevalence of communication disorders among culturally and linguistically diverse populations in the United States is lacking. Nevertheless, it is estimated that approximately 6.2 million culturally and

linguistically diverse Americans have communication disorders (ASHA, 2005). More than 2.3 million individuals of Hispanic origin are in need of speech, language, and hearing services and approximately 69% are adults 18 years or older (Langdon & Cheng, 1992). Furthermore, approximately 21 in every 1,000 African Americans ages 45-64 are living with a communication disorder (Adams et al., 1999).

Despite cultural mismatches between clinicians and some of the clients they serve, we acknowledge the similarities in the speech, language, and communicative behaviors among individuals from various racial-ethnic groups. There are also recognized cultural (e.g., beliefs, values, eye contact, cognitive/learning style) and linguistic (e.g., phonological, grammatical, intonation) differences between individuals

from different racial and ethnic backgrounds; these differences, when not well understood, can adversely affect client-clinician interactions. To ensure that appropriate, effective, and meaningful interventions will occur, speech-language pathologists (SLPs) working with individuals who are culturally and/or linguistically diverse (CLD) must not only be skilled in their clinical and professional decision-making, but they must also be competent in cultural aspects relative to their patients (Qualls, 2002).

People experience the world through their own cultural lenses (Kleinman & Kleinman, 1991); yet, cultural competence requires one to understand and embrace alternate views of the world. For SLPs, the decision to treat, the selection and interpretation of assessment tools, and the techniques and strategies employed in therapy are determined based on their knowledge and skills, together known as competence, which are constrained by their cultural experiences. Cultural competence calls for the “ability to think, feel, and act in ways that acknowledge, respect, and build upon ethnic, cultural, and linguistic diversity” (Lynch & Hanson, 1992, p. 50). Cultural competence, thus, deals with attitudes and behaviors. Accordingly, culturally competent service providers are: a) knowledgeable about cultural differences and their impact on attitudes and behaviors; b) sensitive, understanding, and respectful when dealing with people whose culture is different from their own; and c) flexible and skillful in responding and adapting to different cultural contexts and circumstances (Administration on Aging Guidebook, 2005). Cross et al. (1989) stated that the absence of cultural competence anywhere is a threat to competent services everywhere. A logical first step toward cultural competence is becoming knowledgeable about the influences of culture for language

and communication. The increasing focus on culturally competent management of individuals from diverse backgrounds implies the need to understand how to empirically test cultural variables in both the basic and the applied sciences.

In this paper, we present an argument for including socioeconomic status (SES) as a variable, in combination with race-ethnicity, when studying individuals with cognitive-communicative impairments secondary to brain damage. This is key, particularly because race-ethnicity and SES are highly correlated, and therefore, research results may be confounded when both variables are not accounted for. It is our contention that studies investigating the combined effects of race-ethnicity and SES will reveal more accurately any existing cultural effects. Also in this paper, we present future research directions for increasing our knowledge of the impact of culture on cognitive-communicative behaviors in diverse individuals with neurogenic communication disorders. Clinical implications are discussed within the framework of each proposed area of research.

RACE-ETHNICITY AND SOCIOECONOMIC STATUS

Race-ethnicity is a predisposing factor for a number of neurological conditions that produce cognitive-communicative impairments. In the U.S., for example, epidemiological data show that African Americans and Hispanics are at greater risk for stroke and dementia than other cultural groups (Alzheimer’s Association, 2005; American Heart Association, 2005). African Americans, Hispanic/Latino Americans, American Indians, and some Asian Americans, Native Hawaiian, or other Pacific Islanders are at particularly high risk for type 2 diabetes,

thus, making these groups at greater risk for heart disease and strokes (Centers for Disease Control and Prevention, 2003). Also, African Americans have the highest death rate from traumatic brain injury (TBI), and long-term disability following TBI tends to be more severe for African Americans (Thurman et al. 1999). All of these conditions can lead to cognitive-communicative and/or socio-communicative difficulties that require treatment by SLPs. There are also racial-ethnic differences in general health status, functional status, morbidity, mortality, and medication effectiveness (e.g., hypertensive and diabetes medications) (Administration on Aging, 2005), as well as differences in beliefs about health, health care, and health care professionals (Fung & Roseberry-McKibbin, 1999; Huer & Saenz, 2003; Kritikos, 2003; Qualls, 2002).

Indeed, race-ethnicity determines largely an individual's set of life opportunities. However, when examining speech, language, and communicative differences among groups, race-ethnicity, in and of itself, may only account for a small amount of the variability. By focusing on purely on race-ethnicity as a pivotal variable for observed differences, researchers may be misrepresenting the skills and abilities of culturally and/or linguistically diverse individuals. Wilkinson and King (1994) suggested that health researchers probe beyond demographic or constitutional factors (i.e., race or sex) and examine environmental hazards (e.g., availability of and access to care and/or ability to pay) that will yield more useful information about causation of different behaviors as a function of culture. These researchers highlight an area in critical need of communication sciences and disorders researchers' attention – that is, the culture of poverty. Hence, socioeconomic status (SES)

may be a better predictor of cognitive-communicative behaviors than racial-ethnic background (Roseberry-McKibbin, 2000).

Socioeconomic status is a way of ranking relative position in a society based on class, status, and power (Liberatos, Link, & Kelsey, 1988). SES, represented by financial resources or wealth, level of education, and occupation, largely shapes one's culture. Regarding health, for example, those who are poor have fewer resources to devote to health; as a result, food and shelter compete with health insurance, medications, and physician visits (Smith & Kington, 1997). Furthermore, the effects of poverty often span one's lifetime. For example, low SES individuals benefit less from prenatal care than middle SES and high SES individuals; because of this, low SES individuals are at greater risk for some later-appearing conditions (e.g., hypertension, diabetes) that are precursors to some neurological conditions (e.g., stroke, dementia). Also, the diet of low SES individuals can lead to nutritional deficiencies that affect neurological growth and development, as well as the risk of and response to neurological impairment. Research is needed to validate these claims. In addition to income, education level will likely affect the way individuals respond to their cognitive-communicative impairments or to the treatment of their impairments. The assumption is that individuals with more education, as compared to those with less education, may be more knowledgeable about their medical/neurological condition and be better able to provide self-care to prevent further illness or mitigate its harmful effects (Smith & Kington, 1997). Education level is correlated with literacy (e.g., reading and writing), race-ethnicity, and SES. The National Center for Educational Statistics (1993) reported that: 1) adults with lower levels of education were more likely to perform in the lower literacy levels,

compared to those who had completed high school or who had some postsecondary education; 2) African American, American Indian, and Hispanic adults are more likely than whites to have lower levels of literacy, a finding that is generally explained by lower levels of education in these groups; and 3) adults demonstrating higher levels of literacy are more likely to be employed, they work more, and have higher wages than individuals demonstrating lower levels of proficiencies. Education level may also motivate beliefs and attitudes about the neurological condition, what can be done about it, as well as if and how rehabilitation will be achieved. Researchers in the communication sciences and disorders are challenged to empirically test these assertions.

