Articles

Achievement and Expectations of Immigrant, Second Generation, and Non-immigrant Black Students in U.S. Higher Education - Cynthia Hudley ................................................................. 223

Cognitive Abilities of Pre- and Primary School Children with Spina Bifida in Uganda – Femke Bannink, Johnny R. J. Fontaine, Richard Idro, Geert van Hove................................................................. 249

In-service Teachers’ Sense of Agency after Participation in a Research Master Course – Maria Antonietta Impedovo......................................................... 281

Teaching-Learning Conceptions and Academic Achievement: The Mediating Role of Test Anxiety – Gökhan Baş................................................................. 308

Reviews

Teacher Education for High Poverty Schools, by J. Lampert and B. Burnett – Icy Fresno Anabo................................................................. 336
Achievement and Expectations of Immigrant, Second Generation, and Non-immigrant Black Students in U.S. Higher Education

Cynthia Hudley¹

1) University of California, Santa Barbara, United States

Date of publication: October 24th, 2016
Edition period: October 2016 - February 2017


To link this article: http://dx.doi.org/10.17583/ijep.2016.2226

PLEASE SCROLL DOWN FOR ARTICLE

The terms and conditions of use are related to the Open Journal System and to Creative Commons Attribution License (CC-BY).
Achievement and Expectations of Immigrant, Second Generation, and Non-immigrant Black Students in U.S. Higher Education

Cynthia Hudley
University of California Santa Barbara

Abstract

Research on academic achievement contrasting Black immigrant, second generation, and non-immigrant students as distinct groups is surprisingly sparse in the higher education literature. This study examined Black immigrant and second generation undergraduates from Africa and the Caribbean and non-immigrant Black American undergraduates, using the contrasting lenses of segmented assimilation theory and cultural ecological theory. Results for academic achievement favored second generation students, consistent with cultural ecological theory, while findings concerning expectations were more consistent with segmented assimilation theory. However, findings were moderated by gender in complex ways. This research indicates the need for more comprehensive theories of immigrant student achievement and motivation that incorporate consideration of the context surrounding both emigration from the home country and immigration to the host country.

Keywords: Higher education, expectations, academic achievement, immigration
Rendimiento y Expectativas de Estudiantes Inmigrantes, de Segunda Generación y Negros no Inmigrantes en la Educación Superior en Estados Unidos

Cynthia Hudley
University of California, Santa Barbara

Resumen
La investigación sobre rendimiento académico comparando a estudiantes inmigrantes Negros, de segunda generación y estudiantes no inmigrantes como grupos distintos es sorprendentemente escasa en la literatura sobre educación superior. Este estudio examinó estudiantes de grado inmigrantes Negros y de segunda generación de África y del Caribe con estudiantes de grado Negros Americanos, utilizando las lentes comparativas de la teoría de la asimilación segmentada y la teoría ecológica cultural. Los resultados sobre el rendimiento académico favorecieron a los estudiantes de segunda generación, siendo esto consistente con la teoría ecológica cultural, mientras que los resultados sobre expectativas fueron más consistentes con la teoría de la asimilación segmentada. Sin embargo, los resultados fueron moderados por el género en formas complejas. Esta investigación indica la necesidad de teorías más comprensivas sobre el rendimiento y la motivación de estudiantes inmigrantes que incorporen el contexto que envuelve tanto la emigración del país de origen como la inmigración al país de acogida.

Palabras clave: Educación superior, expectativas, rendimiento académico, inmigración
he literature on academic achievement has not always attended to differences in ethnicity and immigration history among Black youth in U.S. schools. Rather, Black students are too often depicted as a monolithic group, and immigration history is ignored. Further, although a great deal of research has been devoted to the academic trajectories of immigrant and second generation adolescents, relatively little of this body of work has addressed students from Africa and the Caribbean; the largest share of this research has been devoted to immigrant children from Asia and Latin America (cf. Kao & Thompson, 2003; Zhou, 1997). Thus we know relatively little about how the academic experiences and outcomes of immigrant and second generation Black youth compare to non-immigrant Black youth. For the purposes of this investigation, non-immigrant Black youth are those born in the US to parents who were both born in the US; immigrant Black youth were born abroad; and second generation Black youth are US born with at least one parent born abroad. Understanding possible within-group variability among Black students may provide key insights to address the pervasive underachievement, typically measured by GPA and standardized test scores, experienced by some Black students, and importantly for society, stem the loss of valuable human capital.

Some early research, based on 1980 census data, indicated that non-immigrant Black men completed more years of education and earned higher incomes than Caribbean Black immigrant men (Farley & Allen, 1987). However, more recent U.S. census data consistently demonstrated that immigrant Black households from the Caribbean and Africa were more economically and academically successful than non-immigrant Black households. Educational attainment for non-immigrant Black adults 25 years of age and older was 30% with some college, 11% with a Bachelor’s degree, and 6% with a graduate degree. Poverty rates for non-immigrant Black households approximated 20% (U.S. Census Bureau, 2008). For Black adults 25 years and older who immigrated from the Caribbean, 38% completed at least some college education; 54% of all households earned in excess of $50,000; and 31% earned $75,000 or more (Schmidley, 2001). Finally, for immigrant Black adults from the African continent, 24% of had attained a Bachelor’s degree and 19% attained a graduate degree (U.S.
Average educational attainment for this group was 14 years of formal schooling, greater than the average attainment of all whites (12.9 years) and Asians (13.1 years) (U.S. Census Bureau, 2004). As well, 45% of African immigrants had a household income in excess of $50,000, while only 13% of families had incomes below the poverty level (Newburger & Gryn, 2009). Clearly, these data show that immigrant Black households from Africa and the Caribbean are outpacing their non-immigrant Black counterparts in both educational attainment and income.

**Portraits of Economic and Academic Success**

Research treating Black youth as a monolithic group demonstrates that Black children and adolescents underperform academically on traditional indices of academic performance (e.g., standardized tests, grades, college going rates), relative to U.S. averages across all levels of education (NCES, 2007). Lack of successful participation in higher education is one of the especially persistent and troubling findings among Black youth in the aggregate, given that the life chances and income potential of those earning less than a bachelor’s degree are greatly diminished relative to their peers who complete a 4 year degree (Hudley, 2009). However, an emergent, more fine-grained body of research demonstrates the substantial variability within this broadly defined racial category.

Using different national databases, Massey, Mooney, Torres, and Charles (2007) and Bennett and Lutz (2009), for example, found that immigrant and second generation Black students are matriculating at elite institutions at higher rates than their non-immigrant Black peers, although these differences sometimes had much to do with SES and achievement differences between the groups (Bennett & Lutz, 2009). However, other data suggest this overrepresentation was only partly explained by high achievement in high school (Keller & Tillman, 2008). Further, the John Harvard Journal (2004) found that over 50% of the undergraduate Black students at Harvard University were immigrant or second generation youths, though these two generations make up less than 10% of the Black population in the U.S. As well, data from an urban, commuter University revealed that second generation Black freshmen persisted longer at the institution than their non-immigrant Black peers (Jenkins, Harburg, Weissberg, & Donnelly,
Postsecondary participation and persistence are clearly greater for immigrant and second generation Black youth than for their non-immigrant Black peers, and differences in participation are especially evident in elite institutions.

However, a variety of personal characteristics and measures of achievement have not been shown to differ by immigration history among Black students who matriculated in elite institutions (Massey, Mooney, & Torres, 2007). Research in an urban American university with a largely minority student body also revealed no significant differences between immigrant, second generation, and non-immigrant Black students in study habits, attitudes, or GPA (Campbell & Cohen, 2004). However, there is a clear advantage in postsecondary enrollment and persistence for immigrant and second generation Black students that may be somehow relevant to immigration history. The variability in postsecondary indicators among Black students will benefit from further research that clarifies within-group differences.

**Getting ready for college**

Research with younger students has found a mixed picture. An examination of transcripts (Albertini, 2004) revealed that mean cumulative middle school GPA for immigrant Black middle school students from the Caribbean varied from 1.88 to 1.81 on a four-point scale. Research using standardized test scores as outcome variables (Njue & Retish, 2010) revealed that immigrant Black middle school students from Africa outperformed their non-immigrant Black peers in math skills (29% and 25% pass rate, respectively), but in reading the pattern was reversed (39% and 47% pass rate for immigrant and non-immigrant students, respectively). Taken together, findings demonstrate variability in participation and persistence in higher education despite similar constraints in academic preparation for Black students. These findings raise the possibility that success in postsecondary matriculation and persistence but not in academic achievement may be due to influences that are unique to each group (e.g., experiences of racism, individual and family expectations). Deficient K-12 education and academic preparation are too common for Black students regardless of immigration history (Hudley & Duran, 2012). However, immigration history may at least partially explain...
observed differences in postsecondary indicators through its influence on academic motivation, including future expectations.

**Student Expectations**

All Black students typically articulate high expectations, defined as beliefs and plans about the future, to persist and thrive academically beyond high school (Cunningham, Corprew, & Becker, 2009), as well as a strong desires for future life success, (Kao & Thompson, 2003; Solorzano, 1991). In higher education, Black undergraduate students who are immigrants or second generation from Africa or the Caribbean have been shown to choose math and science majors more often than their non-immigrant Black peers. These students reported a belief that such majors represented an expectation for greater adult earning power and future economic benefits from the college degree (Tseng, 2006). Conversely, an in-depth examination of students in higher education using qualitative interviews and participant observation (Berg, 2010) demonstrated that low income non-immigrant Black undergraduates generally reported the expectation that a college degree was not sufficient to assure them of future socioeconomic benefits. These students took into consideration the racial hierarchy in America (Hacker, 1993) and anticipated that their adult life chances could be stymied by a variety of social barriers that constitute institutionalized racism. Cross-sectional survey data similarly have revealed that non-immigrant Black undergraduate students enrolled in a selective, historically White institution had low expectancies for future economic benefits from earning a college degree, and expectations for future economic benefits were sharply lower for juniors and seniors than for freshman and sophomores. The awareness of possible barriers to success increased with time among college students who saw barriers persist despite their academic progress (van Laar, 2001). Thus, expectations for future benefits to accrue from an undergraduate degree seem to differ between immigrant and second generation Black students and their non-immigrant Black peers, making expectations a useful indicator to pursue in search of within-group differences.

On the other hand, a reanalysis of the High School and Beyond data collected in the 1980’s (Beattie, 2002) reported that state level income data did not predict Black students’ postsecondary enrollment decisions,
suggesting that those decisions may not be driven by the expectation of economic benefits. However, state level aggregate data may be too distal an indicator. As well, the ethnic composition of the racially identified Black student subsample was not reported, clearly demonstrating the need for nuanced examinations of within-group variability among monolithically described Black samples. Research on low-income, non-immigrant Black male high school students’ beliefs about school success (Irving & Hudley, 2005) found that students who perceived their academic opportunities to be limited also expressed negative expectations about the future benefits of educational success. Expectations for economic benefits of a college education appear to diverge by immigration history and social class. However, studies that do not report possible ethnic and immigration history in their racially identified Black samples may yield results that obscure differences by immigration history.

Gender

Findings of gender differences in educational attainment for African descent youth have been documented in the literature for several decades. As a monolithic group, Black female students on average achieve higher levels of education than Black male students at almost all levels of education (Grant and Rong, 2002). When one considers within-group variability, immigrant Black women have the highest postsecondary enrollment rates of any race/gender/immigrant group (81%) and non-immigrant Black men the lowest (52%). These gender patterns conform to the current pattern in the overall U.S. population of women attaining more years of school than men (NCES, 2007). Higher achieving girls have also expressed greater aspirations and expectations for future academic success and life attainment than their lower achieving female peers and all male peers (Honora, 2002). Interestingly, as noted above, some of the more debilitating patterns of achievement motivation and future expectations (e.g., perceptions of limited academic opportunities) are more characteristic of non-immigrant Black males but not females. These data clearly point to the strong possibility of an immigration history by gender interaction in the educational achievement and expectations of Black students.
Theoretical Explanations for Differential Academic Success

Existing theories that foreground structural (e.g., Ogbu, 1983) or cultural variables (Portes & Zhou, 1993) have disagreed somewhat on potential trajectories of immigrant and second generation Black students. Ogbu’s cultural ecological theory posits that, in a pluralistic society, all ethnic minority groups that have voluntarily joined the society (i.e., immigrated) should have more educational success than their non-immigrant ethnic minority peers. Based on their voluntary incorporation into a pluralistic society, immigrants and second generation minorities are more optimistic about the link between educational preparation and economic success. They have strong expectations that education will pay off once they learn to navigate the language and culture of the host society, and their success is measured relative to their peers in their home countries. In contrast, groups that were incorporated into the society in an involuntary manner (e.g., through enslavement or conquest) are less likely to expect academic achievement to serve as a direct pathway to economic success. Non-immigrant minorities compare themselves to the dominant society and find persistent inequality. Involuntary minority youth may expect life opportunities to be suppressed by racial discrimination in social and employment spheres rather than facilitated by educational preparation (Irving & Hudley, 2005), a perspective that somewhat diminishes academic motivation and success in high school (Irving & Hudley, 2008). Even academically successful non-immigrant Black college students attributed negative future outcomes to discrimination, although attributions were significantly more pessimistic for students in the third year of college and beyond (van Laar, 2001). Thus, perceived structural barriers apparently do have an impact on achievement and expectations for non-immigrant Black students, i.e., a minority group with a history of enslavement, even among high achieving students. This typology of immigrant and involuntary minority groups, however, has been criticized as rigid and unable to distinguish effectively between immigrant and involuntary status beyond the initial generation of immigrants.

The theory of segmented assimilation has drawn on somewhat different constructs of incorporation to describe educational adjustment, focusing specifically on second generation youth (Portes & Zhou, 1993). This model
theorizes that the segment of American society into which a particular immigrant group assimilates will determine the academic trajectory of their youth, i.e., the second generation. Assimilation into varying segments of society is determined largely according to the race of the immigrant group, the pattern of residence upon first settling in this country, and available economic ladders for upward mobility.

Immigrant Black families with few resources who settle in inner cities in proximity to non-immigrant Black families, according to the theory of segmented assimilation, will find their adolescents under pressure to embrace an oppositional identity similar to non-immigrant youth to cope with structural racism and economic marginalization. This identity choice may block generational upward mobility in ways that are not true for immigrants who enjoy more resources when they arrive, those who are able to settle in suburban or rural areas, or immigrant groups who are not phenotypically similar to minorities victimized by prejudice and discrimination in the U.S. Immigrants who enjoy personal and community resources (education, wealth, previously established strong ethnic communities) may be able to provide access to opportunities in the host culture, protection from potential downward mobility, and opportunities for ethnic solidarity for their youth, irrespective of racial heritage or residential location (Thomas, 2009).

Empirical evidence partially supports segmented assimilation. High school students from the Caribbean have been shown to differ at a rate of 7 to 1 in their identification with their unique ethnic heritage (e.g., Jamaican, Dominican) as a function of SES (57% for middle class vs. 8% for low income youth) (Waters, 1999). More generally, a segmented assimilation perspective draws some support from a sizeable body of research which concludes that in general, youth from lower SES families tend to attain lower levels of education than their more economically advantaged peers (Brooks-Gunn, Duncan, & Aber, 1997; McLoyd, 1998). Thus, it is entirely reasonable to anticipate that immigrant families who arrive with some degree of wealth and join co-ethnic communities with some measure of access to the opportunity structure will enjoy more upward mobility in the second generation than their less advantaged peers. Interestingly, research on academic persistence (Tauriac & Liem, 2012) has demonstrated direct effects of SES and indirect effects of generational status (through high
school grades) on Black students’ persistence in predominately White institutions. Cultural ecological theory and segmented assimilation theory make distinct predictions about the impact of generational status and family income on academic achievement and future expectations among Black students. The current study will examine these contrasting predictions.

The Current Study

Possible reasons why GPA and future expectations might differ among immigrant Black and non-immigrant Black students, particularly college students, have not been fully clarified in the education literature. The current study examined GPA and future expectations among Black undergraduate students who were either first or second generation immigrants or non-immigrants. This integration of race and immigrant status in a single study contributes to our understanding of the role these two factors play in Black college students' achievement and future expectations. The study goal was to examine contrasting predictions of cultural ecological theory and segmented assimilation theory in a sample of students who were enrolled in a selective, historically white (now predominantly white and Asian), multi-campus University system. Academic GPA in higher education is an appropriate outcome of interest, as achieving an undergraduate degree has become an important credential for entry into the middle class in the United States (Wilson, 1999).

Further, the diminishing numbers of Black students on historically white college campuses has become a national emergency, so examining this population can yield especially important insights into supporting academic success among this population. As well, student participants have matriculated into a selective institution, indicating some degree of prior academic success among all groups; thus possible group differences will less likely be a function of systematic differences in academic history. Finally, recall that our brief review indicates that very little of the research examining postsecondary success has considered the influence of multiple categories of immigrant history among this population; thus this study integrates immigrant status into an examination of higher education outcomes and expectations for Black students.
Consistent with segmented assimilation theory and with recent research that accounted for within-group diversity in a sample of Black undergraduates (Campbell & Cohen, 2004) but counter to cultural ecological theory, I posed two specific hypotheses. I hypothesized that undergraduate GPA would differ by family income rather than immigrant history. I also hypothesized that students’ expectations regarding the future benefits of academic success would differ by parental income, as predicted by segmented assimilation theory, but not by immigrant history (as would be postulated by cultural ecological theory). Based on pervasive findings of gender differences in academic attainment, I also expected these hypothesized relationships to be moderated by gender.

Method

Sample

The sample was drawn from the University of California Undergraduate Experience Survey (UCUES), a census that surveys students from each of eight UC undergraduate campuses. From that database, I selected all of the students who self identified as Black, including either immigrant Black students or non-immigrant Black students. International students were excluded. First-generation participants were those who were foreign-born and immigrated to the United States prior to matriculation at the University. Second-generation youth were born in the United States, but had at least one foreign-born parent. Non-immigrant participants were U.S.-born, and both their parents were U.S.-born. The final sample \((N = 820)\) includes only those cases with data on both parent income and immigration history\(^1\), and includes all students from freshman to senior class standing. The sample was 11% first generation immigrant \((M\text{ age} = 20.6)\), 35% second generation immigrant \((M\text{ age} = 20.2)\), and 54% non-immigrant \((M\text{ age} = 20.3)\), as well as 36% male, with a mean family income of $55,700.

