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# The relationship, responses, and reforms pertaining to gun violence and mental illness in the United States

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BOSTON UNIVERSITY  
SCHOOL OF MEDICINE

Thesis

**THE RELATIONSHIP, RESPONSES, AND REFORMS PERTAINING TO GUN  
VIOLENCE AND MENTAL ILLNESS IN THE UNITED STATES**

by

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B.A., Vanderbilt University, 2015

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**STEPHANIE ISABEL SAADEH**

**ABSTRACT**

The United States faces an ever-growing public health concern of gun violence, having the highest rate of homicide by firearm use among Western countries. American leaders on this subject have debated for many years on how to address this issue. Such debate, in turn, has brought up the concern of the mentally ill in possession of firearms, especially in light of mass shootings. The goal of this thesis is to determine the existence of a relationship between gun violence and mental illness. The significance of discerning this relationship is multi-faceted in that gun violence psychologically traumatizes its victims and also has been linked with mental illnesses in a stigmatizing manner, thanks to the spotlight on mass shootings by the media.

Through literature analysis of the behaviors of those with schizophrenia, bipolar disorder, and alcohol abuse, it was determined that, although increasing a person's chances for experiencing at-risk behaviors for violence, intrinsic mental disorders such as schizophrenia and bipolar disorder are not statistically associated with gun violence. In fact, not only has it been reported that very few firearm-related acts of violence are linked with those with mental illnesses, but

also it has been noted that those with serious psychiatric disorders are victimized more often than a person without mental illness. Consequently, it is critical for physicians, lawmakers, and even the general public to take active measures to ensure that those with mental illnesses are not shamed for their condition and receive the necessary services to lead an ordinary lifestyle among their peers.

## TABLE OF CONTENTS

TITLE.....	i
COPYRIGHT PAGE.....	ii
READER APPROVAL PAGE.....	iii
ACKNOWLEDGMENTS .....	iv
ABSTRACT.....	v
TABLE OF CONTENTS.....	vii
LIST OF TABLES .....	viii
LIST OF FIGURES .....	ix
LIST OF ABBREVIATIONS .....	xi
INTRODUCTION .....	1
SPECIFIC AIMS .....	11
PUBLISHED STUDIES.....	12
DISCUSSION AND CONCLUSIONS .....	38
FUTURE DIRECTIONS .....	45
REFERENCES .....	47
CURRICULUM VITAE .....	68

## LIST OF TABLES

Table	Title	Page
1	Public Perception of Societal Threat Potential and Capabilities of Those with Mental Illnesses	8
2	Reasons for Police Interaction for Those with Schizophrenia within Their Communities	35
3	History of Assault Among Men and Women with Severe Mental Illness (SMI)	36

## LIST OF FIGURES

Figure	Title	Page
1	Homicide and Suicide Rates due to Firearm Use in Industrialized Nations	1
2	Mortality Rates over the Last Thirty Years in the United States	3
3	Changes in Stigma Towards Those with Mental Illnesses Between 1996 and 2006	10
4	Chances of Developing Schizophrenia in Persons with Familial History	14
5	Differences in Corticolimbic Connectivity Among Patients Experiencing States of Depression, Bipolar Mania, and Bipolar Depression	21
6	Significant Associations Among Overt Aggression Scale (OAS), Subcategory Aggression, and Serotonin Transporter (SERT) Availability in the Midbrain	24
7	Average Mortality Rates Under the Influence of Alcohol from 2006 to 2010	26

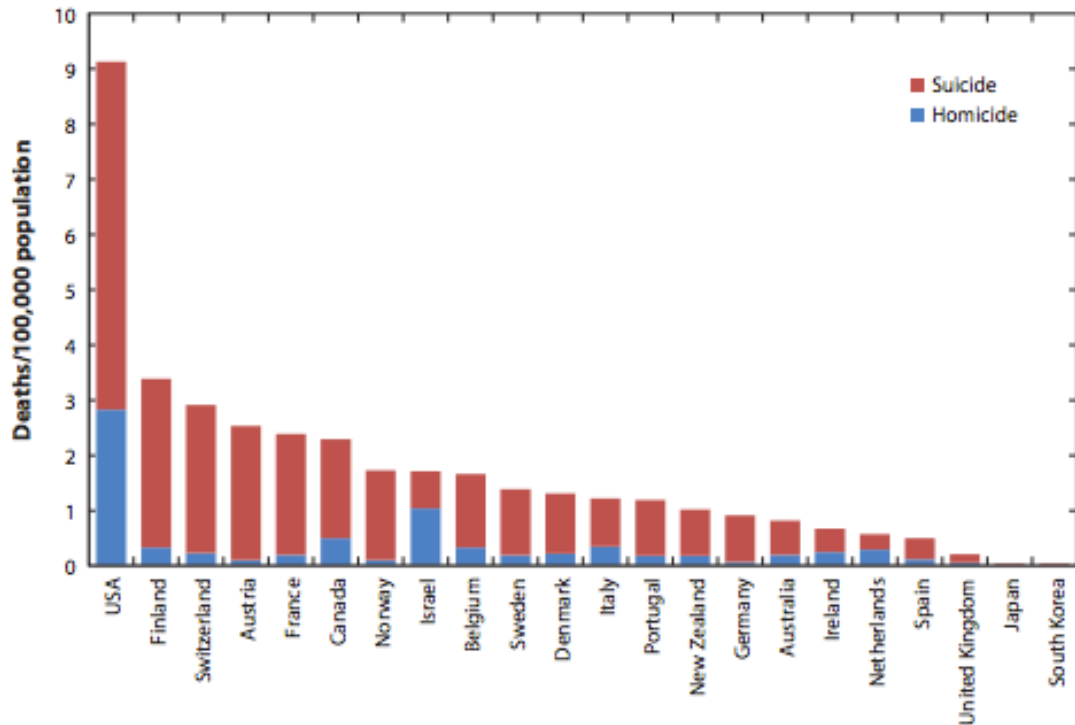
8	Differences in Current Source Density Between Alcoholic and Control Groups	30
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## LIST OF ABBREVIATIONS

ACA.....	Affordable Care Act
AMYG.....	amygdala
BRACHA.....	Brief Rating of Aggression by Children and Adolescents
COMT.....	catechol-O-methyltransferase
DSM.....	Diagnostic and Statistical Manual of Mental Disorders
GM.....	gray matter
IL-10.....	interleukin-10
IL-1 $\beta$ .....	interleukin-1 $\beta$
OAS.....	Overt Aggression Scale
OFC.....	orbitofrontal cortex
pgACC.....	pregenual anterior cingulate cortex
PTSD.....	Post Traumatic Stress Disorder
SERT.....	serotonin transporter
SMI.....	severe mental illness
TNF- $\alpha$ .....	tumor necrosis factor-alpha
TNF.....	tumor necrosis factor
WM.....	white matter

## INTRODUCTION

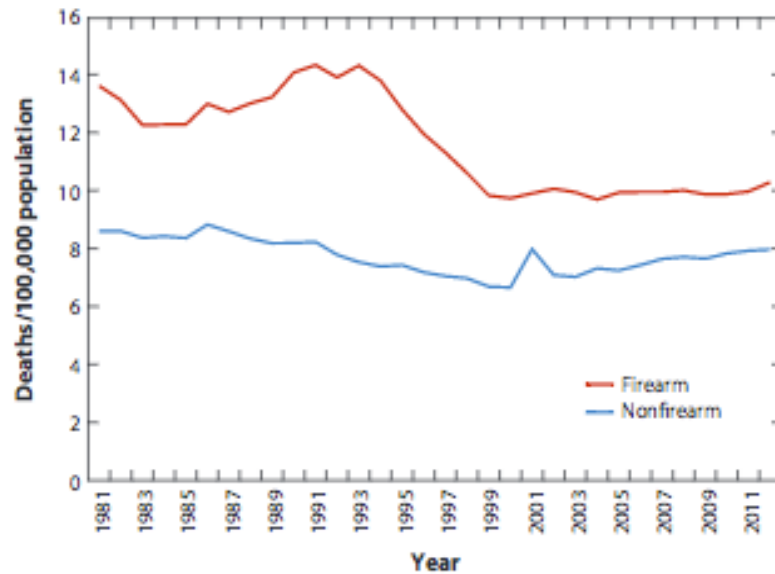
The importance of understanding the issues behind gun violence is becoming increasingly evident in light of the events of recent years. The focus especially needs to be drawn to the United States, for, in comparison to other Western countries, its rates of homicide and suicides due to gun use are uniquely high (**Figure 1**). Attempts to generate solutions for this public health concern go as far back as 1969, when The National Commission on the Causes and Prevention of Violence met to discuss this issue (Wintemute, 2015b).



**Figure 1. Homicide and Suicide Rates due to Firearm Use in Industrialized Nations.** Despite the significantly higher rates, the original author notes that this does not necessarily indicate a particular inclination to violence in the United States. Figure taken from Wintemute, 2015b.

Even so, it wasn't until 1989 that the American Medical Association's Council on Scientific Affairs officially referred to gun violence as a 'critical public health issue' (Wintemute, 2015b). The cause for concern was heightened upon noting that children increasingly were becoming the victims of gun violence, with accidental gun use serving as the fifth highest cause of deaths (American Medical Association Council on Scientific Affairs, 1989). While it sought continued education among those in possession of guns and increased funding from the government for further data collection on this public health issue, the council also called for reduced gun ownership among those who pose as a threat to society; all these measures were to ensure that unwanted deaths and injuries due to poor firearm use are prevented (American Medical Association Council on Scientific Affairs, 1989).