In the U.S. SES will affect significantly decisions regarding health and health care. However, a complete picture of the impact of cultural effects on cognitive-communicative behavior must examine SES in relation to race-ethnicity. Kington and Smith (1997) found that SES plays a greater role in explaining racial-ethnic differences in an individual's ability to function once they have a chronic illness than in explaining disease prevalence. The association between race-ethnicity and SES is particularly salient because of the overrepresentation of nonwhites at lower SES levels. African Americans and Hispanics are disproportionately represented at the low-SES level as compared to the middle- and upper-SES levels (Ostrove, Adler, Kuppermann, & Washington, 2000). We argue that when SES is held constant across racial-ethnic groups, the life experiences, values, and behaviors (including, language and cognitive) of individuals from different groups will tend to be more alike than different. To test this notion, we propose that SES be included as a concomitant variable to race-ethnicity in

research studies investigating the cognitive-communicative impairments found in culturally and/or linguistically diverse individuals with neurogenic communication disorders.

A major advantage for studying the combined effects of race-ethnicity and SES in persons with neurogenic communication disorders is that SES accounts for a greater portion of the variance, precisely because SES includes measures of wealth (e.g., income and other financial assets) and education. All other things being equal, any observed differences might then be considered true and meaningful cultural differences that require further examination. A potential difficulty would be in obtaining the SES data, in particular income. Data acquisition would require the use of qualitative measures such as rating scales, surveys, questionnaires and interviews, although general income data by population may be available. One challenge to researchers would be in the construction and validation of these measures so that reliable information can be obtained without compromising confidentiality for study participants. Another challenge deals with the accuracy of reports, particularly because some individuals may be reluctant to share personal information. It is well known that self-report tends to be less reliable than direct observation (Bordens & Abbott, 2002); nevertheless, the use of multiple measures, population estimates, and large numbers of individuals can reduce substantially the error variance (Bordens & Abbott, 2002; Polgar & Thomas, 2000).

CLINICAL IMPLICATIONS AND FUTURE RESEARCH DIRECTIONS

Research informs clinical practice. However, the growing body of knowledge on normal and disordered communication in

individuals who are culturally and/or linguistically diverse has focused largely on dialect and bilingualism in children. With the exception of bilingual aphasia (see Munoz & Qualls, this issue), research investigating the impact of culture for adults with neurogenic communication disorders continues to be limited. For example, we have no knowledge of post-stroke socio-communicative and/or cognitive-communicative functioning in individuals from the various American Indian nations, the Hawaiian Islands, and the Caribbean Islands, all native speakers of American English, although with different dialects. Notably, Ulatowska and her colleagues have contributed much of the research on language and discourse in African American adults with aphasia, studying narratives (Ulatowska & Olness, 2001; Ulatowska et al., 2000), discourse (Ulatowska et al., 2001; Olness et al., 2002; Ulatowska et al., 2003), and fables and proverbs (Ulatowska et al., 2001). Other studies have examined performance on tests of aphasia in Black and white adults (Molrine & Pierce, 2002) and the relationship between aphasia severity and improvement following treatment in African Americans (Wertz, Auther, & Ross, 1997).

The limited body of knowledge on neurogenic communication disorders in individuals from nonwhite racial-ethnic backgrounds can only lead to erroneous, albeit unintentional, conclusions about the speech, language, and communicative behaviors of these individuals. For example, information about the neurologic conditions of dementia, traumatic brain injury, and motor speech disorders in diverse populations is missing from the literature. However, the establishment of measures of assessment and treatment, research methods, protocols, and procedures, and service delivery approaches that account for cultural (race-ethnicity and SES) variation can only

lead to optimal interventions in culturally and/or linguistically diverse individuals with neurogenic communication disorders and significantly increase the cultural competence of SLPs.

Cultural and linguistic diversity encompasses potential differences across a variety of language areas, including segmental (e.g., phonology, semantics, vocabulary, discourse), suprasegmental (e.g., rate, prosody, emphasis, intonation), nonverbal (e.g., eye contact, proxemics, body language, turn-taking), communication style and intent (e.g., emphasis on the verbal code, use of figurative language), as well as across a variety of nonwhite and white cultural groups. All of these areas provide for a rich field of inquiry for researchers, and will increase significantly the cultural competence of clinicians serving individuals from diverse backgrounds. In the following section, we highlight briefly three current areas in need of neurogenic communication disorders researchers' attention: lesion distribution, treatment outcome/efficacy, and family involvement and social networks.

First, there is evidence of a different distribution of occlusive disease based on group membership. Specifically, there is a higher prevalence of intracranial occlusive lesions in Asians and African Americans as opposed to a higher prevalence of extracranial occlusive lesions in whites (Wong et al., 2000). It may be that the pattern and severity of speech, language, and/or communication deficits will differ based on lesion distribution. This has implications for treatment. Research is needed to test this assumption.

Second, it will be important to know what impact culture has on treatment response. In this case, because various cultural groups ascribe to different values and traditions, researchers could identify any existing cultural differences for the purpose

of appropriately establishing and directing treatment regimens. Wertz et al.'s (1997) research showed that the degree of improvement did not differ significantly between African American and white males, even when initial severity was more severe in the African Americans. These findings, however, have limited generalizability and require replication in a variety of populations that include females. Thus, the impact of culture (SES and race-ethnicity) for treatment regimens and outcomes should be fully investigated.

Third, research is needed to determine the impact of family involvement and social networks for management of individuals with neurogenic communication impairments from culturally and/or linguistically diverse backgrounds. Family and social structures differ by racial and ethnic culture (Lynch & Hanson, 1998); some groups show high family involvement in all clinical management decisions, whereas others do not. SES will likely differentiate further members of racial-ethnic groups regarding family involvement. We speculate that this level of knowledge by clinicians and researchers would result in: 1) a reduction in the number of misdiagnoses and, thus lead to better utilization of human and fiscal resources; 2) an increase in the quality of the services provided and the research process (e.g., formulation of research questions, interpretation of findings); and, 3) quite possibly, improve retention and recidivism rates in therapy as well as in research studies.

