

The Effectiveness of Suicide Terrorism

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Killing more than 21,000 and injuring 50,000 between the years of 1981 and 2008, suicide bombs have proven to be an effective tactic and seem to be a growing trend¹. Terrorism is designed to cause panic, chaos and, optimally, publicity for a cause. Suicide terrorism is effective not only because of its lethal outcome; it also sends the message that the cause is so dire that death is a better outcome than life for the bomber. The level of commitment is astounding and largely considered rational².

In an effort to assess the effectiveness and trends of suicide terrorism, this study tests two hypotheses. First, it has been maintained in previous research that suicide terrorism is being utilized in greater frequency. This assumption may be considered easily supported considering the great numbers of suicide bomber attacks that are reported in the media, but the sheer number of incidents is only a small aspect of the potential trend. Using data from 25 years, this study tests how effective suicide bombing has become: essentially, the deadliness of this tactic. The second hypothesis tests an assumption within the suicide bomber literature: suicide bombing begets more suicide bombing. In statistics such a relationship is known as auto-correlation: events at time t influence events at time $t+1$. Although more incidents may occur year after year, a more useful finding is whether the tactic has become more deadly. Therefore, this study's second hypothesis seeks to determine if deaths due to suicide terrorism are auto-correlated.

The findings of this study offer valuable information about the characteristics of suicide bombings. Understanding the trends of suicide bombing can offer valuable information concerning counter-terrorism policy. This study also tests the assumptions within the literature of suicide terrorism. The article begins by reviewing existing literature studying the characteristics and causes of suicide terrorism. This section is followed by the methodology of the current study. Results from the analysis are then discussed and the findings are reviewed.

Literature Review

Literature on suicide terrorism is primarily concerned with the motivation that would drive one to kill themselves and others in an effort to publicize a cause. Personal and environmental factors play a role in a person's decision to use such a tactic. This section will review relevant literature on suicide terrorism by discussing several topics. First, the rationality of suicide bombers is reviewed. The current study relies on suicide bombers acting rationally, but literature arguing to the contrary is also discussed. Then, previous research examining the environmental/situational factors that are related to suicide terrorism is reviewed.

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¹ Wright, Robin. 2008. "Since 2001, a dramatic increase in suicide bombings". Washingtonpost.com 18 April. www.washingtonpost.com/wp-dyn/content/story/2008/04/18/ST2008041800913.html (accessed 17 July 2008)

² Pape, R. 2003. The strategic logic of suicide terrorism. *The American Political Science Review* 97(3): 343-361

Terrorism and Suicide Bombers as Rational

This study is primarily concerned with the trends of suicide bombers, therefore it is of significant value to establish that suicide bombers and terrorists are acting rationally. If terrorism is irrational, any trend can be considered coincidental. Thus, a review of literature analyzing the rationality of terrorism is necessary before this study's analysis. Many researchers have assumed that terrorists, including suicide bombers, act rationally; yet one researcher tested several competing theories in their application to terrorism. Ferracuti (1982) examined four theories to explain terrorism: frustration-aggression, unbalanced social systems, Olson's rational choice, and Marxist theory. Ferracuti (1982) does understand how rational actors could commit terrorist acts, yet he found that, broadly, all four theories fall short of explaining terrorism. Instead, he found that subculture theory, a type of rational choice theory, holds the greatest explanatory power³. Rational choice theory explains how certain death can still be a logical choice for a terrorist. It is understood that a human's natural survival instinct would prohibit a person from putting himself in danger, but exceptions to this human drive may explain why terrorists logically kill others and themselves⁴. This conclusion is similar to a corner solution in game theory models in which the losses are least when the terrorist kills him or herself. Ferracuti (1982) states, "[d]eath per se cannot be accepted at the experimental level and must therefore be rationalized, attributed to chance or to natural processes, made into a symbol of an exceptional event, or denied and lived simply as a religious transition from life on earth to eternal life"⁵. During times of war, a soldier can be encouraged to murder and understand that his or her life is in jeopardy. Akerlof and Kranton (2004) found that military personnel are inculcated to put "service before self"⁶ and must have "faith in the system"⁷. A terrorist, therefore, creates these war conditions and subjects him or herself to this rule. No longer is the terrorist killing or being killed; instead he is part of a collective action against an enemy⁸. Hoffman (1998) argues that terrorists perceive themselves as freedom fighters and even use military jargon. If captured, they expect treatment as prisoners of war⁹.

