# Finding High Risk Persons with Internet Tests to Manage Risk —A Literature Review with Policy Implications to Avoid Violent Tragedies, Save Lives and Money

Robert John Zagar<sup>1</sup>, Agata Karolina Zagar<sup>2</sup>, Kenneth G. Busch<sup>3</sup>, James Garbarino<sup>4</sup>, Terry Ferrari<sup>5</sup>, John Russell Hughes<sup>6</sup>, Gordon Patzer<sup>7</sup>, Joseph W. Kovach<sup>8</sup>, William M. Grove<sup>9</sup>, Steve Tippins<sup>10</sup>, Steve Imgrund<sup>11</sup>, Judge Julia Quinn Dempsey<sup>12</sup> & Brother Benjamin Basile<sup>13</sup>

<sup>1</sup> Juvenile Division, Cook County Circuit Court, Chicago, USA

<sup>2</sup> Actuarial Risk Tests, L.L.C., Chicago, USA

<sup>3</sup> Former Consultant, U.S. Department of Health and Human Services, Chicago, USA

<sup>4</sup> Pychology Department, Loyola University Chicago, USA

<sup>5</sup> Business Department, Calumet College of Saint Joseph, Whiting, USA

<sup>6</sup> Neurology Department, University of Illinois Chicago School of Medicine, Chicago, USA

<sup>7</sup>College of Business, Roosevelt University, Chicago, USA

<sup>8</sup> Psychology Department, Calumet College of Saint Joseph, Whiting, USA

<sup>9</sup> Psychology Department, University of Minnesota Twin Cities, Minneapolis, USA

<sup>10</sup> College of Management and Technology, Walden University, Minneapolis, USA

<sup>11</sup> Columbia, South Carolina, USA

<sup>12</sup> Juvenile Division, Cook County Circuit Court, Chicago, USA

<sup>13</sup> Quantitative Sciences Department, Calumet College of Saint Joseph, Whiting, USA

Correspondence: Robert John Zagar, Actuarial Risk Tests, L.L.C., 445 East Ohio Street, Suite 303, Chicago, Illinois 60611-4675, USA. E-mail: drzagar@hotmail.com

Received: December 7, 2015	Accepted: January 7, 2016	Online Published: February 24, 2016
doi:10.5539/res.v8n1p212	URL: http://dx.doi.org/10.5539/res	.v8n1p212

## Abstract

The goal is to share policy implications of sensitive, specific internet-based tests in place of current approaches to lowering violence, namely fewer mass murders, suicides, homicides. When used, internet-based tests save lives and money. From 2009-2015, a Chicago field test had 324 fewer homicides (saving \$2,089,848,548, ROI=6.42). In 60 yrs., conventional approaches for high risk persons (e.g., inappropriately releasing poor, severely mentally ill) led to unnecessary expense including yearly: (a) 300 mass murders (59% demonstrating psychiatric conditions); (b) 1-6% having costly personnel challenges; (c) 2,100,000 "revolving door" Emergency-Room (ER) psychiatric admissions (41,149 suicides, 90% mentally ill); (d) 10,000,000 prisoners (14,146 homicides, 20% psychiatric challenges). Current metrics fail [success rates from 25%-73%: (1) for background checks (25%); (2) interviews (M=46%); (3) physical exams (M=49%); (4) other tests (M=73%)]. Internet-based tests are simultaneously sensitive (97%), specific (97%), non-discriminatory, objective, inexpensive, \$100/test, require 2-4 hrs.

Keywords: internet-based-tests, airlines, corrections, education, energy, health, insurance, military, police, religious, transportation, veterans

A depressed commercial pilot crashes a planeload of passengers and crew (Otto & Webber, 2013). Jeopardizing security, a U.S. Secret Service agent abuses intoxicants. A newly released from jail, deranged person goes on a killing spree (Olson & Taheri, 2012).