CONCLUSIONS

Culturally informed research requires: a) a solid foundation in theory and methods; b) an understanding of what about culture really matters (as defined by the specific culture); and c) the formulation and testing of both culture-specific and alternative (impairment, dysfunction)

hypotheses (Lopez, 2002). Researchers and clinicians working with culturally and/or linguistically diverse individuals are challenged to conceptualize, conduct, and publish appropriately designed research studies. This effort will greatly expand our knowledge base about acquired neurogenic disorders of communication and provide SLPs with the necessary tools to more appropriately evaluate and treat culturally and/or linguistically diverse individuals with acquired neurogenic disorders of communication. This line of research will lead to theories and conceptual frameworks upon which current and future interventions should be based.

REFERENCES

- Adams, P.F., Hendershot, G.E., & Marano, M.A. (1999). Current estimates from the National Health Interview Survey, 1996. *National Center for Health Statistics. Vital and Health Statistics, 10(200)*, 93, Oct..
- Administration on Aging. (2005). *Achieving cultural competence: A guidebook for providers of services to older Americans and their families.*
http://AOAMAIN/prof/adddiv/cultural/addiv_cult_pf.asp,
- Alzheimer's Association. (2005). *Minorities Hardest Hit by Alzheimer's Disease.*
http://www.alz.org/internationalconference/Pressreleases/072104_minorities_hardest_hit.asp.
- American Heart Association. (2005). *Heart disease and stroke statistics – 2005 Update.*
<http://www.americanheart.org/downloadable/heart/1105390918119HDSSStats2005Update.pdf>.
- American Speech-Language-Hearing Association. (2005). *Highlights and*

- trends: ASHA counts for 2004.
<http://www.asha.org/about/membership-certification/member-counts.htm>.
- Bordens, K. S., & Abbott, B. B. (2002). *Research design and methods: A process approach*, 5th ed. Boston, MA: McGraw Hill.
- Centers for Disease Control and Prevention. (2003). National diabetes fact sheet: general information and national estimates on diabetes in the United States. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. Atlanta, GA.
- Cross, T. L., Baron, B. J., Dennis, K. W., & Isaac, M. R. (1989). Towards a culturally competent system of care. Child and Adolescent Service System Program Technical Assistance Center. Washington, DC.
- +Fung, F., & Roseberry-McKibbin, C. (1999). Service delivery considerations in working with clients from Cantonese-speaking backgrounds. *American Journal of Speech-Language Pathology*, 8, 309-318.
- Huer, M. B., & Saenz, T. I. (2003). Challenges and strategies for conducting survey and focus group research with culturally diverse groups. *American Journal of Speech-Language Pathology*, 12, 209-220.
- Kington, R., & Smith, J. P. (1997). Socioeconomic status and racial and ethnic differences in functional status associated with chronic disease. *American Journal of Public Health*, 87, 805-810.
- Kleinman, Arthur, and Joan Kleinman (1991) "Suffering and its Professional Transformation: Toward an Ethnography of Interpersonal Experience." *Culture, Medicine, and Psychiatry* 15:275-301.
- Kritikos, E. P. (2003). Speech-language pathologists' beliefs about language assessment of bilingual/bicultural individuals. *American Journal of Speech-Language Pathology*, 12, 73-91.
- Langdon, H.W., & Cheng, L. (1992). Hispanic children and adults with communication disorders: Assessment and intervention. Gaithersburg, MD: Aspen Publishers.
- Liberatos, P, Link, B. G., & Kelsey, J. L. (1988). The measurement of social class in epidemiology. *Epidemiol Rev.*, 10, 87-121.
- Lopez, S. R. (2002). Teaching culturally informed psychological assessment: conceptual issues and demonstrations. *Journal of Personality Assessment*, 79, 226-234.
- Lynch EW, Hanson MJ (1992) Developing Cross-Cultural Competence: A Guide for Working with Young Children and Their Families Baltimore Paul H. Brookes
- Molrine, C. J., & Pierce, R. S. (2002). Black and white adults' expressive language performance on three tests of aphasia. *American Journal of Speech-Language Pathology*, 11, 139-150.
- National Center for Educational Statistics. (1993). Adult Literacy in America. U.S. Department of Education. Washington, DC.
- Olness, G. S., Ulatowska, H. K., Wertz, R. T., Thompson, J. L., & Auther, L. L. (2002). Discourse elicitation with pictorial stimuli in African Americans and Caucasians with and without aphasia. *Aphasiology*, 16, 623-633.
- Ostrove, J. M., Adler, N. E., Kuppermann, M., & Washington, A. E. (2000). Objective and subjective assessments of socioeconomic status and their relationship to self-rated health in an ethnically diverse sample of pregnant women. *Health Psychology*, 19, 613-618
- Polgar, S., & Thomas, S. A. (2000). *Introduction to research in the health science*, 4th ed, Edinburgh: Churchill \ Livingstone.
- Qualls, C. D. (2002). *Assessment and*

- treatment of neurological impairments in African Americans: Sociocultural considerations.* Perspectives on Communication Disorders and Sciences\ in Culturally and/or linguistically Diverse Populations, ASHA Special Interest Division 14, 8, 9-12.
- Qualls, C. D. (1998). [Review of the book Mama might be better off dead: The failure of healthcare in urban America]. *Journal of Health Care for the Poor and Underserved*, 9, 196-200.
- Roseberry-McKibbin, C. (2000). Multicultural matters. *Communication Disorders Quarterly*, 21, 242-245.
- Smith, J. P., & Kington, R. (1997). Demographic and economic correlates of health in old age. *Demography*, 34, 159-170.
- Thurman, D., Alverson, C., Dunn, K., Guerrero, J., & Sniezek, J. (1999). Traumatic brain injury in the United States: A public health perspective. *Journal of Head Trauma and Rehabilitation*, 14, 602-615.
- Ulatowska, H. K., & Olness, G. S. (2001). Dialectal variants of verbs in narratives of African-Americans with aphasia: Some methodological considerations. *Journal of Neurolinguistics*, 14, 93-110.
- Ulatowska, H. K., Olness, G. S., Hill, C. L., Roberts, J. A., & Keebler, M. W. (2000). Repetition in narratives of African Americans: The effects of aphasia. *Discourse Processes*, 30, 265-283.
- Ulatowska, H. K., Olness, G. S., Wertz, R. T., Samson, A. M., Keebler, M. W., & Goins, K. E. (2003). Relationship between discourse and Western Aphasia Battery performance in African Americans with aphasia. *Aphasiology*, 17, 511-521.
- Ulatowska, H. K., Wertz, R. T., Chapman, S. B., Hill, C. L., Thompson, J. L., Keebler, M.W., Olness, G. S., Parsons, S. D., Miller, T., & Auther, L. L. (2001). Interpretation of fables and proverbs by African Americans with and without aphasia. *American Journal of Speech- Language Pathology*, 10, 40-50.
- Wertz, R. T., Auther, L. L., & Ross, K. B. (1997). Aphasia in African-Americans and Caucasians: Severity, improvement, and rate of improvement. *Aphasiology*, 11, 533-542.
- Wilkinson, D. Y., & King, G. (1994). Conceptual and methodological issues in the use of race as a variable: Policy implications. In D. P. Willis (ed), *Health policies and Black Americans*, (pp. 56-71). New Brunswick, NJ: Transaction Publishers.
- Wong, K. S., Li, Huan, Chan, Y. L., Ahuja, A., Lam, W. W. M., Wong, A., & Kay, R. (2000). Use of transcranial Doppler ultrasound to predict outcome in patients with intracranial large-artery occlusive disease. *Stroke*, 31, 2641-2647.