Suicide bombing, as a tactic of terrorism, has also been argued to be rational behavior. Enders and Sandler (2006) argue that even suicide bombers are rational if "the utility obtained from living with the current state of affairs is less than that obtained by a life-ending action"¹⁰. Wintrobe (2006) takes a different approach to establish the rationality of suicide bombers¹¹. He

³ Ferracuti, F. 1982. A sociopsychiatric interpretation of terrorism. *The Annals of the American Academy*: 129-140.

⁴ Ibid.

⁵ Ibid. p. 136

⁶ Akerlof, G. A. & Kranton, R. E. 2004. Identity and the economics of organizations. *Journal of Economic Perspectives* 18(4): 1-24, p. 8

⁷ Ibid., p. 9

⁸ Ferracuti, F. 1982. A sociopsychiatric interpretation of terrorism. *The Annals of the American Academy*: 129-140.

⁹ Hoffman, B. 1998. *Inside terrorism* New York: Columbia University Press

¹⁰ Enders, W. and T. Sandler. 2006. *The political economy of terrorism*. New York: Cambridge University Press. p. 124

¹¹ Wintrobe, R. 2006. *Rational extremism: The political economy of radicalism*. New York, Cambridge University Press.

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argues that the suicide bomber forsakes his/her identity for the solidarity of a group. In doing so he/she rationally displaces his/her own beliefs for the beliefs of the leader. Furthermore, Wintrobe (2006) rejects the commonly assumed “reward” for Islamic martyrs because it is not enforceable and therefore not rational. Instead, he argues that suicide bombers engage in contractual behavior with a religious extremist group, trading their own ideas and feelings for solidarity. Akin to any other group, allegiance is demanded, but religious extremist groups require a greater intensity: intensity so great that suicide is honorable.

Suicide terrorism is particularly successful for three reasons. First, the bomb is more likely to cause greater damage than conventional IEDs would. This is because suicide bombers can penetrate security without needing an exit strategy. Second, the technique gives the target the impression that more violence is likely to occur in the future and that retaliatory violence cannot dissuade the group. Third, because suicide bombers value their cause over social norms, they easily reject these norms thus leading the target to perceive that future strikes will incur greater costs¹². Fourth, these bombs can be more precisely directed and timed for impact than through other delivery systems. These characteristics of suicide terrorism make it a difficult adversary for democratic nations¹³. Therefore, this tactic is rational by powerless groups when power is asymmetric and one may find that participation by rational actors is evident.

The use of humans to deploy and detonate bombs is a reversal of the typical combat roles in which the coercer is the stronger actor and the target is the weaker actor¹⁴. Because these roles are switched, the use of suicide bombers is a logical choice for a weaker actor. As Pape (2003) so aptly stated:

Most suicide terrorism is undertaken as a strategic effort directed toward achieving particular political goals; it is not simply the product of irrational individuals or an expression of fanatical hatreds. The main purpose of suicide terrorism is to use the threat of punishment to coerce a target government to change policy, especially to cause democratic states to withdraw forces from territory terrorists view as their homeland. The record of suicide terrorism from 1980 to 2001 exhibits tendencies in the timing, goals, and targets of attack that are consistent with this strategic logic but not with irrational or fanatical behavior¹⁵.

Suicide terrorism works well against a free population who abhors its use. When this tactic is employed against democratic nations, goals of the terrorist group are more likely to be met than when such tactics are used against non-democratic nations. In addition, foreign occupied nations are more likely to experience a growth of nationalistic beliefs than unoccupied nations. These beliefs are needed for terrorist groups to gain recruits¹⁶.

¹² Pape, R. 2003. The strategic logic of suicide terrorism. *The American Political Science Review* 97(3): 343-361.

¹³ Ibid

¹⁴ Ibid. p. 346

¹⁵ Ibid. p. 345

¹⁶ Ibid.

Brym and Hamlin (2009) argue that rational choice alone cannot explain suicide terrorism¹⁷. Instead, they argue that culture also plays a key role. As opposed to the argument that culture is a controlling factor, i.e. reflexes of socialization, for suicide bombers, Brym and Hamlin (2009) argue that subjective rationality is utilized. Thus, suicide bombers are neither absolute utility maximizers nor driven by socialization but are calculating benefit based upon culture. This perspective on rationality is known as “ordinary rationality;” a term which was coined by Boudon (1997)¹⁸.