Procedure

Participants enrolled in 2004/05 responded to an email invitation sent to the entire student population to participate in a web based survey. Data were
also obtained from the registrar’s office at each campus, including current GPA and self reported family income. Each participant was directed to log in to a secure site maintained by the University. The survey had to be completed in a single session requiring approximately 20 minutes. Once all surveys were completed, all personal identifiers were stripped from the data made available to researchers in order to protect the confidentiality of respondents.

Measures

Participants responded to a core set of items requesting demographic information; participation in and satisfaction with campus activities, programs, and services; self-assessment of academic skills; and educational plans and long-term goals. The analyses reported here concentrate on questions of GPA and academic expectations. Cumulative GPA at the end of spring 2004 and 2003 parent income both were collected from the relevant records at each campus. Parental income, initially reported as 14 categories, was recoded into a 4 level variable. Families were identified as low income if reported family total income was less than $20,000, as moderate income if total family income was between $20,000 and $50,000, as middle income if family income was between $50,001 and $100,000, and families were identified as affluent if total family income was over $100,000. These categories are based roughly on the Federal Poverty Guidelines (U.S. Social Security Administration, 2010) to distinguish low and moderate income, and Federal Census Data to distinguish the 2 lowest categories from the 2 highest categories (U.S. Census, 2008). Three survey items measuring students’ goals while in college were used to examine participants’ expectations of what they “hope to achieve.” One item, “prepare for an advanced degree” measured educational expectations; a second item, “prepare for my chosen career,” assessed occupational expectations; and “earn a lot of money in my chosen career” reflected economic expectations. Responses were measured on a scale of 1-6, with higher numbers reflecting stronger endorsement of the statement.
Results

Preliminary Analyses

To identify any systematic group demographic differences, I examined means, standard deviations, and intercorrelations for all of the study variables. Table 1 reports intercorrelations among variables as well as the means for the full sample and separately by immigration history. For parent income, the sample was 19% low income, 28% moderate income, 32% middle income, and 21% affluent. The income distribution did not differ significantly by gender ($\chi^2[3, N = 835] = 6.50, p = .09$) or generational status ($\chi^2[6, N = 830] = 9.17, p = .16$).

Table 1
Sample means and intercorrelations

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1</td>
<td>.10**</td>
<td>.05</td>
<td>-.04</td>
<td>-.18**</td>
</tr>
<tr>
<td>2.</td>
<td>1</td>
<td>.01</td>
<td>.05</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>1</td>
<td>.46**</td>
<td>.22**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>1</td>
<td>.33**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M (sd)</td>
<td>M (sd)</td>
<td>M (sd)</td>
<td>M (sd)</td>
<td>M (sd)</td>
<td>M (sd)</td>
</tr>
<tr>
<td>Immigrant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>second</td>
<td>2.83 (.56)</td>
<td>48,552 (33,936)</td>
<td>4.92 (1.1)</td>
<td>5.29 (.86)</td>
<td>4.35 (1.2)</td>
</tr>
<tr>
<td>non</td>
<td>2.98 (.50)</td>
<td>56,602 (42,0920)</td>
<td>4.59 (1.4)</td>
<td>5.11 (1.1)</td>
<td>4.15 (1.3)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2.90 (.49)</td>
<td>55,739 (41,787)</td>
<td>4.61 (1.3)</td>
<td>5.19 (.95)</td>
<td>4.19 (1.3)</td>
</tr>
</tbody>
</table>

*p<.05  **p<.01  ***p<.001
Hypothesis Tests

I used ANOVA to examine the first hypothesis, which anticipated that GPA would differ by income rather than immigration status. Final 2004 GPA was the dependent variable and sex of student, 3 categories of immigration history, and 4 categories of family income were the grouping factors. A significant 3-way interaction ($F[6,169] = 2.58, p < .02, \eta^2 = .06$) emerged (See Figure 1), revealing a much more complex relationship than hypothesized.

Figure 1. GPA by immigration history, parent income, and sex of participant
Partially confirming the hypothesis, family income influenced GPA, and effects were moderated by gender, as expected; however, differences by immigration history were also present. Note that all of the cell sizes for immigrant males and one-half of the cell sizes for immigrant females were very small ($n < 10$); thus, findings must be interpreted with extreme caution. Post hoc test revealed that among female participants (top panel), immigrant women’s GPA was higher for the 2 lowest income groups, non-immigrant women’s GPA was highest for the 2 highest income groups, and second generation women had the highest overall GPA among all women. Conversely, immigrant men’s GPA was highest for the 2 higher income groups, and second generation men’s GPA was highest for the highest income group (bottom panel). Non-immigrant men had the lowest GPA overall, irrespective of family income. Thus, student achievement is influenced by family income and moderated by gender as expected, but the effects of immigration history are also significant.

I used MANOVA to examine the second hypothesis, which stated that student academic expectations would differ by family income, and effects would be moderated by gender. The 3 expectation measures were the jointly dependent variables; sex of student, 3 categories of immigration history, and 4 categories of family income were again the grouping factors. A significant multivariate 3-way interaction ($F[6,698] = 2.66, p < .02, \eta^2 = .06$) emerged that was supported by a single significant univariate interaction for occupational expectations (see Figure 2).
Figure 2. Occupational expectations by immigration history, parent income, and sex of participant

Again results must be interpreted with extreme caution. For immigrant women, higher family income related to higher occupational expectations. Conversely, second generation low income women expressed the highest occupational expectations. For non-immigrant women, occupational expectations were generally high irrespective of family income. For men, the most affluent and lowest income participants expressed the highest occupational expectations in both immigrant and non-immigrant groups. However for second generation men, the most affluent group expressed the highest expectations, while the low-income group expressed the lowest expectations of any group in the sample. Again findings only partially support the hypothesis, as family income and immigration history both demonstrate significant effects on occupational expectations. However, effects were moderated by gender, as expected. Note that among immigrant participants, only high income women but high and low income men had high expectations. Among second generation participants, low-income women had among the highest expectations but low-income men had the lowest expectations.

Counter to hypotheses two, neither family income (as expected) nor immigration history influenced educational expectations. Rather, a significant main effect of gender emerged for ($F[1,698] = 3.91, p = .05, \eta^2 = .03$); women endorsed this expectation ($M = 4.71, sd = 1.2$) significantly
more strongly than men ($M = 4.36, sd = 1.2$). Finally, economic expectations revealed a trend for the interaction of immigration history and parent income ($F[6,697] = 1.83, p = .09, \eta^2 = .02$), but counter to hypotheses three, the effect was not moderated by gender (see Figure 3). Affluent immigrant students and low and moderate income non-immigrant students endorsed this expectation more strongly than their peers in other income/immigration history groups. In sum, hypotheses were only partially supported, as both family income and immigration history were significantly related to 2 of the 3 measures of expectations. As well, gender effects were present in only 2 of the 3 expectation measures.

![Figure 3. Economic expectations by immigration history and parent income](image)

**Discussion**

This study set out to examine the contrasting predictions of cultural ecological theory and segmented assimilation theory in a sample of Black undergraduate students. Research on educational questions has typically not attended to immigration history in this population. The results presented here reveal a more complex picture of the relationship between immigration history and family economic circumstances than either theory would
postulate. However, these complex and interesting results must be interpreted very cautiously; recall that cell sizes for some of the gender/immigrant/SES groups were quite small.

In considering the findings for hypothesis 1, results for academic achievement were somewhat consistent with the often reported second generation advantage, or the relative optimism among immigrants postulated by cultural ecological theory. However, these effects often manifested in conjunction with income effects and were moderated by gender. Family income was inversely related to GPA for immigrant women, unrelated to GPA for second generation women, and positively related to GPA for non-immigrant women. For men’s findings, GPA was positively related to family income for first and second generation immigrants, a direct contrast by gender for immigrants, and unrelated to GPA for non-immigrant men, who were the lowest achieving group.

Low income immigrant women’s higher achievement may reflect their belief, consistent with cultural ecological theory’s prediction of immigrant optimism, that education provides opportunity in the host country to transcend economic barriers. This belief may be particularly encouraging for women immigrating from home societies with traditional gender roles. Further, girls in Caribbean immigrant families, for example, are taught that they must become financially independent in the U.S. (López, 2003), and one might speculate that belief in the economic benefits of an education would be strongest in families without economic means to sponsor their daughters into the opportunity structure. By the third generation, messages about education may be more consistent with the income advantage often found in U.S. populations. The effects of family income for male participants are consistent with a large body of work that demonstrates the particular vulnerability of Black boys and men in our society (Noguera, 2001). Findings suggest that parental economic resources serve as a protective factor for immigrant and second generation males, consistent with segmented assimilation theory but not for non-immigrant males, consistent with cultural ecological theory.

Turning to findings on academic expectations, gender differences in the expectation to prepare for graduate school are unsurprising, given the substantial evidence that women are completing most graduate programs at rates higher than men (NCES, 2010). The findings relating to occupational
expectations are more challenging to interpret, as the 3-way interaction yielded very small cell sizes. The two groups (low income immigrant females and low income second generation males) who reported significantly lower expectations than their peers had small cell sizes. The finding would be somewhat consistent with segmented assimilation theory in that low income youth are less certain about their future career prospects, and inconsistent with cultural ecological theory in that these two groups do not display the expected immigrant optimism.

Turning to other groups, family income interacted with immigration history to influence occupational expectations most strongly for low income non-immigrant males, low income second generation women, and affluent immigrants overall. However, cell sizes again were small, particularly for immigrant students. Immigrant males’ responses are consistent with segmented assimilation theory, in that more affluent immigrant families may provide more role models of successful professionals and entrepreneurs. The finding of high expectations for second generation, low income women is again somewhat consistent with cultural ecological theory’s prediction of immigrant optimism and an expectation that education can be especially valuable for women’s self-sufficiency. For second generation women for whom barriers of language have largely been surmounted, expectations of occupational success are unsurprising and consistent with cultural beliefs. It is important to note, however, that the sample overall, irrespective of family income, immigration history, or gender, endorsed this expectation very strongly, in the range of 4-6 on a 6 point scale (scale point definitions ranging from “important” to “essential”). Less than 2% of the entire sample \( (n = 8) \) rated this item in the 1-2 range (“not important”; “of little importance”, respectively).

Finally, the reported trend for economic expectations revealed differences by income and family history, but differences were not moderated by gender. Immigrant Black students whose families were economically successful rated the expectation that a college education would yield high earnings significantly higher than their peers in the lower income groups. These differences by family income were similar but of a lesser magnitude in the second generation sample. Conversely, non-immigrant Black students demonstrated the reverse pattern, with low and moderate income students rating the expectation for a high income after college significantly higher.
than their more affluent peers. Immigrant responses are consistent with a segmented assimilation interpretation, in that affluent immigrants and their children expect to continue the family’s economic success. The families of affluent first and second generation students might also have been similarly advantaged in their home country, an advantage that could explain their initial ability to emigrate. In particular, immigrant families from African countries bear considerable expense to travel to the United States. Cultural ecological theory would have predicted that all immigrant adolescents, consistent with the principle of immigrant optimism, would have high economic expectations.

The responses of non-immigrant Black students are also inconsistent with cultural ecological theory, which would predict that all students (Ogbu, 2003), and particularly low income students, would have relatively low outcome expectations. Prior research (Irving & Hudley, 2005) found that low income high school adolescents’ perceptions of institutional racism relate to lower expectations to gain access to the opportunity structure, regardless of their academic efforts. Similarly, low income college students, who have perhaps attended less advantaged schools or lived in poorly resourced neighborhoods, might also hold lower expectations of material reward for educational efforts. However, I speculate that low income, non-immigrant Black adolescents who were qualified to matriculate in a selective institution maintain high expectations because they have a strong belief in their own potential (Hudley, 2009).

In sum, cultural ecological theory proposes that the first generation may arrive with dreams of a better life but struggle with language and cultural adjustment, while the second generation has begun to overcome some barriers and can concentrate on attaining opportunities for success that were lacking in their home country (Ogbu, 1983). However, the effects of immigrant optimism appear in conjunction with family income effects in these data, consistent with segmented assimilation theory, and findings are moderated by gender. While more definitive conclusions comparing the relative roles of gender, income, and immigration history must be left to future research with larger sample sizes, these findings suggest that Black students unsurprisingly consider a 4 year institution the place to prepare for a future career. These data are thus consistent with a large body of research that indicates students in 4 year institutions uniformly expect their higher
education to prepare them for a chosen future occupation (Metz, Fouad, & Ihle-Helledy, 2009), although ethnic minority students anticipate more barriers to success (Fouad & Byars-Winston, 2005), consistent with cultural ecological theory.

**Limitations**

These findings are limited by a sample size that makes complex interactions with small cell sizes subject to extremely tentative interpretation. It is quite possible that cell sizes alone can explain the lack of interaction effects detected by these analyses. The declining enrollment of Black students on traditionally White campuses makes this population simultaneously compelling and increasingly elusive for disciplined research. Further, a sample drawn from a single higher education system leaves open the question of generalizability. Given the geographic breadth of the U.S., these findings may not generalize to other regions of the country, although the University of California system increasingly enrolls students from across the country. As well, the database used for this secondary analyses provided only a single measure of each of the 3 dependent variables concerning students’ expectations. Given these limitations, the results of this investigation of student expectations, while promising, are exploratory and must await replication with larger national samples and stronger measures that permit more sophisticated and powerful data analytic strategies.

However, this exploratory study is one of only a few to examine within-group variability as a function of immigration history and family resources and thus makes an important contribution in furthering our understanding of the variability inherent in the population of Black students. In general, findings indicate, consistent with Suarez-Orosco (2001), that theoretical formulations about immigrant motivation and achievement must include consideration of the context surrounding both emigration from the home country and immigration to the host country. I would similarly argue that for all students, not only immigrant students, personal and motivational variables can make visible the within-group variability in academic achievement for Black students in a manner that is not possible using structural explanations (Hudley, 2009). Comprehensive models that can explain the largest amount of variance in academic achievement and
motivation for all students will be those that can successfully incorporate historical (e.g. immigration history), contextual (e.g., neighborhood and family resources), and individual (e.g., expectations) variables.

Notes

1 Immigrant and second generation Black students were primarily from Ethiopia, Ghana, and Nigeria in Africa and Jamaica and Belize in the Caribbean.

References


Hudley – Achievement and Expectations

Sociology, 29, 417–442. doi: 10.1146/annurev.soc.29.010202.100019


Cynthia Hudley is a Professor Emeritus in the Department of Education, University of California, Santa Barbara.

Contact Address: Department of Education, University of California, Santa Barbara, Santa Barbara, CA 93106-9490. Email: hudley@education.ucsb.edu
Cognitive Abilities of Pre- and Primary School Children with Spina Bifida in Uganda

Femke Bannink¹, Johnny R. J. Fontaine¹, Richard Idro², Geert van Hove¹

1) Ghent University, Belgium
2) Makerere University, Uganda

Date of publication: October 24th, 2016
Edition period: October 2016 - February 2017


To link this article: http://dx.doi.org/10.17583/ijep.2016.2075

PLEASE SCROLL DOWN FOR ARTICLE

The terms and conditions of use are related to the Open Journal System and to Creative Commons Attribution License (CC-BY).
Cognitive Abilities of Pre- and Primary School Children with Spina Bifida in Uganda

Femke Bannink, Johnny R. J. Fontaine, Geert van Hove

Ghent University

Abstract

This study investigates cognitive abilities of pre/primary school children without and with spina bifida in Uganda. Qualitative semi structured interviews and quantitative functioning scales measurements were combined and conducted with 133 parents, 133 children with spina bifida, and 35 siblings. ANCOVA was used to test for differences in cognitive scores between children and siblings. Logistic regression analyses were used to study predictive demographic, impairment specific, and environmental factors of cognitive functioning. Children with spina bifida in Uganda had lower cognitive outcomes compared to their siblings. Cognitive outcomes were predicted by age, household income, motor functioning, and schooling. Better motor functioning was predicted by age, the presence of hydrocephalus, and parental support. Continence management was predicted by parental support and household income. Schooling was predicted by age, household income, and motor functioning. Limited access to neurosurgery and rehabilitative care, and schooling had a negative effect on cognitive functioning. Children of parents who have support had better motor functioning, and continence management. A holistic approach for children with spina bifida and their families, including community based rehabilitation; ensuring social support and livelihoods for parents; and access to health and education services can contribute to better cognitive outcomes.

Keywords: Cognitive abilities, motor function, schooling, spina bifida, Africa
Habilidades Cognitivas de Estudiantes de Educación Infantil y Primaria con Espina Bífida en Uganda

Femke Bannink, Johnny R. J. Fontaine, Geert van Hove, Richard Idro
Ghent University, Makerere University

Resumen

Este estudio investiga las habilidades cognitivas de estudiantes de educación infantil y primaria con y sin espina bífida en Uganda. Entrevistas cualitativas semi-estructuradas y escalas funcionales fueron combinadas y aplicadas a 133 padres, 133 niños con espina bífida y 35 hermanos. Se utilizó ANCOVA para analizar las diferencias en puntuaciones cognitivas entre los niños y sus hermanos. Análisis de regresión logística se utilizaron para estudiar factores predictores de funcionamiento cognitivo, como demográficos, específicos de la discapacidad y ambientales. Los niños con espina bífida en Uganda tuvieron resultados cognitivos más bajos que sus hermanos. Los resultados cognitivos fueron predichos por la edad, la presencia de hidrocefalia y el apoyo parental. La gestión de la continencia fue predicha por el apoyo parental y los ingresos en el hogar. La escolarización se predijo por la edad, los ingresos en el hogar y el funcionamiento motor. El acceso limitado a la neurocirugía y al cuidado de tipo rehabilitador, y la escolarización tuvieron un efecto negativo sobre el funcionamiento cognitivo. Los niños de padres con apoyo tuvieron mejor funcionamiento motor y gestión de la continencia. Un enfoque holístico para niños con espina bífida y sus familias, incluyendo rehabilitación basada en la comunidad, asegurando apoyo social y la subsistencia para padres, así como el acceso a los servicios de salud y educativos pueden contribuir a mejores resultados cognitivos.