INCREASING MINORITY REPRESENTATION IN THE HEALTH PROFESSIONS

Robin Fleming

University of Washington, Seattle

Bobbie Berkowitz

University of Washington, Seattle

Allen D. Cheadle

University of Washington School of Public Health & Community Medicine, Seattle

ABSTRACT

Research indicates that health disparities may be reduced by increasing the number of ethnic minorities working in health occupations. Establishing health career pathway programs for immigrant and ethnic minority students is one way to address this problem. One such program, Cross-Cultural Education in Public Health (CCEPH), was developed, implemented, and evaluated to determine whether participants expressed greater interest in pursuing health care careers after program completion. A sample of 72 immigrant students in two high schools participated in the program based on Bandura's theory of self-efficacy. Data were gathered using pre- and post-program surveys which measured academic self-efficacy and career consideration. Results for academic efficacy were not statistically significant, but interest level in health care careers rose substantially. While further research needs to be conducted to determine whether such programs increase self-efficacy, programs such as CCEPH can increase the consideration of health careers among immigrant, ethnic minority students.

KEY WORDS: health disparities, immigrant students, health careers, self-efficacy theory, health education programs

Author Biographies:

Robin Fleming, RN, MN
School Nurse, Seattle School District
PhD Student, College of Education, University of Washington
e-mail: flemming@u.washington.edu

Bobbie Berkowitz, RN, PhD, CNAA, FAAN
Chair and Professor
Psychosocial and Community Health
Box 357263
University of Washington
e-mail: bobbieb@u.washington.edu

Allen D. Cheadle, PhD
Research Professor, Dept. of Health Services
University of Washington School of Public Health & Community Medicine
Address: Health Promotion Research Center
e-mail: cheadle@u.washington.edu

INCREASING MINORITY REPRESENTATION IN THE HEALTH PROFESSIONS

Robin Fleming

University of Washington, Seattle

Bobbie Berkowitz

University of Washington, Seattle

Allen D. Cheadle

University of Washington School of Public Health & Community Medicine, Seattle

INTRODUCTION

It is well established that ethnic minority populations in the U.S. share a disproportionate burden of disease, are more likely to live in poverty, die earlier, have less access to medical care and equitable education, and face the daily burdens of discrimination (Drake & Lowenstein, 1998; Krieger, 2000; Morssink, Kumanyika, Tell, & Schoenbach, 1996; Phillips-Smith, Walker, Fields, Brookins & Seay, 1999; Washington State Board of Health, 2002). One of the strategies suggested to reduce health disparities is to increase the ratio of public health providers and leaders to better reflect the composition of the general population. A growing body of research supports the notion that when health care provision and leadership is culturally similar to the population served, health outcomes are improved (Drake & Lowenstein, 1998; Libby, Zhou & Kindig, 1997). The dearth of ethnic minority practitioners and health care leaders is due in part to a lack of diversity among applicants and graduates of health sciences programs (Washington State Board of Health, 2002). While the number

of people of color in the United States is rapidly increasing, their under representation in the health sciences and is exacerbating the existing deficiency of ethnic minority providers (Clawson, 1999).

Most immigrants are ethnic minorities who, upon arrival in the U.S., are “assigned,” both formally and informally, to racial categories that did not exist in their home countries. Mainstream assumptions and modes of discrimination accompany such categorization (Portes & MacLeod, 1999). Therefore, the terms immigrant and ethnic minority are used to address both the shared and unique attributes for which more equitable health representation could engender improved health.

To help address the problem of lack of proportional ethnic representation among health care providers and policy makers, the *Cross-Cultural Education in Public Health* (CCEPH) program was developed. The program, funded by a grant from the Robert Wood Johnson Foundation for the 2000-01 and 2001-02 school years, attempted to mitigate this trend by promoting interest in health care careers among immigrant and ethnic minority middle and high

school students. The nine-week program's curriculum and style of instruction was based on Bandura's (1986) self-efficacy theory. Numerous and diverse studies have

demonstrated that self-efficacy contributes to human motivation and attainments (Bandura, 1992); Brown, Lent & Larkin, 1989). This program was evaluated to determine its effectiveness and its possible application in other settings.

CONCEPTUAL FRAMEWORK

This program was based on Bandura's (1986) theory of self-efficacy and on the predictive relationship between stated intention and behavior (Ajzen and Fishbein, 1980), leading to two research questions: 1) Did the CCEPH program increase students' self-efficacy in terms of academic competency and/or in pursuing health care careers? 2) Did statement of intention to pursue a health care career for which further education is required change after program completion?

Bandura's theory proposes self-efficacy is central to the pursuit, motivation, and development of human undertakings, including consideration and selection of careers (Bandura, Barbaranelli, Caprara, & Pastorelli, 2001). Because self-efficacy supersedes knowledge in terms of influence on decision-making and behavior, the primary goal of the CCEPH program was to increase the level of students' academic and career self-efficacy rather than exclusively focusing on knowledge acquisition or behavior change. The curriculum was designed to increase self-efficacy by incorporating a learning approach that used methods discussed in the literature, such as modeling, peer teaching, and skill development. It also emphasized the host teacher's course curriculum, so that basic math, technology, reading, and writing skills were strengthened and reinforced. In order to increase the numbers of ethnic minorities in the health fields,

however, students must not only believe they are capable of achieving such careers, but also have an intention to pursue them.

LITERATURE REVIEW

Literature was reviewed in four areas relevant to the conceptual framework that guided this study: (a) self-efficacy and career choice; (b) stated intention and its relationship to behavior; (c) the existence and content of similar educational programs; and (d) efficacy beliefs specific to ethnic minority and immigrant children and their relationship to occupational pursuits.