Although Brym and Hamlin (2009) highlight an important aspect (culture) of the calculation necessary to commit suicide based on the furtherance of a cause, their argument continues to support a rational choice perspective. Regardless of how actors calculate their utility, i.e. based on preferences, they are acting rationally.

Previous Research

Although a number of researchers have revealed a plethora of important characteristics concerning suicide bombers, this section will focus on two studies because their findings are pertinent to the current study. In addition, these researchers’ contrary findings reveals an important aspect of suicide terrorism: time. Pape (2003) is well known for his 2003 article that sought to establish the rationality of suicide terrorists and determining factors of incidents. Yet unlike previous research focused on the suicide bomber, Pape (2003) concentrates on the organization’s desire to use suicide terrorism to coerce a government. To establish this, the researcher sets out to learn if terrorists are strategic. Three indicators were used to establish this. First, strategic terrorists plan organized campaigns in an effort to promote a particular political motive. Second, if this tactic is exclusively used against democracies, the terrorists must also be strategic because they are maximizing their outcome. Finally, if the tactic proves efficient then the group must be reacting logically to past experience¹⁹.

Pape’s analysis suggests that terrorists do strategically plan suicide bombings. Of the 188 incidents only 9 were random events; the remainder could be linked to one of 11 campaigns. This indicates that the use of this method is meant to cause a political outcome in accordance to the desires of the terrorist group. In addition, all targets were democracies indicating that this government type is an attractive target because desired political outcomes are more likely to be achieved. Pape’s (2003) findings are supported by the research of Abadie (2004)²⁰ and Li (2005)²¹. Finally, Pape (2003) finds that terrorists learn from past experiences and have

¹⁷ "Suicide bombers: Beyond cultural dopes and rational fools," in Mohamed Cherkaoui and Peter Hamilton, eds Raymond Boudon: A Life in Sociology, 4 vols. (Oxford: Bardwell Press, 2009), Vol. 2, pp. 83-96, with Cynthia Hamlin

¹⁸ Boudon, Raymond. 1997. "The Moral Sense". *International Sociology*, 12: 5-24

¹⁹ Pape, R. 2003. The strategic logic of suicide terrorism. *The American Political Science Review* 97(3): 343-361

²⁰ Abadie, A., 2004. Poverty, Political Freedom, and the Roots of Terrorism, Working Paper Series rwp04-043, Harvard University, John F. Kennedy School of Government

²¹ Li, Q. 2005. Does democracy promote or reduce transnational terrorist incidents? *Journal of Conflict Resolution*: 49(2): 1-20

concluded that suicide terrorism is an efficient method to achieve their political outcomes²². Of the 11 campaigns, 6 were successful. This ratio may not seem efficient, but when compared to military coercion or economic punishments (successful 1/3 of the time) suicide terrorism is considerably more efficient. Pape's (2003) findings become even more alarming when one considers the proposition that suicide terrorism has become more efficient; essentially, terrorists are getting better at killing. This study is an attempt to test such a proposition.

The fear of terrorists targeting democracies is mitigated by Piazza's (2008) findings²³. His contradictory findings to Pape's (2003) are based on his study that uses RAND data (the same used in this study) of 4,660 incidents occurring between 1998 and 2005. As in this study, the number of victims, rather than merely the incident itself, is used to test four hypotheses. First, democracies are no more likely to be targeted by suicide bombers. Second, democracies are less likely to produce suicide terrorists. Third, foreign occupation is positively related to suicide attacks, independent of their political ideology. Fourth, suicide attacks are more likely to be conducted by groups with a universal objective rather than a specific purpose.

Piazza (2008) found that suicide terrorists are not more likely to target a democracy and that occupation by a democracy does not prompt such attacks. Yet he did find that occupation is positively related to suicide attacks. According to his analysis, groups using suicide terrorism are less likely to originate in democracies and groups having universal goals were more likely to use this tactic. Piazza's (2008) findings offer valuable information regarding the nature of suicide terrorism and question the belief that suicide terrorism targets democracies. When considering the contradictory findings of Pape (2003) and Piazza (2008), it is important to remember that each researcher's data covered a different time period. Pape's (2003) data began in 1980 and ended in 2001; whereas Piazza's (2008) data began in 1998 and ended in 2005. Although there is some overlap, the majority of their data are not from the same time period. It may be that terrorism changed between 1980 and 2005.