Palabras clave: habilidades cognitivas, función motora, escolarización, espina bífida, África.
Very little is known about the impact of spina bifida on cognitive development among pre- and primary school children in low income countries. In the current study we have investigated differences in cognitive abilities between pre/primary school children without and with spina bifida as well as the factors that best predict cognitive development among children with spina bifida in the Ugandan context.

**Spina bifida**

Spina bifida is a congenital disability and neural tube defect in which the spinal cord and vertebrae do not form completely and the neural tube fails to develop normally (Northrup & Volcik, 2000). In Uganda an estimated 1,400 children are born with spina bifida annually (Warf, Wright, & Kulkarni, 2011). The majority of these have some degree of paralysis, which affects mobility as well as bowel and bladder control (Abresch et al., 2007; Andren & Grimby, 2000; Danielsson et al., 2008; Northrup & Volcik, 2000; Verpoorten & Buyse, 2008), and 66% develops hydrocephalus (Warf & Campbell, 2008). In hydrocephalus the natural circulation of cerebrospinal fluid (CSF) in the brain is obstructed and fluid accumulates. The excess fluid presses on the brain causing damage to the surrounding tissue. In babies and infants where the skull is still soft, the head enlarges (CURE, 2008; IFSBH, 2014). Most children with spina bifida need surgery to close the back to prevent infections; and those with hydrocephalus need endoscopic third ventriculostomy (ETV) or placement of a ventriculo-peritoneal (VP) shunt to drain cerebral spinal fluid and prevent secondary impairments (IFSBH, 2014; Warf, 2005).

**Cognitive functioning of children with spina bifida**

Research in high income countries suggests that a broad range of cognitive abilities is affected in children with spina bifida (Dennis & Barnes, 2010). They are at risk for difficulties in attention (not sustained attention or ADHD) (Fletcher et al. 2005; Rose & Holmbeck, 2007), short-term memory, prospective memory, immediate and delayed episodic memory (Dennis et al., 2007), nonverbal learning disabilities, language comprehension and
discourse (Pike et al, 2013), and approximate and standardized arithmetic measures (Raghubar et al., 2015). Children with spina bifida and hydrocephalus have lower cognitive function scores compared to children with spina bifida alone (Iddon et al, 2004).

To our knowledge no studies on cognitive functioning in pre-primary and primary school aged children with spina bifida have taken place in sub-Saharan Africa. Warf et al (2009) studied neurocognitive outcomes in infants with spina bifida aged 5 to 52 months in Uganda, and found infants not requiring treatment for hydrocephalus had significantly better neurocognitive outcomes compared to those who did require treatment (Warf et al., 2009). The present study focuses on the cognitive impact of spina bifida among pre-school and primary school aged children in Uganda. We compare children with spina bifida with their siblings and we investigate those factors that predict differences in cognitive abilities within the group of children with spina bifida. We investigate the predictive value of demographic factors that have been found to relate to cognitive abilities in general, of characteristics that are typical for children with spina bifida, and of characteristics that are typical to the Ugandan context.

**Demographic factors contributing to cognitive functioning**

Demographic variables included in our study were age, gender, socio-economic status, and geographic location. We expected that cognitive outcomes increase with age and socio-economical status. We did not expect to find gender differences. One of the most basic findings in intelligence research is that cognitive abilities increase with age until late adolescence (Hunt, 2010). Whilst there is no evidence for general differences in cognitive ability for boys and girls, gender differences have been found on specific cognitive outcomes depending on the type of cognitive testing administered. For instance, girls performed better verbally, whilst boys performed better on quantitative reasoning in earlier studies (Halpern, 2011; Strand, Deary, & Smith, 2006).

Cognitive abilities correlate not very highly, but systematically (about .30) with socio-economic status (SES) (Hunt, 2010). Whilst income on its own does not predict cognitive abilities, parents with higher SES do spend more time with their children in ways that stimulate cognitive functioning.
compared to parents with lower SES (Hunt, 2010). Poverty is a factor contributing to cognitive functioning in children with spina bifida in high income countries (Dennis et al, 2006; Fletcher, Barnes, & Dennis, 2002). Dennis et al (2006) found socioeconomic status plays an important role in the provision of appropriate remediation for specific cognitive and academic skills. They argue for more studies on how environmental factors such as poverty affect cognitive outcomes which provide approaches to enhance outcomes aside scientific understanding (Dennis et al., 2006). In our study we expect that children from parents with higher SES will have better cognitive outcomes as parents are more likely to provide their children with basic needs and access services.

Differences in cognitive outcomes between urban and rural areas are linked to poverty, schooling, and other environmental factors (Dennis et al, 2006). Given the differences in income and social setting, we will investigate if there is a difference in cognitive outcomes between children living in urban and rural areas in Uganda.

Impairment specific factors contributing to cognitive functioning

In the analysis we include spina bifida specific variables such as the presence of hydrocephalus, neurosurgical treatment, motor function, and incontinence management.

Hydrocephalus. The neuropsychological profile of persons with hydrocephalus is one of relative impairment, whether or not spina bifida is present. Shunt infections, revisions, and a history of seizures predict poorer memory (Dennis et al, 2007), meta-cognitive abilities, executive functioning (Tarazi, Zabel, & Mahone, 2008), and cognitive health (Kulkarni et al, 2004). In a comparative study Hampton et al. (2011) found higher neurocognitive scores in children with spina bifida without hydrocephalus compared to children with SB and hydrocephalus. A stepwise pattern in terms of number of affected domains from the shunt-treated group to the arrested-hydrocephalus group to the no-hydrocephalus group was identified (Hampton et al., 2011). We expect to find the same stepwise patterns, with possibly larger effect sizes due to the limitations in access to early neurosurgery and regular physio- and occupational therapy.
Neurosurgery. The majority of children with spina bifida and progressive hydrocephalus need neurosurgery. At the time of this study the initial surgery (closure of the spine) and ETV and VP-shunting for children with progressive hydrocephalus were only available in two public government funded hospitals (Mulago National Referral Hospital in Kampala and Mbarara Regional Referral Hospital), and one private specialized neuro-paediatric hospital (CURE Children’s Hospital) in Mbale, eastern Uganda. Delay in neurosurgery has been associated with more neurodevelopmental delay (Warf et al., 2009). Shunts are sensitive to infection and malfunctioning (Hunt et al, 1999), and are related to epilepsy (Kulkarni et al, 2004). ETV is an alternative primary treatment for hydrocephalus and alternative for malfunctioning and infected shunts (Warf, 2005). Earlier Warf et al. found no differences between cognitive outcomes of infants aged 5 to 52 months treated with ETV and VP shunt treatment (Warf et al., 2009). We will evaluate the effect of type of neurosurgery on cognitive functioning in pre-primary and primary school aged children.

Gross and fine motor functioning. Gross and fine motor functioning are affected in children with spina bifida. Gross motor skills such as movement of the upper and lower limbs, and eyes are core deficits in children with spina bifida (Dennis et al., 2006). Children with spina bifida with extensive paralysis will often require a wheelchair, while others may be able to use crutches, braces, or walking frames. They benefit from physio- and occupational therapy (Abresch et al., 2007; Andren & Grimby, 2000; Danielsson et al., 2008; Jansen et al, 2009). Children with spina bifida are prone to pressure sores and need regular skin checks to prevent these (Lindsay, 2014).

The majority of children with spina bifida have impaired fine motor function and visual-motor integration. Handwriting and drawing are the most affected skills (Feder & Majnemer, 2007; Hetherington et al, 2006; Lindquist et al, 2008; Vinck et al., 2010).

We expect that children with better motor function have better participation in daily activities, including schooling, which will in turn improve cognitive functioning.
Incontinence. Most have bowel and bladder problems. Clean Intermittent Catheterization (CIC) and bowel management techniques are used to keep the child dry and clean (IFSBH, 2014; Verpoorten & Buyse, 2008). CIC and bowel management training in Uganda is offered by the four organizations which provide physical rehabilitative therapy. Through a CBR approach funded by private donors, children are followed up at home and are provided with low costs – if possible locally made - continence materials (Mertens & Bannink, 2012).

We study continence as a possible important factor for inclusion, as we expect that good incontinence management results into increased participation in daily activities, including schooling. A child with not managed incontinence will have accidents and smell of urine, and is more likely to be socially excluded.

Environmental factors contributing to cognitive functioning

Schooling. Although inclusion of children with spina bifida in normal schools is common in high and middle income countries, this remains a challenge in low income countries (Chataika et al, 2012). Implementation of inclusive education in Sub Saharan Africa is affected negatively by non-supportive attitudes of parents, teachers, and community members, distance to school, not conducive school environment (access, materials, equipment), and lack of trained teachers. The Ministry of Education and Sports in Uganda has an Universal Primary Education (UPE) and inclusive education policy for access and inclusion of children with special needs in primary schools (Nyende, 2012), however implementation of inclusive education remains limited at grass root level (Ejuu, 2016).

In our study we expect a large number of children to be out of school. In earlier findings parents of children with spina bifida indicated UPE schools and several private schools would not admit their child (Bannink et al, 2015). Of those in school, children reported being bullied about their physical appearance and learning speed (Bannink, Idro, & Van Hove, 2016a).
Children who are not schooling are likely to have lower cognitive outcomes and become socially more isolated as schooling itself has an effect on general cognitive development (Hunt, 2010; Sylva, 1994).

Social support. In high income countries family support has been identified as a factor contributing to cognitive functioning in children with spina bifida (Dennis et al., 2006; Fletcher et al., 2002). Having support increases the chances of access to remediation for specific cognitive and academic skills. Caregivers of children with disabilities in sub Saharan Africa often felt that they do not have sufficient time to cope with household tasks and feel isolated (Gona et al, 2011; Hartley et al, 2004). Families of children with neuro-disabilities including spina bifida in Kenya (van't Veer et al., 2008), Malawi (Paget et al, 2015), and South Africa (Coomer, 2013) struggle with the social barriers towards care and support for their child. In absence of health care and social services for children with disabilities in sub Saharan Africa, the children’s families are often their main source of care and protection (Guyer, 1981; Miles, 2002).

We expect that cognitive outcomes of children with spina bifida are related to whether parents have support from another adult or support group or not. We believe that parents who feel supported, are more likely to stimulate their children at home, resulting into better cognitive outcomes of their children. In this study we will compare cognitive outcomes of children with spina bifida and their siblings. We will analyse which demographic (sex, gender, SES), spina bifida specific (hydrocephalus, neurosurgery, motor function, incontinence), and environmental factors (schooling and social support) predict cognitive functioning, and make recommendations for further studies and interventions in low resource settings.

Method

Study design

Purposeful sampling was used in Mbarara, Kampala, and Mbale where CURE holds bi-monthly clinics. CURE hospital and the partnering
rehabilitation centers in Kampala and Mbarara were requested to list the children registered in their follow up programs, and inform them during home visits and through telephone calls to attend the clinic. In Gulu and Lira where no follow up system or registry of the children was in place at the time, radio announcements were aired to inform parents about the upcoming review clinic in the area, and specifically invited parents with children with spina bifida and hydrocephalus between the age of 4 and 14 years to attend.

Qualitative semi structured interviews and quantitative functioning scales measurements were combined and conducted between June 2011 and December 2014 with 133 parents, 133 children with spina bifida, and 35 siblings. The siblings were randomly selected from the 63 families living in the central region.

The assessments were held in the local language of the area, and a translator was hired and trained for each area to assist in conducting the assessment. Some of the interviews were conducted in English, if parents, children or teachers were fluent and requested for this.

**Ethical considerations**

Ethical approval and research clearance were obtained from Ghent University, Belgium, the Uganda Virus Research Institute, and the Uganda National Council for Science and Technology. Informed consent was obtained from all parents and teachers, and assent from children and siblings of 8 years and above where possible. Consent forms were translated into the local languages and discussed and agreed with the participant with assistance of a translator if the participant or child did not speak English.

**Selected measures**

Demographic and impairment specific variables such as the presence of hydrocephalus, neurosurgical treatment and rehabilitation services received, and incontinence management was collected from the parents for each child. Data on school going was collected and entered into a database.

Gross motor skills were assessed using basic measures on whether a child was able to sit or walk independently, and was using assistive devices. Fine motor skills were measured with the Vineland Adaptive Behaviour Scales.
(VABS) Daily Functioning Sub Scale and reflect both fine motor skills and daily functioning skills such as the ability to dress oneself, bath, and eat or drink independently. The reliability of the fine motor skill outcomes measure of the VABS was good with a Cronbach’s Alpha of .82. The gross and fine motor skills measures were assessed by asking the parents about the child’s functioning and observing the children’s abilities.

To measure cognitive functioning, a set of cognitive subtests from existing tools was screened, selected for piloting, and administered (See Table 1).

Table 1
Psychometric Assessment Tools Screened, Piloted, and Administered

<table>
<thead>
<tr>
<th>Tool screened</th>
<th>Selected for pilot</th>
<th>Administered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picture Vocabulary Scale (PVS) - adapted from the Kilifi Picture Vocabulary Test (Nampijja et al., 2010)</td>
<td>PVS</td>
<td>PVS</td>
</tr>
<tr>
<td>Kaufman Assessment Battery for Children II - validated for Ugandan population (Bangirana et al., 2009) – subtests selected</td>
<td>Hand movement</td>
<td>Hand movement</td>
</tr>
<tr>
<td></td>
<td>Block counting</td>
<td>Block counting</td>
</tr>
<tr>
<td></td>
<td>Number recall</td>
<td>Number recall</td>
</tr>
<tr>
<td></td>
<td>Triangles</td>
<td></td>
</tr>
<tr>
<td>Wechsler Intelligence Scale for Children IV (Wechsler, 2003) – subtests selected</td>
<td>Picture Concepts Matrix</td>
<td>Reasoning Digit Span,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Letter Number Sequencing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coding, Symbol Search</td>
</tr>
<tr>
<td>Block Design - adapted from the British Ability Scales (Nampijja et al., 2010)</td>
<td>Block design</td>
<td>Block design</td>
</tr>
<tr>
<td>Halstead-Reitan Neuropsychological Battery - progressive figures and trail-making (Reitan, 1985)</td>
<td>Trail-making and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Progressive Figures</td>
<td></td>
</tr>
</tbody>
</table>
Cross-cultural application of neurocognitive assessments has been studied, and assessment batteries have been adapted for sub-Saharan African settings including Uganda, the majority in HIV and malaria studies (Abubakar et al., 2008; Alcock et al., 2008; Bangirana et al., 2009; Bangirana et al., 2015; Boivin, 2002; Holding et al., 2004; Nampijja et al., 2010). The pilot of psychometric assessment tools took place in a group of 12 children in Kampala. Most assessment batteries were difficult to complete, and its cultural adequacy could be questioned. Based on the pilot, we selected subscales which were understood and were culturally relevant. The Picture Vocabulary scale works with pictures relevant to the Kenyan and Ugandan context, and the block design test was simplified using wooden blocks by Nampijja et al. (2010). The other tests were not adapted, but deemed fit for use in the Ugandan context. The subscales were combined and administered to all children. On average the cognitive assessments took 1.5 hours. Assessments took place at the rehabilitation sites or the child’s home.

**Data management**

Basic demographic, impairment, schooling data, and records of the cognitive, gross and fine motor scores were written out during assessments, and entered into a SPSS database after completion. Demographic data included age, gender, religion, location, socio-economic status, parental education, occupation, and marital status. Impairment specific variables included were the presence of hydrocephalus, neurosurgical treatment and rehabilitation services received, incontinence status, and incontinence management. Information on schooling, class, and performance was collected for each child. Motor and cognitive outcomes were entered in

<table>
<thead>
<tr>
<th>Total screened</th>
<th>Selected for pilot</th>
<th>Administered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Motor Integration Test (VMI)—visual perception / motor integration (Beery, Buktenica, &amp; Beery, 1989)</td>
<td>VMI</td>
<td>VMI</td>
</tr>
</tbody>
</table>
handheld assessment scales, and entered into a password protected database. Study files were filed in a lockable cupboard.

**Data Analysis**

The sub-total scores for the VABS subscale were calculated to compare means of the scores between the children with spina bifida and their siblings using SPSS16. Confirmatory factor analysis was carried out to investigate whether all cognitive subtests could be represented by a single underlying cognitive ability factor. Not all children were able to carry out all the sub-tests. Within the confirmatory factor model global cognitive functioning was estimated on the basis of those tests that were completed by each child.

ANCOVA was used to test for significant differences in cognitive scores between children and siblings using age as a covariate. The overall ability scores estimated on the basis of the confirmatory factor analysis was used as dependent variable.

Factors predicting inter-individual differences in cognitive functioning within the spina bifida group were investigated by regression analysis with a forward selection procedure. Because of its importance in predicting cognitive functioning, it was further investigated which factors predicted schooling and motor functioning using logistic regression and multivariate regression respectively.

