ENHANCING EDUCATION POLICY IN THE MIDDLE EAST AND SOUTH ASIA: AN INVESTMENT IN TERRORISM PREVENTION OR AN INEFFICIENT USE OF COUNTERTERRORISM RESOURCES?

A Thesis
submitted to the Faculty of the
Graduate School of Arts and Sciences
of Georgetown University
in partial fulfillment of the requirements for the
degree of
Master of Public Policy
in the Georgetown Public Policy Institute

By

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Washington, DC
April 15, 2004
Enhancing Education Policy in the Middle East and South Asia: An Investment in Terrorism Prevention or An Inefficient Use of Counterterrorism Resources?

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Abstract

Policymakers commonly believe that education is a key to curbing terrorist activity. However, previous academic research shows that this may not be the case. This thesis examines the effects of education, particularly female education, on terrorism. Specifically, it looks at the relationship between various educational variables and the number of terrorist attacks in Middle Eastern and South Asian countries during the time period 1999-2007. I hypothesize that, like previous multivariate regression research such as the work of Claude Berrebi (2007), Ethan Bueno de Mesquita (2005) and Alan Krueger and Jitka Malenkova (2003), I will find that education will not lead to decreases in terrorist attacks. In addition, I also theorize that gender parity in education decreases the number of terrorist acts. This thesis uses time-series, panel data to run tobit regressions on six models in order to establish the relationship between education and terrorist attacks. The first model lacks an educational variable and then each of the following five models are run with a different educational variable, such as literacy rate, primary completion rate and the ratio of girls to boys in primary and secondary education. Unlike, my hypothesis, in each model the educational variable is found to be statistically significant. Furthermore, increasing female education alone results in decreases of terrorist attacks, though it is does not do so in a manner greater than increasing male education. Consequently,
policymakers should continue to promote investment in education when implementing policies to combat terrorism. The long-run gains for education will be part of the antidote to extremist violence.
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Introduction

The roots of terrorism confound policymakers and academics alike. What situations stimulate terrorist activity within a country? And more importantly, what changes in policy will curb acts of terror? The answers to these questions are complex and ambiguous. In order to answer the latter question, it is important to address the initial one. In examining why terrorism occurs within a country, policymakers assess all facets of their society – economic, political and social. Within social policy, the effect of education is an element of popular debate. The discussion of education policies’ effects on terrorism is an interesting paradox. On one end of the continuum are policymakers’ beliefs. Reverence for education policy, in particular education focusing on modern subjects such as sciences, languages and government, is a central component to their fight against terrorism. Most policymakers in countries prone to terrorist acts are proponents of maintaining madrasas (Islamic schools) and propose to modernize the traditional education by supplementing it with applicable skills and education necessary for individuals to function in a global economy. Many policymakers also seek to expand their student base by increasing female enrollment levels in efforts to obtain gender parity.

Conversely, much of the academic research on education’s effect on terrorism finds that education, almost universally based on literacy rate statistics, has no effect on terrorist acts within country. In some cases, research has even found that terrorist

organizations recruit from the more educated societal classes (see Berrebi, 2007; Bueno de Mesquita, 2005; and Krueger & Malenkova, 2003).

The dichotomy of policymakers’ and academics’ views result in lingering questions of whether education does have an effect on terrorist attacks. This paper therefore examines the effect of education on terrorist acts on a greater scale than previous research conducted. Much of the existing literature looks at particular terrorist organizations or at a specific country. Sample sizes for this body of research are also small (n= less than 50) and data is based on household surveys. In contrast, my research examines 178 countries and does not limit itself to particular terrorist groups. The data is based on national statistics. Furthermore, previous work utilizes literacy rates as the sole education indicator. My research seeks to go beyond these studies and incorporates not only literacy rates, but primary completion rates for the relevant aged population and the ratio of girls to boys that are enrolled in primary and secondary education. The literacy and completion rates variables are further disaggregated by gender. The importance of female education in development, stability and growth is embraced by the global community in the Millennium Development Goals. Yet, academic research on terrorist acts with the gender-education dimension is virtually non-existent. The choice of these education variables seeks to encapsulate different dimensions of education; completion rates would indicate overall access to education, literacy rates would be a sign of the quality of education, and ratio of girls-to-boys in primary and secondary enrollment would signify the importance of gender parity within education.

This thesis examines these variables specifically in the context of the Middle East and South Asia, where its findings will be the most policy relevant. Access to education has long been seen as essential to development and progress. As such
Middle Eastern and South Asian policymakers pursue this path in hopes of steering their countries not only into a more developed state, but also beyond an era plagued with terrorist activity. During this time of increasing volatility of terrorist attacks, counterterrorism tactics are at the forefront of policymakers’ agendas. Thus it is essential for them to know what counterterrorism investments will produce the greatest results with their limited available resources. This thesis hopes to discover the importance of education in the counterterrorism scheme, bridging the gap between previous academic findings and policy implications.
Background

Terrorist attacks have occurred for centuries. Contrary to public opinion, the frequency with which they occur has not increased. Instead, terrorist acts occur in cyclical patterns, with peaks of more events and lulls with less.\footnote{Enders, Walter and Todd Sandler. “An Economic Perspective on Transnational Terrorism.” \textit{European Journal of Political Economy}. Vol. 20 (2004) pg. 305. 11 March 2004.} The grave concern, however, is that within the past century technology has presented terrorists with ways to cause greater destruction with tools that are easily accessible. While terrorist attacks occur throughout the globe, certain countries, particularly in the Middle East and South Asia, are plagued with more of them occurring within their borders than other nation-state counterparts. Policymakers are continuously enacting legislation and investing in social welfare in hopes of finding an antidote for extremist violence. Unfortunately, potential policy options are vast and their resources scarce, so it is important that policymakers from these regions of the world understand how they can achieve the greatest impact with limited resources. Determining where education investment and development falls within the spectrum of the cost-benefit analysis is at the forefront of policymakers’ agendas.