Self-efficacy and Career Choice

Bandura (1997) defines perceived self-efficacy as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3). Self-efficacy theory suggests that efficacy beliefs play predictive and mediational roles in human thought patterns, behavior and motivation, and involve the organization of cognitive, social, and behavioral subskills and strategies into action (Chase, 2001). These beliefs exert a powerful influence over children's career trajectories, predicting occupational choice, preparatory achievement, and perseverance in the chosen occupational pursuit (Lent, Brown, & Larkin, 1987). When variations in actual ability, prior level of academic achievement, and vocational interests are controlled, it is efficacy beliefs that predict the range of career options individuals consider viable (Bandura, 1997). While there are multiple factors that exert influence over human choice and behavior (e.g. gender, ethnicity, experience, timing, normative beliefs), self-efficacy is the fundamental core from which choices to pursue, avoid, or perform tasks are made. Children who judge themselves to be

efficacious academically believe that a wider range of careers is available to them, including careers in science and medicine (Bandura et al., 2001). Other studies supported these findings as well as provided evidence that self-efficacy both

increases academic performance and widens career consideration (Bores-Rangel, Church, Szendre & Reeves, 1990; Brown, Lent & Larkin, 1989).

Intention and Behavior

When people state an intention to pursue an activity, what is the probability the activity will be performed? To what degree does stated intention translate into actual behavior? Within the framework of their Theory of Reasoned Action, Ajzen and Fishbein (1980) explored the relationships among beliefs, attitudes, intentions, and behavior, asserting that the most important determinant of behavior is a person's behavioral intention. Behavioral intention is defined as a measure that describes "the likelihood that a person will engage in a given behavior" (p. 42). They view a person's intention to perform a behavior as the immediate determinant of behavior and believe that a person will usually act in accordance with his or her intention. Because "it is not very illuminating to discover that people usually do what they intend to do," (p. 6) the underlying determinants of intentions are critical to altering them, thus affecting the behavior. While it is not within the scope of this article to explicate the determinants of intention, it is interesting to note Burks' (2001) statement that intent to perform a behavior is predicated to a significant degree on a person's confidence in her or his ability to act, suggesting that self-efficacy is among the variables that transform intent into action. While research supports the theory that people usually act on their intentions, this relationship diminishes as the time interval between intention and action increases (Ajzen &

Fishbein, 1980). In other words, the greater the time between intention and action, the greater the likelihood that intervening events may occur to change the action.

Career Education Programs

A literature review revealed no studies of successful programs designed to enhance health care career-seeking behaviors among immigrant and ethnic minority children. However, two programs were described that shared a similar focus with CCEPH in terms of encouraging career and academic pursuits among ethnic minority students: Med Start (Brewer, DuVal, & Davis, 1979) and Program: Learning According to Needs (PLAN) (Abi-Nader, 1991). Both programs targeted ethnic minority and economically disadvantaged children, substantially increased the college attendance rates among program recipients, and delivered mentoring, skill development, and counseling services in a culturally relevant manner. Evaluation was not conducted to determine which of the program variables contributed to program success. However, research literature and health behavior theory support the importance of mentoring, imparting skills and knowledge, and improving literacy in culturally, developmentally, and gender sensitive ways.

Self-Efficacy, Ethnicity and Vocation

The literature is limited in its review of the extent to which degrees of ethnic identity influence self-efficacy and whether self-efficacy overrides the effects of children's internalized perceptions of the host culture's acceptance of them. Bores-Rangel and colleagues (1990) found a positive relationship between self-efficacy and the extent of consideration of occupational activities for high school equivalency Hispanic students. A study of unemployed ethnic youth, however, found that

perceptions of acceptance in the host culture superseded the effects of self-efficacy (Nesdale & Pinter, 2000).

Research suggests that a strong sense of ethnic identity is not incompatible with academic achievement and career consideration and that the adoption of a bicultural orientation meets with more success in career and academic pursuits than one in which the mainstream culture is rejected (Bandura, 1997; Nesdale & Pinter, 2000; Gloria & Herd, 1999). It appears that maintaining a strong sense of belonging to one's ethnic group, its mores and values, while adopting skills required to succeed academically, serves to foster self-efficacy and enhance future academic and occupational pursuits.

METHODS

Program Description

Development, implementation, and evaluation of the CCEPH program was done by a school nurse with the aid of grant funding. The program was administered in math, language arts, computer, and health classes composed largely of immigrant, English as a Second Language (ESL) students. There were nine sessions in the curriculum: there was an introductory and a wrap-up sessions that included data collection; five were classroom-based learning sessions; one was a job fair; and one was a field trip. The classes were held weekly for one class period, ranging from 50 minutes to nearly two hours, depending on the school's schedule. The exception to this was the field trip, which was a half-day excursion to a water quality treatment plant. In addition to class time, students were given homework and group-based projects that some teachers allotted extra class time for.

Content of the classroom sessions included an introduction to public health; culture and health; planning for personal health

and goals; infectious disease; and jobs and careers. The classroom sessions were easily adaptable to reinforce content of the host class. For example, in the computer class, one project helped develop technological and mentoring skills by assisting students to contribute articles and ideas to a local hospital website that provided community health information for immigrant families. Through established contacts with hospital and community health providers, the school nurse, in collaboration with a public health partner, helped to provide the link that allowed immigrant students access to culturally relevant resources where they could act as peer mentors, improve writing and technology skills, and gain access to information about health and health careers. In the language arts class where persuasive writing skills were emphasized, the school nurse assisted students in identifying and exploring public health issues. Students then wrote persuasive letters to local officials suggesting possible solutions.

In addition to the classroom sessions, students went on a field trip to a wastewater treatment facility for an introduction to environmental health and attended a job fair organized specifically for them. The job fair provided skill building and development of practical knowledge from ethnic minority and immigrant adults who worked in public health provided information to students about a variety of health careers as well as the practical skills necessary to obtain scholarships, financial aid, internships, and filling out applications. For the classroom session on jobs and careers in health that preceded the job fair, the school nurse arranged for a guest speaker who was a Haitian immigrant who had a master's degree in public health and served as the head of interpreter services at a large hospital. Her life story, ethnicity, and desire for students' success provided a model through for students to envision their future. Modeling and mentoring also occurred through peer teaching on health

issues such as domestic violence and infectious disease.

The public health department partnered with the school district as a grant recipient and provided a wealth of resources connecting students to the public health community. The school nurse used existing relationships and built new ones with both the health and education communities to form collaborative relationships that enhanced the program and raised awareness of issues surrounding immigrant students.

Evaluation

A single group, pretest/posttest design was used to evaluate the impact of the program. The operational definition of self-efficacy is "Beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). Intention is defined as having a design, purpose or plan in mind that guides the action necessary to fulfill it.

A non-experimental, non-comparative design was used because an adequate control group was not available. In addition, the researchers assumed that students not receiving this program would be unlikely to demonstrate changes related to self-efficacy and intention to pursue higher education or health care careers during the relatively short time frame of the program.

