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## Factors Shaping Qatari Students' Career Expectations in STEM, Business or Public Sector Fields

Abdellatif Sellami

Qatar University, QATAR

Linda Kimmel

Center for Political Studies, University of Michigan, U.S.A.

Jill Wittrock

Center for Social and Behavioral Research, University of Northern Iowa, U.S.A.

Brian Hunscher

Mathematica Policy Research, U.S.A.

Anna Cotter

Department of Political Science, University of Michigan, U.S.A.

Ahmed Al-Emadi

College of Education, Qatar University, QATAR

Darwish Al-Emadi

Strategy & Development Office, Qatar University, QATAR

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### ABSTRACT

The purpose of this study was to identify factors shaping career expectations of Qatari students. The study examined individual and motivational variables likely to influence career expectations in STEM fields, the public sector, and business. This study used survey data of 802 Qatari students and 543 parents from the 2012 Qatar Education Study. The results suggest a varied, context-dependent portrait of career expectations. The results indicate that the education system in Qatar influenced students' STEM career expectations and demonstrate that operating a private business or seeking a job in the public sector continues to rival their expectations about STEM careers in Qatar. The paper concludes with some important implications for policy as well as recommendations for further study and research.

**Keywords:** students' career expectations, parental involvement, STEM, Qatar

### INTRODUCTION

The need for a highly skilled workforce that is adaptable in the face of evolving technologies and globalized competition has been projected to rise rapidly in the years to come (Ewers, 2007; Malecki & Ewers, 2007). STEM careers, in particular, have been singled out as especially critical to the labor force of the future (Greenwood, Harrison, & Vignoles, 2011), and building a pipeline for the STEM workforce has been elevated as a top policy agenda for several countries around the world, such as South Korea, Malaysia, Rwanda (Kramer, Tallant, Goldberger, & Lund, 2015) and at both the national and state level in the United States (EOP, 2013; Hall, Anderson, Metty, Rosenstein, & Whatley, 2016). There are few places with more need for STEM professionals than countries

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**Correspondence:** Abdellatif Sellami, *Al Jamiaa St, Doha, Qatar.*

✉ [asellami@qu.edu.qa](mailto:asellami@qu.edu.qa)

#### **Contribution of this paper to the literature**

- The results this study generates can enhance our understanding of students' career expectations in a Middle Eastern, non-Western context.
- The focus of this study is to explore a varied, context-dependent portrait of students' career expectations.
- Operating a private business or seeking a job in the public sector continues to rival students' expectations about careers in STEM fields in Qatar.

rich in natural resources, such as the states of the Arab Gulf, where the pool of citizens trained in the occupations needed to sustain the oil and gas industries is relatively small and demand especially high (Jiwaji, 2014; Shediak & Samman, 2010). Among the Gulf states, Qatar in particular has taken wide strides to modernize its education system and to nurture local talent into STEM careers (Barnett, 2015; Weber, 2014, 2015). However, unlike other countries with significant resources devoted to STEM education, Qatari students' interest in STEM fields has declined since the government prioritized STEM as part of a series of education reforms in 2003 (Said & Friesen, 2013), leading to the closure of science and mathematics programs at the leading national university (Said, 2010) and increased reliance on highly skilled workers from outside the country to fill STEM-related positions in the natural resource industry (Malecki & Ewers, 2007). Some estimates place the share of migrants at 87% of the total population (World Bank, 2013) in Qatar.

Although the natural gas sector and related enterprises currently dominate areas needing qualified STEM professions, the government has been transitioning to a "knowledge economy," which seeks to graduate future workers in the fields of medicine, computer science, and engineering (Qatar General Secretariat for Development Planning, 2011). In order to realize this vision, it is important to understand what is driving educational aspirations and career expectations related to STEM fields early in life so policymakers can target evidence-based programs that educators can then implement to build a future pipeline (Wiseman, Alromi, & Alshumrani, 2014). There is innumerable evidence that early interest in STEM is critical to later career choices (Ing & Gibson, 2013; Miller & Kimmel, 2012; Tai, Liu, Maltese, & Fan, 2006), but the preponderance of this research focuses on students in educational systems outside the Arab Gulf.

The purpose of this study is twofold. First, we seek to unpack which occupations are the main competitors to a STEM career in Qatar. Second, we explore the degree to which factors known to influence career expectations in previous studies conducted outside the region – the U.S. and Western Europe in particular – apply in the Arab Gulf. The focus on Qatar is important for several reasons. First, it is characteristic of many resource-rich states in the region where the government has devoted significant resources to foster interest in STEM careers. Second, because the population is extremely heterogeneous and overwhelmingly foreign-born, the student population in the education system is far more diverse and multicultural than studies examining the drivers of STEM career expectations in other settings. Thus, factors known to predict student expectations regarding a STEM career may or may not apply to the same degree or in the expected direction. Using data from the 2012 Qatar Education Study, we provide one of the first analyses of the factors shaping student expectations about STEM professions and other occupations with data from schools representing the full spectrum of educational offerings – both public and private – in Qatar. As countries in the Arab Gulf and around the world continue to invest in STEM education, it is important to understand the extent to which factors that shape expectations related to STEM careers in other countries also apply in the Middle East and North Africa.