Suicide terrorism is not static; this tactic is employed strategically. Therefore the environmental conditions that change the trends of suicide terrorism are crucial. In a global statistical analysis, capturing the many factors that incite and change suicide terrorism is a daunting feat because the number of variables is countless. Yet there is a common thread: time. Terrorists are well aware of the environment for terrorism. Terrorist incidents throughout time demonstrate the strategic nature of terrorists: planning incidents that gain the greatest attention for their cause. Thus, time is an important variable. In consideration of this, a natural question is whether the tactic has become more popular. Yet an even more important one is whether, as Pape (2003) argued, terrorists are becoming increasingly more efficient in using this tactic. Unfortunately, research in this aspect of suicide terrorism is lacking. Thus, this study focuses its attention on this crucial aspect of suicide terrorism.

Based on previous literature, this study attempts to further the discussion by testing the two disturbing trends that have been suggested. The first tested trend is the increasing effectiveness of suicide terrorism. Thus, the first hypothesis is:

²² Pape, R. 2003. The strategic logic of suicide terrorism. *The American Political Science Review* 97(3): 343-361

²³ Paizza, J. A. 2008. The Supply-Side View of Terrorism: A Cross-National Study. 70: 28-39

H1: *Suicide terrorism has become deadlier over time*

The second suggested trend is that suicide terrorism is more likely to be used and that these attacks become even more deadly. This relationship is known as serial correlation. In this study, the analysis is designed to essentially determine if deadly attacks are likely to beget more deadly attacks. As opposed to H1, this relationship is not based upon chronological order, but rather the last suicide terrorism event. Thus, the second hypothesis is:

H2: *Suicide bombers are increasingly becoming more efficient in killing*

Methodology

In order to test the aforementioned hypotheses, data was acquired from RAND's MIPT database. Only incidents of suicide terrorism between the years of 1981 to 2006 (25 years) were analyzed. Using this larger timeframe offers a greater understanding of long standing trends. Incidents were recorded into the RAND database from news reports. The data used in this study should be the universe of suicide terrorism incidents; some 2,200 incidents. Although using the universe of incidents is a significant strength, this type of data has the potential to include non-random measurement errors. That is, errors in gathering data could have compromised this data. Pape (2003) tested the accuracy of terrorism data based on news reports and found the method accurate²⁴.

In the analyses that follow, the main dependent variable is the number of fatalities or injuries that have occurred during an incident. Using the number of fatalities or injuries offers this analysis a measure of the magnitude of the incident. It is therefore suggested that incidents that kill more people are more effective. As opposed to merely counting the number of incidents, measuring the magnitude of the incident allows for more accurate testing of terrorism's true effects. The main independent variable is time. The first hypothesis requires the analysis to determine if suicide terrorism is becoming more deadly, and therefore effective. The year is used as the independent variable. To address the second hypothesis, the equation includes a series of lags to determine if the past years' events are deterministic of the current year's events.

Descriptive Statistics:

Represented in Table 1, the descriptive statistics reveal that during the 25 year period the average number killed per incident by suicide terrorists was approximately 8 people. The standard deviation, 45 people, is considerable and indicates that deaths from this tactic range greatly. Injuries averaged 21 people per incident with a standard deviation of 102 people. The greatest number killed in one incident was 1,811 people and the incident with the greatest number of injuries affected 4,000 people. The mean year was 2003 indicating a skewness of the data toward the later years. This indicates, albeit crudely, that more incidents (not deaths) occurred in the latter portion of the time period. A few incidents did not report the number dead and/or injured, therefore the number of observations dropped slightly from 2,002 to 2,000 (for deaths) and 1,195 (for injuries). These missing values are considered to be randomly occurring.

²⁴ Pape, R. 2003. The strategic logic of suicide terrorism. *The American Political Science Review* 97(3): 343-361

Table 1: Descriptive Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Dead	2200	7.608636	44.70318	0	1811
Injuries	2195	21.36629	102.4738	0	4000
Year	2202	2003.554	3.95316	1981	2006

The analysis to test the first hypothesis is very straightforward. The dependent variable is the number dead per incident. This variable is in count form; therefore it does not meet the necessary assumptions of an OLS regression. To account for this type of data, a Poisson regression is employed. The independent variables are year (a time variable) and a series of fixed effects. Because the model would not converge with all nations (minus one as a reference group), a number of fixed effects variables were randomly omitted until the model converged. The model can be represented in the following equation:

$$Y = \text{Year} + FE \text{ nation} + e$$

Where: Y = number dead or injured

$Year$ = The year of the incident

$FE \text{ nation}$ = A series of fixed effects variables

e = stochastic term

Empirical Results:

The results of the regression analysis, as reported in Table 2, indicate that a significant negative relationship exists between time and the number of deaths. That is, as each year passed the number of deaths diminished by 8% of a life. Therefore, after 12.5 years, one fewer life was lost. The Pseudo R-square value (.404) and Likelihood Ratio chi-square (24,085) is quite high considering the complexity of terrorism. These results indicate that the explanatory power of the variables and the model's fit were rather strong. Although the impact of the time variable may not be great, the significance of this finding lies in its opposition to the prevailing assumption that because incidents are increasing the number of deaths is also increasing. Instead, suicide bombers are killing fewer people even though more incidents are occurring.

Table 2: Time regressed on Number of Dead from Suicide Bombings (n=2000)

	IRR	Std. Err.	Z	P>z	Pseudo R ²
IV: Time	.924	.003	25.36	.000	.404

*Fixed effects were included in the regression but are excluded from the table

Table 3 reports the results of the regression analysis when injuries from suicide bombs are considered. Similar to the previous regression utilizing deaths as the measure of magnitude, injuries caused by suicide terrorism also seem to be decreasing as the years pass. The incident rate ratio indicates that as each year passes, 3% of an injury is abated. The Pseudo R-square (.245) is lower than the regression using the number of deaths as the dependent variable. This should be expected since variability of injuries is far greater than death; i.e. when one is dead they cannot become more or less dead. The likelihood ratio chi-square (34,372) indicates a strong model fit. Again, the finding of this regression is contrary to the prevailing assumption that suicide terrorism is causing greater harm than it once was.

Table 3: Time regressed on Number of Injuries from Suicide Bombings (n=1995)

	IRR	Std. Err.	Z	P>z	Pseudo R ²
Time	.9670074	.0013993	23.18	0.000	.245

*Fixed effects were included in the regression but are excluded from the table

The second half of the empirical analysis considers the assumption that suicide terrorism is becoming more popular. Essentially, that suicide terrorism begets more suicide terrorism. Several methods can be employed to test for serial or auto correlation, but this study will use a vector auto-regression (VAR). VAR offers a significant advantage over other methods of determining auto-correlation because it regresses one time period on another and measures the impact of that response. Results are reported graphically using impulse and accumulated impulse response graphs. This study is primarily concerned with the following equation:

$$Dead_t = Dead_{(t-1)} + Dead_{(t-2)} + Dead_{(t-3)} + Dead_{(t-4)} + \dots + Dead_{(t-i)} + e$$

Also of importance is the effect of time on terrorism. This is also tested using VAR, but the fixed effects used in the previous analysis are not included; therefore these results are prone to spurious variables.

As reported in Figure 1 (lower right hand quadrant), a serial correlation does seem to exist according to the impulse response graph, but the direction is in the opposite direction than expected. In effect, suicide terrorism has become less deadly. One may even conclude that it is

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becoming a less efficient tactic. In addition, the vector auto-regression indicates that time slightly decreased the number of lives lost per incident as the years increase, as reported in the upper right hand quadrant of the figure. This finding is supported in the previous analysis.

Figure 1: Impulse Response Graph of Time and Deaths from Suicide Terrorism
Response to Cholesky One S.D. Innovations \pm 2 S.E.