When examining terrorism and its contributory components, it is important to clarify numerous definitions before proceeding into analysis. The State Department defines terrorism as a “premeditated, politically motivated violence perpetrated against noncombatant targets by sub-national groups or clandestine agents, usually to influence an audience.”\footnote{Hull, Edmund. Introduction Patterns of Global Terrorism. \textit{Department of State}. 30 April 2001 \url{www.state.gov/s/st/rls/crt/2000/2419.htm}} In the context of my research, I examine international terrorism which
is “terrorism involving citizens or the territory of more than one country.” ⁴ In particular, I focus on an act of terrorism which is defined as the “calculated use of violence (or the threat of violence) against civilians in order to attain goals that are political or religious or ideological in nature; oftentimes this is done through intimidation or coercion or instilling fear”.⁵ Within my data set, an important definition is the Location Start of a terrorist act or in other words the place where the terrorist activity was initiated.⁶ This is particularly noteworthy for incidents of hijacking, as the terrorist attack could be targeted at either the country where the plane embarked or disembarked. For the nature of my research it is examined from the perspective of where the plane departed. There are also important educational terms that must be defined in the context of observing the Middle East and South Asia. A madrasa (or madrasah) is a “school” or “center of learning” in Arabic that dates back to the ninth century.⁷ It comes from gatherings of students, “Taliban”, at mosques to learn more about the Qur’an, Sharia (Islamic law), Hadiths (chronicles of the Prophet Muhammad), Muslim history and literature, mathematics, and science.⁸

Now that the important terms are defined, the intricacies of the effects of education on terrorism can be discussed. The educational debate has many different facets to it. First, there is the question of whether access and educational attainment play a role in quelling extremist violence. Second, there is the question of what types of education changes are most important. Alternatively phrased, does the quality of

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⁴ Hull, Edmund. Introduction Patterns of Global Terrorism. Department of State. 30 April 2001
⁶ Ibid.
⁷ Schmidt, Todd. Reforming the Madrasah: A Disregarded Dimension on Terror. Military Review; May/Jun 2008; 88, 3; Military Module. pg. 29
⁸ Ibid.
education matter? And is it important for females to have equal access to education as their male counterparts?

Quality in Middle Eastern and South Asian schools is very difficult to quantify. Madrasa make this an acute issue. Madrasa are a particularly challenging issue of contention when discussing the quality of education due to their religious foundation and lack of modern subjects infused into their curriculum. Some claim that these schools incite extremist violence through their Islamic rhetoric. Many policymakers, however, feel that it is the lack of modern educational curricula within these institutions that will contribute to an unprepared and unemployed work force that then seeks out terrorist options. The effects of madrasa education are very difficult to quantify and thus remain highly speculative. The Middle East and South Asia lacks standardized tests and educational tracking which would make quantitative analysis of the quality of these institutions possible.

With respect to female education, in many Middle Eastern and South Asian countries, women are prevented from attending school or their schooling is cut short. This stems from the religious belief that men and women should be separated in society. Resources are scarce and priorities lie in educating males before building a separate girl’s school. Furthermore, it is often seen that a women’s place is in the home. However, research shows that countries with higher levels of female education have lower birth rates, more stability and over all higher levels of development.

My research pieces together the questions that have arisen from previous academic research. Rather than looking at a specific terrorist organization or country, I

9 Schmidt. Pg. 29.
10 Pakistan PM says lack of education main cause of growing terrorism. BBC Worldwide. 30 July 2009
examine more regional effects of education on terrorism. I also analyze whether the role of female education has an effect on terrorist acts. Furthermore, by examining education through multiple variables, I am able to look at the issue in a more encompassing manner. By determining the effects of education, particularly female education, on terrorist acts, more information will be available to policymakers determining where to invest their counterterrorism resources.
Literature Review

Policymakers’ Views

Academic literature on education’s effect on terrorism falls into two categories. The first category examines the prescriptive outlet of policymakers. Here the predominant policymakers’ view is that both increased access and better quality education will decrease acts of terrorism. Policymakers in countries with and without a high terrorist presence share the conviction that education is a path to curbing acts of terror. This viewpoint is held by policymakers from around the world. For example, in Africa, the Commission on Respect and Understanding was comprised of academics of various backgrounds, including psychiatry, economics and politics, in attempts to examine the effects of education on terrorism. The commission’s findings incorporate the idea that education is about participation, engagement and investment. Additionally, children should be instilled with ideas of religion, community and a disregard for violence in an educational setting. Thus, they find that education should have a “huge contribution” to combating violence.

In Australia, policymakers also support the idea that education helps decrease violence. In fact, the Australian government is currently funding Indonesian schooling in hopes of decreasing violence that occurs within Indonesia and overflows onto Australian soil. In the United States, both former President George W. Bush and former Vice President Al Gore have been proponents of educational investment in order to combat terrorism.

12 Ibid.
13 Australia, Indonesia agree cooperation on security, HIV, schools. BBC Worldwide. 7 February 2008.
Even policymakers from countries that are plagued with frequent attacks express the belief that investments in and modernization of education are the antidotes to violence. In Bangladesh, Law Minister Shafique Ahmed states that madrasas are turning into breeding groups for religious-based terrorism.\textsuperscript{15} He explains that it is not because of the traditional education but rather because they are not following the Quran or state laws. According to Minister Ahmed’s account, modern education needs to be incorporated into the madrasa education in order for students to compete in the job market later in life and that without these essential tools many lack job options and fall prey to terrorist groups.\textsuperscript{16}

Minister Ahmed’s pronouncements come despite the fact that only 19\% of terrorist operatives that are caught in Bangladesh are found to have madrasa education. Nevertheless, the law minister, who believes that in Bangladesh there is a sharp void between those that receive madrasa education and those that receive public education, feels that improvements in education will stem this entry into such groups.\textsuperscript{17} As a result, the Bangladeshi ministry of education is planning to bring the traditionally religious independent schools under government control in return for use of newer, state owned facilities. This incentive is being discussed as a result of findings that the quality of education in these institutions is so drastically far behind their public counterparts.\textsuperscript{18}