### **COMPETITORS TO A STEM CAREER IN QATAR**

When examining the factors related to student STEM career interest and expectations, researchers typically dichotomize the choice in the data analysis; that is, either the student expects or is interested in a career in a STEM field or any other career (Crisp, Nora, & Taggart, 2009; Miller & Kimmel, 2012). This is in part driven by research convention and in part for practical reasons: researchers are interested in explaining variation in STEM career expectations rather than explaining expectations related to other occupations. Yet, in Qatar, there are two major

rivals to a STEM career that are worth additional scrutiny: 1) operating one's own private business, and 2) public service employment.

State-owned industries related to the petroleum and natural gas sector have long dominated Qatar's economy. Efforts to promote entrepreneurship began in earnest with the implementation of the Qatar National Vision 2030 as part of a long-term strategy to train citizens in financial services, education, and the health sector (Silatech/Gallup 2010, 2012). Small and medium-sized firms along with start-ups have been targeted by the Qatari government in recent years, and recent polling data suggests this has been impacting attitudes and perceptions among citizens. According to one report, slightly more than half of Qataris queried in an annual survey of entrepreneurship said they intend to start a new business in the next three years (Coury, Chidiac, Sayre, & Al Zaatari, 2014). In addition to support from the government, there are several non-governmental organizations that encourage entrepreneurship in the country specifically targeted to secondary and university students (Greene, Brush, Eisenman, Neck, & Perkins, 2015). There is preliminary evidence that these efforts may be coming to fruition with approximately one-in-three Qatari citizens between the ages of 15 and 29 saying they plan to start a business (Silatech/Gallup, 2012).

The government sector in Qatar has traditionally been a significant employer of Qatari citizens, and when queried in 2015, many nationals indicate a strong preference for public over private sector employment (Benchiba-Savenius, Mogielnick, Owens, & Scott-Jackson, 2016). In several countries in the Arab Gulf, government jobs have been an industry of choice for young adults (Behar & Mok, 2013; World Bank, 2013). Young people with adequate resources will wait for public sector jobs to open, rather than taking a job in the private sector, given the differentially high pay offered in public sector jobs and the corresponding low expected productivity (World Bank, 2013; Bunglawala, 2011; Stasz, Eide, & Martorell, 2008; Shediak & Samman, 2010).

## LITERATURE REVIEW: FACTORS INFLUENCING STEM CAREER EXPECTATIONS

For purposes of this study, we focus on expectations related to how a student's individual attributes and attitudes (e.g., gender, individual educational aspirations, motivation) and characteristics of the household (e.g., parent education, parent occupation) shape students' career expectations. However, we rely on literature that has focused not only on career expectations but also career interest and aspirations.

*Individual-level factors.* Numerous studies have found a relationship between gender and aspirations for a career in a STEM field. The direction of this relation has been mixed. Some researchers have found girls less likely to aspire to a STEM career than boys (Boujaoude & Gholam, 2013; DeWitt et al., 2013) whereas others say the opposite holds in Qatar (Abdulwahed, Ghani, Hasna, & Hamouda, 2013).

Student educational expectations and academic achievement are directly associated with the types of careers to which they can aspire and eventually attain. Previous studies of STEM careers have found an association between educational aspirations and career choice and entry (Sadler, Sonnert, Hazari, & Tai, 2012; Tyson, Lee, Borman, & Hanson, 2007; Whalen & Shelley, 2010) and students who planned on obtaining a Baccalaureate degree or higher while in high school were substantially more likely to eventually be a STEM professional than those who did not plan on graduating from college (Miller & Solberg, 2012). There are linkages in the existing literature between early academic achievement and eventual employment in a STEM field (Benbow, 2012; Crisp, Nora, & Taggart, 2009; Miller & Kimmel, 2012). For instance, Miller and Kimmel (2012) found students with higher science and mathematics achievement scores were more likely to enroll in a STEM major when they entered college, and were more likely to be a STEM professional by age 40.