**Sample description**

The study population consisted of 133 children with spina bifida (myelomeningocele type) (59.4% male, 40.6% female) of which 60 with spina bifida and hydrocephalus; 133 parents; 35 siblings (21 female, 14 male); and 30 teachers (22 female, 8 male) of children with spina bifida. Table 2 describes the demographics of the study population.
Table 2
Demographic Characteristics ($N=133$ children with spina bifida, $N=35$ siblings)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Child</th>
<th>%</th>
<th>Sibling</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>79</td>
<td>59.4%</td>
<td>14</td>
<td>40.00%</td>
</tr>
<tr>
<td>Female</td>
<td>54</td>
<td>40.6%</td>
<td>21</td>
<td>60.00%</td>
</tr>
<tr>
<td>Child is schooling in</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nursery school</td>
<td>48</td>
<td>36.1%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>22</td>
<td>16.5%</td>
<td>9</td>
<td>25.70%</td>
</tr>
<tr>
<td>Secondary school</td>
<td>4</td>
<td>3.0%</td>
<td>26</td>
<td>74.30%</td>
</tr>
<tr>
<td>Not schooling</td>
<td>59</td>
<td>44.4%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Type of disability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spina bifida</td>
<td>73</td>
<td>54.9%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Spina bifida and hydrocephalus</td>
<td>60</td>
<td>45.1%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Location / region</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central</td>
<td>63</td>
<td>47.4%</td>
<td>35</td>
<td>100%</td>
</tr>
<tr>
<td>East</td>
<td>26</td>
<td>17.3%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>West</td>
<td>29</td>
<td>21.1%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>North</td>
<td>19</td>
<td>14.3%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Religion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christian</td>
<td>100</td>
<td>77.5%</td>
<td>32</td>
<td>80.0%</td>
</tr>
<tr>
<td>Muslim</td>
<td>26</td>
<td>20.2%</td>
<td>6</td>
<td>17.1%</td>
</tr>
<tr>
<td>Other</td>
<td>13</td>
<td>2.3%</td>
<td>1</td>
<td>2.9%</td>
</tr>
<tr>
<td>Relationship parent</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>104</td>
<td>78.2%</td>
<td>26</td>
<td>74.3%</td>
</tr>
<tr>
<td>Father</td>
<td>14</td>
<td>10.5%</td>
<td>6</td>
<td>17.1%</td>
</tr>
<tr>
<td>Grandmother</td>
<td>9</td>
<td>6.8%</td>
<td>2</td>
<td>5.7%</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td>4.5%</td>
<td>1</td>
<td>2.9%</td>
</tr>
</tbody>
</table>
Table 2 Continued

<table>
<thead>
<tr>
<th>Variable</th>
<th>Child</th>
<th>%</th>
<th>Sibling</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education level parent</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>6</td>
<td>4.7%</td>
<td>3</td>
<td>8.6%</td>
</tr>
<tr>
<td>Primary</td>
<td>72</td>
<td>56.7%</td>
<td>22</td>
<td>62.9%</td>
</tr>
<tr>
<td>Secondary</td>
<td>28</td>
<td>22.0%</td>
<td>6</td>
<td>17.1%</td>
</tr>
<tr>
<td>Vocational</td>
<td>11</td>
<td>8.7%</td>
<td>1</td>
<td>2.9%</td>
</tr>
<tr>
<td>University</td>
<td>10</td>
<td>7.9%</td>
<td>3</td>
<td>8.6%</td>
</tr>
<tr>
<td>Marital status parent</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>12</td>
<td>9.2%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>101</td>
<td>75.6%</td>
<td>26</td>
<td>74.3%</td>
</tr>
<tr>
<td>Separated</td>
<td>9</td>
<td>6.9%</td>
<td>6</td>
<td>17.1%</td>
</tr>
<tr>
<td>Widowed</td>
<td>11</td>
<td>8.4%</td>
<td>3</td>
<td>8.6%</td>
</tr>
<tr>
<td>Monthly household income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 30 euro</td>
<td>25</td>
<td>19.7%</td>
<td>11</td>
<td>31.4%</td>
</tr>
<tr>
<td>30 - 60 euro</td>
<td>28</td>
<td>22.0%</td>
<td>7</td>
<td>20.0%</td>
</tr>
<tr>
<td>61 - 90 euro</td>
<td>26</td>
<td>20.5%</td>
<td>8</td>
<td>22.9%</td>
</tr>
<tr>
<td>&gt; 90 euro</td>
<td>48</td>
<td>37.8%</td>
<td>9</td>
<td>25.7%</td>
</tr>
<tr>
<td>Occupation parent</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finance / administration</td>
<td>5</td>
<td>3.8%</td>
<td>2</td>
<td>5.9%</td>
</tr>
<tr>
<td>Small scale private business</td>
<td>30</td>
<td>22.7%</td>
<td>7</td>
<td>11.8%</td>
</tr>
<tr>
<td>Teacher / education</td>
<td>9</td>
<td>6.8%</td>
<td>3</td>
<td>8.6%</td>
</tr>
<tr>
<td>Medical / paramedical</td>
<td>5</td>
<td>3.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil service / government</td>
<td>2</td>
<td>1.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peasant farmer</td>
<td>65</td>
<td>49.2%</td>
<td>19</td>
<td>62.9%</td>
</tr>
<tr>
<td>No occupation</td>
<td>6</td>
<td>12.1%</td>
<td>3</td>
<td>8.6%</td>
</tr>
</tbody>
</table>
The average age of the children with spina bifida was 6.1 (SD=2.04), and 7.8 years (SD=2.53) for siblings. The majority of the children with spina bifida (122, 91.7%) had undergone surgery to close their spine (myelomeningocele closure) earlier in life. Whilst we looked for children in communities using radio announcements and searches through community leaders, we did not find more children who had not undergone surgery. We think that the majority who did not access neurosurgery died, as the initial surgery is key to survival in spina bifida. Of the 60 children who had both spina bifida and hydrocephalus, 25 (41.7%) had undergone endoscopic third ventriculostomy while 12 (20.0%) had ventriculo-peritoneal shunts placed. Here too, we could not find more children who had undergone VP shunt placement, which could be attributed to the high infection and mortality risks associated with this type of treatment in a low resource setting like Uganda. During our study 3 children died from the complications of shunt malfunctioning. The majority of parents took their children (123, 92.5%) for rehabilitation services such as physio- and occupational therapy.

Parents’ ages ranged from 24 to 46 years with an average age of 32.9 (SD 5.2) years. About a third, 31.8% (42) of the parents did not have support from another adult or parents support group.

The household size ranged from 2 to 13 with an average of 6.5 persons per household (SD=2.49), with on average 4.3 children (SD 2.2) and 2.3 adults (SD 1.0) per household. The average monthly household income was 82 euro (range 12 to 604 euro). In total 63 families resided in the capital city and surrounding urban areas (47.4%), whilst 52.6% (70) lived in rural areas.

In total 54 children with spina bifida who were not in school, 74 children with spina bifida who were schooling, and 35 siblings who were schooling were included in the analysis of cognitive outcomes.

Gross motor skill outcomes of children with spina bifida were grouped into 4 groups: 58 children who can sit and walk (43.6%), 36 children who can sit, and use assistive devices to walk (27.1%), 37 children who can sit, not walk and do not use assistive devices to ambulate (27.8%), and 2 children who could not sit nor walk and are not using assistive devices (1.5%).

In total 106 children (79.7%) with spina bifida were incontinent; 97 of them used CIC. The continence factor was dichotomized by grouping
children who were using CIC and bowel management together and comparing them to 25 children who do not use continence management

Results

Cognitive test battery

Confirmatory factor analysis was carried out on the seven subtests. The one-factor model fitted the data well ($\chi^2 = 24.04$, $df = 14$, $p = .034$, $\chi^2/df = 1.72$, RMSEA = .07, CFI = .96, SRMR = .04. Table 3 shows the standardized factor loadings of each subtest. All subtests had high factors loadings (> .70).

Table 3
Confirmatory Factor Analysis of Cognitive Measures

<table>
<thead>
<tr>
<th>Cognitive Sub Test</th>
<th>Fit factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picture Vocabulary Scale total score - measures verbal cognitive ability</td>
<td>.70</td>
</tr>
<tr>
<td>Block Design total score – measures spatial ability</td>
<td>.99</td>
</tr>
<tr>
<td>Block Count total score - measures visual processing</td>
<td>.89</td>
</tr>
<tr>
<td>Hand movement - measures short term memory / sequential processing</td>
<td>.98</td>
</tr>
<tr>
<td>Number recall – measures short term memory / sequential processing</td>
<td>.96</td>
</tr>
<tr>
<td>Visual Motor Integration – measures motor output skills coordination</td>
<td>.83</td>
</tr>
<tr>
<td>Visual Motor Integration – measures visual perception input skills</td>
<td>.79</td>
</tr>
</tbody>
</table>

Cognitive outcomes in children with spina bifida with their siblings

An Analysis of Covariance with overall cognitive functioning as dependent variable, group (siblings, schooled children with spina bifida, and non-schooled children with spina bifida) and sex as independent variables, and
age and socio-economical status (income) as covariates showed a significant and strong group effect \( F(2,145) = 17.34, p < .001, \) partial \( \eta^2 = .193 \). There was no significant effect of sex \( F(1,145) = 0.56, p = .456, \) partial \( \eta^2 = .004 \) and no significant interaction effect between sex and group \( F(2,145) = 0.291, p = .748, \) partial \( \eta^2 = .004 \). Moreover, both covariates were significant \( F(1,145) = 43.650, p < .001, \) partial \( \eta^2 = .231 \) for age and \( F(1,145) = 7.165 p = .008, \) partial \( \eta^2 = .047 \). Table 4 summarizes the mean scores and standard errors.

<table>
<thead>
<tr>
<th>Table 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive Outcomes for Schooling and Not Schooling Children With Spina Bifida and Siblings Controlled for Age and Household Income</td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Child with spina bifida not schooling</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Child with spina bifida schooling</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Sibling schooling</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
</tbody>
</table>

Note. Covariates appearing in the model were evaluated at the following values: age child=6.5687, household income = 2.71.

Siblings of children with spina bifida had better cognitive outcomes compared to their schooling brothers and sisters with spina bifida, whilst children with spina bifida enrolled in school had better cognitive outcomes compared to children with spina bifida not enrolled in school. No significant gender differences were found.
Factors related to differences in cognitive functioning of children with spina bifida

To investigate the predictors of inter-individual differences in cognitive functioning within the group of children with spina bifida, a regression analysis was executed with forward selection procedure with age, sex, impairment (e.g. spina bifida alone or spina bifida and hydrocephalus), type of treatment received for those with hydrocephalus (ETV or VP shunts), continence, household income, geographical region, education level parents, and support received by parent as possible predictors. Only four predictors were selected for cognitive functioning on the basis of this forward selection regression procedure (fine motor skills, age, schooling, and income). These four predictors accounted for 50.4% of the total variance in cognitive functioning. Older children with better fine motor skills, who were schooling and came from households with higher household income had significantly better cognitive functioning (see Table 5).

Table 5
Selected Predictors for Cognitive Functioning

<table>
<thead>
<tr>
<th>Predictors</th>
<th>$B$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine motor skills</td>
<td>.194</td>
<td>.390**</td>
</tr>
<tr>
<td>Age child</td>
<td>.294</td>
<td>.271**</td>
</tr>
<tr>
<td>Schooling</td>
<td>.942</td>
<td>.210**</td>
</tr>
<tr>
<td>Household income</td>
<td>.304</td>
<td>.153*</td>
</tr>
</tbody>
</table>

Note. * p < .05, ** p < .001

Because of the importance of schooling and motor skills, we have further explored which factors predict schooling and these motor skills. To investigate the predictors of whether children with spina bifida were schooled or not, a logistic regression was executed with a forward selection procedure with age, sex, impairment (e.g. spina bifida alone or spina bifida and hydrocephalus), type of treatment received for those with hydrocephalus (ETV or VP shunts), continence, household income, geographical region, level parents, and support received by parent as possible predictors. Only
three predictors were selected. The older the child (Exp(B) = 1.595, Wald = 10.692, p < .001], the higher the household income of the parents (Exp(B) = 1.869, Wald = 9.087, p = .003], and the better the fine motor functioning (Exp(B) = 1.235, Wald = 15.338, p < .001] the more likely the children with spina bifida was going to school.

To investigate the predictors of fine motor functioning among children with spina bifida a multivariate regression analysis was executed with a forward selection procedure with age, sex, impairment (e.g. spina bifida alone or spina bifida and hydrocephalus), type of treatment received for those with hydrocephalus (ETV or VP shunts), household income, geographical region, educational level parents, and support received by parent as possible predictors. Three significant predictors were identified: age, parental support and impairment. These three predictors accounted for 19.6% of the variance in fine motor functioning. The older the child (β = .309), parents having social support (β = .246), and children without hydrocephalus (β = .214) had significantly better fine motor skills \( F(3, 128) = 10.408, p < .001, R^2 .196 \).

Moreover, fine motor skills were also significantly correlated with gross motor skills \( r = .616, p < .001 \) and with continence \( r = .405, p < .001 \). A multivariate and a logistic regression analysis with a forward selection procedure using the same predictors as for fine motor functioning identified similar predictors for gross motor skills and continence respectively. The older the child (β = .216), parents having social support (β = .210), and children without hydrocephalus (β = .267) had significantly better gross motor skills \( F(3, 129) = 7.805, p < .001, R^2 .154 \). When parents could rely on social support \[ \text{Exp}(B) = 3.420, \text{Wald} = 3.383, p = .012 \] and when parents had a higher income \[ \text{Exp}(B) = 1.900, \text{Wald} = 8.036, p = .005 \] children were more likely to be continent or manage their continence.

**Discussion and conclusion**

**Cognitive testing**

Environmental factors play a key role in the cognitive function of children with spina bifida in Uganda. Earlier Bangirana et al. (2009, 2015) and
Nampijja et al. (2010) have provided evidence for successful adaptation of assessment batteries for Ugandan children taking cultural factors into consideration. Despite the cultural sensitivity of some of these instruments, most of these assessment tools were too challenging to complete for the children with spina bifida due to motor difficulties. To mitigate this, we did not apply tests which were too difficult from a motor perspective, and estimated cognitive functioning on the basis of less challenging test. No speed tests were applied which enabled children with lower motor ability to take their time to answer the questions. Despite the adjustments made and testing the pilot in the central region, a number of children in the study group could still not perform the procedures. In some cases observations during the cognitive testing indicated that non-responding was caused by feeling shy rather than being unable to complete the tests. This mainly concerned children who were not schooling and were from rural areas where they lived in rather remote areas.

We do not have a comparable assessment tool to look at effect size between high income countries and our findings. However from the high number of children who could not complete the culturally and impairment specific testing set, we may conclude that the level of cognitive functioning was lower compared to high income countries.

Cognitive outcomes in children with spina bifida and their siblings

Children with spina bifida in Uganda had lower cognitive outcomes compared to their schooling siblings. This is in line with earlier studies in which children with spina bifida have lower scores on visual perception, language comprehension, attention, processing and memory tasks compared to their peers (Dennis & Barnes, 2010; Dennis et al., 2007; Rose & Holmbeck, 2007). Hampton et al (2011) found differences of 13 to 20 points in IQ scores in children with spina bifida. In our study we did not have Ugandan population norms which would allow us to precisely estimate the size of effects in terms of IQ points. Cognitive outcomes in our study population were predicted by age, household income, motor functioning, and schooling.
Demographic factors contributing to cognitive functioning

As expected age had an evident effect on cognitive functioning. No significant differences were found between boys and girls, which is in line with earlier studies of cognitive functioning in Ugandan children (Nampijja et al., 2010). Children from rural and urban areas had similar cognitive outcomes.

Household income was a main factor in predicting cognitive outcomes. Interestingly parental education or social economical status did not predict cognitive outcomes, but household income did. Having sufficient income to send children to school and access rehabilitative care, is key in a low resource setting with limited public services. Earlier we found that parents would not prioritize sending their child with spina bifida to school if they did not have sufficient funds to send all children to school (Bannink, Idro, & Van Hove, 2016b).

Impairment specific factors contributing to cognitive functioning

Motor function. Children with better motor function had higher cognitive functioning scores. Although children with good gross and fine motor skills are expected to score higher on cognitive tests which require fine motor skills such as block designs, and the visual motor integration drawing tasks (Raghubar et al., 2015), we believe this result is not a direct effect.

No timed tests were administered and if a child could not complete a subtest, this was adjusted for, leaving out negative impacts on the total cognitive outcomes scores. Instead we believe children who have better motor function are more likely to participate in daily activities, and be stimulated through these, resulting in better cognitive development.

Parental support and household income were important predictors for continence management. If parents feel supported, they may be more likely and able to carry out CIC several times a day. This in turn will help improve quality of life; earlier better motor function and continence management were related to better quality of life in Kenya (van't Veer et al., 2008). Higher household income would help with covering travel costs to rehabilitation centers for supplies of catheters.
Hydrocephalus. The type of impairment, neurosurgery or rehabilitation services the children received did not affect the cognitive outcomes in children in our study. In earlier findings Ugandan infants not requiring treatment for hydrocephalus had significantly better neurocognitive outcomes compared to those who did require treatment, but no differences were found between cognitive outcomes of infants treated with ETV and VP shunt treatment (Warf et al., 2009). We did not find significant differences between children with and without hydrocephalus controlled for fine motor development. However hydrocephalus did predict motor function, which significantly contributes to cognitive outcomes, indicating an indirect effect. Hampton et al (2011) found lower cognitive outcomes in children with spina bifida and hydrocephalus compared to children with spina bifida alone.

It is possible that our sample was too small to find any direct effect, or that the effect is reduced as other factors in our setting are more important, e.g. having sufficient income, and better motor functioning and going to school. The effect of the presence of hydrocephalus and type of surgery may not weigh sufficiently in a setting where a child is not being schooled or has not access to rehabilitative care.

Environmental factors contributing to cognitive functioning

Schooling. Children with spina bifida enrolled in school had better cognitive outcomes compared to children with spina bifida not enrolled in school. Schooling was predicted by age, household income, and motor functioning. When controlling for motor function and income, schooling still had a significant effect on cognitive functioning. This pleads for increasing school enrolment and inclusion.

In total 58.7% of the children with spina bifida in our study were in school. This is low compared to the national net enrolment ratio for primary school of 94.5% (Government of Uganda, 2013), but high compared to the UNICEF study in which only 9% of children with disabilities were enrolled in school (UNICEF, 2014). It should be noted that this last study provided a percentage for children with all types of impairments. Whilst children with spina bifida have cognitive functioning deficits, they generally are able to enrol and participate in school and follow the national curriculum material. As well our study mainly included children who had received neurosurgery
and may have been more likely to survive, receive care, and enrol in school compared to a child with cerebral palsy or intellectual disability.