In Pakistan, similar statements about the effects of education on terrorist activity are being expressed by government officials. Yusuf Raza Gillani, the Pakistani Prime Minister, finds that lack of education is a “root cause” in the increasing terrorist

\textsuperscript{15} Bangladesh ministry urges forming security council to fight terrorism. BBC Worldwide. 25 May 2008.
\textsuperscript{16} Ibid.
\textsuperscript{17} Ibid.
\textsuperscript{18} Ibid.
activity in Pakistan.\textsuperscript{19} He believes that the keys to reforming the Pakistani educational system are modernizing madrasa education and increasing female education. Gillani also feels that complementing traditional education with vocational training will create a better trained workforce and will curb terrorist violence.\textsuperscript{20}

**Research Findings**

Contrary to the anthropological foundation of policymakers’ beliefs, academic research based on econometric multivariate regression analysis has found that education does not have an effect on terrorist acts within a country. Claude Berrebi is one of the researchers at the forefront of examining the relationship between education and terrorism. His work has looks specifically at Hamas, the Palestinian Islamic Jihad (PIJ) and the Israeli electorate. In the Palestinian situation, Berrebi uses survey data from the late 1980’s until 2000 and finds the opposite of what many policymakers believe. His results show that higher education and higher standards of living are positively associated with participation in a terrorist group.\textsuperscript{21} This is particularly acute within the role of a suicide bomber.

Ethan Bueno de Mesquita finds similar results. He interacts variables including government, terrorist organization and potential terrorist volunteers. The later variable is individuals that have little ability and education so are most likely to volunteer to join the terrorist organization. He uses utility gains in his regressions and finds terrorist organizations screen volunteers for qualities; they want high skilled, educated

\textsuperscript{19} Pakistan PM says lack of education main cause of growing terrorism. BBC Worldwide. 30 July 2009.

\textsuperscript{20} Ibid.

operatives. He also has two contradictory findings – (1) terrorist operatives are not poor; and (2) lack of economic opportunity and recessions are positively correlated with terrorism.\textsuperscript{22} Bueno de Mesquita endogenizes the effect of counterterrorism on mobilization. He does this because government crackdowns decrease the terrorists’ ability to carry out effective attacks and at the same time provoke opposition. His findings are also consistent with Krueger and Maleckova’s.

Krueger and Maleckova find that there is no causal relationship between education and support of extremist or terrorist groups.\textsuperscript{23} People are willing to join these organizations for religious or political reasons regardless of education. Terrorist organizations, they find, are self-interested entities and would prefer to recruit well-educated members. Krueger and Maleckova establish this finding through survey data of Hezbollah, the West Bank and the Gaza strip, much like Berrebi utilized. Also similar to Berrebi, they particularly look at suicide bombers and find them to have higher levels of education.

Furthermore, Krueger and Maleckova utilize the same dataset as I do for my dependant variable and use the same method of examining terrorist attacks by the location start. Krueger and Maleckova find that both supply and demand side of terrorist recruitment are affected by national economic conditions.\textsuperscript{24} They break down the origin of perpetrators, target countries and the country where the event took place. Then Krueger and Maleckova run regression time-series regression analysis with literacy, GDP per capita, ethnic fractionalization and political and civil rights. While I

\begin{flushleft}
\textsuperscript{24} Ibid. pg. 143.
\end{flushleft}
run my regressions with literacy rates and GDP per capita, our other control variables differ which may account for our result differences.

Krueger and Maleckova’s study is also interesting in that it establishes that civil liberties are closely associated with participation rate in terrorism, whereas GDP per capita is not.\(^{25}\) Furthermore, they find that countries with low levels of political rights are more likely to participate in terrorism, but political stability, country’s terrain, ethnolinguistic fractionalization, and religious fractionalization are not statistically significant. These results vary from my own, which find both GDP per capita and political stability variables statistically significant. Another noteworthy finding is that the country of occurrence (location start) and perpetrators’ country have similar profiles: poor, high illiteracy rate and high infant mortality.\(^{26}\)

Krueger obtains similar findings in his other works. In other time-series analysis, he finds that macroeconomic shifts generally fail to result in changes in the number of terrorist attacks. He also establishes that most terrorists come from the better-off ranks in society – not the poor and uneducated.\(^{27}\)

Similar to the previous researchers, Enders and Sandler also use time series to exam different policies on terrorism. They however expand their analysis to include game theory and utility maximizing models. Enders and Sandler use the same dataset that I use as well. Their relevant and important finding was that the dataset does pick up trends and cycles.\(^{28}\)

\(^{25}\) Ibid. pg. 141

\(^{26}\) Ibid.


Quan and Schaub’s research is different from the aforementioned academics. It examines how a country’s economy effects terrorist activity. They examine the effects of economic globalization on number of transnational terrorist attacks within countries. Quan and Schaub find that increases in trade, foreign direct investment and portfolio investment do not result in a decrease of terrorist acts. They also find that the economic development of both a country and their key trading partners does reduce the number of terrorist acts within their borders.29

Other Sources

Additional research on the effects of education on terrorism has been conducted from a political, anthropologic and sociological standpoint. Ehrlich and Liu look at how socioeconomic factors, such as healthcare, education, and gender issues affect terrorist participation.30 Their motivation was to optimize US aid to reduce terrorist acts. Schmidt and Stearn both examine the role of madrasas in terrorist activities. Schmidt examines it from military and policy point of view. It is descriptive and not based on multivariate analysis, but digs deeply into the potential issues of current Middle Eastern and South Asian educational policies. He has a particular lens on the school systems in Pakistan, India, Bangladesh and Afghanistan.31 Stearn also examines it from a policy viewpoint. She delves into the reasons that the madrasa education has persisted. She explains why many wealthy people still educated their children within

31 Schmidt, Todd. Reforming the Madrasah: A Disregarded Dimension on Terror. Military Review; May/Jun 2008; 88, 3; Military Module. pg. 29
the system, and the failures of the system from the prospective of the modern economy.  