Age of the child has also been found to matter, with many studies finding children tend to lose interest in STEM fields as they grow older (Baram-Tsabari & Yarden, 2011; George, 2006). Numerous researchers have examined the flow of individuals out of the STEM pipeline with dropouts occurring as the child progresses through primary, secondary, and post-secondary grades (Chen, 2013; Maltese & Tai, 2011; Rask, 2010). This may be compounded in part by student motivation, especially in Qatar. Student motivation has been singled out as an important factor for understanding interest in school and post-secondary education (SESRI, 2012; Baker, Kanan, &

Al-Misnad, 2008). Educators who teach Qatari students are less likely to be satisfied with student motivation than educators at schools with a more diverse student body, and approximately half of students from Independents Schools – which are government run and attract primarily Qatari nationals – report being bored “most of the time” at school in the 2012 Qatar Education Study (SESRI, 2012). A study conducted by Baker, Kanan and Al-Misnad (2008) revealed that family affluence, parents’ involvement in their child’s education, and the general school atmosphere are strong determinants that draw the line between students who are motivated to achieve academically and those who are not.

*Contextual-level factors.* Features of the household, especially parent education and parent occupation, have been used to explain variation in STEM career expectations. Parents’ level of education has been found to have a significant and positive relationship with to their aspirations for their children’s educational and occupational pursuits (Ing, 2014; Raque-Bogdan, Klingaman, Martin, & Lucas, 2013; Hill & Tyson, 2009). Research on the perceived relationship between the parent’s profession and their child’s career pursuit has shown that the father or mother’s field of work is a predictor of students’ choice of STEM (Leppel, Williams, & Waldauer, 2001; Moakler, & Kim, 2014).

## RESEARCH HYPOTHESIS/QUESTIONS

A combination of these personal and contextual factors informs what we believe predicts expectations regarding a particular career, and we expect there to be significant relationships among personal characteristics, a student’s household demographics, and expectations about a STEM occupation. We also build on previous research by broadening the scope beyond a simple dichotomy of STEM careers versus all others in our operationalization of career expectations to include what are in our view the main competitors to a STEM career in Qatar (i.e., starting a business and government employment). Our aim is to provide a holistic view both in terms of what predicts career expectations (i.e., individual and contextual) which is based on prior research and also recognizing that students do not view career expectations as an “either/or” choice. Specifically, we seek to answer the following broad research questions: (1) Do students’ personal and household characteristics have a significant relationship with their expectations of a STEM career in Qatar and (2) How do the factors influencing expectations of a career in STEM differ from those of a career in business or the public sector?

## METHODOLOGY

The design of this study is observational with data obtained via a nationally representative survey of central stakeholders in K-12 education in Qatar. The data collected for this study originate from the 2012 Qatar Education Study (QES), a nationally representative survey that was conducted by the Social and Economic Survey Research Institute (SESRI) in December 2012. The QES is comprised of four surveys administered to students, parents, teachers, and administrators.

Crafting the questionnaires began with consultations with teachers, academic advisors, school principals and parents, and subsequent focus group discussions with key stakeholders. Debriefings were also conducted with randomly recruited members of the public. This process was useful in allowing researchers to obtain the perspectives of relevant stakeholders and elicit information on different aspects of the school system in Qatar. Next, two educational experts who were also senior faculty members at Qatar University developed the questionnaires, and forward- and back-translations were conducted by translation experts. These draft questionnaires were evaluated using pre-tests in four randomly selected schools and the result was a refined survey instrument. In this study, we use data from the student and parent questionnaires. The mode of data collection involved self-administered paper-and-pencil questionnaires completed by students in the classroom and by parents in their home.

**Table 1.** Demographic Composition of Participants

<b>Group</b>	
<b>1. Students (Qatari)</b>	802
<b>Gender</b>	
Boys	406 (51%)
Girls	396 (49%)
<b>Average Age</b>	
8 <sup>th</sup> grade	13
9 <sup>th</sup> grade	14
11 <sup>th</sup> grade	16
12 <sup>th</sup> grade	17
<b>Grade Level</b>	
Preparatory	
8 <sup>th</sup> grade	182 (23%)
9 <sup>th</sup> grade	211 (26%)
Secondary	
11 <sup>th</sup> grade	178 (22%)
12 <sup>th</sup> grade	231 (29%)
<b>2. Parents (Qatari)</b>	543
<b>Gender</b>	
Male	320 (59%)
Female	223 (41%)
<b>Average Age</b>	
	41

## Participants

Participants included in this article are Qatari students ( $n=802$ ) and one of their parents ( $n=543$ ). The students are from two primary and two secondary grades and their race-ethnicity is 100% Qatari. **Table 1** provides the demographic characteristics of the participants involved in the current study.