**Parental support.** Aside the positive effect of schooling on cognitive outcomes, we believe that having support and more income, directly affects the child. Most likely parents who receive social support and have a higher income, have more time to take their children for physical rehabilitation, and provide direct stimulation at home, which stimulates the motor and cognitive development, and CIC. They may equally have more funds to purchased mobility devices and physiotherapy compared to parents with lower incomes. Even in high income countries, physical impairment outcomes such as continence, and community ambulation are lower in groups without private insurance (Schechter et al, 2015).

**Limitations**

Limitations of our study included purposeful selection of participants. Despite radio announcements and searches for children with spina bifida in the communities by local leaders, we did not find any children who had not received neurosurgery and rehabilitation. Most likely those who did not receive this died. The children who participated in our study may have therefore only represented those who did ‘better’ or did not have shunt infections, resulting in overly positive cognitive outcomes.

Another limitation was the lack of a validated and normed cognitive assessment tool for Ugandan children with spina bifida to define cognitive assets and deficits in detail and make recommendations on neurocognitive learning goals. The impact of medical factors such as Chiara II malformation could not be included in the study as information and imaging facilities were not available. The number of siblings included in the study was limited due to logistic constraints in follow up of children upcountry.
Implications for future studies and interventions

In future a cohort study following children from birth is recommended to understand mortality, survival, and motor and cognitive development in relation to their environment and rehabilitation care received. In future studies we recommend selecting families in one or two geographical areas and follow the child, siblings, parents, and other caregivers over time.

The feasibility and meaning of performing psychometric procedures in children with severe impairment has been questioned (Fletcher, 2014). We found difficulties in assessing children from rural areas who lived isolated lives and would not answer questions. We equally struggled to find appropriate tests which could be completed by children with spina bifida. Fletcher, Barnes and Dennis (2002) have argued for the use of adaptive behaviour assessments as a supplement to cognitive neuropsychological assessments and more studies on how environmental factors affect cognitive functioning providing approaches to enhance outcomes (Dennis et al., 2006; Fletcher, 2014). Building on this, and our findings which indicate the importance of household income, motor function, and parental support we argue for awareness raising on the cognitive profiles of children with spina bifida and develop low costs strategies to help them in learning, and providing parental support.

Livelihood support to increase household income will be a key strategy to increase access to services and improve cognitive functioning in the long run. Successful approaches reported by non governmental and governmental programs have included village savings and loan associations and small scaled capacity building programs, and could target more families of children with disabilities (Government of Uganda, 2014; NUDIPU, 2016; USAID & AVSI, 2016).

We argue for implementation of public health community based rehabilitative services. Despite policies in place, none of the families in our study access governmental CBR services. Better referral networks from public facilities where CBR is lacking to private facilities is recommended to ensure children receive rehabilitative therapy.

Lastly but most importantly we argue for more support for parents as parental support improves children’s outcomes in the long run: from better motor skills to school enrolment and better cognitive outcomes. This support
can consist of the presence of another adult in the home to help in daily tasks, but also of a peer support group to discuss care and challenges with other parents with spina bifida. The International Federation for Spina Bifida and Hydrocephalus (IF) had such support groups in place and encourages set up and support of new groups in low resource countries (Mertens & Bannink, 2012). Further use and support of such groups can enhance the future education outcomes of the children.

By ensuring a holistic approach for children with spina bifida and their families, involving the physio-, and occupational therapist in community based rehabilitation to develop fine and gross motor skills; making sure parents receive social support and improve their livelihoods so that children can go to school; cognitive outcomes can improve over time.

Acknowledgements
The authors thank all parents of children with spina bifida and hydrocephalus, staff of Cure Children’s Hospital Uganda, Gulu Regional Orthopaedic Workshop and Rehabilitation Center / AVSI Foundation, Katalemwa Cheshire Home, and Our Useful Rehabilitation Services for their participation in this study. Our gratitude goes to the International Federation for Spina Bifida and Hydrocephalus, and the IF Uganda office for their support.

References


276 Bannink et al. – Cognitive Abilities


Paget, A., Mallewa, M., Chinguo, D., Mahebere-Chirambo, C., & Gladstone, M. (2015). "It means you are grounded" - caregivers' perspectives on
Bannink et al. – Cognitive Abilities


Femke Bannink resides in Uganda and is a PhD candidate at Ghent University. Prof. Dr. J.R.J. Fontaine and Prof. Dr. Geert van Hove are leading researchers at Ghent University, Faculty of Psychology and Educational Sciences, Ghent, Belgium.

Dr Richard Idro is a researcher and lecturer at Makerere University, College of Health Sciences, Department of Paediatrics and Child Health, Kampala, Uganda.

Contact Address: Femke Bannink, Ghent University, Faculty of Psychology and Educational Sciences, Department of Disability Studies and Inclusive Education, Henri Dunantlaan, 2, 9000 Ghent, Belgium. Email: femke.bannink@ugent.be
In-service Teachers’ Sense of Agency after Participation in a Research Master Course

Maria Antonietta Impedovo

1) Aix Marseille Univ, ADEF, Marseille, France

Date of publication: October 24th, 2016
Edition period: October 2016 - February 2017


To link this article: http://dx.doi.org/10.17583/ijep.2016.2206

PLEASE SCROLL DOWN FOR ARTICLE

The terms and conditions of use are related to the Open Journal System and to Creative Commons Attribution License (CC-BY).
In-Service Teachers’ Sense of Agency after Participation in a Research Master Course

Maria Antonietta Impedovo
Aix Marseille Université

Abstract
In this paper, we investigate the in-service teachers ‘sense of agency’ after their participation in a research master course. A semi-structured interview was administrated to nine in-service science teachers, coming from three different African countries: Zimbabwe, Lesotho, and Burkina Faso. All of them attended a European master course aimed to acquire skills in science educational research. The data collected was qualitatively analysed through a system of categories. This paper aims to contribute to the discussion about the professionalisation of teacher education and the integration of research into teacher training.

Keywords: In-service teacher, research skills; science educational, teacher agency.
Sentido de Agencia del Profesorado en Servicio después de Participar en un Curso de un Máster de Investigación

Maria Impedovo
Aix-Marseille Université

Resumen
En este trabajo, se investiga el ‘sentido de agencia’ de los maestros en servicio después de su participación en un curso de máster de investigación. Una entrevista semiestructurada se administró a nueve profesores de ciencias en servicio, procedentes de tres países diferentes de África: Zimbabue, Lesoto, y Burkina Faso. Todos ellos asistieron a un curso de máster europeo destinado a adquirir habilidades de investigación en educación. Los datos recogidos se analizaron cualitativamente mediante un sistema de categorías. Este artículo tiene por objeto contribuir a la discusión acerca de la profesionalización de la formación del profesorado y la integración de la investigación en la formación docente.

Palabras clave: Maestro en servicio, habilidades de investigación, ciencias de la educación, agencia del maestr
Today, the figure of the teacher must respond to new needs and demands due to an evolving educational system, as recognised in the national and international policy and research literature (Bates, Swennen & Jones, 2011; European Commission, 2013). In particular, in-service teachers—being full-time employees—need to continuously update their role and keep up with the constant evolution of society (Iannaccone, Tateo, Mollo & Marsico, 2008). Teachers are required to be able and willing to address the educational changes and to innovate their teaching practices (Kompf, Bond, Dworet & Boak, 1996). Reforms are important in science education, where there is a general dissatisfaction with how science is traditionally taught (Bybee & DeBoer, 1994), with the need to support also the professional development of science teachers (Munby, Cunningham, & Lock, 2000).

For this reason, more and more in-service teachers project themselves towards professional and academic training. Growing attention for teachers is about acquiring research skills. Indeed, teacher educators are expected to be excellent in both teaching and in researching (Berry, 2007). We consider that the acquisition of research skills in science education for in-service teachers can bring a development and an enrichment of their professional identity. Indeed, learning always provides an ontological change in identity (Lahn, 2011; Packer, 1999), achieved through active participation in a community (Brown & Campione, 1990; Wenger 1998). So, through the learning process, teachers can incorporate new ways of being (Vågan, 2011), with personal and social transformation (Packer & Goicoechea, 2000). In particular, we are interested in how the development of research skills and attitude influence the sense of agency, considered as capacity to initiate purposeful action that implies will, autonomy, freedom and choice (e.g. Bandura, 2006; Biesta & Tedder, 2006; Ecclestone, 2007; Edwards & D'Arcy, 2004; Gillespie, 2012; Holland, Lachicotte, Skinner & Cain, 1998). We suggest that teachers’ agencies support the implementation of innovation in teaching practices.

In order to pursue this aim, we have administrated a semi-structured interview to nine in-service science teachers. They belong to three different African countries (Zimbabwe, Lesotho, and Burkina Faso) and all have attended an international full-time master programme aimed to acquire skills of science educational research. Through several interviews, we will explore
the in-service science teachers’ sense of agency one year after attending an educational research course.

In the first part of the paper, we consider the influence of research skills on supporting professional development, with reference to teachers’ identity and sense of agency. Finally, we present the data results with a qualitative analysis. This paper aims to contribute to the discussion about the professionalisation of teacher education and the integration of research in teacher training.

Learning Research Skills

There is a growth of research on practice conducted by teacher education practitioners themselves (Cochran-Smith, 2005; Lampert, 2000; Loughran, Hamilton, LaBoskey, & Russell, 2004). This trend started from teachers that consider academic research not relevant to their needs or is written in a way that fails to help them understand their classroom situation. So, the research question may stem from researchers’ or teachers’ own questions about everyday classroom practice, or in common agreement (Postholm, 2008; Postholm & Madsen, 2006). Cochran-Smith (2005) suggests that part of the task of the teacher educator is to function simultaneously as both researcher and practitioner, stressing the blurring boundaries between the two roles (Cochran-Smith & Lytle, 1999). This perspective takes into account the dual demands of being both a teacher, the practice, and a researcher, contributing to the public knowledge base of teachers’ education (Dobber et al, 2005).

Teacher research is mainly linked to the action research (Cochran-Smith & Lytle 1999; Meier & Henderson, 2007), understood as research designed by practitioners to seek practical solutions to issues and problems in their professional and social lives (Stringer, 2007; Anderson & Herr, 1999). Indeed, through the research, teachers gain insights into teaching and learning, becoming a reflective activity, affecting changes in the local scholastic community, and improving students’ learning (Cochran-Sm ith & Lytle, 1999). So, teachers’ research conducted individually or collaboratively helps firstly to understanding teaching and learning in context (Meier & Henderson, 2007). Although these questions and reflections are context-specific, the teachers’ research enables teachers to
link theory and practice (Bullough & Gitlin, 2001). It generates new “local” knowledge about teaching and learning (Stremmel, 2007).

Training on research skills for in-service teachers became an opportunity to acquire new meaning, new processes for decision making (Van Huizen, Van Oers, & Wubbels, 2005), new knowledge and skills to be implemented in their practices. Teachers involved in the research can develop a “researcherly disposition”, defined as the habit of mind to engage in research (Cochran-Smith, 2003; Munn, 2008). Tack & Vanderlinde (2014) theoretically extended this construct as “teacher educators’ researcherly disposition”, referring to cognitive component (the knowledge about educational research, research methods and practitioner research), a behavioural aspect (to be engaged in research, integrating the results into individual teaching practice) and an effective aspect to the teaching profession. Also, during the process of involving, the teachers may also learn some strategies to use in future development activities (Postholm, 2008).

To be involved in the research community gives teachers the possibility to acquire new rules, practices and processes that affect their identity (Brown & Campione, 1996; Wenger, 1998). Indeed, according to Girod and Pardales (2001) “the process of becoming a teacher-researcher is powerful because it challenges teachers core beliefs and values about themselves and the work they do, it forces them to confront who they are as teachers and who they want to be as professionals” (p.3). For these reasons, we consider that attending a master course aimed at developing research skills would sustain teachers’ identity and nourish a teacher’s agency, important dimensions to supporting innovation, as we will explain in the next section.

**Teachers’ Identity: Sense of Agency**

Teacher agency refers to the specific teachers’ agency in performing activities in schools. It is seen as an important dimension of teacher professionalism (Priestley, Biesta & Robinson, 2012) and it is a significant concept for teacher professional identity development (Beijaard, Meijer & Verloop, 2004; Vloet & Van Swet, 2010). Indeed teachers’ agency in relation to professional identity allows examine how teachers experience the world of school (Achinstein, Ogawa, & Speiglman, 2004), in relation to
Impedovo – Teachers’ Sense of Agency

educational practices (Schweisfurth, 2006). Emirbayer and Mische (1998) suggest that agency should be understood as a temporally embedded process of social engagement, influenced by the past (in its habitual aspect), oriented towards the future (as a capacity to imagine alternative possibilities) and engaged with the present (in the contingencies of the moment). This three-dimensional perspective on agency generates a new understanding of how agency is achieved in concrete situations, and of the different factors which might promote or inhibit the achievement of agency. In their ecological view, Priestley, Biesta and Robinson (2012) see the agency as an emergent phenomenon that results from the interplay of individual efforts, available resources and contextual and structural factors. Agency is, therefore, related to what people do and achieve in a specific context (Biesta & Tedder, 2006). Bullough and Gitlin’s (2001) study looks at the tension between what the context demands of the individuals and what they are or really want to be. Sannino (2009) discusses the concept of experience to highlight a positive connection between resistance and agency, and its potential for teachers’ professional development and educational change. Chia, Zhang and Ye (2010), in a case study, show how existing and emerging structure/resources enabled and developed teacher agency in sustaining and scaling up a pedagogical innovation. These views make agency “a contextually enacted way of being in the world” (van Lier, 2008).

In this paper, we intend to explore how participation in a master course, expressly devoted to improving research skills, may impact teachers’ sense of agency after one year. This analysis will be performed though the use of the interview, considered in a socio-cultural perspective, as “dialogical social events based on repertoires of socially and culturally embedded and constantly changing words and discourses” (Tanggaard, 2015).

Method

Research Question

Our research is guided by the following question: How do in-service teachers draw on different modalities to characterize their own agency when
reflecting on their participation in a master course on research skills attended one year before?

Participants

This work is a follow-up study of a previous research initiative to study teachers’ agency (Impedovo & Ligorio, 2016). We interviewed nine in-service teachers (six men and three females), who constituted a whole class of a full-time international master course. The course is a master on Educational Research sponsored by the European Program Erasmus Mundus. The main aim of this two years full-time master was to improve teaching skills in science educational research by also sustaining a research attitude. The main subjects were: methodology of research, statistics, innovative educational approaches in sciences education, and use of educational technology in the classroom. They all came from three African countries (Zimbabwe, Lesotho and Burkina Faso) with structural problems in the education system, such as the lack of basic resources and teachers low qualifications (Haßler, Hennessy, Cross, Chileshe & Machiko, 2015). At the same time, these countries recognise the importance of the technology and science as an engine for innovation (OECD, 2008, 2014).

Their average age is around 39 years (the youngest is 30 and the most senior is 50 years old). All have a bachelor in educational science gained in their respective countries. Their teaching subjects are mainly biology, mathematics and/or physics. They have different seniority in teaching service at high school as full-time teachers: two of them have less than five years; four of them between 10 to 15 years and the remaining three more than 20 years of teaching experiences. They all teach in a higher school, and three of them are teacher educators in high school and university. All speak English as a second language (at different levels of fluency).

Teachers were contacted one year after the end of the international master and they accepted to be interviewed. At the time of the interview, all the participants were living in their respective countries and had obtained the official qualification after the discussion of their final research dissertation in science education, based on data collected in their local school. A common dissertation’ topic was the use of simulation software and ITC for teaching science education. Details of the interview are in Appendix.
Data collection

The collect narrative data about research skills and attitude comprise a semi-structured interview (Patton, 2002). The interview contained eight questions around two topics:
- Participation in the master course: dissertations; difficulties; implication on personal and community level;
- Involving in the research: interest and involving in new research; the implication of research on teaching practices.

The interview was conducted with Skype and, when it was not possible, we used a synchrony chat. The interviewer used the mirroring technique (Rogers, 1967). We used the narrative interview in our study since we believe that this qualitative method allows us to reflect on selected experiences and events in order to make them meaningful (Watson, 2006), bringing out their sense of agency. Through considering the language in the narrative in teachers’ stories it was possible to examine their agency (e.g. Shaw, 2001).

Data-analysis

A qualitative method has been used to analyse the data collected. The texts of the interviews were read and analyzed by two independent researchers. The reading phase is crucial to familiarize with the content of the interviews and to break down the parts of the text expressing similar ideas. Then, our thematic analysis of the content was performed, consisting of an iterative and circular process between theoretical concepts, research questions, and empirical data (Bryant & Charmaz, 2007; Charmaz, 2006). During this process, some discrepancies were found and resolved through discussions and clarification until an agreement was reached. Below, we proceed to describe in detail the six modalities of agency considered through the analysis and the linguistic analysis performed on the corpus data.

Six modalities of agency

From the methodological point of view, agency is a broad concept, and we are aware that it is difficult to capture considering the large number of claims made about agency within different traditions. For this study, taking
into consideration Jyrkämä (2008) and the following work of Sairanen & Kumpulainen (2014), we consider six modalities for the analysis of sense of agency. These six modalities of agency, reported as follows, were used as analytic tools:

- **To want**, positions the person in question as wanting to do something;
- **To know**, ascribes the person with certain knowledge and know-how;
- **To be able**, characterizes the physical abilities and limitations of the person;
- **Have to**, ascribes a must or something that the person has to do;
- **To feel**, experience, appreciate, positions the person as being able to feel and experience, and lastly;
- **To have the possibility** ascribes the person as having possibilities to do something in a given situation.

These modalities are understood, following the discussion of Sairanen & Kumpulainen (2014), as a socially constructed relation between an individual’s perspective (made of aspirations, opportunities and limitations) and a given practice. Adopting this perspective, we compiled a joint guideline for identifying these six modalities of agency from the data, and with it, we analysed the interviews.