Sample

The group studied was a convenience sample of 72 students enrolled in ESL programs at two urban high schools in the Northwest. These schools were selected because neither had previously participated in the CCEPH program and the ESL instructors were agreeable to participation in the program. Students in the program were first or second-generation immigrants or ethnic minorities. The classes selected were those that best accommodated scheduling needs without regard to ethnicity,

age, gender, literacy level, language fluency, or academic standing. Students were in grades 9 through 12 with an age range from 15 to 20 years. They reflected the varied composition of immigrant and ethnic minority students enrolled in the school district, with the majority of students being Mexican, Somali, and Vietnamese.

Instruments

The instruments were designed to measure academic self-efficacy and career consideration. An altered form of the Occupational Self-Efficacy Scale (OSES) developed by Betz and Hackett (1981) was used. The original instrument contained several measures designed to measure career self-efficacy of traditional male and female occupations. Layton's (1984) study showed total internal consistency reliability for the OSES to be .95. Betz and Hackett (1998) also reported that extensive study by multiple investigators provided strong evidence of OSES content, concurrent, and construct validity.

For the purpose of this study, two of the OSES measures were altered by the investigators to measure academic self-efficacy and career interest in relation to careers in health care and public health. The first measure, the Academic Efficacy Scale, was changed to include descriptions of academic coursework necessary to attain specific job in health care. Seventeen health care jobs and three jobs unrelated to health care were added. The survey measured two elements related to academic efficacy: (1) whether students believed they could successfully complete educational requirements to obtain 20 jobs listed, and (2) a 10-point Likert-type scale that measured degree of confidence in their ability to meet those requirements.

The second measure, the Career Consideration Scale, was modeled after Betz's and Hackett's (1998) OSES measure of the same name. The only alterations to this

measure were the substitution of 17 health care careers and 3 non-health care careers, as well as a descriptive listing of job duties and characteristics under these job titles. The respondents were asked to indicate with a yes or no whether they had ever considered the career

listed and then to rate the degree of interest in that career by circling a number from 1 to 10 on a Likert-type scale, with higher numbers indicating higher interest. Providing job descriptors was intended to help avoid misleading results based on student misunderstanding of job duties based on unfamiliar and vague job titles (Bandura et al., 2001).

Data Collection and Analysis

Data were collected using identical pre and post-study surveys. The pre-study survey was distributed during the first class session. All surveys were in English. Each question was read aloud to ensure comprehension. Due to scheduling and the lack of interpreters in the school setting, only one Vietnamese interpreter was available to assist with survey comprehension on two occasions at School 1. The interpreter assisted three students on both occasions. The post-study surveys were distributed during the final class session, using the same method of administration.

Aggregate scores related to academic and career self-efficacies and career consideration were generated from the individual items following the procedures used in the original studies using these instruments. Some of these included a quiet place (classroom setting) to administer the surveys, review of instructions, and conformance to human subjects standards. Two-sample (unmatched) t-tests were used to test for changes over time in both the aggregate scores and individual items.

RESULTS

At School 1, a sample of 38 students completed pre-study survey; two students dropped out of the program due to scheduling conflicts, reducing the post-program survey sample to 36. The pre-study survey was administered to 37 students at School 2. One student declined to complete the post-program survey, reducing the sample for this survey to 36. The total sample size pre-survey was 75; at post-survey, the total sample size was 72. Table 1 shows the demographic of the students participating in the program. Participants came from a number of countries, most from Vietnam, Somalia, and Mexico.

Academic Efficacy

Results for academic efficacy were not statistically significant (Tables 2 and 3). Slightly more than half of the subjects showed an increase in academic efficacy (55%), and 45% had a decrease. None of the yes/no questions about ability to complete training and educational requirements for jobs were statistically significant, and the number of significant scale items was not more than would be expected due to chance alone.

Career Consideration

Students at School 1 reported an increase in consideration of 13 careers; interest was unchanged in 2 careers; and it decreased in 5 careers (Table 4). At School 2, consideration increased in 16 of 20 careers and decreased in 4. Combined scores showed statistical significance for the careers of nursing and nutrition. Statistical significance was approached for the occupation of medical interpreter. At School 2, two items, health researcher and social worker, were significant.

DISCUSSION

This study examined whether in the CCEPH program increased students' self-efficacy to complete coursework and/or training required for specified careers. This measure may serve as an indicator or students' beliefs in their abilities to attend college. This study also measured the level of interest students assigned to health careers. The results for student self-efficacy were unchanged -- there were no trends toward increased self-efficacy, and none of the individual items were statistically significant. The results for career consideration were more positive. In 13 of 20 careers in one school and 16 of 20 in the other, students reported an increased interest in pursuing a career in the health professions, although few items were statistically significant.

One possible explanation for the lack of increase in academic efficacy scores was that the baseline academic efficacy scores were high at baseline measurement. For example, nearly 95% of students at School 1 and 86% of students at School 2 indicated baseline belief in their ability to complete academic requirements for a medical assistant. One explanation for the high baseline scores is the wording of the questions was such that even students with minimal confidence may have believed they could complete educational and training requirements for specific jobs.

Study Limitations and Recommendations

A limitation of the study was the English fluency level of the students. Because interpreters were not available to assist students with survey comprehension, it is likely that lack of understanding affected survey results. It was particularly challenging for students with limited English literacy to distinguish between personal career interests and their assessment of their academic efficacy for jobs that may not have been appealing to them. An additional

limitation was the small sample size of 72 participants and lack of a comparison group. In future studies, instruments used in measuring self-efficacy should be carefully constructed to take into account language difficulties, and all students with limited English should have access to interpreters. Ideally, instruments should be administered in the subjects' native language(s).

IMPLICATIONS FOR SCHOOL NURSING PRACTICE

The CCEPH program was designed, implemented, and evaluated by a school nurse. While grant funding enabled the nurse to have time for program development, many of the classroom teaching activities and projects as well as community-school coordination efforts are functions that can be seamlessly implemented into a busy school nurse practice – in fact, many of them are activities that many school nurses are already doing.

School nurses bring specific strengths and skills to the implementation of educational and career programs. As advocates and educators, school nurses are in a unique position to promote the development and implementation of health programs in schools that are increasingly populated by immigrant and ethnic minority students. They are also likely to be one of the few adults in their school buildings who have consistent access to many immigrant students, as well as knowledge of community resources that can be coordinated to help deliver health services to these students and their families. Such access creates opportunity to model the role of the health professional to immigrant students, to forge bonds between immigrant populations and community health and education resources, and to take a leadership role in linking immigrant students with health education opportunities that may lead to broadening students' thinking about career choices available to them.

As the national nursing shortage persists, school nurses should view health career promotion as within their scope of practice. Such promotion for immigrants and ethnic minorities – through modeling, linking families and students to community resources, and advocating for and assisting in the implementation of programs that provide health education with an eye toward careers – is an activity that may, in combination with other interventions, ultimately serve to increase the diversity of individuals entering health-related occupations.