## Procedure

This study used data collected from students and parents from the 2012 QES (SESRI, 2012). The school system in Qatar is organized into the following categories: 1) independent; 2) international; 3) community; and 4) Arabic private. The majority of Qatari students attend government-financed independent schools, which are all single-gender schools. In our study, the distribution of Qatari students across school type is as follows: 1) 93% independent schools ( $n=742$ ); 2) 4% international schools ( $n=28$ ), 3) 4% Arabic private schools ( $n=31$ ) and 4) <1% Community schools ( $n=1$ ). Due to the small sample size for the other school types, we did not include a system-level test of differences between or among schools.

The Qatar Education Study (QES) is based on a two-stage probability school sample of Qatari students. The sampling frame for the survey is based on a comprehensive list of public and private schools provided by the Qatar Supreme Council of Education (replaced by the Ministry of Education and Higher Education in early 2016 as part of a government reorganization). The first stage sample was a proportionate sample of schools based on school size, school type (i.e. independent, international, community, and Arabic private), gender (boy, girl, or coed) and grade (8<sup>th</sup>, 9<sup>th</sup>, 11<sup>th</sup>, or 12<sup>th</sup>). Schools were randomly selected within each of these subgroups (school type, gender, and grade) so that the school size selected from each strata was relative to its incidence in the entire sampling frame. In stage two, one class from each grade in a school was randomly selected and all students in the class were included in the survey. Students were given a printed parent questionnaire to give to one of their parents at home.

**Table 2.** Student Career Expectations

Occupation	Proportion (%)
Join the military	15.5
Join the police	7.0
Accountant	1.3
Teacher	3.4
Lawyer	5.1
University professor	1.7
Medical doctor	4.1
Nurse	1.0
Clerk	6.0
IT technician	.1
Physical therapist	.1
Chef	.3
Scientist	1.8
Businessman/businesswoman	13.4
Diplomat	8.1
Other	14.1
I do not know	16.8

**Question:** What kind of work do you expect to be doing in the future? (1) join the military; (2) join the police; (3) accountant; (4) teacher; (5) lawyer; (6) university professor; (7) medical doctor; (8) nurse; (9) clerk; (10) IT technician; (11) physical therapist; (12) chef; (13) scientist; (14) businessman/businesswoman; (15) diplomat; (16) other ("please specify"); (98) don't know.

Upon receiving approval from the Internal Review Board at Qatar University, official letters requesting permission to conduct the study were sent to the schools. Parents/guardians and students were informed in advance about the aim of the study, that participation in the survey was voluntary and that all of their answers would be confidential. No questionnaires were distributed until consent for the study was obtained.

Forty-three schools were initially sampled, with four schools refusing to participate, resulting in a response rate of 90.7% at the school level. Classrooms were randomly selected in 39 schools and all students in selected classrooms fully participated in the survey. However, we do not have information on the actual class sizes to calculate a response rate at the classroom level. This design resulted in 1,848 students (both Qatari and non-Qatari) and 1,472 parents. The response rate of parents was 79.6%. For purposes of this article we use only data from the Qatari national students (n=802) and their parents (n=514). The maximum sampling error was calculated at +/- 2 percentage points for the student survey and +/- 2.7 percentage points for the parent survey.

### Measures

*Student Career Expectations.* This is the main dependent variable for the statistical analysis. In the student questionnaire students were asked: "What kind of work do you expect to be doing in the future?" and were instructed to select one answer from a list of 15 options: 1) join the military; 2) join the police; 3) accountant; 4) teacher; 5) lawyer; 6) university professor; 7) medical doctor; 8) nurse; 9) clerk; 10) IT technician; 11) physical therapist; 12) chef; 13) scientist; 14) businessman/businesswoman; and 15) diplomat. (see **Table 2**). The list also included an "Other" option (with an open-ended, "please specify" space) and an "I do not know" option.

The career options were developed as part of the questionnaire construction process described above, and resulted from the consultations, focus groups, and questionnaire development by educational experts, as well as the eventual pilot testing and revision of the questionnaire. Knowing the list was not exhaustive, an "other" option was included. The open-ended responses to the other "please specify" option were coded into the original categories (including "other").

Responses were collapsed into four categories:

- STEM = (7) medical doctor; (8) nurse; (10) IT technician; (11) physical therapist; and (13) scientist,
- Public sector = (1) join the military; (2) join the police; (15) diplomat,
- Business = (3) accountant and (14) businessman/businesswoman, and
- Other = (4) teacher; (5) lawyer; (6) university professor; (9) clerk; (12) chef; (16) other; and (98) I do not know.

Overall, 13.9% of the students expect a STEM career, 16.8% a career in business, 37.8% a public sector career, and 31.4% some other career (see [Table 4](#)). Summary statistics for the four-category dependent variable and all of the independent variables described below are listed in [Tables 3](#) and [4](#).