By failing to post \$5,000 bond for attempted petty theft, a severely mentally ill, jailed offender eats screws, leather straps, and needles that result in medical costs of \$1,300,000 (Schmadake, 2015). An intoxicated, oil truck driver crushes dozens of autos filled with drivers and passengers (Miller, 1997).

With constant battlefield nightmares, a veteran suffering from Post-Traumatic Stress Disorder (PTSD) drives a pickup truck into an oak tree. In 2013 alone, this failure to identify high risk persons led to 22 daily suicides among U.S. military veterans (Coughlin, McNeil, Provenzale, Dursa, & Thomas, 2013).

All of these are documented, predictable, preventable tragedies that need not result in this suffering, including the loss of tens of thousands of lives and billions in 2012 U.S. dollars or money.

Internet-based, sensitive and specific tests are nondiscriminatory and objective. Providers can use tests to help predict risk that can then be managed with empirical diversions to prevent violence.

The purpose of this literature review is to share the policy advantages of sensitive (finding the actually high-risk persons) and specific (avoiding falsely labelling low-risk persons) internet-based tests as an alternative to current approaches, including background checks, interviews, and physical examinations. This improved alternative way to current approaches would lead to fewer mass murders, suicides, and homicides.

This would be consistent with targeting at-risk with evidence-based diversions from violence. The widely used conventional approaches have a miss rate of 54% to 61% in the identification of the at-risk persons.

This paper includes 26 sections. In the first quarter are: (1) "exceptions to the rule"; (2) hypotheses; (3) how to reduce violence and exceptions; (4) the benefits of finding violent prone persons; (5) evidence that internet-based tests are better than current ways; and (6) internet-based tests are sensitive and specific: .94 to .98.

In the second quarter there are: (7) executive function correlates with other tests and test item; (8) avoid losing money by targeting jobs to at-risk by using the internet-based risk test model; (9) summary saving 324 lives and \$2,005,848,548 by targeting at-risk with jobs; (10) application to various work groups, which includes: [(11) pilots; (12) energy workers; and (13) internet-based tests can help lower military violence].

In the third quarter are other applications: [(14) nonprofit and religious organizations; (15) personal injury cases; (16) public safety and police; (17) prisons and courts; (18) transportation (ports, rail engineers, truckers); (19) veterans; and (20) workers' compensation].

In the last quarter are: (21) diverting at-risk from ER hospitalization; (22) moving mentally ill from hospitals to prisons: 1959-2013; (23) ten prisoner characteristics and empirical diversions from violence; (24) discussion and barriers to entry; (25) limitations; and (26) summary with policy implications.

As shall be seen throughout the discussion of this literature review, it is clear that the economic dimension of violence is crucial. Violence fluctuates as a function of jobs for high risk persons.

Also, diverting high risk from violence derives from the economic conditions, primarily jobs for the high risk individuals. The highlighted policy implications are: (a) targeting jobs to divert these at-risk from violence; (b) moving nonviolent offenders to electronic bracelets; (c) screening workers where the cost of failure is high; and using internet-based tests in the ER for psychiatric and substance abusing at-risk.

This allows decision makers to manage better because current convention approaches have a miss rate of 54% to 61%. This costs lives and money that need not be wasted.

#### 1. "Exceptions to the Rule"

One of the most challenging issues for managers is finding the "exception to the rule". This is the person whose anti-social, self-destructive, and/or violence-prone behavior causes great harm.

This exposure can result in enormous financial, moral, and political liability to an organization. Discovering, who this person is, in advance of the dangerous behavior, is basic.

This applies to recruitment, retention, return to work after medical leave, promotion, hospital admission, fitness-for-duty, crisis debriefing, and court sentencing. Due to limited information, discovering the "exception" can be daunting.

Over decades, researchers have produced three consistent findings: (1) conventional background checks, physical exams, and interviews are inaccurate and unreliable; (2) these current widely used approaches often produce results that are worse than would be obtained by flipping a coin (Zagar et al., 2013); and (3) sometimes these conventional approaches result in *finding people as dangerous when they are not, or as not dangerous when they are*.