Little research has been done regarding the effects of female education on terrorist attacks. Perhaps this is because education has not been found statistically significant or because the correlation between female education and development has only recently been established. Furthermore, female education has religious implications in the Middle East and South Asia, which makes the subject sensitive. However, there has been extensive policy work with regards to trying to increase female education globally to achieve gender-parity. This is best seen through the Millennium Development Goals.

Research shows that majority of out of school children are concentrated in the Middle East, South Asia and Africa. Females account for around 60% of them. However, these societies are missing out on the positive effects associated with increased female education. Increasing female education is proven to reduce fertility rates, lower infant mortality rates, lower maternal mortality rates, protect against HIV, increase labor force participation and create inter-generational effects. Significant findings include establishing that one year of primary education correlates with a 10-20% increase in a woman’s wages later in life. Additionally, an extra year of education is proven to reduce the risk that her children will die in infancy by 5-10%. Also there is evidence that suggests education promotes safer sexual behaviors and reduces fertility thus achieving more sustainable families. In South Asia and Sub-Saharan

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34 Girls Education. World Bank. 1 April 2009.
Africa, a study found that increased gender parity could have led to a nearly 1% higher annual per capita GDP growth from 1960 to 1992.\textsuperscript{36}

My research will complement the existing research because it goes beyond just examining the effects of education, but also looks at the gender element of education. Furthermore, it looks at various educational variables from a regional perspective, not at the terrorist group level. By examining education’s effects on terrorism differently than previous researchers, my results will be able to give policymakers a better understanding of where to invest their limited resources in order to prevent terrorist acts.

\textsuperscript{36}Ibid.
Data Description

In order to construct my dataset, I compiled data from various sources. The first source is used to construct my dependent variable, number of terrorist attacks. This dataset is the International Terrorism: Attributes of Terror Events (ITERATE). The data is collected from 1968-2009, but I used 1999-2007 due to data limitations of my independent variables. The ITERATE dataset was constructed by Peter Flemming, Edward Mickolus, Jean Murdock and Todd Sandler. The project seeks to quantify data on the characteristics of transnational terrorist groups and their activities. The dataset defines terrorism as:

“the use, or threat of use, of anxiety-inducing, extra-normal violence for political purposes by any individual or group, whether acting for or in opposition to established governmental authority, when such action is intended to influence the attitudes and behavior of a target group wider than the immediate victims and when, through the nationality or foreign ties of its perpetrators, its location, the nature of its institutional or human victims, or the mechanics of its resolution, its ramifications transcend national boundaries.” 37

From this dataset, I used the location start country and the date in order to determine the number of terrorist acts occurring within a country of origin to construct a time-series panel dataset. As mentioned previously, location start is where the terrorist attack was initiated. Hijackings are the single example in which the attack is

not initiated and completed in the same location. Attacks on embassies are included in the data of the country they are physically located in, rather than soil of the country represented.

There are 256 location start identifiers, which include both countries and international organizations. Since the data set ranges from 1960-2008, it incorporates countries which are no longer in existence. Its country classification is based on a code developed by Russett, Singer and Small. Flemming et al. also incorporated additional entities into their research. Of their sample, I utilized data for 178 countries over a nine year period, totaling 1602 observations. International organizations are extracted because they are not a nation state. Furthermore territories that are dependencies or countries with disputed legitimacy are either eliminated or consolidated. To merge this data with World Bank and IMF data used in my independent variables, I combined territory attacks in dependencies with their parent-country (though many of these regions did not have any attacks).

The countries included in this study correspond with those recognized by the U.S. Department of State, which gives the dataset external validity. Exceptions including Serbia, Montenegro, Kosovo and Oman are excluded due to the fact the borders of the ITERATE data do not correspond with the current country lines. This dependant variable takes into account only international terrorist acts – meaning that the actors are traversing boundaries in order to commit the attack. It does not include domestic terrorist acts nor does it include acts of violence during civil wars.

My independent variables were gathered from multiple datasets. The first is the Global Governance Index. This dataset was created by the World Bank and covers

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1996-2008 (excluding ’97, ‘99, ‘01). It was obtained from survey data from 212 countries and indicators run generally from about -2.5 to 2.5. The data set looks at 6 different government components: (1) voice and accountability, (2) political stability and absence of violence, (3) government effectiveness, (4) regulatory quality, (5) rule of law, and (6) control of corruption. I examine political stability and the absence of violence, and control of corruption with respect to terrorism. In order to compensate for the missing data in 1999 and 2001, I lag the years 2000 and 2002 in order to give their values to 1999 and 2001.

From the World Bank, I gathered literacy rates, female literacy rates, primary school completion rates in terms of percentages of relevant school age children, primary school female completion rates in terms of percentages of relevant school age children, ratio of girls to boys in primary and secondary enrollment, Gini Coefficients, which are an income inequality measurement, and GDP growth. Though economic data is available from 1975 to present, education data is limited until the late 1990s. Much of the data is collected through population censuses, though some is through household surveys. My GDP per capita purchasing power parity in international dollars was extracted from an IMF dataset.

Table 1 in the appendix provides a detailed list of all of the variables included in my research – dependant and independent- as well as a definition for each variable. It includes some such as corrupt and gdp growth, which are not included in my models due to high levels of correlation to other variables included. The table also contains the source of the data and how the variable is coded in my dataset for ease of referencing in future tables presented.