*Individual-level factors.* Gender, attitudes and attributes related to educational aspirations and performance, and age in school were all examined as individual-level predictors of career expectations.

*Gender.* This was reported by students, and it is placed in the model as a dichotomous variable (female=1, male=0). Qatari students were almost equally split between female (49%) and male (51%).

*Grade Level* was used as a proxy for age of the child and was obtained from the original list provided by the Supreme Council of Education. 8<sup>th</sup> and 9<sup>th</sup> grades were collapsed into preparatory and 11<sup>th</sup> and 12<sup>th</sup> grades into secondary. Like gender, Qatari students were divided equally between preparatory (49%) and secondary (51%).

*Student Motivation Issues.* We measure motivation using a series of questions in the student questionnaire: 1) "How many times were you late for school over the past four weeks?" (response options of none, 1 to 2 days, 3 to 4 days, 5 to 10 days, 11 days or more, and I do not remember); 2) "In a typical week, how many days do you miss school (absent from school)?" (response options of never, one day, two days, three days, four days, or all week); 3) "How often do you feel bored when you are at school" (response options of most of the time, once in a while, never); and 4) "I do not put in my maximum effort in studying" (response options of strongly agree, somewhat agree, somewhat disagree, and strongly disagree). The summary student motivation issues variable ranges from zero to four and assigns one point to a student for each of the following: (1) coming to school late three or more days in the past four weeks; (2) being absent from school two or more days in the past week; (3) feeling bored most of the time when at school; and (4) strongly or somewhat agreeing that they do not put their maximum effort into studying. The measure has a mean of 1.3. In the model, the top two categories (3 and 4) are collapsed into 3 due to a small number of responses in the highest category.

*Student Educational Expectations.* Students were asked "How far in education do you think you will go?" and were offered the following response categories: 1) will not finish secondary or high school; 2) will graduate from secondary or high school, but will not go any further; 3) will join the community college; 4) will join a BA program at a university; 5) will graduate from a university; 6) will finish postgraduate studies; and 7) I do not know. From these responses, an indicator for planning to attain a Baccalaureate degree or higher was created. Overall 62% of the students aspire to a Baccalaureate degree or higher.

**Table 3.** Descriptive Statistics of Variables in Analysis

Variable	Source*	Mean/Proportions	SD	N
Gender	SQ	51% male	0.50	802
Grade Level	AD	51% secondary students	0.50	802
Father with BA or higher	PQ**	25% with B.A. or higher	0.43	785
Mother with BA or higher	PQ**	26% with B.A or higher	0.48	779
Parent in STEM Career	SQ	2.4% in STEM career	0.17	782
Count of Student Motivation Issues	SQ	1.30 out of 4	0.91	795
Student Educational Aspirations	SQ	62% aspire to B.A. or higher	0.49	790
GPA	SQ	2.5 out of 4.0	0.88	779
Homework Time	SQ	4.90 hours	2.53	788

\* SQ=Student Questionnaire; PQ=Parent Questionnaire; AD=Administrative Data.

\*\* If the parent questionnaire was missing, the student report of parent education was used for the analysis.

**Table 4.** Career Expectations of Qatari Students, 2012 Qatar Education Study

Group	STEM	Business	Public Sector	Other	N
All Qatari students	13.9%	16.8%	37.8%	31.4%	785
<b>Gender</b>					
Boys	11.2	15.4	52.4	21.0	397
Girls	16.9*	18.4	21.9***	42.9***	388
<b>Grade Level</b>					
Preparatory (8 <sup>th</sup> and 9 <sup>th</sup> grades)	13.8	11.8	44.3	30.1	387
Secondary (11 <sup>th</sup> and 12 <sup>th</sup> grades)	14.0	21.9***	31.3***	32.9	398
<b>Parent in STEM Career</b>					
Neither	13.4	16.5	38.4	31.7	746
One or both	26.8	16.9	10.7***	45.7	19
<b>Mother's Education</b>					
Less than B.A.	12.2	14.9	41.1	31.8	579
B.A. or higher	18.9*	23.8**	27.1***	30.2	200
<b>Father's Education</b>					
Less than B.A.	12.0	14.7	41.3	32.0	591
B.A. or higher	20.1*	24.4**	27.7***	27.8	194
<b>Student Educational Aspirations</b>					
Less than B.A.	7.6	7.6	49.4	35.4	301
B.A. or higher	18.1***	22.8***	30.6***	28.5*	489

\*\*\*p<.0001, \*\*p<.01, \*p<.05 as measured by a difference in proportion test.