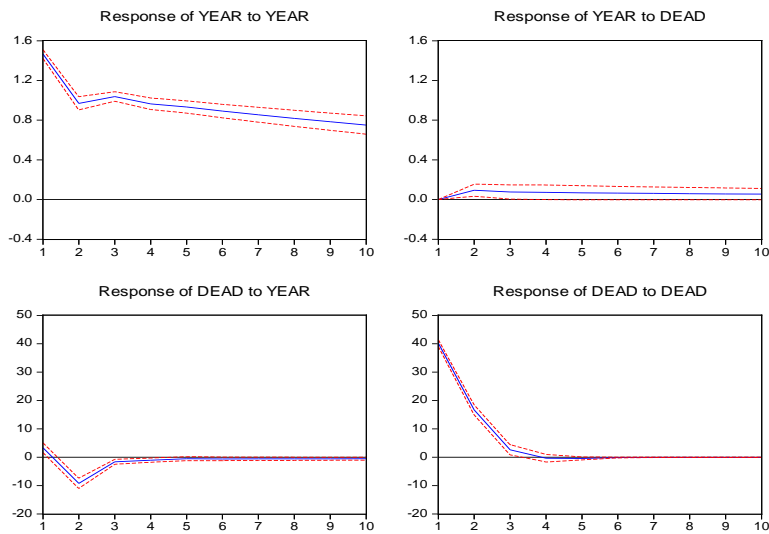
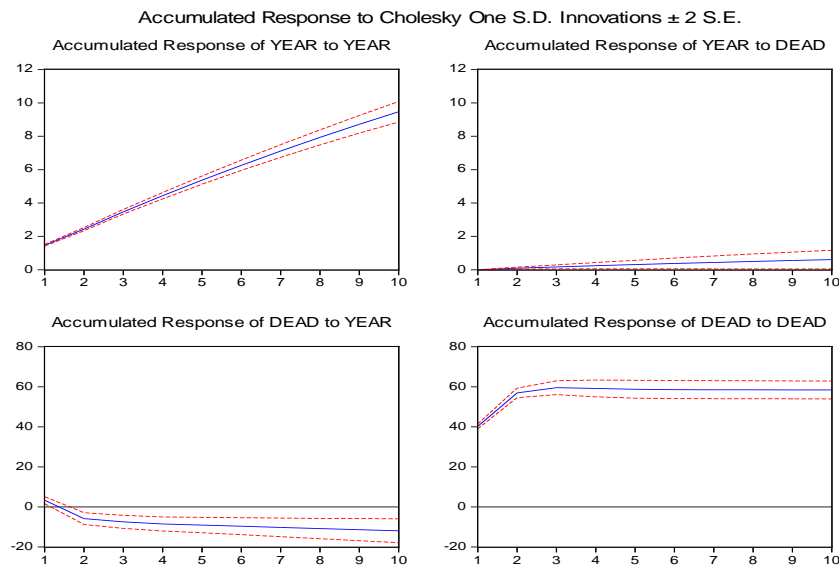


Figure 2 reports the findings of the accumulated impulse response graph. According to the lower right hand graph a serial correlation may occur when accumulated after two deaths, but after this point the relationship ceases to continue. Therefore, a true auto-correlation is not likely to exist. Interestingly, when accumulated, time increases the number of deaths attributed to suicide terrorism, but this effect is marginal and likely quite unreliable because control variables were omitted.

Figure 2: Accumulated Impulse Response Graph of Time and Deaths from Suicide Terrorism
Accumulated Response to Cholesky One S.D. Innovations \pm 2 S.E.



Discussion and Conclusion:

The purpose of this study is to test, as previous researchers have claimed, whether terrorism is becoming a more prevalent and dangerous tactic. According to the findings of this study, this may be true only in part. The first hypothesis expected that suicide terrorism had become deadlier over time. This hypothesis has been refuted; instead it has become a slightly less fatal tactic over time. The second hypothesis expected that deaths from suicide terrorism are continually rising; essentially that suicide terrorism has become more efficient. According to this study, suicide terrorism is not becoming more efficient; in fact, it has become less efficient in killing and injuring victims.

The results of this study are contrary to the prevailing assumption that suicide terrorism is a greater threat than it once was. Although the incidence of suicide terrorism may be increasing, fewer people are being killed by this tactic. Two possible reasons could explain this phenomenon. First, security may be getting better. Suicide terrorists may be more likely to encounter security personnel, thus forcing them to detonate their weapon in a less densely populated location. The second possibility is that terrorists are not seeking to kill as many people as possible. Instead, terrorists may send out their bombers to target locations rather than people. A possible reason for this approach may be to reduce the likelihood of a backlash from terrorist supporters on whom the terrorists depend. It may also be a combination of security and the terrorist's will.

Certainly, the results of this study indicate that further research on this topic is necessary. Future research should use the most current data to better identify trends. Researching the trends of terrorism, suicide or otherwise, is a practical method of understanding the true state of terrorism. Because researchers are rarely invited to speak to terrorists and obtaining such invitations as to provide a comprehensive understanding of terrorism throughout the world is impractical, investigating trends is an invaluable tool in a world where preventing terrorism is crucial. It is possible that trends can uncover the very inner workings and deficiencies within terrorist groups. With such information counter-terrorism policy may be designed to prevent an incident rather than merely reactively enacting policy hastily and blindly. Considering the immense amount of resources that are used to provide security and the state of the economic climate, efforts must be made to make security more effective. With research such an endeavor is possible.