But today, the math and science necessary to predict and prevent violence are available to save lives and money on a scale previously impossible. All that is required is the use of appropriate predictive analytics or internet-based tests. Thus, this literature review is important in spreading the news that predictive analytics, namely internet-based tests, and evidence-based diversions from violence, can not only save lives. Internet-based tests can reduce costs as well.

## 2. Hypotheses

In this literature review, the following questions about violence, diversion of at-risk, screening ER patients, nonviolent offenders, and workers, and internet-based tests are addressed: (a) Are mass murders, "active shooting incidents" suicides, and homicides related to economic trends?

(b) Can internet-based tests help identify at-risk (mentally ill, deceptive, substance abusing or violent-prone) individuals reliably, sensitively (finding the actually high-risk persons) and specifically (avoiding falsely labelling low-risk persons)? (c) Can using sensitive and specific internet-based tests on the at-risk presenting at the ER result in diversion from expensive psychiatric hospitalization?

(d) Can internet-based tests be used to divert nonviolent offenders from costly jail or prison to electronic bracelets without return to court and without jeopardizing community safety? Based upon the newly available evidence, we believe that the answer to each of these questions is "Yes".

#### 3. How to Reduce Violence and Exceptions

Most people are not at-risk of committing violent, antisocial acts that are sometimes linked to being emotionally imbalanced. Yet, there are some who are.

These are the "exceptions to the general rule of nonviolence." Detecting these "exceptions" is complicated by the mathematics of deviance.

Finding these "needles in the haystack" among the well-functioning is a matter of sorting. Sensitivity (finding the actually high-risk persons) or specificity (avoiding falsely labelling low-risk persons) is an economic, manageable statistical task (Zagar & Grove, 2010; Zagar, 2014). Predicting deviance is done in much the same way that one finds, intervenes, and cost estimates violence and other "exceptions to the rule".

Our use of tests is actually no different than bankers using algorithms to predict the return on the investment of money. Admittedly, the "exception to the rule" is entangled in civil rights and labor rights law.

The costs of mistakenly identifying a low risk person as a person at high risk for committing a violent or antisocial act are significant. There is a stigma (and possible abridgement of civil rights) and liability for the screening personnel (for missing a homicide or other high cost violent crime).

However, unlike a face-to-face interviewer, internet-based tests shield the analysis from bias introduced by knowing the age, appearance, education, ethnicity, gender, race, religion, or socioeconomic status (SES) of the person being examined. A lawyer cannot cross examine a computer algorithm about the decision-making test report that is generated with internet-based computer.

A computer algorithm is consistent with policies and laws that prohibit discrimination and forbid subjectivity. Rather, an internet-based equation test report is consonant with the objective application of the evidence-based, peer-reviewed, scientific facts. It is inconsistent with the error that current ways that have a miss rate of 54% to 61%.

Consider the baseline data of more than 308,000,000 people in the United States with 7% at-risk. Only 1% were abusive or criminally violent (Sellin & Wolfgang, 1968); 1% were brain damaged (Busse, Bischkopf, Riedel-Heller, & Angermeyer, 2003); 1% suffer cognitive delay, intellectual disabilities, or mental retardation (Belfer, 2008); 1% have deceptive self-presentation (Serota, Levine, & Boster, 2010).

Regardless of age, education, ethnicity, gender, race, religious or nonreligious orientation, or socioeconomic status, 1% of all clergy, coaches, professors, teachers, youth workers and others were actively pedophilic or sex offending (Rice, Harris, & Quinsey, 1990, 1997; Rice & Harris, 1997); 1% were severely mentally ill; and also 1% of the population was engaged in substance abuse (Hasin, Stinson, Ogburn, & Grant, 2007); 1% of all are deceptive in self-presentation (Pope, Butcher, & Sellen, 2006).

To save lives and money, there is an example of predicting and preventing these "exceptions" from assuming positions in which they can harm others. There is a study of 82,647 severely mentally disordered treated with medications; 604 were convicted of violent crime before the study (Fazel, Zetterqvist, Larsson, Langstrom, & Lichenstein, 2014; Blair & Sweit, 2014).