Although the 1990s saw a decline in mortality rates due to firearm use, data have shown that, since around 2000, the mortality rate has stabilized for the most part (**Figure 2**). In fact, homicide represented 96.2% of deaths related to firearm use and suicide (Wintemute, 2015b). Despite this, those in favor of gun ownership and rights contend that such ownership may be key to *reducing* homicide rates by providing a method of protection for "the weak" from dangerous people (Lott, 2010). Whether or not this could be true, statistically it still remains that gun ownership is significantly correlated to non-stranger homicide rates caused by firearm use, a truth resulting from data spanning thirty years in the United States (Siegel et al., 2014).



**Figure 2. Mortality Rates over the Last Thirty Years in the United States.** Compared to the mortality rates that are not related to firearms, the number of deaths due to firearms since the 1980s onward has consistently been higher. Although the 1990s saw a decline in that rate, it inevitably plateaued during the 2000s, with occasionally slight increases. Figure taken from Wintemute, 2015b.

## Mass Shootings

The psychological impact felt by victims of gun violence is another driving force to address this issue, especially in terms of mass shootings. After the 2007 shooting at Virginia Tech, a study found that female students who ineffectively coped with the situation were likely to experience depression and anxiety one year after the shooting and that post traumatic stress disorder (PTSD) symptoms in these women tended to yield maladaptive coping mechanisms (Littleton, Axsom, and Grills-Taquechel, 2011a). In addition to PTSD, alcohol use seemed to be another route of handling traumatic events, as evidenced by the victims of the Clayton Courthouse incident of 1992 in Missouri (Johnson et al., 2002). Interview data that was collected at established time intervals (including after six

weeks and after three years) revealed that, after the tragic incident, twenty-five percent of the victims had issues that could be classifiable as post-disaster disorder (Johnson et al., 2002). In fact, the prevalence of various disorders resulting from the event is as follows: post-disaster alcohol use disorder found in nine percent of victims, PTSD in five percent, major depression in four percent, and panic disorder in one percent (Johnson et al., 2002). Using data taken from the National Institutes of Health (n.d.) and Gradus of U.S. Department of Veterans Affairs (2016) as a point of reference, the following, rounded values for adults in the general population are reported for alcohol use disorder, PTSD, major depression, and panic disorder, respectively: seven percent, seven percent, four percent, and three percent. Moreover, those who were already at risk for a psychiatric disorder had higher chances of experiencing either post-disaster alcohol use disorder or PTSD (Johnson et al., 2002).

Along with triggering the onset of psychiatric disorders in victims, gun violence also tends to significantly affect people's general behaviors in life, which could make it difficult to carry out a typically normal day. After the 2008 mass shooting at Northern Illinois University, along with experiencing the symptoms for PTSD, a study found that a significant number of students who had seen the shooting firsthand experienced a loss of sleep, motivation, and optimism as they tried to continue on with their lives (Littleton, Kumpula, and Orcutt, 2011b). Moreover, in another study that surveyed those who had experienced the Columbine shooting in 1999, it was noted that, after the event, there was a

significant increase in students feeling unsafe when going to school. This was in addition to a significant decrease in willingness to report contemplations or plans to commit suicide (Brener et al., 2002). Mass shootings can alter the behaviors of young children as well; through the use of a two-piece growth curve, Liao and her colleagues (2015) could examine the trajectory of children's behaviors before the shooting (piece one of the growth curve) and also the trajectory after the shooting (piece two of the growth curve). With this growth curve, Liao and her colleagues (2015) found that the disruptive behaviors of children dropped significantly after the occurrence of a school shooting, when compared to disruptive behavioral patterns before the school shooting.

### **Gun Violence and Mental Illness**

Aside from considering rates of homicide and impact on mental health, the issue of gun violence also brings up the widespread debate of the potential relationship between mental illness and gun violence. Historically speaking, at the same time that the initial search for answers to gun violence was being conducted, there was also a change in the text for classifying and defining mental illness during the sixties and seventies, from a softer tone of split personalities to an inclusion of harsher terminology such as 'hostility, aggression, and projected anger' (*Diagnostic and Statistical Manual of Mental Disorders (DSM)*, 1968). Consequently, an association was slowly being developed that connected mental illness to aggression and gun violence; this was seen with presentations by

Hollywood and even by the Federal Bureau of Investigation of the mentally ill as schizophrenics who were 'gun toting' and recklessly violent (Metzl and MacLeish, 2015). To reiterate the development of this relationship, the origins of the stereotype 'crazy vet' must be considered (Metzl and MacLeish, 2015). During the mid-nineteenth century up to World War II, it was believed by army leaders and physicians alike that trauma from the battlefield led to neurological issues later on and, according to the DSM-III at the time, post-traumatic stress disorder (PTSD) was viewed as a reaction to 'exceptional events' (Metzl and MacLeish, 2015). Unfortunately, over time, violence was linked with the war-torn victim, yielding the 'crazy vet' stereotype (Metzl and MacLeish, 2015).

Looking towards the present time, in 2013, a report from the Consortium for Risk-Based Firearm Policy noted that mental illness factors in a small number of acts of gun violence and holds some importance in consideration for reasons behind gun violence (Knopf, 2014). This debate has been presented often with a bias in the media in the wake of a mass shooting, with reporters often declaring that mental illness is the reason behind the shooting. In the case of the Sandy Hook elementary school shooting in 2012, sources such as *Psychology Today* and the *New York Times* ascertained that shooter Adam Lanza was likely a schizophrenic who was never diagnosed (Metzl and MacLeish, 2015). Moreover, when Jared Loughner shot and killed six innocent participants in a 'Congress on Your Corner' meeting in Tucson, Arizona, in 2011, the media drew a connection between mental illness and gun violence, with *TIME* magazine questioning why

the mentally ill could still bear firearms (Metzl, 2011). In fact, an analysis of news stories from fourteen national and regional news sources between 1997 and 2012 noted that connections between gun violence and mental illness tended to be reported in the event of a mass shooting (McGinty et al., 2014c). Additionally, reporting of people with a serious mental illness as a basis for gun violence was significantly related to propositions strictly regarding gun restriction for people with serious mental illness (McGinty et al., 2014c).

Over the years, the media publicizing of the mentally ill as murderous has been shown to impact the public's perception and treatment of this subset of the population. This powerful influence rings true especially in light of the fact that, in a study led by the Robert Wood Johnson Foundation, it was found that around seventy-four percent of people surveyed reported their source of knowledge about mental illnesses stemming from newspapers (Daniel Yankelovich Group, Inc., 1990). With numerous people relying on the media for their understanding of mental disorders, it can be concluded that whatever is dictated by the headlines will likely dictate the approach the general public will take with mentally ill people. After all, through an assessment of over three hundred articles from prominent news outlets, it was discovered that dangerousness was a recurring theme in these articles, when discussing people with mental illnesses (Wahl et al., 2003). In addition, this connection is specifically being distinguished from other potential reasons to cause violence. Data collected from interviews revealed that, whenever a violent person was described as having schizophrenia or depression,

the consensus on forced treatment was at least ninety-four percent (Pescosolido et al., 1999). However, when the violent person was simply described as ‘troubled,’ only eighty-four percent of people felt that forced treatment was best, assuming that the person could be a societal threat (Pescosolido et al., 1999). Such a belief was evidently supported by the mentality that those with schizophrenia or drug dependency, for instance, were unable to make their own decisions regarding treatment (Table 1).

**Table 1. Public perception of societal threat potential and capabilities of those with mental illnesses.**  
Table taken from Pescosolido et al., 1999.

Item	Mental Health Vignette				
	Alcohol Dependence, %	Major Depression, %	Schizophrenia, %	Drug Dependence, %	Troubled Person, %
<b>Ability to make treatment decisions<sup>a</sup></b>					
Very able	13.6	20.4	4.5	8.6	60.8
Somewhat able	34.9	43.3	21.2	19.3	32.3
Not very able	37.9	27.0	48.6	36.6	6.8
Not able at all	13.6	9.3	25.7	35.5	0.0
<b>Ability to make money management decisions<sup>b</sup></b>					
Very able	9.6	21.6	6.4	2.4	63.8
Somewhat able	30.7	48.6	23.4	5.6	30.9
Not very able	43.3	25.5	44.3	35.2	5.3
Not able at all	16.3	4.3	25.9	56.8	0.0
<b>Likelihood of doing something violent to others<sup>c</sup></b>					
Very likely	17.5	9.2	12.8	42.0	4.3
Somewhat likely	53.4	24.1	48.1	45.3	12.5
Not very likely	23.9	49.3	30.8	10.1	45.9
Not likely at all	5.2	17.4	8.3	2.5	37.4
<b>Likelihood of doing something violent to himself or herself<sup>d</sup></b>					
Very likely	30.2	27.2	32.0	52.3	6.3
Somewhat likely	51.9	47.7	54.5	39.9	19.6
Not very likely	17.2	20.2	10.5	5.3	42.7
Not likely at all	0.8	4.9	2.9	2.5	31.4

<sup>a</sup> $\chi^2 = 513.6$  (12 df,  $P \leq .01$ ),  $n = 1402$ .  
<sup>b</sup> $\chi^2 = 797.4$  (12 df,  $P \leq .01$ ),  $n = 1386$ .  
<sup>c</sup> $\chi^2 = 460.2$  (12 df,  $P \leq .01$ ),  $n = 1332$ .  
<sup>d</sup> $\chi^2 = 468.9$  (12 df,  $P \leq .01$ ),  $n = 1360$ .