*GPA.* The QES does not include direct measures of student academic achievement such as scores on standardized tests or matched transcripts. We use a combined measure of self-reported grades from the student questionnaire as a surrogate for academic performance in this analysis. We recognize that while self-reported grades are used frequently in educational research, there are some questions about their reliability with actual grades. However, a meta-analysis of self-reported grades found that self-reported grades generally predict outcome variables in the same manner as actual grades (Kuncel, Crede, & Thomas, 2005). The student questionnaire asked students, "What is your average grade in each of the following subjects?" Students were presented with a grid that included four subjects: mathematics, science, English, and Arabic. The response options for each of the subjects were: 1) Mostly A(s) (90-100%); 2) Mostly B(s) (80-89%); 3) Mostly C(s) (70-79%); 4) Mostly D(s) (60-69%); 5) Mostly below D(s) (below 60%); and 6) Not applicable. We converted the response for each subject to a standard GPA ranging from 0 (Mostly below D(s)) to 4 (Mostly A(s)). An overall GPA - the variable used in the models - was created as the mean of the GPA for the four subjects. On a 0- to 4-point scale the students had a mean GPA of 2.5.



*Homework Time.* The student questionnaire asked students to report how much *time they spent each week on homework* for math and for science. We combined the amount of time spent on math and science homework, resulting in a variable ranging from 0 (no time spent) to 16 (20 or more hours). The students reported spending on average 4.9 hours per week on homework.

*Contextual-level factors.* Parent education and parent occupation were the two sets of family household characteristics used in the analysis, and this information was obtained from the student and parent questionnaires. The parent questionnaire asked parents both for their and their spouse's highest level of education and occupation.

*Parent education.* Parents were given the following education options: 1) Primary (1-6); 2) Preparatory (7-9); 3) Vocational; 4) Secondary (10-12); 5) Post-secondary (Diploma); 6) University Graduate/BA/BCOM/BSC; 7) Masters' degree; 8) Ph.D.; 9) Other (specify); and 10) Never attended any school. We were interested in the effect of parents having a college degree on their child's career expectations, and collapsed the responses to Baccalaureate degree or higher versus less than Baccalaureate degree. Separate measures of mother's and father's education are entered in the models as 0= parent does not have a Baccalaureate degree or higher, 1=parent has a Baccalaureate degree or higher. If a student's parents did not complete the parent questionnaire, we used the student report of their mother's and father's education. Overall 25% of the fathers had a Baccalaureate degree or higher while 26% of the mothers had a similar level of education.

*Parent Employment in STEM Occupation.* The student questionnaire asked students: "What is your father/male (mother/female) guardian's main occupation?" We were specifically interested in the influence of having a parent employed in a STEM field on the likelihood that the student would select a STEM career, and created a dichotomous variable measured as 0=neither parent employed in a STEM field, 1=one or both parents employed in a STEM field. Only 2.4% of the students reported having a parent employed in a STEM field.

## DATA ANALYSIS AND RESULTS

A weighted maximum-likelihood multinomial logit model was constructed for the four-category career expectation variable using STATA 13. The *svyset* command was used in Stata to account for the two-stage sampling design and clustering of students within schools. In this analysis, the choice of Business as a career expectation is treated as the reference category; therefore, we are modeling the odds of a student picking one of the other options versus picking business.

**Table 4** provides the distribution of selected groups of Qatari students who expect a career in STEM, business, the public sector, and all other occupations. Looking first at gender, girls are more likely (16.9%) to expect a STEM career than boys (11.2%). Conversely, boys are more likely to expect a career in the public sector (52.4%) than are girls (21.9%). Girls are also more likely to expect "other" careers (42.9%) than boys (21.0%). When grade level is considered, secondary students (21.9%) are more likely than preparatory students (11.8%) to expect a career in business, while preparatory students (44.3%) are more likely to expect a career in the public sector than secondary students (31.3%). There is no difference based on grade level in STEM or "other" career expectations.

The home background of the students appears to matter, as students whose mother has a B.A. or higher are significantly more likely to expect a career in a STEM field (18.9%) or in business (23.8%) and are less likely to expect a career in the public sector (27.1%) than those whose mother has less than a baccalaureate. Similarly, students whose father has a Baccalaureate degree or higher are more likely to expect a career in a STEM field (20.1%) or in business (24.4%) and are less likely to expect a career in the public sector (27.7%) than are those whose father has less than a Baccalaureate degree.

Students who have at least one parent employed in a STEM field are less likely to expect a career in the public sector (10.7%) than are those with neither parent employed in a STEM field (38.4%). While twice as many students who have one parent employed in a STEM field (26.8%) expect a career in a STEM field than those who do not have a parent similarly employed (13.4%), the difference is not significant given the small number of Qatari students with a parent employed in a STEM field.