Medicating and intervening with these psychiatric patients resulted in a 45% drop in violent crime convictions among those with a history of violent offenses in the past (assaults, homicides, robberies, and sex offenses). One

wonders if the decrease in violent crime convictions could have been even greater had internet-based tests been employed.

Contrast internet-based tests with inadequate, insensitive (not finding the actually high-risk persons), nonspecific (not avoiding falsely labelling low-risk persons) interviews and physical and unstructured psychiatric examination. Also if these violent psychiatric patients were targeted with jobs, anger management, and mentors, these approaches would result in a greater diversion from violent crime saving more lives and money.

## 4. The Benefits in Finding At-Risk

Many think that severely mentally ill people are harmless. Indeed most are.

However, some persons with mental health issues commit mass murders, active shooting incidents, suicides and homicides. Their violent actions are related to personal mental health problems in 20% to 59% of the incidents studied.

See Figure 1. According to the Federal Bureau of Investigation (FBI), from 2000 to 2013, there were 160 active shooters.

An active shooter is a person killing or attempting to murder people in a confined, populated area. In contrast, mass murders have at least four victims (Blair & Schweit, 2014).

Active shooting incidents have the highest casualties. Among 39 incidents, there were 117 deaths; 40% committed suicide; 56-66% had mental illness (Blair & Schweit, 2014).



Figure 1. One-hundred, sixty active shooter incidents from 2000-2013: 1046 dead (FBI, 2014)

In the year following Sandy, there were 30 mass shootings with 100 victims. In 2013, there were 300 mass murders with 59% due to psychiatrically illness.

Over 50 years Hempel, Meloy and Richards (1999) studied 30 mass killings finding 66% were psychotic in the half century of data. From 1949 to 1999, Fessenden (2000) showed 50% of 100 active shooters had serious mental health challenges.

Follman, Aronsen, and Pan (2012) discovered 61% of active shooters displayed mental health issues from 1982 to 2012. So, in summary, from 50-66% of active shooters with an average (*M*) of 59% had psychiatric illness (Welch & Hoyer, 2013; FBI, 2014).

Depression, psychosis and bipolar disorder led to active shooter violence (Foxx & Levin, 2011). One wonders how much the deinstitutionalization of the severely mentally ill combined with the inadequate, insensitive (not finding the actually high-risk persons), nonspecific (not avoiding falsely labelling low-risk persons) interviews, physical and psychiatric exams, rather than objective, sensitive, specific, internet-based tests, plays in this rise in mass murderers and active shooters.

In the top curve of Figure 2, in 2013, some 41,149 Americans (.01% of the population) were suicidal (Center for Disease Control, 2014). From 1900 to 2013, suicide rose from 11 to 12/100,000; 90% of suicides are related to severe mental illness issues (Barriera, 1999).

Historically, suicides rose during economic recessions.

Since the American Revolutionary War in the 1700s, there are more homicides on the U.S. streets than battlefield mortalities. Thus, living in some America city neighborhoods is more dangerous than living in a conventional warzone.

As seen in the middle curve of Figure 2, in 2013, some 14,146 people (.005% of the population) committed murder (U.S. Bureau of Justice, 2014); 20% of murderers had psychiatric illness (Wilcox, 1985; Matejkowski,

Cullen, & Solomon, 2008). From 1900 to 2013, homicides went from 1 to 4/100,000.

Murders decreased during the post-World War II and dot.com era economic booms, when more jobs were consistent with a lowering of homicide rates.

As seen in the bottom curve of Figure 2, the fourth leading cause of death among male workers was homicide. The leading cause of death among women laborers was workplace homicide (U.S. Department of Labor, Occupational Safety and Health Administration (OHSA), 2014).

Riedell (2003) compared national and workplace homicide rates. He found the curves were similar.

The national homicide rates were 22 times greater than workplace murders. Over 35 years, annual workplace homicides dropped from 1,000 to 400; 25% of yearly workplace homicides were due to robberies. If one included just off-the-work-site murders, these annual work place homicide rates doubled to 800 (Zagar, Kovach, Basile, et al., 2013).