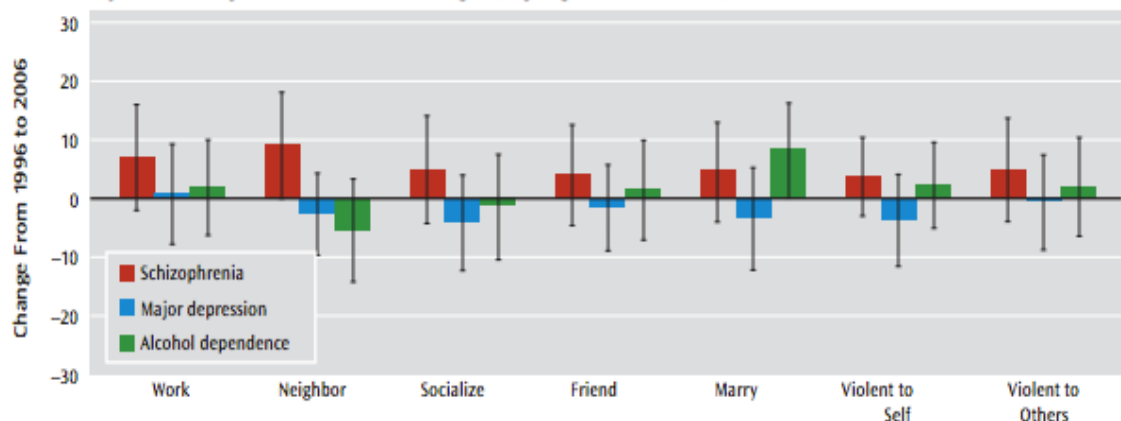
Particularly regarding mental illnesses and the more recent issue of gun violence, one study had participants in three different groups read one of the following three types of stories: a mass shooting event by a person with a serious

mental illness, the same shooting event and a proposition for gun restrictions on the mentally ill, and the same shooting event and a proposition for outlawing large capacity magazines for firearms (McGinty, Webster, and Barry, 2013). Results were that, regardless of what story was read, there was a greater negative mindset towards those with severe mental illnesses, and the additional information regarding gun restrictions or outlawing large-capacity magazines did not alter this negativity towards the mentally ill (McGinty, Webster, and Barry, 2013). It would seem that media presentation of the mentally ill is a powerful factor in a person's perception of this particular population subset, especially if the person has had little interaction with said group (Zillman and Brosius, 2000).

The stigma associated with mental illnesses results in people refusing to seek treatment for their specific disorders, and a study affirmed that by noting that older, mentally ill patients who sensed stigma in getting treatment were more likely to stop help earlier on (Sirey et al., 2001). It was observed, in a study surveying people from both the United States and Canada, that it was often those with the most severe cases that had the most negative outlooks on seeking treatment (Jagdeo et al., 2009). As one way to combat the stigma, the National Alliance on Mental Illness led a campaign called "Campaign to End Discrimination" in order to present the neurobiological bases of mental disorders to the public, assuming that neuroscience would be key to eliminating such prejudice and discrimination (Pescosolido et al., 2010). Despite this response to the high levels of stigma, significantly more people during 2006 (forty-five

percent) than during 1996 (thirty-five percent) still reported that they were less willing to have a person with schizophrenia live next door to them (Pescosolido et al., 2010). Even with the public having a more in-depth understanding of these mental diseases, the degree of stigma remains high (**Figure 3**).

**FIGURE 3. Adjusted Survey Year Differences in Stigma, by Vignette Condition, 1996 and 2006\***



\* Graphs indicate the discrete change in the predicted probability for a given outcome with respect to year (multiplied by 100), calculated with controls held at their means for the combined sample. Data are from the mental health modules of the 1996 and 2006 General Social Surveys and are weighted. Tic marks indicate 95% confidence intervals.

**Figure 3. Changes in Stigma Towards Those with Mental Illnesses Between 1996 and 2006.** Although the American public has recently embraced a more neurobiological understanding of mental illnesses, there seems to have been no reduction in stigma associated with mental disorders over the years. Figure taken from Pescosolido et al., 2010.

## **SPECIFIC AIMS**

The goal of this thesis is to examine the relationship between gun violence and mental illness through an assessment of the following mental illnesses: schizophrenia, bipolar disorder, and alcohol abuse. By examining current research on the relationship between each disorder and violent behaviors, it is hoped that the findings will provide concrete evidence for or against the possibility of a relationship between gun violence and mental illness.

Moreover, this thesis will explore the current and developing responses on the part of the government of the United States, physicians, and the general public to this issue.

## **PUBLISHED STUDIES**

### **Schizophrenia and Violent Tendencies**

As previously mentioned, Adam Lanza, the gunman behind the Sandy Hook shooting, was portrayed by the media as a schizophrenic who had been misdiagnosed (Metzl and MacLeish, 2015). Meanwhile, during that same year, James Holmes, the perpetrator behind the shooting in Aurora, Colorado, was reported to have been seeing a psychiatrist whose specialty was in schizophrenia in the days prior to his mass murder of moviegoers (Metzl and MacLeish, 2015). In fact, this psychiatrist, Dr. Lynne Fenton, had classified Holmes as 'at risk for homicidal behavior,' and yet the University of Colorado failed to take action (Rosenberg, 2014). With these mass shootings having been so heavily publicized in the media, it is no surprise that they led public figures such as Colorado Governor John Hickenlooper to seek out greater funding for mental health services, for his assumption seemed to be that every instance of mass gun violence resulted from a perpetrator who suffered from a mental illness (Rosenberg, 2014).

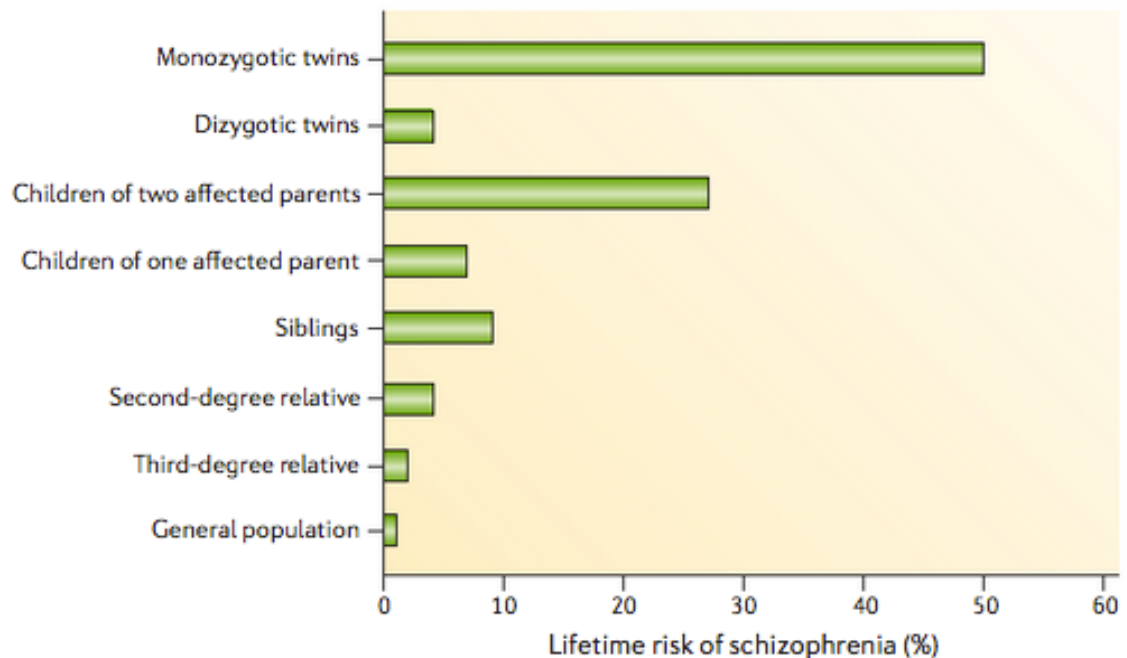
The relationship between schizophrenia and violence is a complex one, dependent upon the social and familial environments in which the mentally ill person was raised and his or her mental health conditions (Swanson et al., 2006). After an assessment of over one thousand schizophrenic patients over the course of six months, a study found that the prevalence of violence among patients was around nineteen percent, with around four percent of the patients

reporting serious violent behavior (Swanson et al., 2006). Interestingly, serious violent behavior within this patient population was linked to the following factors: psychotic symptoms, childhood conduct problems, and current social situation (such as a higher chance to commit violence if residing with one's family) (Swanson et al., 2006). However, the prevalence of violence among these patients remains relatively small, when compared to the general crime rate (386.9 crimes per 100,000 inhabitants) associated with the general U.S. population (319 million people) (Federal Bureau of Investigation, n.d.).

### **What Is Schizophrenia?**

Schizophrenia is defined as a chronic, complex mental disorder that yields deficits in multiple aspects of everyday life, such as keeping up personal relationships, maintaining employment, and leading an independent life (Harvey, 2014). The onset of this disorder is difficult to detect and is referred to as the prodromal phase (Kahn et al., 2015). The onset is identifiable by a general reduction in social and cognitive capabilities, which starts typically during the adolescent period, and it can last for more than ten years before the first psychotic episode takes place (Kahn and Keefe, 2013). With the symptoms beginning between the ages of sixteen and thirty, a person suffering from schizophrenia appears to the outsider to have lost touch with reality (National Institutes of Health, n.d.). Although the risk to the general population of developing schizophrenia is small, those with a familial history of the mental

illness, such as children of two impacted parents, could face this disease later on in life (**Figure 4**).



**Figure 4. Chances of Developing Schizophrenia in Persons with Familial History.** Although the general population runs a risk as low as two percent in developing schizophrenia, familial genetics strongly predispose the following groups to suffering from the mental illness later on in life: monozygotic twins, children of two impacted parents, and those with impacted siblings. Examination of family history can be critical to early diagnosis and treatment planning to effectively manage a lifestyle with schizophrenia. Figure taken from Kahn et al., 2015.