**Guideline and the linguistic analysis**

We attend to various linguistic features for the analysis of agency. In particular by looking at the use of pronouns (*I, we, my, our*), use of active verbs (first person or first plural person), statements connected to speakers’ desires and intentions (*I will, I choose*), and temporal positioning relative to action (*Before I do, now I do*). These linguistic elements are what are generally used for the linguistic analysis of agency (e.g., Archer, 2000; Duranti, 2004; Kumpulainen, 2014). In Table 1 the Guideline is used to perform the analysis with the six modalities of agency and the main linguistic indicators considered:
### Table 1

*Guideline: Modalities, Definition and Indicators*

<table>
<thead>
<tr>
<th>Modalities</th>
<th>Definition</th>
<th>Main linguistic indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>To want</td>
<td>Positions the person in question as wanting to do something</td>
<td>Action verbs with expression of desire or interests (I wish; I am thinking of looking; I intend…)</td>
</tr>
<tr>
<td>To know</td>
<td>Ascribes the person with certain knowledge and know-how</td>
<td>Action verbs with expression of learning reached (I gained instructional; I learned that…)</td>
</tr>
<tr>
<td>To be able</td>
<td>Characterises the physical abilities and limitations of the person</td>
<td>Action verbs with expression of ability obtained (I apply; I use; I am able), combined with temporal indicator (now, before …)</td>
</tr>
<tr>
<td>Have to</td>
<td>Ascribes a must or something that the person has to do</td>
<td>Action verbs with references to duties (I have shared the results; I did an exhibition …)</td>
</tr>
<tr>
<td>To feel</td>
<td>Experience, appreciate, positions the person as being able to feel and experience, and lastly</td>
<td>Action verbs with references to feeling (It was confusing; I am so happy…)</td>
</tr>
<tr>
<td>To have the possibility</td>
<td>Ascribes the person as having possibilities to do something in a given situation</td>
<td>Action verbs with references to opportunities (I was involved; I am to join …).</td>
</tr>
</tbody>
</table>

### Results

We discuss the results of our study in two phases. First, we highlight how in-service teachers draw on different modalities to characterise their own agency. Second, we focus on what insights can be drawn from in-service teachers’ sense of agency regarding the attended course and interests in the research discussed in the interviews.
In-service Teachers Modalities of Agency

Below we present the results about the sense of agency in the nine teachers interviewed. In Table 2 we present the emergent themes from the nine in-service teachers’ interviews, and we do so according to the six modalities used to explore the sense of agency.

Table 2

<table>
<thead>
<tr>
<th>Modality of agency in teachers’ reflections</th>
</tr>
</thead>
<tbody>
<tr>
<td>To want</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>To continue with research in local country</td>
</tr>
<tr>
<td>To attend a specialist course</td>
</tr>
<tr>
<td>Looking for new job to have more time to do research</td>
</tr>
<tr>
<td>To do a doctorate</td>
</tr>
<tr>
<td>To write academic papers</td>
</tr>
</tbody>
</table>


In what follows, we analyse each modality in detail through the use of in-service teachers interviews’ extracts.

**To Want**

Teachers express in different ways their sense of agency related to “to want”. They express essentially their desire to continue to do research in their local community, in the hope of making a contribution to their country: “I am now satisfied with my research thesis and *wishes to* research some other issues affecting the educational system in Vanuatu” (Male, 31 years, Vanuatu).

Also there is the aspiration to look for new job to have more time to do research, having therefore the opportunity to publish some papers about their topics:

I am still working as a High School teacher and **I am very much interested in** continuing with research. **I want to** further my studies **so that I can** frequently manage to undertake research activities. Since there is a lot of work at high school, **I am thinking of looking** for a job that can comfortably allow me to continue with research. (Female, 44 years, Lesotho)

To archive this, they express the willingness to enrol in a specialist course and also in a doctorate level course:

**I am still very much interested in it.** That is the reason **I want to** go further **and do** a doctorate on the same subject. (…) **I have not published** any article or report as yet but **I intend** to do so very soon. (Male, 51 years, Lesotho)

**To Know**

Thanks to the participation in the international master course aimed to develop research skills and attitude, during interviews all teachers claim to have developed ITC knowledge and skills, especially related to technological education and computer simulations: “**I have gained instructional** technology skills to improve students learning. **I also gained knowledge** about current affairs and areas of concerns in science education and education research methods” (Female, 44 years, Lesotho).
At the same time, the master course allowed them to broaden their knowledge of theoretical issues, by making them aware of students' misconceptions, a central topic in their master course in science education: “I learned that computer simulations can be used as an alternative method of teaching. I learned that students come to the classroom with different ideas on a topic, some which may be correct others which may be wrong” (Male, 38 years, Zimbabwean).

This theoretical knowledge, gained through lessons and didactical materials, has allowed them to broader teacher resources, changing also teaching perspectives:

- **My research made me** look beyond boundaries of a classroom. **It made me look** at students as people who are potentially capable of achieving knowledge only if you put the writing tools in their hands and point them in the right direction. (Male, 31 years, Vanuatu)

**To be Able**

The teachers declared to be able and feel more confident to apply instructional technology in classrooms, a new area for almost all of them, with direct impact on student learning:

- **The research improved my** teaching practices a lot. **I now apply** instructional technology in my classrooms. **I now use** computer simulations and Youtube videos in my lessons and encourage learners to research from the internet, all of which were not done before. **I am now able to provoke** them to reveal the preconceptions they **have before instruction**. (Female, 44 years, Lesotho)

Teachers also feel confident to explore deeper subjects of science education thanks to the acquired ability to access to academic resources: “**I now have** a broader base of teacher resource support material from the internet” (Male, 35 years, Zimbabwe).

In general, teachers have the common perception to be able to do research in science education: “**My main personal advantage is that I am now familiar** with research and am competent to do any research in the arena of education and others as well” (Male, 31 years, Vanuatu).
Have to

This modality ascribes a must or something that the person has to do. In relation to this, the teachers express they have had to manage the international course during the master course. This activity was not always simple, considering the involvement of three countries and three respective universities in the Erasmus project. The second important element is that teachers express is the “mission” to share the results of their research dissertations with their students, colleagues, schools and community:

I have shared the results with students who were participants, the teachers who were also taking part in the study and through a conference organised by the National University of Lesotho, I shared the results with teachers from Tertiary institutions and high schools who in preparation for publishing in their journal at national and regional level. (Female, 44 years, Lesotho)

The sharing of results has been proposed in various ways, through the activities of presentations: “I did an exhibition representing the local university, I also encourage my colleges at the school to use the simulations during staff development meetings” (Male, 35, Zimbabwe) or indirect through the sharing of artefact produced “I shared with my colleagues by letting them read my paper” (Male, 51 years, Lesotho).

To Feel

Teachers express that they felt confused about how to reach a final decision about their dissertation: “Having a common understanding on issues from supervisors from the three universities. Sometimes it was confusing to reach the final decision about the way forward. Adaptation to two countries of different cultures and approaches to people was also a challenge” (Female, 44 years, Lesotho). And, during the research, they express difficulties in the involvement of participants in collecting data. A more general feeling is in the difficulties for the use of technological resource in school, like computers but mainly the Internet:

Time was not enough for undertaking the research especially when I had to be teaching the students and at the same time conduct a research. Access to Internet facilities was a big challenge. Most of the time the
The difficulty of access to the Internet is considered a limitation in access to useful resources and existing, that can add value to the lesson: “I could not access some of the important journals which I intended to use for my research even from the university website” (Male, 35, Zimbabwe). Nevertheless, teachers express happiness to have learned research skills, regarded as "tools" to be used for putting into practice innovation activities access: “I am so happy to have learned the skills to do research. It is the only way to find a possible solution to issues faced inside a society” (Male, 31 years, Vanuatu).

To have the Possibility

This last sense of agency modality ascribes the person as having possibilities to do something in a given situation. In our case, after the participation in the master course, the teachers have had the opportunity to be involved in a nationally relevant official activity: “I was also involved in writing a professional report at International level for Ministry” (Female, 44 years, Lesotho) or for disseminations:

To reach the science teachers and students is to be involved in projects and participating in TV presentations on "how can biology be best taught in the classroom". There is a program like this in our Lesotho Television. I am preparing at the moment some 20-minute presentations on some biology topics that will take off from January 2016. As a researcher to improve my skills I am to join the National University Team of Researchers next year 2016. (Female, 50 years, Lesotho)

Finally, teachers think their participation in the master course has supported their classroom or sometimes the entire school to adopt ICT in teaching and learning activities: “The main contribution of my research was to encourage schools in my community to adopt the use of ICT into the teaching methodology and how to use it effectively” (Male, 31 years, Vanuatu). Indeed, their reach to change the attitude of some colleagues or sometimes of all the school about the limitation in the use of ICT, with
relevant changes: “The school has adopted the use of computers in lessons and is no longer limiting teachers’ access to the internet during working hours” (Male, 35 years, Zimbabwe).

Discussion

In this paper, by drawing on the sociocultural framework and narrative semiotics, we have addressed in-service teachers ‘sense of agency’ as they reflect on their participation in a master course. Teachers express their sense of agency in different ways related to the different modality of agency.

About the ‘want’, they express essentially their desire to continue to do research in their local community, in the hope of giving a contribution to their country. Indeed Stremmel and Horm-Wingerd (2007) encompass a view of teaching as an inquiry process, useful in seeking practical solutions to real problems in their professional and social lives. They express the need of a research inside a real-life context of the classroom and the voice of the teacher (Davis, 2007).

This desire is so high to orient some of them to a change in the profession, with a higher investment in education (like the choice to do a doctorate course). So personal learning includes a reflective orientation to oneself and to the local conditions of the learning community (Calderhead, 1996). In this sense, in-service teachers’ sense of agency is strictly linked to the context and local community (Gallagher, 2012).

About the ‘to know’ all teachers claim to have developed ITC knowledge and skills, especially related to technological education and computer simulations. Theoretical knowledge -gained through lessons and didactical materials- has allowed them to utilise broader teacher resources, changing also teaching perspectives. Indeed, teachers who have been involved in research may become more reflective, more critical and analytical in their teaching, and more open and committed to professional development (Oja & Pine 1989; Henson, 1996).

At the same time, they feel more confident applying instructional technology in classrooms, with direct impact on student learning. Also, teachers have the common positive perception to be able to do research in science education. The master course has given them the basic tools to know about research in science education. The discussion is open on how to
evaluate the quality of teacher research, in order to ensure the quality and
authenticity of teacher research (Cochran-Smith & Donnell, 2006). However, there is agreement that standards for rigour must be maintained

They feel the “mission” to share the results of their research dissertations with their students, colleagues, schools and community. The development of a knowledge base for teaching practice is considered as a shared responsibility among teachers themselves, looking to the involvement of schools and institutions (Bickel & Hattrup, 1995). This attitude helps to develop the community and can make possible subsequent learning communities (Hargreaves, 2003; Oosterheert & Vermunt, 2001). For teachers, sharing is important to implement “inquiry communities”, understood as a setting where learning is visible and accessible to others (Cochran-Smith, 2005).

Teachers express some difficulties in doing the research in the local context, especially considering the ITC and internet restriction, with consequent limitation in the access to the resources. Nevertheless, teachers express happiness to have learned research skills, regarded as “tools” to be used for putting into practice innovation activities access. This positive perception helped to establish a harmonious relationship between personal identity, aspirations and enthusiasm for the profession (Korthagen, 2004; Korthagen & Verkuyl, 2007).

Teacher research has helped to introduce a significant change in local teachers ‘context, in helping schools develop a new curriculum methods with the use of ITC and starting to build new institutional network, with universities or others schools. The participation in the course and the research conducted on local context has given them the opportunity to become an active voice, contributing to the discourse constructed by and maintained by that community. Becoming a subject in a community also means becoming an active agent, and this is based on the subject’s reflective awareness. In the same time also the community co-develops with its members on the basis of the exteriorization of members ‘activity in practise of collective interest (Van Oers, 2002).

In general, thanks to the research training, teachers have in general understood that they can improve teaching and create the possibility of
transformation and renewal of their community. So, as stressed by Stremmel (2007) it is important to reconceptualise the role of teacher and teachers research, in an intertwinements of personal, social, and educational change (Meier & Henderson 2007; Stremmel, 2007).

**Conclusion**

The utilisation of the sense of agency modality contributes to describing in-service teacher narratives that constituted the actors of the story (Fontanille, 2006; Greimas & Porter, 1977). The applicability of the modalities of agency as analytical tools helped to understand how in-service teachers perceive themselves as authors of their professional growth. Although our conceptualizations are based on in-service teachers’ narrated interview accounts of their sense of agency rather than an examination of agency in action, our study paves the way for future research in this regard.

Finally, teacher research is a path for lifelong learning in the profession, supporting reflective and mindful teaching, and self-transformation to develop a better understanding of teachers themselves, their classrooms, and their practice (Mills 2000; Stringer 2007; Stremmel, Fu, & Hill 2002). In an age of accountability, more than ever, teachers, schools, and school districts need to be actors in introducing and supporting innovation.

**Acknowledgement**

I sincerely thank the participants who dedicated their precious time to interviews. I also want to acknowledge the passion they showed for their professional development.

**References**


Educational researcher, 28(5), 12–21. doi: 10.3102/0013189X028005012


Impedovo – Teachers’ Sense of Agency


Dr. Maria Antonietta Impedovo is researcher and teaching assistant in Aix-Marseille Université in France (ADEF).

Contact Address: ENS Lyon, ADEF EA4671, 13248, Aix-Marseille Université, Marseille, France. Dr. Impedovo’s e-mail address: maria-antonietta.IMPEDOVO@univ-amu.fr
Appendix

Interview Protocol

1. Which have been the main advantage and difficulties in doing your research during the international master course?
2. After one year from the international master course, are you still interested in your research topic?
3. At the retour in your country, did you share the results of your research with colleagues/students or other schools? In which way?
4. In your opinion, what is the most important contribution of your research in your school or/and community?
5. Do you think that have done your research have had an impact in your teaching practices? In which way?
6. Have you published or do you plan to write articles about your research?
7. Are you involved in new research project?
8. Do you intend to improve your professional skills? In which way?
Teaching-Learning Conceptions and Academic Achievement: The Mediating Role of Test Anxiety

Gökhan Baş¹

¹) University of Ömer Halisdemir, Turkey

Date of publication: October 24th, 2016
Edition period: October 2016 - February 2017


To link this article: http://dx.doi.org/10.17583/ijep.2016.2271

PLEASE SCROLL DOWN FOR ARTICLE

The terms and conditions of use are related to the Open Journal System and to Creative Commons Attribution License (CC-BY).
Teaching-Learning Conceptions and Academic Achievement: The Mediating Role of Test Anxiety

Gökhan Baş
University of Ömer Halisdemir

Abstract
The current research aimed at examining the mediating role of test anxiety in the relationship between teaching-learning conceptions and academic achievement. The correlation investigation model was adopted in this research. The participants of the research were volunteering teachers (n = 108) and students (n = 526) from five different high schools. For data collection, the “teaching-learning conceptions scale” (Chan & Elliott, 2004), the “Westside test anxiety scale” (Driscoll, 2007), and the “Grade point average determination form” were used. The data was analysed using hierarchical multiple regression analysis. According to the results obtained, it was found that there were significant relationships amongst teaching-learning conceptions, test anxiety, and academic achievement. Furthermore, it was concluded that test anxiety mediated the relationship between teaching-learning conceptions and academic achievement significantly.

Keywords: teaching-learning conceptions, test anxiety, academic achievement, correlation research.
Concepciones de Enseñanza-Aprendizaje y Rendimiento Académico: El Papel Mediador de la Ansiedad ante los Exámenes

Gökhan Baş
University of Ömer Halisdemir

Resumen

El propósito de la presente investigación es examinar el papel mediador de la ansiedad ante exámenes en la relación entre concepciones de enseñanza-aprendizaje y el logro académico. La investigación adopta el modelo de correlación. Los participantes de la investigación fueron profesores \( n = 108 \) y estudiantes \( n = 526 \) voluntarios de cinco escuelas secundarias. Para la recolección de datos se emplearon la escala de concepciones de enseñanza-aprendizaje (Chan & Elliott, 2004), la “Westside test anxiety scale” (Driscoll, 2007), y la “Grade point average determination form”. Los datos se analizaron mediante regresión múltiple jerárquica. De acuerdo con los resultados obtenidos, se encontró que existen relaciones significativas entre las concepciones de enseñanza y aprendizaje, la ansiedad ante los exámenes y el logro académico. Además, se concluyó que la ansiedad ante los exámenes medió la relación la relación entre las concepciones de enseñanza-aprendizaje y el rendimiento académico de manera significativa.

Palabras clave: concepciones de enseñanza-aprendizaje, ansiedad antes los exámenes, rendimiento académico, investigación de correlación.
Almost everyday, teachers have to take many different decisions affecting teaching and learning process in the classroom (Woolfolk, 2007). The decisions that teachers have to make almost everyday affect the teaching and learning process directly or indirectly, as well as in a positive or negative way (Kauchak & Eggen, 2007). Hence, the decisions that teachers make in regard to classroom processes affect instructional activities, and ultimately such situation becomes one of the determinants of effective teaching in the classroom (Borich, 2014). In this context, while the studies carried out in regard to this topic reveal that teachers’ classroom behaviours are affected by many variables (Brophy, 1986; Evertson, Emmer, Clements, Sanford, & Worsham, 1984; Fang, 1996), the literature also reports that one of the most important variables affecting the decisions of teachers regarding classroom instruction is teaching-learning conceptions (Tilemma, 2000). Teaching-learning conceptions, also affected by many variables, such as prior school experiences, observations, personal beliefs, values, personalities, and instructional practices of teachers (Canbay & Beceren, 2012; Chan, 2004; Richardson, 2003), have become an issue attracting considerable attention of educational researchers in recent years (e.g., Aypay, 2011; Baş, 2014, 2015a; Chan, 2004; Chan & Elliott, 2004; Igwebuike, Okandeji, & Ekwevugbe, 2013; Teo & Chai, 2008).