Figure 2. U.S. suicide & homicides/100,000 from 1900-2014 (U.S. Bureau of Justice Statistics, 2014)

In summary then, violence and severe mental illness are linked and respond to the economy. With fewer jobs available, suicides increase.

With more jobs, homicides decrease. And 25% of workplace homicides are driven by robbery with the rates increasing when just off-site murders are included.

See Figure 3 for a comparison of the homicidal with and without prior arrest. An average of 16% of the killers did not have an arrest, which makes a good case for internet-based tests to find the at-risk and divert the violent-prone from murder (Zagar, Busch, Grove, & Hughes, 2009c).



Figure 3. 1 of 7 (16%) homicidal were never arrested: Internet tests are crucial to help find violent prone

In a series of 5 studies, infants, children and youth were followed over time in randomly selected samples that were studied for violence. The first three studies, there were: (a) abused infants later homicidal teens, *Mage*=3.1 years with follow up at the *Mage*=15.2 (Zagar, Busch, Grove, Hughes, & Arbit, 2009b); (b) abused children later homicidal teens, *Mage*=12.8 years (Hughes, Zagar, Busch, Grove, & Arbit, 2009); and (c) homicidal youth with a *Mage*=14.9 years followed backwards to *Mage*=7.2 years and forward to *Mage*=18.0 years (Zagar, Busch,

Grove, Hughes, & Arbit, 2009d).

In the remaining fourth and fifth study, there were: (d) assaulting youth later homicidal adults, *Mage*=14.0 years (Zagar, Busch, Grove, & Arbit, 2009e); and (e) sex offending youth later sexual homicidal adults, *Mage*=14.2 years (Busch, Zagar, Grove, Hughes, Arbit, Bussell, & Bartikowski, 2009). Among these 2,722, there were 234 homicidal with a range (R)=10 to 17 years (Zagar & Grove, 2010).

#### 5. Evidence that Internet-Based Tests Are Better than Current Ways

As seen in Figure 4, internet-based tests like the Standard Predictor for Adults or Adolescents have a sensitivity and specificity as measured by Area Under the Curve (*AUC*) or Receiver Operating Characteristic (ROC)=91 to 99 (Zagar & Grove, 2010). To contrast approaches, AUC, ROC, (sensitivity and specificity), interobserver reliability, and percentile hit or miss are listed as decimals and in this and following figures for comparison although not precisely equivalent mathematically.

The current ways on average have a miss rate of 61%. The current ways are physical-psychiatric exams, interviews and judgment, background and credit checks, and short risk tests.

Physical and psychiatric exams have .49 on average for interobserver correlation which when squared is even less and more comparable to AUC or ROC (American Board of Medical Specialties, 1986; Hsieh, Gutman, & Haliscak, 2000; Loke, Liaw, Tiong, Ling, & Chang, 2002; Madan & Harley, 2003; Bueno-de-Mesquita, Nuyten, Wesseling, van Tinteren, Linn, & van de Vijver, 2009).

Interviews and judgment are an averagehit rate across of .46 converted from percentile to a decimal for these studies (Sepejak, Menzies, Webster, & Jensen, 1983; Lidz, 1993; Monahan, 1996; Rice, Harris, & Quinsey, 1996). Background checks have a hit rate of .25 (Quinsey, Harris, Rice, & Courmier, 1998, 2006, 2015).

Short tests have sensitivity and specificity from AUC or ROC = .70 to .76 for: (a) the Arnold Risk Scale given freely to 15 states by the Arnold Foundation, .75; (b) the Violence Risk Appraisal Guide (VRAG), .76, (Quinsey, Harris, Rice, & Courmier, 1998, 2006, 2015); and (c) the Sex Offender Risk Appraisal Guide (SORAG), .70, (Quinsey, Harris, Rice, & Courmier, 1998, 2006, 2015).