These symptoms can be classified into the following three categories: positive, negative, and cognitive. Positive symptoms are defined as behaviors not seen in mentally healthy people and include the following: hallucinations, delusions, disorganized speech and behavior (Kahn et al., 2015). Negative symptoms seem to impact social relationships more specifically in that they involve a reduced motivation to participate in activities, social withdrawal, flat affect, and an inability to gain pleasure from typically pleasurable acts

(anhedonia) (Kahn et al., 2015). The cognitive component of schizophrenia is associated with generalized impairment, the severity of which, alongside that of the negative symptoms, dictates the ability of the person with schizophrenia to live independently (Reichenberg et al., 2014). These cognitive symptoms can alter memory or other mental capabilities and entail the following: worsening decision-making abilities, inability to focus, and issues with 'working memory' (National Institutes of Health, n.d.). For those with schizophrenia, the outcome of living with this illness is variable, ranging from total recovery to chronic care, with a life expectancy reduction of twenty years when compared to the general population (Laursen et al., 2014).

There are multiple, diverse factors that contribute to the development of schizophrenia that include environmental risk and genetics, and it is believed that, due to such factors, early brain development in those with schizophrenia is impacted, consequently altering intrinsic, biological adaptations to experiences in life (Weinberger and Levitt, 2010; Howes and Murray, 2014). Environmental factors include fetal and birth complications, increased paternal age when having a child, living in an urban environment, and a history of migration throughout life (Kahn et al., 2015). In addition to these factors, constant drug abuse has been shown to cause a "high" that parallels the presentation of paranoid schizophrenia (Murray et al., 2013). Lastly, social adversity in childhood, such as physical and sexual assault and bullying, also can contribute to the chances of a person developing schizophrenia later on in life (Stilo and Murray, 2010).

In terms of the genetic factors, identical twin studies have shown that schizophrenia is highly heritable (**Figure 4**). Recent studies have shown that the genes associated with schizophrenia are expressed during fetal development, suggesting that these genes are involved in the genetics of brain development (Gulsuner et al., 2013; Birnbaum et al., 2014; Jaffe et al., 2015). Genetic risk has been linked with irregularities in brain functioning, and the dysfunction has been identified in the prefrontal cortex, hippocampus, and striatum, areas of the brain involved in memory formation and reward (Kahn et al., 2015). Current neuroimaging has allowed researchers to discover possible candidate genes for schizophrenia, and this includes that for catechol-O-methyltransferase (COMT), an enzyme that is unable to break down dopamine if its gene is mutated (Soyka, 2011). As time goes on, more genes continue to be evaluated for candidacy as researchers discover them in association with the pathology of schizophrenia (Soyka, 2011).

### **Schizophrenia: A Physiological Understanding**

Alongside bipolar disorder, schizophrenia has been reported to be one of the major mental illnesses that are likely to yield increased homicidal tendencies in a person (Sher et al., 2015). Although the neurobiological basis of schizophrenia is not fully understood, several papers have focused on an enzyme involved in dopamine metabolism, COMT, the gene for which is found on chromosome 22 (Soyka, 2011). COMT is key to the degradation of dopamine in a person's pre-frontal cortex, and studies reported that low activity of this enzyme

has been associated not only with increased aggression but also with cognitive impairment and hallucinations (Soyka, 2011). The reason for this reduced COMT activity has been reported by some studies to be the result of a functional polymorphism in the COMT gene, a single amino acid exchange of valine for methionine (Soyka, 2011). More recently, although this finding requires further replication of results, another single-nucleotide polymorphism, where alanine is exchanged for serine at locus 72 of the COMT gene, has also been associated with homicidal behavior in schizophrenic patients (Soyka, 2011).

Studies have also examined anatomical differences between schizophrenic patients and healthy controls. Studies generally have found reductions in volume in the orbitofrontal gray matter and the hippocampus (Soyka, 2011). For instance, in a study that focused on whether dysfunctional impulsivity was connected to a history of seriously violent behavior and specific brain deficits in schizophrenics, it was observed that this impulsivity is heightened in patients with a tendency towards repeated acts of violence, and this finding coincided with volume reductions in both the orbitofrontal cortex grey matter and the hippocampus (Kumari et al., 2009). However, in another study, generally increased volumes of orbitofrontal cortex (OFC) were linked with worse neuropsychological performance and higher levels of aggression (Hoptman et al., 2005). More specifically, greater total aggression scores were linked with larger left OFC gray matter (GM) volumes and with larger left and right OFC white matter (WM) volumes (Hoptman et al., 2005). Additionally, the use of the Positive

and Negative Syndrome Scale for the assessment of each patient's severity of schizophrenia indicated that the higher scores in Hostility item from the Positive Scale correlated with increased size solely in left-sided OFC, WM volumes (Hoptman et al., 2005). Interestingly, it was also noted that, in a patient with larger left than right OFC volumes, he or she was more prone to dealing with substance use disorders, in addition to the schizophrenia (Hoptman et al., 2005). Given that the general trend seems to be reductions in brain region volume, Hoptman and his colleagues (2005) attributed their findings to potential reductions in neuronal density, indications of edema, and other possible pathological processes not fully understood.

### **What Is Bipolar Disorder?**

Also referred to as manic depressive illness, bipolar disorder is another multifaceted mental disorder that is characterized by a severe disturbance in mood; this mood swing has the person experiencing extreme elation or mania in one moment and feeling intense depression in the next (Craddock and Jones, 1999). In the United States, bipolar disorder is present in at least four percent of citizens, with that statistic going as high as around six percent (Judd and Akishal, 2003). Although an adult onset of this disorder is possible, the illness onset, in over half of patients, is reported to be before the age of nineteen (Lish et al., 1994; Perlis et al., 2004). If bipolar disorder begins during adolescence, as opposed to later on in adulthood, the person is more likely to experience a more

severe form of the illness, in addition to more likely being disabled and resistant to treatment (Carlson et al., 2000; Perlis et al., 2004).

In addition to this mood swing, a person who suffers from bipolar disorder is prone to unstable thinking and behaviors, which could include delusions and hallucinations (Craddock and Jones, 1999). Given that this disorder is episodic, the person can recover from these instances and resume daily activities until the next episode (Craddock and Jones, 1999). Currently, there are two major subtypes of bipolar disorder, bipolar I disorder and bipolar II disorder (American Psychiatric Association, 2013). For some time, it was often believed that the greatest difference between the two subtypes lay within the severity of the manic symptoms, with the consequent belief that bipolar II disorder was less severe than bipolar I disorder (Dell'Osso et al., 2016). However, as more research has been published, more clinical distinctions between the two subtypes have been discovered that may yield more directed approaches to treatment for each subtype (Dell'Osso et al., 2015; Dell'Osso et al., 2016; Goffin et al., 2016). For example, when compared to those with bipolar I disorder, those with bipolar II disorder dealt with higher burdens of depression, specifically accounting for depressive episodes, severity, duration, and even subthreshold, depressive episodes (Judd et al., 2002; Judd et al., 2003). Moreover, when compared to those with bipolar I disorder, it was found that people with bipolar II disorder were more likely to commit suicide in a more brutal manner (Novick et al., 2010). Other variables that have been identified, such as family history for mood disorders,

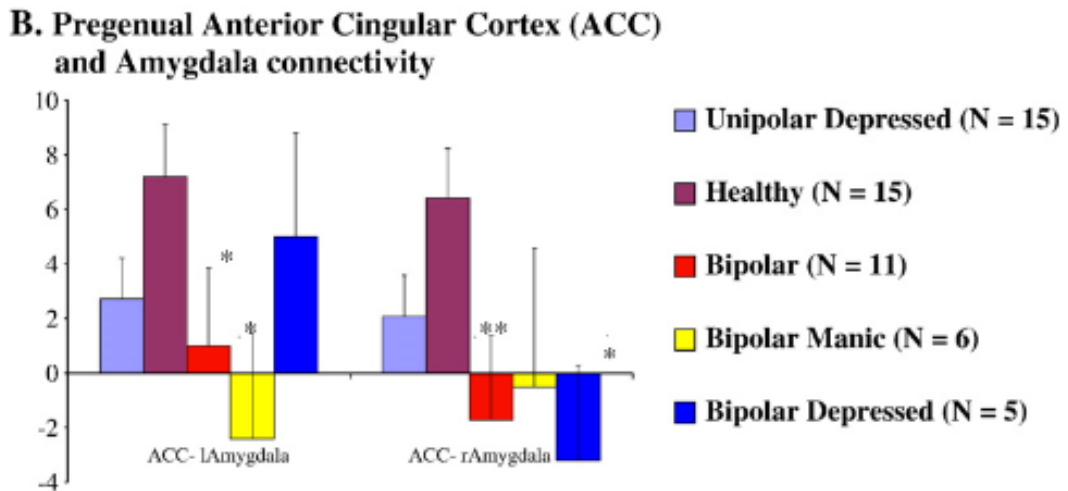
require more studies to confirm their use in distinguishing between bipolar I and bipolar II disorders (Vieta et al., 1997; Benazzi, 1999; Bega et al., 2012).

### **Bipolar Disorder: A Physiological Understanding**

It is critical to understand the neurological basis behind violent tendencies in those with bipolar disorder, especially in light of the fact that incarcerated persons were six times more likely to be dealing with bipolar disorder than a person in the general population (Robins and Reiger, 1991).

In studies examining differences in neural activity between healthy controls and patients with bipolar disorder, alterations in the connectivity within the components of the limbic system seemed to be key to finding a neurophysiological basis to mood disorders such as bipolar disorder (Anand et al., 2009). When generally comparing the unipolar depressed and bipolar subjects with healthy controls, it was found that there was a significant reduction in connectivity between the pregenual anterior cingulate cortex (pgACC) and the amygdala (AMYG), thalamus, and pallidostriatum, which were all designated areas of interest within the limbic system (Anand et al., 2009). In fact, when assessing differences in limbic connectivity among control, unipolar, bipolar, bipolar manic, and bipolar depressed subjects, it was found, specifically in bipolar depressed subjects, there was a significant reduction in the connection between the pgACC and the right AMYG (Anand et al., 2009). Meanwhile, in bipolar manic subjects, there was less connectivity between the left AMYG and the pgACC (Anand et al., 2009). As illustrated in **Figure 5**, discovering such deficits in these

specific neural pathways for each phase of bipolar disorder can be key for more directed, future treatment of these patients, for, through such neuropathology, it would allow physicians to better understand the precise connections needed for normal physiological functioning.