Table 2 displays the basic descriptive statistics for all of the independent variables. This includes the mean, standard deviation, minimum and maximum. I
utilize the mean and standard deviation in order to construct high, medium and low categories for each of the variables that to show relationships in tables that will

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region</td>
<td>.1813</td>
<td>.3854</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Political Stability</td>
<td>-.0957</td>
<td>1.0012</td>
<td>-3.1822</td>
<td>1.6832</td>
</tr>
</tbody>
</table>

discussed in the following sections.
<table>
<thead>
<tr>
<th></th>
<th>.0412</th>
<th>1.0134</th>
<th>-2.6245</th>
<th>1.9806</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Corruption</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gini Coefficient</strong></td>
<td>40.4784</td>
<td>9.3486</td>
<td>24.70</td>
<td>74.30</td>
</tr>
<tr>
<td><strong>GDP Growth</strong></td>
<td>4.5567%</td>
<td>4.9905</td>
<td>-41.30</td>
<td>61.8974</td>
</tr>
<tr>
<td><strong>GDP per capita</strong></td>
<td>$10,518.50</td>
<td>12471.40</td>
<td>9.237</td>
<td>85370</td>
</tr>
<tr>
<td><strong>Primary Completion Rate</strong></td>
<td>84.263</td>
<td>23.5074</td>
<td>14.0158</td>
<td>150.3078</td>
</tr>
<tr>
<td><strong>Female Primary Completion Rate</strong></td>
<td>82.8231</td>
<td>25.8122</td>
<td>11.0412</td>
<td>151.8461</td>
</tr>
<tr>
<td><strong>Literacy Rate</strong></td>
<td>82.9859</td>
<td>19.9452</td>
<td>9.3913</td>
<td>100</td>
</tr>
<tr>
<td><strong>Female Literacy Rate</strong></td>
<td>79.0785</td>
<td>24.0472</td>
<td>9.3987</td>
<td>100</td>
</tr>
<tr>
<td><strong>Ratio of Girls to Boys in Primary and Secondary Enrollment</strong></td>
<td>95.8545</td>
<td>10.4258</td>
<td>41.0117</td>
<td>116.5513</td>
</tr>
</tbody>
</table>

Table 2: Basic Statistics by Explanatory Variable
Conceptual Model

To test the effects of education on terrorist attacks, I ran multiple models. The first model excludes all education effects in order to have a base regression and see the effects of my control variables. Due to the fact that my corruption and political stability variables have high levels of correlation, I opted to use political stability in my models. The same thing occurred with GDP growth and GDP per capita and I choose to include GDP per capita. Furthermore, I imputed the missing variables into my times-series panel data prior to running my Tobit regressions. Subsequently, I ran five additional models, each of which has the same control variables plus a different educational variable. Listed below are the different empirical models I used in my analysis:

1. Number of terrorist acts per year = B + Political Stability + GDP per capita + Region + Gini Coefficient
2. Number of terrorist acts per year = B + Political Stability + GDP per capita + Region + Gini Coefficient + overall primary completion rates
3. Number of terrorist acts per year = B + Political Stability + GDP per capita + Region + Gini Coefficient + female primary completion rates
4. Number of terrorist acts per year = B + Political Stability + GDP per capita + Region + Gini Coefficient + literacy rate
5. Number of terrorist acts per year = B + Political Stability + GDP per capita + Region + Gini Coefficient + female literacy rate
6. Number of terrorist acts per year = B + Political Stability + GDP per capita + Region + Gini Coefficient + ratio of girls to boys in primary and secondary enrollment
Methods

After combining the data sources, I used my time-series panel data to run Tobit regressions. Since the distribution of my dependent data is skewed to the left, with a high percentage of the data coded zero for no terrorist attacks. This occurrence is unsurprising and not unwanted, since many countries do not have any terrorist attacks in any given year. It does, however, violate one of the key assumptions of Ordinary-Least-Squares (OLS) regression, a normally distributed dependent variable. I employ Tobit regression to address the skewness problem and avoid bias. I chose to run Tobit regressions because the dependant variable contained a large number of zeros as the observation. With the abundance of left-hand limit observations in the dependent variable, an ordinary-least-squares regression would produce biased results. Though the coefficients cannot be directly interpreted with this method, it allows me to delve more deeply into the association of the variables.

Further research would benefit from using the fixed effects model, which would take into account that the effects of the model are non-random, as terrorist attacks are non-random. With panel data, the fixed effects model will assume that the observations are time independent. In the case of terrorist attacks, this will allow for each observation to be taken independently. The model would also take into account non-observed heterogeneity.
Results