While the growing interest in teaching-learning conceptions may be related to beliefs of teachers in classroom instructional practices (Chen, Brown, Hattie, & Millward, 2012), teaching-learning conceptions are defined as “the beliefs held by teachers about their preferred ways of teaching and learning. These include the meaning of teaching and learning and the roles of teacher and pupils” (Chan & Elliott, 2004, p. 819). In the relevant literature, teaching-learning conceptions are conceptualised under two conceptions based on different philosophical foundations (Chan, 2004; Chan & Elliott, 2004). Two conceptions based on different philosophical foundations can be defined, namely: (a) constructivist teaching-learning conception and (b) traditional teaching-learning conception (Chan & Elliott, 2004). These two conceptions symbolise diametrically opposed teaching-learning conceptions (Baş, 2015a). Teachers’ pedagogical beliefs vary along a continuum of considering teaching and learning as a process of knowledge
transmission at one end to a process of facilitating students’ knowledge construction in the learning process at the other end (Chan & Elliott, 2004).

The traditional teaching-learning conception, also referred to teacher-centred instruction (Kember & Gow, 1994), sees learning as getting information from teachers and textbooks, considering the teacher as transmitter of knowledge as well as students as recipients of knowledge (Chan & Elliott, 2004). The traditional teaching-learning conception places much emphasis on teaching as transmission of corpus of knowledge from authoritative sources like teachers and textbooks to students as recipients of information (Igwebuike, Okandeji, & Ekwevugbe, 2013), who are expected to get all the information presented without questioning (Özden, 2005). Hence, knowledge is considered as a passive absorption of information transferred from teachers to students (Brooks & Brooks, 1999). While teachers are very active in the transfer of knowledge to students, students are in a very passive position in the construction of knowledge (Baş, 2014). Learning is considered as remembering and memorising (Engin & Daşdemir, 2015). For this reason, teachers who adopt this approach place themselves at the centre of the teaching and learning process, and mostly use traditional teaching methods in the classroom (Cheng, Chan, Tang, & Cheng, 2009), which might include some enforcement and punishment.

Participation of students in the teaching and learning process is very limited; they are not allowed to direct the teaching-learning process by themselves (Gagnon & Collay, 2001). At the same time, an instruction process in the classroom based on this type of conception focuses on the formation and shaping of students’ behaviours by teachers (Barut, 2011). This approach is more associated with behaviourist theories (Woolfolk, 2007), according to which students’ behaviours are expected to be introduced into a certain format and be disciplined (Prosser, Trigwell, & Taylor, 1994). A classroom based on a traditional teaching-learning conception can be characterized by authoritative classroom management (Yılmaz, 2009), as well as by custodial student control ideology (Baş & Beyhan, 2013), these being focuses of the classroom instructional process. Teachers tend to have the sole authority and the ultimate domination on all processes in the classroom (Jones & Harty, 1980). In other words, teachers organize teaching and learning processes by themselves, not allowing
students to share this responsibility (Jessup, 1995). Additionally, in classrooms where teachers adopt traditional teaching-learning conceptions students’ individual differences are not taken into consideration; all students are considered to progress at the same time, pace, setting, and conditions (Fer & Cirik, 2007). Also, while in classrooms where teachers adopt traditional teaching-learning conception both classroom design and instruction stuck in a rut (Brooks & Brooks, 1999), teachers do not make an effort in order to differentiate instruction, as well they use simple methods of instruction based on transferring knowledge to students in a short period of time (Pritchard, 2015).

Moving apart from the traditional approach to instruction, the constructivist conception stresses the importance of experience and active learning processes that encourage discovery, collaboration and critical thinking by considering the teacher as a counsellor, as well as the student as an active participant (Chan & Elliott, 2004). While the traditional teaching-learning conception emphasises the transmission of knowledge from teachers to students (Özden, 2005), where teachers represent the authority of knowledge and students are viewed as passive recipients (Gagnon & Collay, 2001), the constructivist teaching-learning conception emphasises teachers as a guide who help students in the construction of knowledge as active participants of the learning process (Brooks & Brooks, 1999). This constructivist teaching-learning process reveals that knowledge cannot be seen as independent from the individual, so meanings belonging to the individual cannot be transferred to others (Phillips & Soltis, 2004). Given so, teachers are active counsellors helping students, facilitators and organisers of the teaching and learning process (Chan & Elliott, 2004), while students are in an active role of getting, explaining, and constructing knowledge (Baş, 2014). In this sense, a key feature of constructivist learning is not to get and accept knowledge given, but to infer meaning from the shared knowledge (Driscoll, 2000). Emphasis is placed in developing teaching strategies that are able to sustain the permanence of the learnt knowledge and to contribute to the development of higher-level cognitive skills in students (Duffy & Cunningham, 1996). At the same time, in classrooms where a constructivist teaching-learning conception is dominant, it is observed that students try to question, interpret, discuss, and compare the knowledge transferred to them.
with other knowledge sources rather than just accepting them form teachers and textbooks (Marlowe & Page, 1998). This implies participating in teaching-learning process actively (Abbott & Ryan, 1999). In this regard, constructivist teaching fosters learning in students through problem solving, critical thinking, and creativity endeavours (Fer & Cirik, 2007). Besides, in classroom where teachers adopt constructivist teaching-learning conceptions a democratic environment is provided to students (Marlowe & Page, 1998), where teachers make a considerable effort to differentiate instruction (Tomlinson, 2014), taking individual differences of students into account and responding to them by using various contemporary methods and techniques of instruction in the classroom (Pritchard, 2015). Lastly, teachers who adopt constructivist teaching-learning conceptions in the classroom organise the classroom in constructivist ways and direct the instruction accordingly (Brooks & Brooks, 1999). Therefore, teachers adopting constructivist teaching-learning conceptions sustain learning environments that are rich in learning experiences in which they are just a guide in the meaning construction process performed by their students in the classroom (Gagnon & Collay, 2001).

The current research was aimed to extend the existing literature on instructional models and their impact on learning by considering academic achievement and test anxiety of students in the context of one powerful contextual factor, namely, the teaching-learning conceptions of teachers. While students’ academic achievement levels may be affected by numerous variables including socio-economic status, general ability level, teaching-learning conception of teachers, quality of peer group of the student, extra learning opportunities, etc. (see Borich, 2014; Kauchak & Eggen, 2007), amongst these variables, teachers’ teaching-learning conceptions is considered as one of the most significant factors (Chan & Elliott, 2004). Nonetheless, when the relevant literature is reviewed, a few studies are seen to examine teaching-learning conceptions of teachers in regard to some other learning variables (e.g., Aydın, Tunca, & Şahin, 2015; Aypay, 2011; Baş, 2015a; Baş, & Beyhan, 2013; Bikmaz, 2011; Boulton-Lewis, Smith, McCrindle, Burnett, & Campbell, 2001; Chan & Elliott, 2004; Engin & Daşdemir, 2015; Eren, 2009). Particularly, the few studies that examine the relationship between students’ academic achievement levels and teachers’
teaching-learning conceptions use to adopt qualitative research methods (e.g., Donche, De Maeyer, & Van Petegem, 2007; Gow & Kember, 1993). Thus, the use of quantitative methods to approach this research question would complete such qualitative explorations. Also, despite there are a few studies examining the relationship between academic achievement and test anxiety levels of students (e.g., Carden, Bryant, & Moss, 2004; Chapell, Blanding, Silverstein, Takahashi, Newman, Gubi, & McCann, 2005; Culler & Holahan, 1980; Fincham, Hokoda, & Sanders, 1989), the relationship between teaching-learning conceptions and academic achievement with the mediating role of test anxiety in this context is not present in the relevant literature. While teachers’ teaching-learning conceptions might have an impact on the academic achievement levels of students, test anxiety may have a significant role in the relationship between those two variables. Because testing is a much present reality in schooling today (McDaniel, Anderson, Derbish, & Morrisette, 2007), this variable (test anxiety) is considered to have a mediating impact in the relationship between teaching-learning conceptions adopted by teachers and the levels of academic achievement of students.

The present study aimed to examine the relationship between teachers’ traditional or constructivist teaching-learning conceptions, as well as the mediating role of test anxiety, on the levels of academic achievement of students. It is posited that teaching-learning conceptions of teachers have a significant effect on students’ academic achievement levels, and that test anxiety mediates the impact of teaching-learning conceptions adopted by teachers on students’ academic achievement levels.

**Purpose of the Study**

The purpose of this research was to examine the mediating effect of test anxiety on the relationship between teaching-learning conceptions of teachers and academic achievement levels of students. In accordance with this aim in the current research, answers to the following questions were sought:

(1) Are there any significant relationships amongst teaching-learning conceptions, academic achievement, and test anxiety?
(2) Does test anxiety mediate the relationship between teachers’ teaching-learning conceptions and students’ academic achievement?

Methodology

Research Design

The correlation investigation model was adopted in this research (Fraenkel & Wallen, 2009). In the related literature, the correlation model is defined as a research model aiming to determine the existence or the level of mutual change of two or more variables (Creswell, 2012). In the current research, the relationships amongst teachers’ teaching-learning conceptions, academic achievement, and students’ test anxiety levels were examined by using the correlation investigational model.

Participants

The participants of the research were volunteering teachers \((n = 108)\) and students \((n = 526)\) from five different high schools in the province of Nigde in Turkey. Among the teachers, 43.52% \((n = 47)\) were males and 56.48% \((n = 61)\) were females. The occupational experience of the teachers in the study ranged between 1-5 and more than 20 years. The age range of the teachers was 24 to 56 years \((M = 36, SD = 2.64)\). Regarding the participant students, 45.63% \((n = 240)\) were boys and 54.37% \((n = 286)\) were girls. With regards to class level, students were between the 9th and 12th grades. The students’ ages ranged from 13 to 18 \((M = 16.4, SD = 3.48)\).

Data Collection Tools

Teaching-Learning Conceptions Scale (TLCS). In order to examine the teachers’ teaching-learning conceptions, “Teaching-Learning Conceptions Scale”, developed by Chan and Elliott (2004) and adapted into Turkish by Aypay (2011), was used. The teaching-learning conceptions scale consisted of 30 items. The participants responded on a 1 (totally disagree) to 5 (totally
agree) scale; scores were averaged. The scale consisted of two sub-dimensions; (a) traditional teaching-learning conception (18 items; e.g., “Good students keep quiet and follow teacher’s instruction in class”; $\alpha = .83$), (b) constructivist teaching-learning conceptions (12 items; e.g., “It is important that a teacher understands the feelings of the students”; $\alpha = .88$). The confirmatory factor analysis results (GFI = .93; AGFI = .91; RMR = .50; RMSEA = .54) revealed that the scale had acceptable values to be used in the current study (Aypay, 2011).

**Westside Test Anxiety Scale (WTAS).** In order to examine students’ test anxiety levels in the research, the “Westside Test Anxiety Scale”, developed by Driscoll (2007) and adapted into Turkish by Totan and Yavuz (2009), was used. The Westside test anxiety scale was consisted of 11 items. The participants responded on a 1 (totally disagree) to 5 (totally agree) scale; the scores were averaged to form test anxiety levels of students. The scale consisted of a single factor (11 items; e.g., “During important exams, I think that I am doing awful or that I may fail”; $\alpha = .89$). The confirmatory factor analysis results (GFI = .93; CFI = .97; IFI = .97; RMSEA = .45) revealed that the scale had acceptable values to be used in the current study (Totan & Yavuz, 2009).

**Grade Point Average Determination Form (GPA).** In order to determine high school students’ academic achievement levels, grade point averages (GPA) of the participating students at the end of the academic year were employed. The GPA results of the students were collected through the e-school system (see http://e-okul.meb.gov.tr) of the Ministry of National Education (MoNE) of Turkey by getting permission from the school administrations. A Microsoft® Office Excel® 2007 form was designed. Then, the school administrations were asked to transfer the GPA results of the selected grade and class students into the form prepared for collecting the data for the research.
Data Analysis

In the current research, the relationships amongst teaching-learning conceptions of teachers, academic achievement and test anxiety levels of students were calculated by conducting Pearson Product-Moment Correlation analysis, and hierarchical multiple regression analysis was used to identify the variables that predict test anxiety levels of students. Prior to the analyses, the hypotheses in accordance with hierarchical multiple regression analysis were tested in the research. As a result of the analysis, it was concluded that there was no values that hamper the linearity and normality assumptions in the data set, so that it was decided that the normality and linearity hypotheses were met. Also, the presence of autocorrelation between variables in the regression analysis was examined; Durbin-Watson value (D-W = 1.23) demonstrated that an autocorrelation did not exist between the variables. The data set was also examined in regard of the multicollinearity assumption and it was seen that there was not multicollinearity between the independent variables. Variance inflation factor (VIF) and conditions index (CI) were examined and VIF values were detected as 1.02-1.08, and CI values were found as 1.00-8.28 in the study. Values in regard to VIF equal to or higher than 10 and values in terms of CI equal to or higher than 30 demonstrate multicollinearity (see Büyüköztürk, Çokluk, & Köklü, 2011). In this regard, the findings obtained in the study demonstrated that there was not multicollinearity between the independent variables. These examinations showed that the data set was fit for multiple regression analysis, so that the related analyses were conducted in the study. To test the mediating role of test anxiety in the relationship between teaching-learning conceptions, Sobel-z test was adopted in the research.

Data Collection Procedure

The data of the current research was collected from teachers and students in public high schools. The information was collected by the researcher and this process lasted two months approximately. The collection of the data for teaching-learning conceptions scale from teachers and the data for test anxiety scale from students lasted one month. Also, the collection of the
GPA in regard of the academic achievement levels of the students from the e-school system of the MoNE lasted for nearly one-month time. When the researcher was visiting the selected high schools, he firstly informed the teachers and students about the purpose of the study, and then explained how to fill the data collection tools to these participants. The completion of the scales took approximately 30 minutes for each scale used in the study. The voluntary participation of both teachers and students was taken seriously into account.

**Findings**

The relationships amongst teaching-learning conceptions adopted by teachers and the academic achievement and test anxiety levels of students were examined. Also, the mediating role of test anxiety for the relationship between teaching-learning conceptions and academic achievement was analysed in the study. To achieve these aims, first, descriptive statistics (mean, standard deviations, and relationships amongst the variables) was performed, to later continue with hierarchical multiple regression analysis. Table 1 presents the relationships amongst teaching-learning conceptions, academic achievement and test anxiety levels.

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. TTLC</td>
<td>3.42</td>
<td>3.83</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. CTLC</td>
<td>3.88</td>
<td>3.53</td>
<td>-.218**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. TA</td>
<td>3.47</td>
<td>7.69</td>
<td>.142</td>
<td>-.271**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>4. AC</td>
<td>54.65</td>
<td>11.62</td>
<td>.171*</td>
<td>.208**</td>
<td>-.283**</td>
<td>-</td>
</tr>
</tbody>
</table>

*p < .05, **p < .01

*Note. TTLC = Traditional Teaching-Learning Conception; CTLC = Constructivist Teaching-Learning Conception; TA = Test Anxiety; AC = Academic Achievement.*
According to the Pearson analysis conducted, it was seen that the traditional teaching-learning conception related negatively with the constructivist teaching-learning conception and academic achievement. However, it was concluded that traditional teaching-learning conception exhibited a positive, but not a significant relationship with test anxiety. On the other hand, it was seen that constructivist teaching learning conception exhibited a significant positive relationship with academic achievement, but exhibited a significant negative relationship with test anxiety. Also, it was found that test anxiety exhibited a negative relationship with academic achievement significantly.

At this point of the analysis, predictors of academic achievement levels of students were examined in three steps using hierarchical multiple regression analysis to consider the correlation coefficients between research variables. The findings indicated moderate level of significant relationships amongst the variables. Therefore, it was decided to examine the mediating role of test anxiety and the relationship between teaching-learning conceptions and academic achievement. Hence, the first step (model 1) evaluated traditional teaching-learning conception, the second step (model 2) evaluated traditional teaching-learning conception and constructivist teaching-learning conception, and the last step (model 3) evaluated traditional teaching-learning conception and constructivist teaching-learning conception and test anxiety on academic achievement.

<table>
<thead>
<tr>
<th>Model</th>
<th>Dependent</th>
<th>Independent</th>
<th>( \beta )</th>
<th>( t )</th>
<th>( R^2 )</th>
<th>( F )</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AC</td>
<td>TTLC</td>
<td>.171</td>
<td>2.114</td>
<td>.029</td>
<td>4.467</td>
<td>.036*</td>
</tr>
<tr>
<td>2</td>
<td>AC</td>
<td>TTLC</td>
<td>.227</td>
<td>2.826</td>
<td>.093</td>
<td>7.511</td>
<td>.005*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CTLC</td>
<td>.258</td>
<td>3.205</td>
<td>.158</td>
<td>9.139</td>
<td>.019*</td>
</tr>
<tr>
<td>3</td>
<td>AC</td>
<td>CTLC</td>
<td>.191</td>
<td>2.376</td>
<td>.158</td>
<td>9.139</td>
<td>.001*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TA</td>
<td>-.267</td>
<td>-3.367</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*\( p < .01 \)

Note. TTLC = Traditional Teaching-Learning Conception; CTLC = Constructivist Teaching-Learning Conception; TA = Test Anxiety; AC = Academic Achievement.
In the first step of the analysis, it was seen that the traditional teaching-learning conception predicted academic achievement significantly, $\beta = .171$, $p < .01$, and explained 3% of the variance. In regard of the second step of the analysis, it was observed that the traditional teaching-learning conception predicted academic achievement significantly, $\beta = .227$, $p < .01$, as well as the constructivist teaching-learning conception predicted academic achievement significantly, $\beta = .258$, $p < .01$. In the analysis, it was seen that traditional and constructivist teaching-learning conceptions together explained 9% of the variance. Lastly, in the third step, test anxiety emerged as a mediating variable that significantly predicted academic achievement, $\beta = -.267$, $p < .01$, and explained approximately 16% of the variance together with traditional and constructivist teaching-learning conceptions in the research. In the third step, it was concluded that taken together with the mediating variable (test anxiety), there was an increase in the strength of the relationship between teaching-learning conceptions and academic achievement. Therefore, it can be claimed that test anxiety mediated the relationship between teaching-learning conceptions and academic achievement significantly, Sobel-$z = 2.149$, $p < .01$.