**Figure 5. Differences in Corticolimbic Connectivity Among Patients Experiencing States of Depression, Bipolar Mania, and Bipolar Depression.** The results of the MRI scans allude to deficiencies in connectivity that are specific to a phase of bipolar disorder. In other words, reduced connectivity was found between the left amygdala (AMYG) and the pregenual anterior cingular cortex (ACC) for those with bipolar mania, while there was deficient connection between the right AMYG and the ACC for those with bipolar depression. Understanding such neural deficits can be key for treatment and management of bipolar disorder, as the ACC and the AMYG are involved in emotion regulation and processing. Figure taken from Anand et al., 2009.

The importance of understanding the specific neuropathologies of the phases of bipolar disorders is clear when noting that, although minor offenses have been described during the manic phase of patients, many studies have noted that more serious acts of violence tend to be committed during the depressive states of bipolar disorder (Yoon et al., 2012). In fact, after an examination of over two hundred offenders suffering from bipolar I disorder, one

study noted that the depressive offenders tended to kill family members more often and for altruistic reasons (in a supposed attempt to relieve real or imagined suffering) (Yoon et al. 2012). Although it was noted that these differences needed to be further studied, these observations could pave the way for an in-depth understanding of how compromised circuitry in different brain pathways can lead to distinct, violent behaviors within different phases of bipolar disorders (Anand et al., 2009).

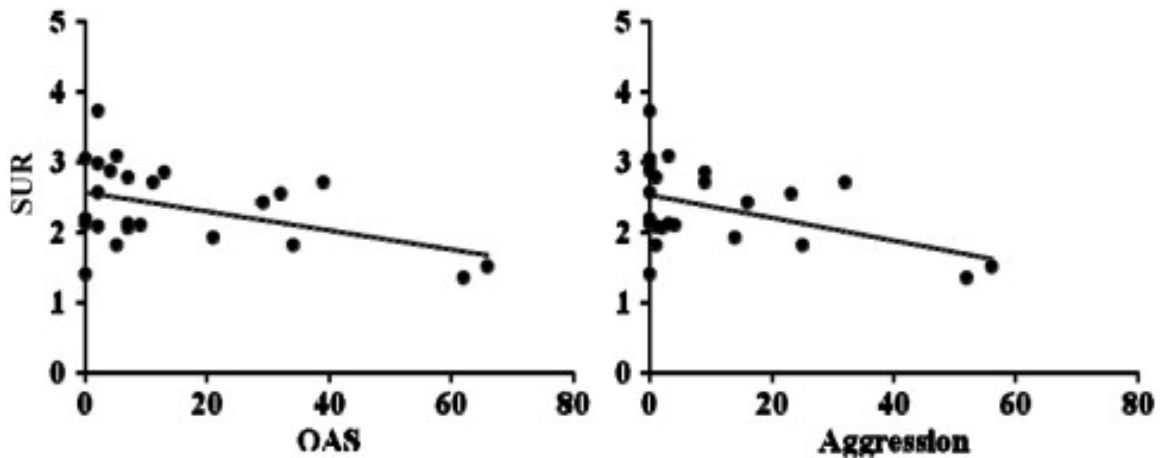
Another study had their adolescent subjects complete the Brief Rating of Aggression by Children and Adolescents (BRACHA), after which fMRI assessment of specific regions of their limbic systems followed (Barzman et al., 2014). After subjects' completion of frustration-stimulating tasks during the fMRI assessment, the study revealed that the scores obtained by BRACHA, which were indicative of the patients' extent of aggression, were inversely related to the activities of the left subgenual anterior cingulate gyrus, right AMYG, a part of the OFC, and the right thalamus (Barzman et al., 2014).

Interestingly, establishing a plan for early treatment of symptoms of bipolar disorder in adolescents can include an understanding of the role of some components of the inflammatory pathways, specifically genes encoding for tumor necrosis factor (TNF). TNF-alpha (TNF- $\alpha$ ) has been noted to be involved in neuroinflammatory processes of bipolar disorder, specifically within brain areas regulating emotion and impulsivity, like the AMYG and prefrontal cortex (McAlpine et al., 2009). In the previously mentioned study by Barzman and his

colleagues (2014), three differing gene expressions for TNF were inversely associated with BRACHA scores, with one TNF-associated gene being directly related to the BRACHA score. However, it was later noted that this TNF-associated gene is involved in preventative and defensive measures against the inflammation within the limbic system (Yu et al., 2006). Given these reports, the TNF gene family may serve as a future biomarker for assessment of aggression in young adults with bipolar disorder. In turn, this could allow for earlier, more efficient diagnosis of aggression in bipolar disorder. (Tremblay et al., 2004).

Another factor related to bipolar aggression focuses on the well-known serotonin transporter (SERT). SERT is involved in the reuptake of serotonin, a mood-regulating neurotransmitter, and thus the termination of its effects at neuronal synapses (Holmes et al., 2002). Thus, in animal studies, absence of SERT in mice has been linked with a decline in their aggression (Holmes et al., 2002). In past studies with bipolar patients, it has been suggested that reduced serotonergic functioning could be associated with greater, impulsive aggression (Swann et al., 1994). As shown in **Figure 6**, Chou and his colleagues (2013) seemed to provide further evidence for this idea, for they noted that the total scores on the Overt Aggression Scale (OAS), in addition to the scores of the specific domain of aggression, were significantly correlated to the SERT availability in the midbrains of euthymic bipolar type II patients, not in control subjects. Although it was observed that there were no differences in SERT availability between the controls and euthymic bipolar type II patients, this

particular association between the OAS's aggression domain and SERT availability could reflect a potential biomarker specifically for aggression in bipolar type II patients (Chou et al., 2013).



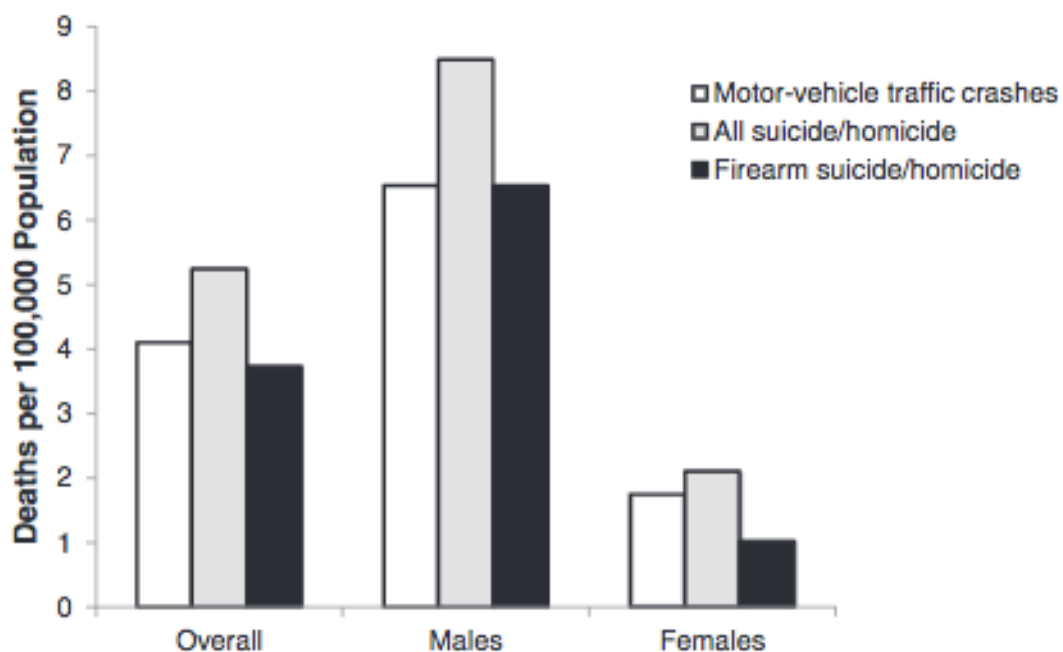
**Figure 6. Significant Associations Among Overt Aggression Scale (OAS), Subcategory Aggression, and Serotonin Transporter (SERT) Availability in the Midbrain. Left Graph:** Represented as Specific Uptake Ratio (SUR), SERT availability was significantly correlated with scores on OAS overall. **Right Graph:** With SUR as the variable for Y-axis, SERT availability was significantly correlated with the OAS subcategory of aggression; the higher the scores, the lower the SERT availability. Figure taken from Chou et al., 2013.

Finally, there is also growing evidence demonstrating that cytokines, either pro-inflammatory or anti-inflammatory, impact SERT activity (Chou et al., 2016). For instance, past studies have noted that the pro-inflammatory cytokine TNF- $\alpha$  can increase the activity of SERT in cell models (Mossner et al., 1998). Moreover, interleukin-1 $\beta$  (IL-1 $\beta$ ), another pro-inflammatory cytokine, has been demonstrated to promote SERT in cell models as well (Ramamoorthy et al., 1995). Among the seven cytokines that were examined in one study between controls and bipolar patients, IL-1 $\beta$  was significantly reduced in bipolar patients, (Chou et al., 2016). Moreover, the anti-inflammatory cytokine interleukin-10 (IL-

10) was notably increased and was significantly associated with SERT availability in the midbrain, which was reduced in this brain region (Chou et al., 2016). Although limited evidence exists for the exact role of IL-10 in bipolar patients, it was proposed that higher levels of IL-10 could perhaps serve as a counteracting response to the effects of pro-inflammatory cytokines such as TNF- $\alpha$  and IL-1 $\beta$  through down-regulation of their synthesis or actions (Chou et al., 2016). By continuing to unveil these connections among inflammatory cytokines, SERT availability, and specific brain regions, future researchers may discover more precisely the neurobiological relationship between cytokines and mood regulation, specifically of aggression, in bipolar patients. (Torrey, 2002).