I begin the analysis with an examination of the bivariate relationships between my explanatory and dependent variables. Table 3 presents means for each of my educational variables by country characteristics. I’ve divided each explanatory variables into 3 ordinal categories – low (< ½ standard deviation from the variable’s mean, medium (+/-½ standard deviation from the variable’s mean), and high (>½ standard deviation from the variable’s mean). For each of the education variables, you can see that increases in political stability are associated with increased levels of education. The ratio of girls to boys ranges from a low of 92% in countries of low political stability to over 100% in countries that are very politically stable. Higher GDP per capita is also associated with increased education. The relationship between corruption and education is also expected. Lower levels of corruption are associated with higher levels of education. Furthermore, more income equal societies tend to have higher levels of education than their more unequal counterparts. Interestingly enough, one of the statistics that I would not have expected to encounter was that literacy rates, both male and female, are on average 6% higher in Middle Eastern and Southeast Asian countries than elsewhere.
Table 3: Mean Educational Attainment and Enrollment Outcomes, by Country Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Literacy Rate</th>
<th>Female Literacy Rate</th>
<th>Primary Completion Rate</th>
<th>Female Primary Completion Rate</th>
<th>Ratio of Girls to Boys in Primary and Secondary Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political Stability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>77.8807</td>
<td>72.5036</td>
<td>79.4685</td>
<td>77.1567</td>
<td>92.9575</td>
</tr>
<tr>
<td>Medium</td>
<td>80.2310</td>
<td>76.5382</td>
<td>80.5851</td>
<td>79.2431</td>
<td>95.8189</td>
</tr>
<tr>
<td>High</td>
<td>94.2353</td>
<td>93.1879</td>
<td>96.3120</td>
<td>96.1698</td>
<td>100.0952</td>
</tr>
<tr>
<td>Corruption</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>88.8410</td>
<td>86.2322</td>
<td>88.9593</td>
<td>88.1545</td>
<td>97.6898</td>
</tr>
<tr>
<td>Medium</td>
<td>83.8986</td>
<td>80.7294</td>
<td>87.8873</td>
<td>87.3607</td>
<td>97.8405</td>
</tr>
<tr>
<td>High</td>
<td>73.5503</td>
<td>67.5050</td>
<td>73.1020</td>
<td>69.8601</td>
<td>90.4500</td>
</tr>
<tr>
<td>Gini Coefficient</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>91.0096</td>
<td>88.8487</td>
<td>92.3977</td>
<td>91.5248</td>
<td>98.4667</td>
</tr>
<tr>
<td>Medium</td>
<td>77.7725</td>
<td>72.4928</td>
<td>78.1036</td>
<td>75.2092</td>
<td>92.2702</td>
</tr>
<tr>
<td>High</td>
<td>76.5736</td>
<td>72.7432</td>
<td>78.5475</td>
<td>78.0563</td>
<td>96.1007</td>
</tr>
<tr>
<td>GDP Growth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>83.3925</td>
<td>79.4799</td>
<td>84.6617</td>
<td>83.3630</td>
<td>95.8905</td>
</tr>
<tr>
<td>Medium</td>
<td>83.1166</td>
<td>79.3396</td>
<td>84.9798</td>
<td>84.9798</td>
<td>96.4516</td>
</tr>
<tr>
<td>High</td>
<td>82.1116</td>
<td>77.8690</td>
<td>81.7663</td>
<td>80.1722</td>
<td>94.0380</td>
</tr>
<tr>
<td>GDP per capita</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>70.3788</td>
<td>64.0431</td>
<td>69.2990</td>
<td>66.2083</td>
<td>89.4782</td>
</tr>
<tr>
<td>Medium</td>
<td>91.6467</td>
<td>89.6837</td>
<td>95.3749</td>
<td>95.6108</td>
<td>100.4592</td>
</tr>
<tr>
<td>High</td>
<td>96.5778</td>
<td>95.8914</td>
<td>98.8284</td>
<td>98.8401</td>
<td>100.6743</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle East or South Asia</td>
<td>79.5515</td>
<td>73.4301</td>
<td>89.0632</td>
<td>87.0548</td>
<td>93.6969</td>
</tr>
<tr>
<td>Elsewhere</td>
<td>83.7676</td>
<td>80.4099</td>
<td>83.2857</td>
<td>81.9353</td>
<td>96.2925</td>
</tr>
</tbody>
</table>
Table 4 examines the relationship between levels terrorist attacks and the explanatory variables. Levels of terrorist attack are broken down into four categories – no terrorist attacks, a single terrorist attack, medium level terrorist attacks, which is equal to between two and five attacks annually, and high level terrorist attacks which are greater than five and less than 25. Outlier countries with the four highest counts of terrorist attacks (from 45 to 133) were dropped from the analysis to avoid skewing the estimated coefficients. Again, expected relationships appear to hold true. The 84% of countries plagued with high levels terrorist attacks also have low political stability. In addition, 46% of countries with high levels of terrorist attacks also demonstrate high corruption levels.

As expected, the low levels of GDP per capita represent the largest percentage of any category across all terrorist attack levels. Meanwhile, countries with medium-level GDP growth appear to have the highest percentage of terrorist attacks across all levels. Finally, 56% of countries with high levels of terrorist attacks are located in the Middle East and South Asia.

<table>
<thead>
<tr>
<th>Variable</th>
<th>No Terrorist Attacks</th>
<th>One Terrorist Attack</th>
<th>Medium Terrorist Attack</th>
<th>High Terrorist Attacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political Stability Low</td>
<td>40.11</td>
<td>65.77</td>
<td>69.23</td>
<td>84.00</td>
</tr>
</tbody>
</table>
Table 5 presents mean values on each of my education variables for each category of terrorist attacks using my 4-level ordinal measure. While there is little difference between any of the education variables in countries with single and medium terrorist attack levels, there are notable differences between countries without terrorist acts and those with high numbers of terrorist attacks. In addition, the mean literacy rate for females is on average 16 percentage points higher in countries with no terrorist acts.
attacks than those with high levels of terrorist attacks, while the overall literacy rate is still on average 12 percentage points higher in countries without terrorist acts. The mean ratio of girls to boys in primary and secondary education is 10 percentage points higher in countries without terrorist attacks than those with high levels of terrorist attacks.

Table 5: Mean Terrorist Attack Level, by Education Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>No Terrorist Attacks</th>
<th>Single Terrorist Attack</th>
<th>Medium Terrorist Attacks</th>
<th>High Terrorist Attacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Literacy Rate</td>
<td>83.6920</td>
<td>81.6387</td>
<td>82.0110</td>
<td>71.3346</td>
</tr>
<tr>
<td>Mean Female Literacy Rate</td>
<td>80.1524</td>
<td>76.8470</td>
<td>77.2041</td>
<td>63.7241</td>
</tr>
<tr>
<td>Mean Primary Completion Rate</td>
<td>84.3705</td>
<td>82.3991</td>
<td>85.5201</td>
<td>83.2078</td>
</tr>
<tr>
<td>Mean Female Primary Completion Rate</td>
<td>83.1351</td>
<td>80.1767</td>
<td>83.3514</td>
<td>79.0114</td>
</tr>
<tr>
<td>Mean Ratio of Girls to Boys in Primary and Secondary Enrollment</td>
<td>96.3304</td>
<td>95.3063</td>
<td>94.7289</td>
<td>86.8828</td>
</tr>
</tbody>
</table>

Table 6 displays the results of the six models I ran. In the first model, which lacked an educational variable, the region, political stability and GDP per capita were statistically significant. In each of the models that followed, the same variables were statistically significant. The Gini Coefficient, however, was not statistically significant in any of the models. What these results mean is that increases in political stability will
lead to fewer terrorist attacks. Also being located in the Middle East and South Asia increases the likelihood of terrorist attacks.