**Discussion**

The purpose of this research was to examine the mediating role of test anxiety on the relationship between teaching-learning conceptions and academic achievement. Up to now, the study of teaching-learning conceptions and academic achievement has taken place in relative isolation; researchers have mostly focused on academic achievement levels of students by analysing their socio-economic status, parental factors, study skills, learning strategies, etc., whereas the impact of teaching-learning conceptions adopted by teachers on academic achievement levels of students has received less attention in the literature (Donche, De Maeyer, & Van Petegem, 2007; Gow & Kember, 1993). Most relevant to the current study, there is a lack of research examining the relationship between teaching-learning conceptions and academic achievement. Thus, the research reported in this article extends the literature by examining the relationship between
teachers’ teaching-learning conceptions and students’ academic achievement levels, and the mediating role of test anxiety in the relationship between teaching-learning conceptions and academic achievement.

According to the first finding obtained in the research, positive significant relationships between teaching-learning conceptions and academic achievement, defined as independent and dependent variables respectively were determined (see Table 1). According to this finding, it was concluded that there was a significant positive relationship between teachers’ traditional and constructivist teaching-learning conceptions and students’ academic achievement levels. Also, while it was seen that both traditional and constructivist teaching-learning conceptions were a significant predictor of academic achievement, the constructivist conception was understood to be a more significant predictor of academic achievement, compared to the traditional conception. Previous research literature reports that there are significant positive relationships between teaching-learning conceptions adopted by teachers and academic achievement level of students (e.g., Donche, De Maeyer, & Van Petegem, 2007; Gow & Kember, 1993).

Although there is little research regarding the issue explored in our study; such research had concluded that students in classrooms where teachers adopt a constructivist teaching-learning approach had a higher level of academic achievement than students in classrooms where teachers adopt traditional teaching-learning conceptions (e.g., Gow & Kember, 1993). At the same time, despite different results were acquired in studies which examined the instruction based on constructivist and traditional approaches on academic achievement levels of students by using experimental research methods (e.g., Akyol, 2011; Ilyas, Rawat, Bhatti, & Malik, 2013; Koç, 2002; Latchman, 2000; Serin, Serin, & Saygılı, 2008), the instruction based on constructivism is advocated that it is a more effective approach in raising academic achievement levels of students than traditional ones (e.g., Akyol, 2006; Baş, 2015b; Becker & Mousiniyet, 2004; Christanson & Fisher, 1999; Koç, 2002; Latchman, 2000; Polak, 2008).

Today, there is a trend in instruction to move from traditional to constructivist approaches (Travis & Lord, 2004; Grant, 1997). The debate over which one is more effective in raising academic achievement levels of students maintains its topicality (Khalid & Azeem, 2012). Despite the debate
over which approach is more effective in raising academic achievement levels of students maintains its topicality; the trend towards the use of constructivism in instruction is increasing steadily (Fer & Cırık, 2007; Shymansky, 1992). Although the number of research testing the effect of instruction based on traditional and constructivist approaches on academic achievement levels of students by using experimental research methodology is quite more, there is not much research reporting the impact of teaching-learning conceptions adopted by teachers on academic achievement levels of students in the literature (Donche, De Maeyer, & Van Petegem, 2007; Gow & Kember, 1993). Hence, the current research is evaluated as to be an important step in resolving the lack regarding this issue. The limited number of research on this issue increases the need for future research on the related subject.

In addition, it was concluded in the research conducted that there was a significant relationship between teaching-learning conceptions adopted by teachers and test anxiety levels of students. According to this finding, it was seen that there was a significant negative relationship between constructivist teaching-learning conception and test anxiety, and a positive but not a significant relationship was found between traditional teaching-learning conception and test anxiety. The research literature provides supporting results for this finding obtained in the current study (e.g., Alsup, 2004; Baş, 2015b). Thus, in the literature on this topic was observed that students in classrooms where teachers adopted constructivist teaching-learning conceptions had lower levels of test anxiety. However, students in classrooms where teachers adopted traditional teaching-learning conception students showed higher level of test anxiety (e.g., Alsup, 2004; Kelley, 1999; Kim, 2005). So, our finding in this regard can be explained by considering teaching-learning conceptions adopted by teachers in the classroom. In this sense, while it can be said that students in constructivist classrooms are being educated in anxiety free, autonomous, self-directed, and cooperative learning environments (Semerci, 2001), it can also be stated that students in traditional classrooms are being educated in environments where coercion, strict study, and punishment highly exist (Hoy & Weinstein, 2006). Besides, while students in constructivist classrooms are evaluated in the learning process by using multiple ways such as projects, presentations,
worksheets, structured assessment grids, concept maps, portfolios, etc., and the scores of these students are only used for determining the strengths and weaknesses of them, instead of making students proceed to upper grades (Brooks & Brooks, 1999; Gagnon & Collay, 2001; Herman, 1992), students in traditional classrooms are evaluated by adopting formal examinations, multiple choice tests, verbal examinations, etc., and the scores of these students carry weight with making them proceed to upper grades at school (Anderson, 1998; Black & William, 1998). Hence, it is expected that test anxiety of students in classrooms where teachers adopt constructivist teaching-learning conception stay in low level, whereas test anxiety of students in classrooms where teachers adopt a traditional instructional approach is expected to be higher. In this regard, our findings are consistent with related results in current research literature (e.g., Alsup, 2004; Baş, 2015b; Kelley, 1999; Kim, 2005).

Also, it was found that there was a significant negative relationship between test anxiety and academic achievement levels of students. This finding shows consistency with other results published in current relevant literature (e.g., Chapell et al., 2005; Culler & Holahan, 1980; Fincham, Hokoda, & Sanders, 1989; Seipp, 1991). Other studies have found that learning and academic achievement decrease as a result of high anxiety, and increase as a result of reinforcement and anxiety free learning atmospheres (Hembree, 1988; Rana & Mahmood, 2010). So, students with a higher level of test anxiety are expected to have low levels of academic achievement; also, students with a lower level of test anxiety are expected to have higher levels of academic achievement at school (e.g., Carden, Bryant, & Moss, 2004; Hancock, 2001). In the current research, it was revealed that there was a significant negative relationship between test anxiety and academic achievement levels of students, so this finding implies that test anxiety levels of students decrease as their academic achievement levels increase or test anxiety levels of students increase as their academic achievement levels decrease. This results adds to the existing research literature in proving the negative relationship between test anxiety and academic achievement levels of students at school.

Additionally, it was found that test anxiety emerged as having a mediating role in the relationship between teaching-learning conceptions and
academic achievement. In the research reported here, it was concluded that test anxiety significantly mediated the relationship between the teaching-learning conceptions adopted by teachers and the academic achievement levels of students. In the analysis, it was seen that the traditional teaching-learning conception predicted academic achievement significantly and explained 3% of the variance. In this regard, it was observed that the traditional teaching-learning conception as well as the constructivist teaching-learning conception predicted academic achievement significantly. Also, it was seen that traditional and constructivist teaching-learning conceptions together explained 9% of the variance. Besides, test anxiety emerged as a mediating variable that significantly predicted academic achievement and explained approximately 16% of the variance together with traditional and constructivist teaching-learning conceptions in the research (see Table 2). Thus, we could conclude that test anxiety mediated the relationship between teaching-learning conceptions and academic achievement significantly. This finding is especially relevant, as it indicates that teaching-learning conceptions, which have been mostly neglected in the relevant literature, are an important factor in shaping academic achievement of students. Up to now, while research has identified that teacher classroom behaviours have direct or indirect effects on academic achievement levels of students (e.g., Brophy, 1986; Cobb, 1972; Fisher, 1981), the research regarding the impact of teaching-learning conceptions adopted by teachers on academic achievement levels of students has been poor in the literature. Out finding provides evidence on what the literature has suggested; that the conceptions adopted by teachers in terms of teaching and learning affect how students learn (Gow & Kember, 1993), as students are educated in accordance to the conceptions adopted by their teachers (Chan & Elliott, 2004). Regarding the mediating role of test anxiety, such instructional conceptions of teachers are reflected on the academic achievement levels of students at school.

In other words, it has been demonstrated that how teachers think about learning and teaching is associated with how their students learn (Donche, De Maeyer, & Van Petegem, 2007). While teachers’ teaching-learning conceptions and test anxiety are important factors for students’ academic achievement levels, there may be additional factors shaping academic
achievement that should be taken into account, such as the educational philosophy of teachers (e.g., Gutek, 1988), classroom management styles (e.g., Evertson et. al., 1984), and student control ideologies (e.g., Willower, Eidell, & Hoy, 1973). There is a large body of literature indicating that student control ideologies (e.g., Baş & Beyhan, 2013) and teachers’ beliefs on philosophy of education (e.g., Baş, 2015a) are closely related with the teaching-learning conceptions adopted by teachers. Therefore, it may be claimed that these factors may be effective in explaining academic achievement levels of students in the classroom.

**Implications for Practice**

The findings obtained in the current research have important educational implications for teachers and teacher educators. On the one hand, the results suggest that teaching-learning conceptions were a significant predictor of academic achievement. The findings indicated that both traditional and constructivist teaching-learning approaches had significant impacts on student academic achievement. It appears that both traditional and constructivist conceptions may be beneficial to students by promoting higher level of academic achievement, however, constructivist conception emerged as a more significant predictor of academic achievement, compared to the traditional one, without taking test anxiety into account (see Table 2). Hence, the finding suggested that students in classrooms where teachers adopted constructivist teaching-learning approaches were more successful than the students in classrooms where teachers adopted the traditional one. Thus, implementing constructivist methods in classroom instructional practices proves being beneficial. However, despite the constructivist teaching-learning conception was a more significant predictor of academic achievement compared to the traditional one, it must also be noted that the traditional teaching-learning conception was a significant predictor of academic achievement. So, this result indicated that both conceptions adopted by teachers were effective in raising academic achievement levels of students. Thus, although most experimental studies show that constructivist approach is more effective in raising students’ academic achievement levels than the traditional approach, there are contrasting results in regard of the
positive effect of both constructivist and traditional approaches on the academic achievement levels of students. Therefore, more research is needed on this very issue.

On the other hand, the findings of the research indicated that test anxiety had a mediating role in the relationship between teaching-learning conceptions and academic achievement. This finding suggested that test anxiety was an important mediating factor in explaining the predictive value of teaching-learning conceptions on academic achievement. Without test anxiety, teaching-learning conceptions predicted 9% of the variance of academic achievement; however, teaching-learning conceptions predicted approximately 16% of the variance of academic achievement when taking test anxiety as a mediating variable into account. Therefore, test anxiety may be claimed to be an important factor in the explanation of academic achievement of students by teaching-learning conceptions adopted by their teachers. Also, it was seen in the research that there was a significant negative relationship between constructivist teaching-learning conception and test anxiety, yet a positive but not a significant relationship between traditional teaching-learning conception and test anxiety was observed. This finding suggests that students in classrooms where teachers adopted a constructivist conception of learning had a negative level of test anxiety, whereas students in classrooms where teachers adopted the traditional one had a positive level of test anxiety. Hence, this finding informs that students have lower level of test anxiety in constructivist classrooms, so that measurement and evaluation methods out of formal tests and examinations are very important, resulting in low level of test anxiety in students (Crooks, 1988). Therefore, it may be suggested that students should be educated in classrooms where teachers adopt constructivist teaching-learning conception (e.g., Alsup, 2004; Baş, 2015b). As a whole, the current research leads to the conclusion that teachers would do well to provide students with a constructivist classroom, as opposed to the traditional one, and that they should seek opportunities to implement a constructivist atmosphere in the classroom.
Implications for Research

In this research, teaching-learning conceptions adopted by teachers were seen to be effective in explaining academic achievement levels of students, with the mediating role of test anxiety. However, while these conceptions adopted by teachers are not the sole factors in explaining students’ academic achievement levels, future research should be carried out to account for those other factors. Also, in future research additional mediating factors such as locus of control, student control ideology, etc. should be taken into account to examine academic achievement levels of students. Furthermore, experimental studies should be conducted to determine what other variables in addition to teaching-learning conceptions, such as student control ideology and beliefs of educational philosophy, impact students’ levels of academic achievement. Besides, other research, similar to the one reported here, should be conducted to support with qualitative data the questions addressed in our study. This would help to better understand the impact of teaching-learning conceptions adopted by teachers on academic achievement as well as the overall role of teaching-learning conceptions in shaping the academic achievement levels of students.

Limitations

Limitations of the current research included the fact that a rather small number of participants (both teachers and students) were included in the study. Also, the research was carried out in a rather small province of Turkey, thus the results of this research should be completed with data from participants from larger provinces and samples. Besides, the current research included a small number of variables (teaching-learning conceptions and test anxiety) to determine the academic achievement levels of students. Future research may be conducted to evaluate the impact of teaching-learning conceptions by considering additional factors that are thought to be effective on academic achievement.


doi: 10.5328/JVER29.2.133


doi: 10.1080/0969595980050102


doi: 10.1016/S0959-4752(00)00014-1


doi: 10.1037/0003-066X.41.10.1069


Carden, R., Bryant, C., & Moss, R. (2004). Locus of control, test anxiety, academic procrastination, and achievement among college students. *Psychological reports, 95*(2), 581-582. doi: 10.2466/pr0.95.2.581-582


Shymansky, J. A. (1992). Using constructivist ideas to teach science teachers about constructivist ideas, or teachers are students too! *Journal of Science Teacher Education*, 3(2), 53-57. doi: 10.1007/BF02614740


Dr. Gökhan Baş is Assistant Professor at the University of Ömer Halisdemir, Faculty of Education.

**Contact Address:** Eğitim Fakültesi, Merkez Yerleşke, Bor Yolu Üzeri, Niğde 51240. Dr. Bas’ email: gokhanbas51@gmail.com
Teacher Education for High Poverty Schools

Icy Fresno Anabo¹

1) Deusto University, Spain.

Date of publication: October 24th, 2016
Edition period: October 2016 - February 2017


To link this article: http://dx.doi.org/10.17583/ijep.2016.2280

PLEASE SCROLL DOWN FOR ARTICLE

The terms and conditions of use are related to the Open Journal System and to Creative Commons Attribution License (CC-BY).
Review


Reducing poverty and inequality of opportunities has been increasingly at the forefront of political agendas in the global landscape, with education being put forward as an indispensable means to resolve these social issues. One of the important aspects of responding to the pressing concern of poverty and its consequences is the availability of, and access to, quality and well-prepared teachers.

The book “Teacher Education for High Poverty Schools” edited by Jo Lampert and Bruce Burnett is a compilation of recent researches, management approaches, and pedagogical advances in the realm of teacher education and recruitment for high-poverty educational settings in six country contexts – the US, Canada, Australia, Chile, South Africa, and the UK. It offers sufficient introductory coverage into the theories, practices, and tensions involved in educating quality teachers for disadvantaged populations through the lenses of social justice and critical pedagogy.

A relevant task tackled in the book is exposing the many faces of disadvantage. As exemplified in the book’s chapters, being poor can mean more than just having a low socio-economic status: it can also be conflated with other forms of disadvantage as experienced by students in urban settings, suburban schools, and areas with high linguistic diversity and cultural dissonance between staff and students. Poverty, as framed in dominant discourse and as has been shown in numerous studies, is problematic because it plays a role in below-par educational performance and poor student outcomes.
The book balances this commonsensical interpretation of the nature of the educational achievement gap in school outcomes with the deconstructive aspect of poverty by inviting its readers to adopt a critical and reflective approach. It is argued that automatically linking poverty with academic underperformance and intellectual inferiority is a form of epistemic injustice (Fricker, 2007) that disregards the rich resources present in the students’ experiences themselves. It contends that moving forward in teacher education entails engagement in the practice of deconstructing the existing measures and our very own attitudes and assumptions about poverty as well as our deep-seated biases against students who are “poor,” “urban,” or “indigenous.” The authors propose a paradigm shift away from individual blame towards acknowledging that the system is fraught with inequities and homogenizing tendencies. By breaking away from deficit thinking to an asset-based frame of reference, teachers and teacher educators can also respond more effectively to the reality and the concomitant challenges of increasingly diverse student populations.

Alongside providing ample literature to reference its social justice and critical pedagogy roots, the book sets forth to illustrate practical approaches to governance, curriculum design, and classroom practice. At the macro level, it describes some efforts to redistribute not just well-meaning but also academically competent teachers to areas that need them the most through projects like the National Exceptional Teachers for Disadvantaged Schools in Australia (Chapter 4) and Teach First in England (Chapter 8). At the meso-level, institutions and teacher education curriculum developers will benefit from the examples given on how to approach teacher recruitment and retention in high poverty settings, how to incorporate family and community involvement into the curricula for pre-service teachers, and how to facilitate critical inquiry and teacher-researcher roles among pre-service teachers through pedagogical tools. The book also provides practicing teachers some insights on how to leverage diversity in the classroom and to enact an asset-based frame of reference in planning lessons and activities.

Indeed, the strength of the book lies in its ability to cater to various actors -- policy makers, families and communities, school leaders, and teacher-researchers -- involved in high poverty educational settings. Its holistic and
multi-level approach to the issue is a sober attempt to locate the features of responsive teacher education programs in the complex web of structural and dispositional limitations. The book also advertently warns against romanticizing the role of teacher education in addressing poverty, which reaffirms the fact that teachers cannot and should not be expected to generate change single-handedly.

Although admittedly non-exhaustive, the book is a good departure point to get a good grasp of teacher education with a social justice perspective. Even readers without a robust knowledge of relevant theories will find it a useful material to reflect on and a valuable resource to inform their respective practices and contexts.

References


Icy Fresno Anabo
Deusto University
icy.anabo@opendeusto.es