### **Alcohol Abuse**

Substance abuse, especially that of alcohol, is becoming a greater public health concern due to the dangers that it presents to the general population, especially in the form of gun violence (Wintemute, 2015a). In fact, particularly regarding males, there are just as many alcohol-driven suicides and homicides caused by firearm use as there are motor-vehicle traffic crashes with drivers under the influence (**Figure 7**).



**Figure 7. Average Mortality Rates Under the Influence of Alcohol from 2006 to 2010.** Original author notes that the death rate regarding firearm suicide or homicide is actually underestimated, when compared to that regarding motor vehicle crashes. Recognizing the forms of violence that are perpetuated in intoxicated states is critical to understanding the reasons behind public health issues such as gun violence. Taken from Wintemute, 2015.

Alcohol represents one of the leading causes of death in the United States, with a yearly mortality rate of 88,000 deaths (Esser et al., 2014). In fact, it was reported that those who had threatened others with a gun had a higher chance of meeting the Diagnostic Statistical Manual of Mental Disorders-IV (DSM-IV) classification for alcoholism (Casiano et al., 2008).

In light of the fact that firearm owners are more likely than the average person to binge drink, understanding the risk for aggression and serious violence that alcoholism may cause is important for public safety (Wintemute, 2011). After assessing the relationship among firearm access and use, alcohol or illicit drug

abuse, and 'impulsive angry behavior,' one study found that those with alcohol or illicit drug abuse were more likely to experience these angry behaviors and/or have firearms at or outside of their homes (Swanson et al., 2015b). Also as a result of alcoholism combined with access to guns, partner homicides have been reported at a frequent rate, with women being the victims more often than their male counterparts. After looking over one hundred cases in New Mexico, one study concluded that eighty-nine percent of all murders (each with a murdered female involved) entailed the use of firearms, with forty-six of the murderers reporting as significantly intoxicated (Banks et al., 2008).

### **Alcohol Abuse: A Physiological Understanding**

To understand the decisions made by some alcoholics to perpetuate gun violence, one must assess the specific cortical areas impacted by alcohol and the behaviors that arise as a result. In one study, Point Subtraction Aggression Paradigm measured the extent of human aggression while using fMRI on non-alcoholic and alcoholic subjects (Kose et al., 2015). With this paradigm, it was found that alcoholic subjects generated more aggressive responses with every provocation, compared to the controls (Kose et al., 2015). Moreover, upon looking at the their fMRI results during their aggressive responses, the following brain areas of alcoholics, when compared to those of controls, demonstrated lowered activation levels: postcentral, middle frontal (including the dorsolateral prefrontal cortex), and inferior frontal gyrii, and subcortically in the thalamus and

hippocampus (Kose et al., 2015). Most of these regions are involved in visual motor processing, planning, synchronizing complex movements, and specifically the middle frontal gyrus is associated with go/no-go inhibitory control, decision making, and emotional regulation (Kose et al., 2015).

Moreover, in one study regarding alcoholics, the characteristic lack of inhibitory control was further studied through examination of the components of their brains' event-related potentials, specifically the P3 peak component of the brain's response inhibition (No Go) (Kamarajan et al., 2005). Considered the electrophysiological marker of response inhibition in the brain, the P3 peak is the second component of the event-related potential associated with response inhibition (Kamarajan et al., 2005). It deflects upward and peaks between 300 and 600 milliseconds (Pfefferbaum et al., 1985; Jodo and Inoue, 1990; Jodo and Kayama, 1992; Eimer, 1993; Kopp et al., 1996). When examining the brain activity of alcoholics, a reduction in this P3 peak during response inhibition (No Go) condition indicates that alcoholics may lack the necessary restraint to make safe decisions (Kamarajan et al., 2005). The differences in neuroelectrophysiology between alcoholics and controls were further explored by studying differences in current source density throughout the entire brain (Kamarajan et al., 2005). It was noted that, during the No Go condition, the electrical activity of the brains of the control group demonstrated a strong, central focus, while those of the alcoholic group presented a weaker source that seemed to be more spread out throughout the brain (**Figure 8**). Additionally, when

comparing the two groups during the response activation (Go) condition, the brains of the control group recruited more regions for proper functioning, given the activity in the left parietal, right centro-temporal, and occipital regions; meanwhile, the brains of alcoholics only had activity in a parieto-occipital area (**Figure 8**). The fact that statistical analysis saw distinct differences in the extent of electrical activity and activation between the Go and No Go conditions for *only* the brains of control group indicates that alcoholics likely exhibit poor cognitive ability to distinguish between different task conditions (Kamarajan et al., 2005).

With the impairment of these cortical areas and reductions in electrical activity, failure to make proper, rational decisions could pose a threat to the safety of the alcoholic himself or herself as well as the general public. This point hits home especially when one study noted, after an analysis of inmates imprisoned for homicide, that intoxication caused them to impulsively buy guns; some of the inmates were reported to have become inebriated, to then have obtained guns, and to finally return to their original site of conflict with the firearms (Phillips et al., 2007). To Phillips and his colleagues (2007), this reflected a serious concern that alcoholism could inevitably yield a fatal, sobering outcome, should there continue to be such access to firearms.

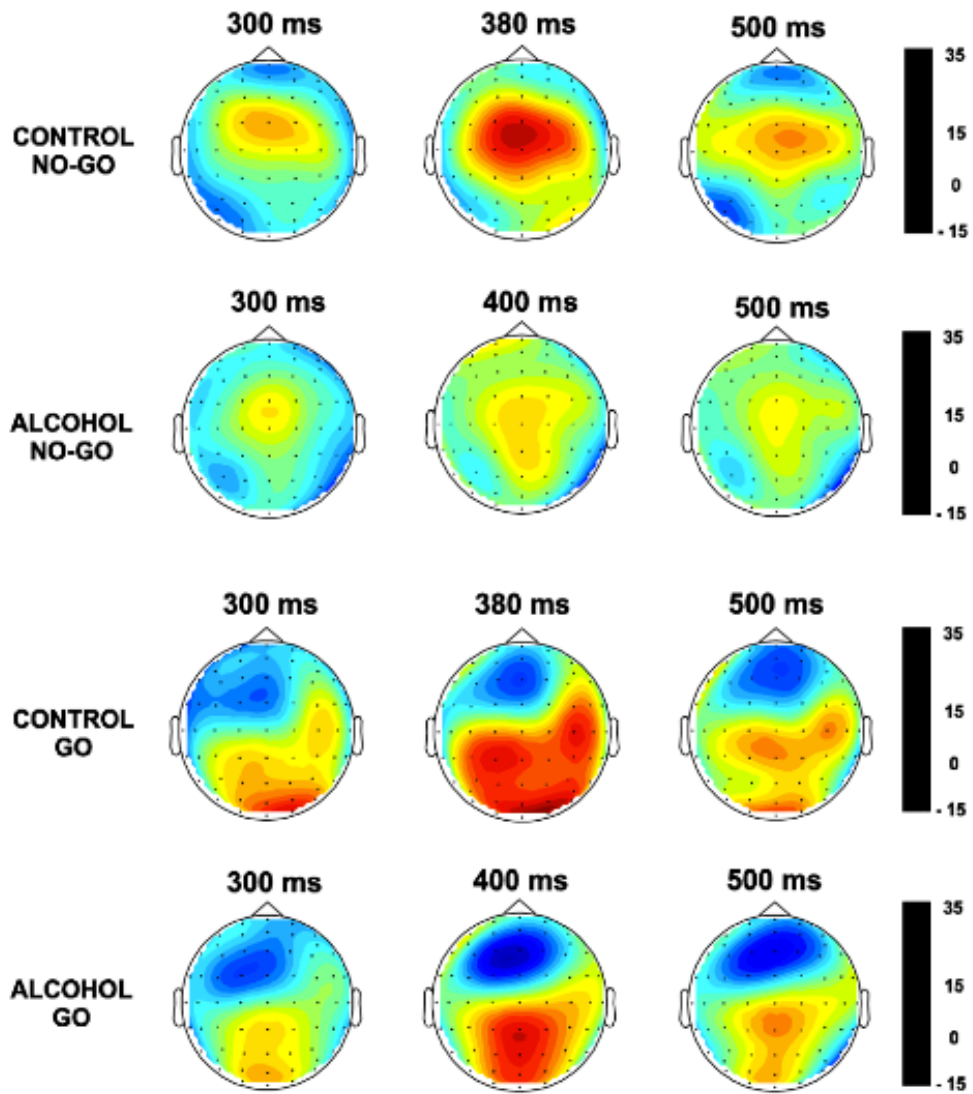


Fig. 4. The spatial distribution of CSD (in  $\mu\text{V}/r^2\text{-cm}^2$ , where  $r$  = head radius) at three time intervals of the P3 component in control and alcoholic groups during No-Go and Go conditions.

**Figure 8. Differences in Current Source Density Between Alcoholic and Control Groups.**

Measurements of current source density to assess electrical activity in the brain revealed that there was electrical activity specific to the brains of the control group and to those of the alcoholic group. The reduced anteriorization of the current source density in the brains of alcoholics during the No Go condition suggests a reduction in frontal lobe activity, indicating likely cognitive impairment in decision-making. Figure taken from Kamarajan et al., 2005.