| Table 6: Estimated Coefficients for Tobit Models Predicting Terrorist Attacks |
|---------------------------------|----------------|----------------|----------------|----------------|----------------|
| GDP per capita                  | .1218*         | .2103***       | .2363***       | .2103***       | .2184**        | .2708***       |
| Gini Coefficient               | .0017          | .0017          | .0028          | .0013          | .0017          | .0068          |
| Political Stability            | -.5075***      | -.5019***      | -.4976***      | -.5074***      | -.5027***      | -.4762***      |
| Region                         | 1.045***       | 1.071***       | .068***        | 1.0151***      | .9960***       | 1.0002***      |
| Primary Completion Rate        | -.0081**       |                |                |                |                |                |
| Female Primary Completion Rate |                | -.0094***      |                |                |                |                |
| Literacy Rate                  |                |                | -.0092*        |                |                |                |
| Female Literacy Rate           |                |                |                | -.0084**       |                |                |
| Ratio of Girls to Boys in      |                |                |                |                | -.0338***      |                |
Primary and Secondary Enrollment

<table>
<thead>
<tr>
<th>Sample Size (n)</th>
<th>1598</th>
<th>1598</th>
<th>1598</th>
<th>1598</th>
<th>1598</th>
<th>1598</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\chi^2$</td>
<td>80.42</td>
<td>86.42</td>
<td>89.66</td>
<td>85.44</td>
<td>86.39</td>
<td>104.50</td>
</tr>
</tbody>
</table>

(1) statistically significant at .10%, ** statistically significant at .05%, *** statistically significant at .01%

In model two, GDP per capita was statistically significant at the .01% level, whereas in the previous model it was only significant at the .10% level. Primary completion rate was statistically significant at the .05% level. Female primary completion rates, in model three, however, were statistically at the .01% level. Although the coefficient in model three is not larger than for overall completion rates, it is nevertheless still notable that female primary completion rates on its own can have an impact on the effects of terrorism.

Much like models two and three, models four and five have similar findings. Overall literacy rates are statistically significant at the .10% level, whereas female literacy rates are statistically significant that the .05% level. Again, there is little difference in the size of the coefficient. Thus, increasing either male or female literacy rates will lead to decreases in terrorist attacks. In model six, the coefficient on the ratio of girls to boys in primary and second education was the largest of any educational
variable. It was also highly statistically significant at the .01% level. Thus increasing the ratio of girls to boys in primary and secondary enrollment will also lead to decreases in terrorist attacks.

All of the educational variables in my models were statistically significant. These results differ greatly from previous academic research. There could be various reasons for the difference in findings. First, the results could differ because use a much larger sample size in my models. Generally, increasing the sample size makes the findings more accurate. Second, it could be that the control variables in my models differ from those used in similar studies. For example, I do not take into account religion, instead included a variable for region. Also I use a GDP per capita rather than national level GDP. Third, literacy rate turns out to be the least statistically significant of all of the education variables.

Interestingly enough, while the differences in literacy rate and female literacy and primary completion rate and female primary completion vary little, what is remarkable is that female education on its own is also statistically significant. This means that increases in just female education levels will indeed have an impact on terrorism. Furthermore, gender equality in education is important as the ratio of girls to boys in primary and secondary enrollment turns out to be both statistically significant and has the largest of all coefficients.
Policy Implications

The effects of education on terrorism have important policy implications. As terrorist attacks become increasingly violent, understanding their roots becomes more imperative. Without understanding the causes of extremist violence, policymakers are unable to implement policies that effectively curb the activity. While full knowledge of terrorists’ motivations will never be clear, it is important to pinpoint some of the factors that foster such activity. This thesis finds that education is statistically significant in contributing to terrorist attacks. Each education variable shows that an increase in education or in gender parity of education will decrease terrorist acts. While the coefficients on none of the variables are large, increases in education and even just female education will decrease terrorist attacks.

Thus, policymakers have been correct in their assumptions, despite previous academic research, that investments in education will reduce terrorist activity. Though lack of education is not the sole cause of terrorist acts, nor can changes education be the single solution to the violence, education is an investment that will help combat terrorism. As policymakers continue to search for other the tools that will curb terrorism, increased education and increased gender equality within education will contribute to their success. It is also important to note that there are already educational initiatives such as the Millennium Development Goal of gender-parity within
education will not only achieve their ambitions of improving development and stability statistics, but the resources put towards this initiative will also have the consequence of decreasing terrorist attacks in the Middle East and South Asia.

Additional research should be done with a fixed-effects model to further evaluate the impact of education and female education on terrorism. Furthermore, research should be done to see what policies best complement educational policies. For example, perhaps economic policies that promote economic growth and job opportunity will amplify the educational effects. In countries with stagnant, poor economies, having an education will do little for a person’s future earnings or ability to provide for their family. Also, additional research should be done on the particular gains of quality of education. Performance measurement indicators should attempt to be placed in educational policies and as a stipulation to the foreign aid given to countries prone to terrorist attacks. This will provide countries, particularly developing countries, the ability track the quality of their institutions. Increased quality of education, that includes modern subjects and vocational training, may lead to greater effects of education on terrorist attacks. These are issues that my thesis does not address, but that would enhance research in this area.
Conclusions

The main objective of this study was to provide an analysis of the relationship between education and the number of terrorist attacks occurring. Data from 178 countries from a nine-year time period, 1999-2007, was used to run tobit regressions with five different educational variables to determine whether or not increased education will indeed decrease terrorist attacks. Results of the regressions actually dispute my initial hypothesis and find that education is statistically significant with regards to terrorist attacks. Furthermore, female education is also statistically significant, though it is no more important that overall education.

Though all education variables were statistically significant, it is the ratio of girls to boys in primary and secondary education with largest coefficient. This reveals the importance of gender-parity in education policies that endeavor to prevent terrorist acts. The fact that all of the education coefficients are small represents the fact that education alone will not be the antidote to extremist violence.