ACKNOWLEDGEMENT

The Cross-Cultural Education in Public Health Program was made possible by funding from the Robert Wood Johnson Foundation and the Association for Supervision and Curriculum Development. The authors also would like to acknowledge the support of the Seattle School District and the Seattle and King County Public Health Departments

REFERENCES

- Abi-Nader, J. (1991). Creating a vision of the future: strategies for motivating minority students. *Phi Delta Kappan*, 72(7), 546-549.
- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, N.J.: Prentice-Hall, Inc.
- Bandura, A. (1986). *Social foundation of thought and actions*. Englewood Cliffs, N.J.: Prentice-Hall, Inc.
- Bandura, A. (1992). Social cognitive theory. In R. Vista (Ed.), *Six theories of child development: Revised formulations and current issues* (pp. 1-60). London: Jessica Kingsley.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W.H. Freeman and Company.
- Bandura, A., Barbaranelli, C., Caprara, G.V., & Pastorelli, C. (2001). Self-efficacy beliefs as shapers of children's aspirations and career trajectories. *Child Development*, 72(1), 187-206.
- Betz, N., & Hackett, G. (1981). The relationship of career-related self-efficacy expectations to perceived career options in college women and men. *Journal of Counseling Psychology*, 28, 399-410.
- Betz, N. & Hackett, G. (1998). Retrieved June 12, 2002 from: <http://seamonkey.ed.asu.edu/~gail/osesa.htm>
- Bores-Rangel, E., Church, A., Szendre, D., & Reeves, C. (1990). Self-efficacy expectations to perceived career options in college women and men. *Journal of Counseling Psychology*, 28, 399-410.
- Brewer, W.R., DuVal, M.K., & Davis, G.M. (1979). Increasing minority recruitment to the health professions by enlarging the applicant pool. *The New England Journal of Medicine*, 301(2), 74-76.
- Brown, S., Lent, R., & Larkin, K. (1989). Self-efficacy as a moderator of scholastic aptitude – academic performance relationships. *Journal of Vocational Behavior*, 35, 64-75.
- Burks, K. (2001). Intentional action. *Journal of Advanced Nursing*, 34(5), 668-675.
- Chase, M. (2001). Children's self-efficacy, motivational intentions, and attributions in physical education and sport. *Research Quarterly for Exercise and Sport*, 72(1), 47-54.
- Clawson, D.K. (1999). Challenges and opportunities of racial diversity in medical education. *Clinical Orthopedics*, 362, 34-39.
- Drake, M., & Lowenstein, D. (1998). The role of diversity in the health care needs of California. *Western Journal of Medicine*, 168(5), 348-354.
- Gloria, A., & Hird, J. (1999). Influences of ethnic and nonethnic variables on the career decision-making self-efficacy of college students. *The Career Development*

- Quarterly*, 48(2), 157-174.
- Krieger, N. (2000). Discrimination and health. In L. Berkman and I. Kawachi (Eds.), *Social Epidemiology* (1st Ed., pp. 36-75). New York: Oxford University Press.
- Layton, P.L. (1984). *Self-efficacy, locus of control, career salience, and women's career choice*. Unpublished Ph.D. dissertation, Department of Psychology, University of Minnesota, MN.
- Lent, R.W., Brown, S.D., & Larkin, K.C. (1987). Comparison of three theoretically derived variables in predicting career and academic behavior: Self-efficacy, interest congruence, and consequence thinking. *Journal of Counseling Psychology*, 34, 293-298.
- Libby, D., Zhou, Z., & Kindig, D. (1997). Will minority physicians meet U.S. needs? *Health Affairs*, 16(4), 205-214
- Morssink, C., Kumanyika, S., Tell, G., & Schoenbach, V. (1996). Recruiting minorities into the profession of epidemiology: surveying the applicants' mail. *Annals of Epidemiology*, 6 (1), 4-11.
- Nesdale, D., & Pinter, K. (2000). Self-efficacy and job-seeking activities in unemployed ethnic youth. *The Journal of Social Psychology*, 140(5), 608-614.
- Phillips-Smith, Walker, Fields, Brookins, & Seay (1999). Ethnic identity and its relationship to self-esteem, perceived efficacy and prosocial attitudes in early adolescence. *Journal of Adolescence*, 22(6), 867-880.
- Portes, A., & MacLeod, D. (1999). Educating the second generation: determinants of academic achievement among children of immigrants in the United States. *Journal of Ethnic and Migration Studies*, 25(3), 373-405.
- Washington State Board of Health (2002). *Final report on health disparities and workforce diversity*. Retrieved April 18, 2002 from: <http://www.doh.wa.gov/SBOH/Pubs/pubs.htm>

Table 1. Demographics

Item	School 1 (N=38) % (N)	School 2 (N=37) % (N)
Age		8.3% (3 students)
14	5.4 (2)	11.1 (4)
15	10.8 (4)	19.4 (7)
16	16.2 (6)	27.8 (10)
17	18.9 (7)	19.4 (7)
18	32.4 (12)	8.3 (3)
19	8.1 (3)	5.6 (2)
20	8.1 (3)	
Grade		32.4 (12)
9	21.6 (8)	29.7 (11)
10	37.8 (14)	16.2 (6)
11	21.6 (8)	21.6 (8)
12	18.9 (7)	
English Proficiency	10.8 (4)	Very good 21.7 (8)
	62.2 (23)	Can manage 48.7 (18)
	2.7 (1)	Know a few words 8.1 (3)
	18.9 (7)	Know some sentences 13.5 (5)
	5.4 (2)	Not at all 8.1 (3)
Country of Origin	Argentina 2.7 (1)	Afghanistan 2.7 (1)
	Bulgaria 2.7 (1)	Bangladesh 2.7 (1)
	Burma 5.4 (2)	Cameroon 2.7 (1)
	China 8.1 (3)	China 5.4 (2)
	Honduras 2.7 (1)	Ethiopia 13.5 (5)
	Laos 2.7 (1)	Guatemala 5.4 (2)
	Mexico 21.6 (8)	India 2.7 (1)
	Nicaragua 2.7 (1)	Italy 2.7 (1)
	Peru 2.7 (1)	Kenya 2.7 (1)
	Philippines 2.7 (1)	Korea 5.4 (2)
	Seattle 2.7 (1)	Mexico 13.5 (5)
	Somalia 5.4 (2)	Peru 2.7 (1)
	Sudan 5.4 (2)	Philippines 2.7 (1)
	Vietnam 32.4 (12)	Somalia 27.0 (10)
	Frequency Missing = 1	Vietnam 8.1 (3)
Year of Arrival	1990 2.9 (1)	1995 3.0 (1)
	1995 8.6 (3)	1997 6.1 (2)
	1998 5.7 (2)	1998 18.2 (6)
	1999 22.9 (8)	1999 15.6 (5)
	2000 45.7 (16)	2000 24.2 (8)