## **Alcohol Abuse and Its Co-Occurrence with Mental Illness**

Often, substance abuse is noted in terms of its co-morbidity with mental illnesses. One study noted that, among the ninety mentally ill murderers that were examined, seventy-four percent of them suffered from substance abuse disorders, with seventy-two percent of them specifically dealing with alcohol use disorder (Putkonen et al., 2004). Preventing this comorbidity of substance abuse and mental disorders such as schizophrenia could critically reduce the chances of homicide, for one study found that the incidence of lethal crimes committed by schizophrenics with co-morbid substance abuse was significantly increased (around twenty-eight percent), when compared to schizophrenics without this factor of substance abuse (around nine percent) (Fazel et al., 2009).

In addition to the neurological alterations that are inherent to mental disorders, comorbid behaviors like alcohol abuse bring added risks, such as exacerbation of dangerous behavioral patterns. In terms of bipolar disorder, one study found that, upon specifying the substance of abuse for each bipolar subject, those with alcohol use disorder were more likely to have conduct disorder comorbidity (Grunebaum et al., 2006). Another study noted that alcohol's influence on those suffering from manic bipolar disorder, for instance, may heighten their impulsivity and, in turn, possibility for homicide (Yoon et al., 2012). This could be explained by the fact that chronic use of alcohol could trigger alcohol-associated dementias and thus lead to longer-term impairment in

proper decision-making, putting the person at risk to be a threat to himself or to innocent bystanders (Sher et al., 2015).

### **Schizophrenia & Bipolar Disorder: Not Linked with Violence?**

Much of the evidence presented so far seemingly points toward the well-recognized public concern about the mentally ill possibly being violent and in possession of firearms. Even so, there is an opposing front to this viewpoint that is supported not only by physicians and researchers but also by those involved in the law-making process. This is because, in the case of medical professionals, it is understood that specific *symptoms*, not necessarily the mental illness as a whole, are what may predispose the mentally ill person to violent tendencies (Friedman, 2006). In other words, in the absence of these symptoms, those with mental illnesses are just as capable of leading a non-violent lifestyle than those without them; this was evidenced when a study noted that the risk of violence was the same after a year of discharge for a group of treated, mentally ill patients, when compared to that for subjects without a mental disorder (Steadman et al., 1998). In fact, instead of mental illness, physicians point to other external influences as more effective factors to utilize in discerning which people should have restrained access to firearms. For instance, the MacArthur Violence Risk Assessment Study found that, out of over nine hundred patients from civil inpatient facilities who were able to follow-up, only twenty-three perpetrated one or more instances of gun violence; additionally, out of those

twenty-three patients, only three had bipolar disorder, while three others obtained different diagnoses (Steadman et al., 2015). However, among these twenty three patients who had committed gun violence, seventeen were reported to have abused alcohol, while fourteen dealt with drug abuse (Steadman et al., 2015). These statistics suggest that serious inherent, mental illnesses, such as bipolar disorder and schizophrenia, were not the driving force behind the use of firearms. Rather, substance abuse, along with physically abusive childhoods and previous commitments of crime, were the factors more significantly responsible for these patients' violent behaviors (Steadman et al., 2015).

Although the media has reported on situations like mass shootings in and out of school buildings, many professionals caution the public not to generalize and thus risk stigmatizing the majority of those with mental illness who are not violent. One study noted that only 4% of violence in the United States is associated with people with mental disorders (Metzl and MacLeish, 2015). Given that around 19% of the U.S. population suffers from mental illness, this only reinforces the point that very few people that represent this large subpopulation (around forty-four million) commit violent acts (N.A.M.I., n.d.). In addition, another study reported that there was actually no statistically significant association between severe mental disorders, independent of substance abuse, and community violence (Elbogen and Johnson, 2009). It is important, thus, that the media refrain from presenting mental illness as either mild and insignificant or extreme and dangerous (Metzl and MacLeish, 2015). Such binary presentation of

mental illness prevents the general public from understanding that not only are mental illnesses actually complex but also can managed in everyday living (Metzl and MacLeish, 2015).

Contrary to popular belief, it actually has been reported that those with mental illnesses are more likely to be victims, as opposed to perpetrators, of violence (Metzl and MacLeish, 2015)., With regards to those with schizophrenia, for example, police reports revealed that their rate of victimization ranges from 65% to 130% or higher, when compared to the general public (Brekke et al., 2001). This same study also noted that it was only for eighteen percent of cases that the reasoning for police involvement was for disruptive behavior on part of the mentally ill person towards another or a property (Brekke et al., 2001). These statistics suggest that, if the mentally ill are interacting with law enforcement, it is more often for minor incidents that do not endanger the public by any means **(Table 2)**.

**Table 2. Reasons for police interaction for those with schizophrenia within their communities.** Based on the data obtained from conducting interviews, the most prominent reason for police contact was related to traffic violations. Only eighteen percent of police contact was related to an offense against a person or property. Table modified and taken from Brekke et al., 2001.

**Community risk variables over a three-year period in a sample of 172 individuals with schizophrenia living in the community**

Variable	Subjects <sup>1</sup>		Incidents	
	N	%	N	%
Police contact	83	48	138	
Police assistance	19	11	26	19
Illness-related contact	17	10	20	15
Status offense	17	10	19	14
Offense against property	10	6	13	9
Offense against person	11	6	12	9
Traffic-related offense	20	12	31	23
Drug-related offense	7	4	8	6
Other	9	5	9	7

Another study revealed that, after examining several papers regarding victimization of the mentally ill, forty-four percent of over one thousand mentally ill, homeless persons reported victimization, with acts ranging from robbery to sexual assault (Choe, Teplin, and Abram, 2008). In addition, one study observed that, when considering both inpatients and outpatients, the percent of those who were physically assaulted was as high as thirty-five percent (Goodman, New, and Siever, 2004).

For these reasons, along with homelessness, professionals must account for the additional factors that put a mentally ill person at risk for victimization within his or her community. According to one study, notable factors included female gender, depression, and a history of child abuse (Roy et al., 2014).

Regardless of gender, one study found that reports of both sexual and physical assault were frequent (**Table 3**). However, gender differences lay in that women with severe mental illnesses (SMIs) were more likely to have been sexually assaulted within the past year, during their adulthoods, and during their childhoods; on the other hand, men with SMIs were more likely to only report physical assault in the past year (Goodman et al., 2001).

**Table 3. History of assault among men and women with severe mental illness (SMI).** Irrespective of the gender differences in patterns of assault, one of the alarming conclusions that was drawn from this data was that eighty-seven percent of both females and males with SMIs have either been physically or sexually assaulted at some point in their lives. Table taken from Goodman et al., 2001.

**Table 2. Prevalence of Assault Among Women and Men With SMI**

	Women ( <i>n</i> = 321)	Men ( <i>n</i> = 461)	$\chi^2$ value
<b>Past year</b>			
Sexual assault	64 (20.3%)	35 (7.6%)	26.66***
Physical assault	81 (25.6%)	156 (34.1%)	6.39**
Either assault	106 (33.4%)	168 (36.7%)	0.86
<b>Overall adulthood</b>			
Sexual assault	181 (57.1%)	112 (24.5%)	84.90***
Physical assault	238 (74.6%)	364 (79.3%)	2.37
Either assault	256 (80.3%)	367 (80.0%)	0.01
<b>Childhood</b>			
Sexual assault	155 (48.7%)	134 (29.2%)	30.73***
Physical assault	174 (54.4%)	265 (58.1%)	1.07
Either assault	213 (66.6%)	296 (64.6%)	0.31
<b>Lifetime</b>			
Sexual assault	217 (68.2%)	183 (40.0%)	60.11***
Physical assault	262 (82.1%)	395 (86.1%)	2.21
Either assault	276 (86.8%)	396 (86.7%)	0.00

*Note.* *N*s for women range from 316 to 320; *N*s for men range from 456 to 459; *df* = 1 for each category.

\*\**p* < .01. \*\*\**p* < .001.

Specifically looking at homeless women in Jacksonville, Florida, one study revealed that anxiety disorders were more prevalent in homeless women who

had a history of abuse (Holt, Montesinos, and Christensen, 2007). To put the impact of victimization in perspective, this study observed that the chances of having PTSD was ten times higher in those with a history of abuse, when compared to those without it (Holt, Montesinos, and Christensen, 2007). According to another study, drug and alcohol abuse also subjected those with severe mental illnesses to victimization; past research cited by this study postulated the reason may be, in the case of mentally ill women, that seeking drugs could lead them to unwillingly perform sexual acts for the sake of acquiring them or the money for them (Goodman and Fallot, 1998). Because of such addictions, those with mental illnesses may unintentionally put themselves at risk for being harmed (Hiday et al., 1999).

## **DISCUSSION AND CONCLUSIONS**

An exploration of the relationship between mental disorders and gun violence was possible through an examination of the following mental illnesses: schizophrenia, bipolar disorder, and alcohol abuse. After an extensive review of the literature regarding these three specified mental disorders, several conclusions were drawn.

First, given the multiple published studies indicating the neurobiological risk of aggression and impulsive, violent behaviors in those with mental disorders, it is understandable that this may lead others to think that mentally ill people can pose a threat to society. However, more studies show this to be statistically false. Several studies report that minor percentages of the mentally ill cause violent events; if any interactions with the police took place, they were often for reasons, such as traffic violations and personal assistance, that did not impact the safety of the general public in any manner.

Second, the presentation in the media of the mentally ill as crazy, dangerous, and armed is often multi-faceted and misleading in that it encourages this factually non-existent relationship between mental illness and gun violence. From newspaper headlines to television reports on mass shootings, the portrayal of the mentally ill as insane seems to be almost inescapable. Given that people have admitted that their source of knowledge about those with mental disorders prominently derives from the media, it is no wonder that the general public tends to view those with mental illness as the media presents them to be. Thus,

working with major news broadcasting networks and newspaper outlets so they are more mindful of their word choices in publicizing a story involving a person with mental illness could be the first step in breaking down the stigma towards those with mental disorders. In the meantime, viewers must be wary of the information presented to them in the media before drawing incorrect conclusions about this subgroup of the population too quickly.