**Table 5.** Multinomial Logit Model of Factors Related to Career Expectations in Qatar

Variables	Category	STEM		Public Sector		Other	
		Beta	(S.E.)	Beta	(S.E.)	Beta	(S.E.)
Gender	Female	0.433	(0.398)	-0.957**	(0.293)	0.825*	(0.297)
Grade Level	Secondary (11 <sup>th</sup> and 12 <sup>th</sup> grade)	-0.647	(0.360)	-0.806*	(0.293)	-0.540	(0.269)
Parent Level of Education	Father with BA or Higher	-0.057	(0.352)	-0.622*	(0.281)	-0.359	(0.331)
	Mother with BA or Higher	0.236	(0.303)	-0.650*	(0.283)	-0.103	(0.316)
Parent in STEM Career	At least one Parent	0.227	(1.031)	-0.462	(0.929)	0.997	(0.977)
	0	-0.131	(0.415)	0.180	(0.465)	-0.197	(0.371)
Count of Student Motivation Issues	1	-0.333	(0.485)	0.00284	(0.457)	-0.515	(0.291)
	2	-0.293	(0.755)	-0.0458	(0.744)	-0.222	(0.468)
	3 or 4	-0.576	(0.335)	-1.392***	(0.294)	1.302***	(0.236)
Student Educational Aspirations	BA or Higher	0.348*	(0.132)	-0.252*	(0.121)	-0.218	(0.160)
GPA	NA <sup>†</sup>	0.0339	(0.0549)	-0.0451	(0.0416)	-0.0353	(0.0456)
Homework Time	NA <sup>†</sup>	-0.121	(0.842)	0.283	(0.785)	-0.167	(0.530)
Intercept		-0.513	(1.160)	3.409**	(0.984)	2.566**	(0.899)

Students who plan to obtain a Baccalaureate degree or higher are significantly more likely to expect a STEM career (18.1%) or a career in business (22.8%) and less likely to plan on a career in the public sector (30.6%) or other careers (28.5%) than are those who do not plan to graduate from college.

Table 5 shows the results from the multinomial logistic model discussed above. For each career choice, we show the odds of a Qatari student expressing a desire to enter that career field rather than enter into a career in business. Standard errors are in parentheses. When comparing student expectations regarding STEM careers versus business careers, only educational attainment aspirations reach statistical significance. Students who expressed a desire to attain a B.A. or higher degree were more likely to report a desire to enter a STEM career than a business career, perhaps because many STEM careers are known for having strenuous education requirements. Given the results of Table 2, it is perhaps unsurprising that the rest of the indicators fail to show significant differences between STEM and business field expectations. Gender (female), grade level, and parent's career and education choices all positively affected the likelihood of both business and STEM career expectations. The results of the logistic regression do not suggest that these indicators push students to consider a STEM career any more than a business career. Rather, the results taken overall may mean that students from elite educational backgrounds are more likely to choose high status careers with high educational requirements overall.

When comparing public sector to business career expectations, the results support previous work relating higher socioeconomic student backgrounds and expectations to more rigorous careers. Females, secondary students, and those whose parents have at least baccalaureate degrees are significantly less likely to choose public sector careers versus business careers. Students who expressed expectations for advanced educational degrees are also less likely to expect to enter a public sector career. Females are more likely to report expectations regarding other career options relative to a career in business.

Interestingly, students with more motivation issues are less likely to report expectations related to public sector careers or other careers relative to the business sector. Although the results fail to reach statistical significance, students with motivation issues are also less likely to report expectations for a STEM career relative to

a business career. These results perhaps signify that business is seen as a less demanding career field after educational goals have been achieved. Indicators of school workload or effort fail to reach significance for any career group.

## DISCUSSION

The aim of this study is twofold. First, we examine whether factors that have been found to influence student expectations related to STEM careers in other research also apply in the State of Qatar. Second, we also try to unravel the occupations that constitute the main rivals to STEM careers in Qatar. What started as an investigation into the determinants of students' STEM career expectations in Qatar has evolved into an examination of the factors guiding career expectations related to STEM, the public sector, and business fields. Using previous studies of STEM career expectations as an organizing framework, we identified individual and contextual variables likely to influence career expectations in Qatar. The analysis of the data from the QES 2012 points to a varied and context-dependent portrait of the motivations underlying student expectations regarding STEM occupations versus one in the public sector or business.