However, the policy implications for this study are of great consequence. Policymakers have been correct in their respect for including educational investment in their counter-terrorism efforts. Educational policies should therefore continue to be enhanced and implemented, especially those that promote gender-parity. Even if
policies just involve female students, the increases in education will likely see decreases in terrorist activity.

Further research is needed to capture the true relationship of the quality of education and terrorist activity. Performance indicators or extensive household survey data would be needed to best capture this information. Due the statistical significance of the most of the control variables, it is important to note the wealth, or GDP per capita, the fact a country is located in the Middle East or South Asia and a country’s political stability also contribute to the occurrence of terrorist attack. When implementing policies it is important for policymakers to try to target all of these aspects. Policies that complement multiple of these factors may greater amplify the effects on terrorist attacks.

In conclusion, this study provides a comprehensive analysis of the effects of education on terrorist attacks. Though more research is needed, the results suggest that the investment in increased education both male and female education will contribute to the curbing of terrorist activity.
### Table 1: Variable Definitions and Coding

<table>
<thead>
<tr>
<th>Variable</th>
<th>SAS/STATA Code</th>
<th>Type of Variable</th>
<th>Definition</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Terrorist Attacks</td>
<td>terrattack</td>
<td>dependent</td>
<td>Organized by location start- or the origin of the attack- then by year, terrorist attacks are summed together by country by year.</td>
<td>ITERATE</td>
</tr>
<tr>
<td>Political Stability and the Absence of Violence</td>
<td>polstab</td>
<td>independent</td>
<td>Political stability is “the likelihood that the government will be destabilized by unconstitutional or violent means including terrorism.” This control variable is included to account for the level of governmental stability which will affect the number of terrorist attacks occurring. Governments that are less stable are more susceptible to violence. The indicator is measured between -2.5 and 2.5, with 2.5 being a very stable and non-violent and -2.5 being unstable and beset with violence.</td>
<td>Global Governance Indicators – World Bank</td>
</tr>
<tr>
<td>Control of</td>
<td>corrupt</td>
<td>independent</td>
<td>Control of corruption is</td>
<td>Global</td>
</tr>
</tbody>
</table>

---

Corruption ―the misuse of government resources for personal gain." This variable is used as a control variable for an indicator of the quality of governance. Countries with higher levels of corruption are normally susceptible to more violence. The variable is measured between about -2.5 to 2.5. Though the Global Governance Index has 2.5 as being countries with the least corruption, I reversed the variable, so that it is more intuitive with higher numbers being for countries with higher levels of corruption.

<table>
<thead>
<tr>
<th>Governance Indicators – World Bank</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Gini Coefficient</th>
<th>ginicoef</th>
<th>independent</th>
</tr>
</thead>
</table>

The Gini Coefficient "measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution. A Lorenz curve plots the cumulative percentages of total income received against the cumulative number of recipients, starting with the poorest individual or household.

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40 Ibid.
The Gini index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. Thus a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality. The inequality can affect both access to education as well as the likelihood of terrorist acts.

| Region | region | independent | Region is a dummy variable. If the variable equals one, then it is a country that is located in the Middle East or South Asia. For all other countries the variable equals zero. | Created |
| GDP Growth | gdpgrowth | independent | GDP growth is the annual percentage that GDP has grown at a national level. GDP growth is used a control variable for economic levels of the country. Since the correlation with GDP capita is high due to multicollinearity they are not used in my models together. | World Bank |

---

<table>
<thead>
<tr>
<th>GDP per capita purchasing-power-parity</th>
<th>gdpppp</th>
<th>independent</th>
<th>GDP per capita PPP is the sum of gross value added per each individual. “Purchasing power parity (PPP) conversion factors take into account differences in the relative prices of goods and services—particularly non-tradables—and therefore provide a better overall measure of the real value of output produced by an economy compared to other economies.”</th>
<th>IMF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literacy Rate</td>
<td>litrate</td>
<td>Independent – education variable</td>
<td>Literacy rate “is the percent of population above the age of 15 with the ability to read and write with understanding a short and simple statement on everyday life.” I am utilizing this variable as an instrument of education. A higher literacy rate is a sign of a more well-educated society.</td>
<td>World Bank</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Female Literacy Rate</th>
<th>litratefem</th>
<th>Independent – education variable</th>
<th>It is defined as “the percent of female population above the age of 15 with the ability to read and write with understanding a short and simple statement on everyday life.” I am utilizing this variable as an instrument of education. A higher literacy rate is a sign of a more well-educated society. Female literacy rate will not be used in regressions with the literacy rate of the entire population to prevent multicollinearity.</th>
<th>World Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Completion Rate</td>
<td>comprate</td>
<td>Independent – education variable</td>
<td>“Primary completion rate is the percentage of students completing the last year of primary school. It is calculated by taking the total number of students in the last grade of primary school, minus the number of repeaters in that grade, divided by the total number of children of official graduation age.” I utilize it to indicate access to education.</td>
<td>World Bank</td>
</tr>
<tr>
<td>Female Primary</td>
<td>compfem</td>
<td>Independent – education</td>
<td>It is the percent of relevant school age female children</td>
<td>World Bank</td>
</tr>
</tbody>
</table>

45 Primary School Completion Rate (% of relevant age group). *World Bank*. 2010
<table>
<thead>
<tr>
<th>Completion Rate</th>
<th>variable that complete primary education. It is calculated in the same manner as the variable for overall population. I utilize it to indicate female access to education.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio of Girls to Boys in Primary and Secondary Enrollment</td>
<td>ratiogb Independent – education variable The ratio of the percentage of girls to boys enrolled in primary and secondary education in both public and private institutions within a country. It is an indicator of gender equality within the nation’s educational system.</td>
</tr>
</tbody>
</table>
References


Australia, Indonesia agree cooperation on security, HIV, schools. BBC Worldwide. 7 February 2008.


Pakistan PM says lack of education main cause of growing terrorism. BBC Worldwide. 30 July 2009


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