Third, if there was anything to be noted about the studies that assessed the behaviors of those with these mental disorders, more often it seemed that the external circumstances surrounding a mentally ill person were what triggered their lethally violent behaviors. More specifically, it was often alcohol abuse, even without an inherent mental disorder, that caused a person to make deadly decisions. In other words, intrinsic mental disorders, such as schizophrenia and bipolar disorders, were unlikely, on their own, to put a person on the path towards senseless murder. Making this distinction can be beneficial in ascertaining how to best monitor a mentally ill person's risk for threatening behavior, for, given this information, a caretaker can be attentive to any environmental triggers, such as alcohol, that could predispose a mentally ill person to dangerously aggressive behaviors, thus preventing potential harm to the person and innocent bystanders.

A significant fourth conclusion that must be emphasized to physicians and the public alike is that those with mental disorders are more likely to be victims of violence, as opposed to perpetrators of violence. Numerous studies point

towards recent sexual assault and physical assault being prevalent among those with mental illnesses, regardless of the person's gender. The homeless subpopulation must also be addressed in that many of them report not only being mentally ill but also being victimized in various ways, from being robbed to sexual assault. Thus, care must be taken by physicians, specifically psychiatrists, to focus on the homeless subgroup to ensure that they are being provided sufficient mental health services, in addition to being kept safe from their abusers.

With all these important points in mind, it is clear that appropriate attitudes by physicians, the public, and even lawmakers are key to moving forward in treating mentally ill people fairly in the future. Such responses, of course, must incorporate the proper approach to handling persons with mental illnesses who are at risk for carrying out violent behaviors. In this way, those with mental illnesses can be helped to lead as normal a lifestyle as they can and should, among the general population.

In terms of interacting with a patient that the physician knows to be at risk for violent behavior, the physician is legally permitted in every state to ask the patient about his or her possession of firearms, as long as it is pertinent to that person's health (Wintemute, Betz, and Ranney, 2016). In fact, there are various circumstances in which it is critical to the safety of the patient and of others to address firearm possession, which include acute exacerbations of the mental disorder, traumatizing victimization, and alcohol or drug abuse (Wintemute, Betz, and Ranney, 2016). By taking note of these acute symptoms that are causing the

intensifications of the mental disorders in a hospital setting, doctors can safely keep the patient in an environment that will promote his or her mental stabilization prior to his or her return to society through necessary counseling or referrals (McNamara and Findling, 2008; Wintemute et al., 2016). In this manner, treated patients will be able to live freely among their peers without worry of any behaviors endangering them, demonstrating that those with mental illnesses are not inherently violent and are capable of normal living.

With regards to the general public, the response consists of two layers. The first, broader layer, relates to individuals within the community and how their approach to handling those at risk for carrying out gun violence could be best modified to possibly diffuse a dangerous situation effectively. Programs such as the Cure Violence model have been put in place in several cities, based on the three following aspects to stop the implementation of gun violence: stop the act in itself directly, recognizing and reasoning with the mindsets of the perpetrators of gun violence, and working to alter the norms generally relating to violence (Butts et al., 2015). It is hoped that, by educating at-risk individuals on alternative routes to resolving conflicts, the likelihood of community violence can be diminished in these areas (Butts et al., 2015). The second, more institutional layer of the response by the general public, relates to proposed and actual measures taken by schools to help prevent the chances of shootings from taking place. Although many schools are quick to expel those students in possession of firearms, evidently there still remain too many who go without punishment (Redding and

Shalf, 2001). Recommendations to address gun violence in schools seems to be dependent on the location of the school, for, while schools in all types of communities (urban, suburban, and rural) need anti-bullying and social conflict-resolution programs, schools in inner city communities should focus on further crime reduction in the area, particularly with regards to firearm and drug sales (Redding and Shalf, 2001).

With regards to policymakers, an examination of the effectiveness of current gun restriction policies towards those with mental illnesses should be one of their roles in addressing gun violence and mental illness. In one study, it was found that, after a law in Indiana granted police the right to take away firearms from those considered 'dangerous' without warrant, suicide was the predominant reason for firearm use and only around ten percent of cases involved someone with a serious mental disorder (Parker, 2010). Aside from this study, there are few that assess the usefulness of these policies on reducing gun violence. For psychiatrists, the greater concern stemming from these policies is the propagation of the stigma associated with those with mental illnesses, along with the negative attitudes that those with mental illnesses hold about their condition. Psychiatrists fear that such policies may discourage the use of mental health services by those in greatest need of them, which could cause untreated symptoms to inevitably transform into violent behaviors later on (McGinty, Webster, and Barry, 2014b). Thus, it is critical to generate more published

studies that explore this particular issue so as to carefully inform policymakers of the possible consequences of their executed plans.

Moreover, a growing concern has been the policymakers' inability to translate the relevant data provided by researchers into effective measures to address the issue of gun violence. Consequently, a more integrative approach to policymaking was taken through the formation of "The Consortium for Risk-Based Firearm Policy" that consisted of representatives from the communities of mental health, domestic violence prevention, gun violence prevention, law enforcement, and general academia (Horwitz, Grilley, and Kennedy, 2015). Through a focus on distinguishing risk factors for dangerous behaviors, this consortium allowed for any desired reform to be carefully administered without fear of risking increased stigma towards those with mental illnesses (Horwitz, Grilley, and Kennedy, 2015). In terms of the particular issue of handling people with mental illnesses exhibiting at-risk violent behaviors, one solution involved the New Medicaid Expansion Program, which, through the Affordable Care Act (ACA), would allow for the estimated seven million, uninsured people with mental illnesses to receive coverage in every state (Miller, 2014). By doing so, it is hoped that those with mental disorders will have greater chances of being treated sufficiently to avoid developing symptoms leading to future, violent behaviors. Additionally, by carrying out this expansion through the ACA, states do not need to have financial concerns in providing such mental health services to this subpopulation since they will be covered by Medicaid and the federal

government (Miller, 2014). In this way, state hospital expenses due to emergencies caused by acute exacerbations of mental illnesses will surely be reduced (Miller, 2014).

## **FUTURE DIRECTIONS**

With an understanding that no systematic relationship between mental illness and gun violence exists, communities must work together to ensure that those with mental illnesses feel accepted and are treated with equal respect and warmth as individuals without psychiatric disorders. After looking at the roles of various subgroups within the general population, it is clear that no one group holds ultimate responsibility in addressing this task. From individuals in the general community to representatives of federal government, everyone has a unique, but equally significant role to contribute in the breakdown of negative attitudes towards those with mental illnesses. By addressing the issue in this communal manner, it is hoped that the stigma can be easily eradicated in every aspect of life.

It is the responsibility of the physician to monitor for the acute symptoms that put the mentally ill person at risk for violent behaviors and to inform his or her loved ones for the sake of their safety. By doing so, the community at large will also be protected, as the patient is rehabilitated within a space that can provide the medical attention he or she needs.

It is the duty of the policymaker to carefully create policies that will benefit both the public and the mentally ill. Policymakers must collaborate with researchers and psychiatrists alike to ascertain whether the policies in the making are detrimental to the public perception of the mentally ill and must encourage further publishing of studies to validate or dispute these concerns.

Additionally, they must seek to have more studies published that assess the general effectiveness of policies. This is so they may appropriately modify current policies to best meet the needs of their particular community in ending gun violence.

Finally, it is the obligation of every individual to seek an education on how to healthily resolve conflicts without the use of firearms and to encourage his or her peers, especially those who exhibit at-risk behaviors for violence, to do the same. Individuals can facilitate this by working with representatives of local governments to establish community programs with a focus on gun violence prevention. In the meantime, more studies need to be conducted on the helpfulness of these programs to better determine what elements of conflict that people of a specific community need the most help addressing. On a more institutional level, educating our teachers in actively identifying at-risk behaviors for violence in students would be beneficial in preventing their troubled students from making decisions that could have lethal consequences for others.

It is with immense hope that, by taking measures such as these, our peers with psychiatric disorders will realize that they are not alone in their efforts to lead a normal life, and any need for support can undeniably be found in every facet of their lives.

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## **CURRICULUM VITAE**

### **STEPHANIE ISABEL SAADEH**

Year of Birth: 1993

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#### **Education**

##### **Boston University School of Medicine, Boston, MA**

Candidate for Master of Science in Medical Sciences, May, 2016

##### **Vanderbilt University**

Bachelor of Arts in Neuroscience, May 2015

#### **Research Experience**

##### **Wake Forest School of Medicine, Research Intern**

May 2014 – July 2014

Conducted research on the effects of norbinaltorphimine and ethanol on anxiety-associated behaviors of chronically stressed mice.

##### **Vanderbilt University, Research Assistant**

August 2013 – May 2014

Helped graduate student Rachel Aaron to design possible methods to treat the psychological condition of alexithymia.  
Personal involvement entailed reviewing questionnaires chosen for her studies and data entry in Dr. Sohee Park's lab.

##### **Wake Forest School of Medicine, Research Intern**

May 2012 – July 2012

Conducted research on the relationship between hypertension and the anatomy of the blood brain barrier.

## **Medically Relevant Experiences**

### **Shadowing at Monroe Carell Jr. Children's Hospital**

February 2014 - April 2014

Shadowed a pediatric neurosurgeon every Tuesday morning during his clinical hours.

### **Wake Forest Baptist Medical Center, Volunteer**

January 2012 - April 2012

Escorted patients to and from their rooms within the Physical Therapy department.

Interacted with patients by playing games with them to improve their physical strength.

Helped to clean up all the equipment used and delivered the necessary supplies to each therapist in need of them.