The results concluded from this study reveal that individual attributes and attitudes, including gender and individual educational aspirations and motivation, are the main drivers behind students' career expectations. Previous studies have found mixed results regarding the impact of gender on student career expectations in a STEM career. Our results indicate that in Qatar, girls are more likely to aspire to a STEM career than boys which is consistent with another study conducted in Qatar (Abdulwahed, Hasna, & Hamouda, 2013) but differs from results found in an overall Arab study (BouJaoude & Gholam, 2013). Similarly, our results regarding the influence of educational aspirations and motivation are consistent with previous findings in other research (Crisp, Nora, & Taggart, 2009; George, 2006; Rask, 2010). Student household characteristics, specifically parent education and parent occupation, are also found to be important predictors of Qatari students' career expectations. These results corroborate similar findings concluded in other studies (Ing, 2014; Raque-Bogdan, Klingaman, Martin, & Lucas, 2013; Leppel, Williams, & Waldauer, 2001).

Taking a closer look at the results, it is apparent that operating a private business or seeking a job in the public sector continues to rival expectations to have a STEM career, regardless of government initiatives to grow a STEM pipeline from school to the workforce. This is revealed partly in the bivariate comparisons between career expectations and individual-level and motivational factors. Girls are more attracted to STEM careers, whereas boys tend to be drawn to occupations in the public sector. Although student education aspirations are the only significant result in the multinomial model for STEM, the contrast between business and public sector is significant for several of the bivariate-level results, notably gender, grade level, and parent education. Taken together, the individual-level factors suggest that students coming from households with highly educated parents are more likely to expect careers with higher status, regardless of the overall educational requirements in the long-term. The results from the motivational factors suggest that those with less motivation have fewer expectations about public sector careers or other careers compared to those in business. While at first this may seem contrary to our expectations, it could, in fact be the stereotypes associated with a career in the public sector (i.e., adherence to rules and regulations, rigidity) that may drive students with motivational issues to consider alternative career paths.

Throughout the Middle East and North Africa there is a prevailing belief that youth will continue to be attracted to public sector careers. While there may be evidence to support this in several states in the region, our results paint a more nuanced picture of the underlying factors motivating students to pursue occupations outside the public sphere. We find that female students in younger grades who have parents with a B.A. or higher are less likely to pursue a career in the public sector. Those students who already expect to pursue a B.A. or higher also are less likely to look at a career in the public sector.

The implications of our study are two-fold, including both policy-level issues for the Qatar government and potential future directions for researchers in other country. First, it is clear that despite extensive efforts by the Qatar government to increase the number of students attracted to a STEM career, much work remains to be done.

Based on our study, only a small percentage of Qatari students are interested in a career in a STEM field, while a large percentage remain attractive to jobs in the public sector and business. Second, most researchers have focused solely on the dichotomy between student interest in a STEM career versus all other careers. Within the context of Qatar, we have found major competing occupations – business and the public sector – that attract a larger percentage of students. It may be useful for researchers in other countries, particularly in non-western countries interested in increasing the flow of students into the STEM pipeline, to explore the major competitors for a STEM career.

### LIMITATIONS OF THE STUDY

This study sought to identify the factors that shape students' career expectations using data from the QES student and parent questionnaires. As described earlier, the QES questionnaires were developed through a careful process involving focus groups and interviews with key educational stakeholders in Qatar. The resulting questionnaires were then pre-tested with students, parents, and key stakeholders and revised as needed. However, our analyses as described here would be enhanced with additional information. Resources permitting, follow-up interviews with a sample of students who indicated they aspired to careers in business, STEM, and the public sector would have allowed for in-depth exploration of what their understandings were of these occupations. Second, if not concerned for respondent burden and the length of the student questionnaires, it would have been interesting to include questions that include subscales for each separate subject area.

With regard to the analysis, it is possible that school type also shapes student STEM career expectations in Qatar, but we are unable to explore this because the predominant school type in our study is the publicly funded independent school, which comprises the majority of the Qatari students in our sample (93%). Finally, we cannot compare how similar or different this study is to those carried out in non-Arab countries, for a nation's social and cultural norms and values influence its education system (Barbour, Barbour, & Scully, 2008).

### DIRECTIONS FOR FUTURE RESEARCH

This study is important in unveiling what shapes students' expectations regarding careers in STEM, business, or the public sector. However, future research is needed to better understand the extent to which Qatar's education system shapes expectations about these career pathways, and in particular STEM careers, for all students. Schools in Qatar attract different groups in society that tend to cluster along nationality and linguistic cleavages, and future work should broaden the focus beyond Qatari students to include the full spectrum of students participating in the school system. Furthermore, additional research needs to evaluate in greater depth how those students who say they want to pursue a STEM career differ from students who want to go into business or the private sector. In other words, we need to investigate what precisely motivates these students to go into fields that have historically been dominated by immigrant workers and expatriates and take on the additional coursework needed to fulfill these jobs. Additional research is required to establish in greater detail the personal motivations and other context-specific factors that foster interest in STEM careers in Qatar. Finally, further study and research are needed to understand the extent to which these findings generalize to other societies with extremely heterogeneous and predominantly immigrant student populations.

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