ECHO

	2001 14.3 (5)	2001 2001 33.3 (11)
--	---------------	---------------------

Table 2. Academic Efficacy – Degree of Confidence that Education/Training Can Be Completed

Item	School 1		School 2		Combined	
	Baseline (N=38)	Follow-up (N=36)	Baseline (N=37)	Follow-up (N=36)	Baseline (N=75)	Follow-up (N=72)
Degree of confidence (1-10) can complete training to become:						
Medical Assistant	7.2	7.7	7.1	7.6	7.2	7.7
Health Inspector	8.0	7.8	8.0	8.0	8.0	7.9
Secretary	8.0	8.1	7.1	7.6	7.6	7.9
Physician	6.7	6.9	7.7	6.9	7.1	6.9
X-Ray tech.	6.6	7.3	7.6	6.8	7.1	7.1
Dentist	7.4	6.1	7.0	6.8	7.1	6.4
Engineer	7.0	7.0	8.1	7.3	7.5	7.2
Nurse	7.6	7.6	8.6	8.2	8.2	7.9
Physical Therapist	6.7	6.5	7.4	6.9	7.1	6.7
Social Worker	6.9	7.2	7.6	7.0	7.2	7.1
Nutritionist	7.9	7.0	7.7	7.5	7.8	7.3
Dental Hygienist	6.6	6.9	6.9	7.5	6.7	7.2
Health Educator	6.8	7.6	7.2	7.4	7.0	7.5
Medical Interpreter	7.5	8.6	8.0	7.4	7.8	8.0
Emergency Medical Tech.	7.3	8.0	7.6	6.9	7.5	7.5
Lab Tech.	6.6	7.7*	7.3	6.7	6.9	7.3
Accountant	8.2	7.9	7.7	8.2	7.9	8.0
Health Administrator	7.5	7.0	7.7	7.1	7.6	7.1
Epidemiologist	6.5	6.5	8.0	5.6*	7.2	6.1
Health Researcher	6.7	6.9	7.5	7.0	7.2	6.9

* = statistical significance

Table 3. Academic Efficacy – Percent Who Believe Education/Training Can Be Completed

Item	School 1		School 2		Combined	
	Baseline (N=38) %	Follow-up (N=36) %	Baseline (N=37) %	Follow-up (N=36) %	Baseline (N=75) %	Follow-up (N=72) %
Percent who believe education/training can be completed to be a:						
Medical assistant	95	86	87	92	91	89
Health inspector	88	94	78	86	83	89
Secretary	81	71	78	83	80	77
Physician	58	47	43	53	51	50
X-Ray tech.	81	83	75	83	78	83
Dentist	50	47	57	42	53	44
Engineer	68	83	57	67	63	75
Nurse	60	75	70	86	65	81*
Physical Therapist	45	64	57	42	51	53
Social Worker	79	69	62	69	71	69
Nutritionist	58	67	61	69	60	68
Dental Hygienist	57	61	60	58	58	60
Health Educator	78	69	73	69	76	69
Medical Interpreter	81	75	83	81	82	78
Emergency Medical Tech.	76	78	76	75	76	76
Lab Tech.	83	75	64	61	74	68
Accountant	81	80	78	74	80	76
Health Administrator	53	64	46	57	49	61
Epidemiologist	31	42	28	33	29	38
Health Researcher	33	36	49	44	41	40

* = statistical significance

Table 4. Career Consideration

Item	School 1		School 2		Combined	
	Baseline (N=38)	Follow-up (N=36)	Baseline (N=37)	Follow-up (N=36)	Baseline (N=75)	Follow-up (N=72)
(% ever considered); Seriousness of consideration (1-10)						
Medical Assistant Consideration	72.2 7.52	72.2 7.24	78.4 7.97	82.9 7.36	75.3 7.76	77.5 7.30
Health inspector Consideration	58.3 7.14	66.7 6.65	38.2 7.77	51.4 6.89	48.6 7.38	59.1 6.76
Secretary Consideration	52.8 7.37	52.8 6.84	67.6 7.76	57.1 7.35	60.3 7.59	55.0 7.10
Physician Consideration	58.3 7.14	50.0 7.35	56.8 7.71	64.7 7.27	57.5 7.43	57.1 7.31
X-Ray tech. Consideration	63.9 7.13	50.0 6.75	48.7 6.72	58.8 6.00	56.2 6.95	54.3 6.33
Dentist Consideration	47.2 5.50	41.7 6.36	43.2 8.06	58.8 6.80	45.2 6.78	50.0 6.62
Engineer Consideration	66.7 7.00	71.4 7.44	59.5 6.59	62.9 7.20	63.0 6.80	67.1 7.33
Nurse Consideration	47.2 6.65	62.9 7.33	75.0 7.93	91.2 8.00	61.1 7.43	77.0* 7.73
Physical Therapist Consideration	58.3 6.19	50.0 6.35	37.8 6.93	57.1 6.65	48.0 6.49	53.5 6.51
Social Worker Consideration	66.7 7.04	58.3 7.15	66.7 7.96	71.4 6.42*	66.7 7.50	64.8 6.75
Nutritionist Consideration	42.9 6.71	63.9 6.18	48.7 6.53	60.6 7.25	45.8 6.61	62.3* 6.69
Dental Hygienist Consideration	28.6 6.60	33.3 6.92	59.5 6.00	53.1 6.71	44.4 6.19	42.7 6.79
Health Educator Consideration	57.1 7.05	61.1 6.76	66.7 6.91	68.8 6.91	62.0 6.98	64.7 6.84
Medical Interpreter Consideration	60.0 7.62	63.9 7.77	63.9 7.61	84.4 7.41	62.0 7.61	74.0 7.57
Emergency Medical Tech. Consideration	42.9 6.47	60.0 6.43	65.0 8.00	59.4 7.16	54.2 7.41	60.0 6.78
Lab Tech.	34.3	47.2	51.4	55.0	43.1	51.0

ECHO

Consideration	6.00	6.50	6.84	5.88	6.52	6.18
Accountant Consideration	69.0 7.17	72.2 6.96	65.0 7.67	66.0 7.43	66.7 7.42	69.1 7.17
Health Administrator Consideration	46.0 7.13	50.0 6.71	56.0 6.58	47.0 6.53	50.7 6.83	49.0 6.63
Epidemiologist Consideration	23.0 5.75	28.0 6.67	38.0 7.14	39.0 6.75	31.0 6.64	33.0 6.71
Health Researcher Consideration	37.1 6.54	42.0 6.71	38.0 8.36	44.0 6.36*	38.0 7.48	43.0 6.54

* = statistical significance