For the remaining studies, the accuracy is: (d) the Classification of Violence Risk (COVR), 70; (Monahan et al., 2000); and (e) the Static-99, .75, (Hanson & Thornton, 2000). For risk tests, the AUC or ROCs were .75, .76, .70, .70, .75 or M = .73. See Figure 4 for the M = .39 hit rate of conventional approaches which is less than chance.



Figure 4. Internet-based tests are better than conventional ways: .91-99 vs. .25-76 (current ways miss 60%)

One would be better flipping a coin than using current ways. From this Figure 4, one can see conventional approaches have a hit rate on average of 39% or 1 out of 3 cases and a miss rate of 3 out of 5 cases.

The risk tests have an average of 73% hit rate or 3 out of 4 cases but a miss rate of 1 out of 4 persons. The Standard Predictor in addition to conventional approaches has a hit rate of .91 to .99.

As the reader will note later, because of the conventional use of interviews, background checks, physical and psychiatric exams and short tests, Rice, Harris, and Quinsey (1996) demonstrated that *forensic providers seemed* most ready to release without supervision those most likely to reoffend violently. These same professionals were retaining or recommending intense supervision for the least dangerous patients.



Figure 5. Physical and psychiatric exams on average miss 51% which is less than chance probability

*Note*. Physical Exams include (American Board of Medical Specialties, 1986; Hsieh, Gutman, & Haliscak, 2000; Loke, Liaw, Tiong, Ling, & Chang, 2002; Madan & Harley, 2003; Bueno-de-Mesquita, Nuyten, Wesseling, van Tinteren, Linn, & van de Vijver, 2009).

See Figure 5 for the physical examination inter-observer agreement that has range from rs = .20-.85 depending upon the medical specialty, presenting illness, and the complexity of the sickness. The mean interobserver reliability was .49. This could be interpreted as a 51% miss rate.

In an unpublished study from the American Board of Medical Specialties (1986), inter-observer agreement among physicians was from .20 to .70 depending on whether psychiatrists, internists, or surgeons were studied. Loke, Liaw, Tiong, Ling and Chang (2002) reported that among 2,200 nurse-physician observations, interobserver agreement were from .27 to .37 on cardiovascular, respiratory, gastrointestinal, urinary, endocrine, joint/skeletal, cerebrovascular, infectious, muscular, oncology, psychiatry, gynecological, eye-nose-throat, dermatology, trauma, fracture, and burns.

Madan and Harley (2003) reviewed 114 segments of 23 limbs with inter-observer agreement were from .39 to .52. Among 694 patients grading breast sample nodes, the inter-observer agreement was from .56 to .85 (Bueno-de-Mesquita et al., 2009). Perez-Stable, Miranda, Munoz and Ying (1990) found that physicians under-recognized and misdiagnosed depression in 64.3% of 70 patients.

In another study, Singh, Meyer and Thomas (2014) estimated 5% of patients are misdiagnosed every year, which is likely an underestimate. In a random sample of 169 adults (41 males, 28 females, Mage = 44.6+11.3) and 31 adolescents (12 boys, 11 girls, Mage = 13.9 + 7.5, 61% had a disagreement on primary, secondary and/or tertiary assessment.

After seeing these kinds of inaccuracy, insensitivity and lack of specificity, one wonders why deterministic algorithms are not used more often rather than conventional subjective human analysis (Siegel, 2015). Tossing a coin would be more precise than either conventional approach of background/credit check, judgment/interview or physical/psychiatric exam.

Yet for decades, clinicians, executives, human resources, judges, lawyers, among others rely on current ways in important decision making. This occurs despite the inaccuracy 54% to 61%.

To support deterministic algorithms, in 128 of 131 studies (Grove & Meehl, 1996), risk tests were found to be superior to clinical judgment. For more detail on these 131 studies please read Grove, Zald, Lebow, Snitz, and Nelson (2000).

See Figure 6 for the comparison of how inaccurate clinical judgment is. In 4 studies on the inaccuracy of forensic examiner, the hit rates are .39, .53, .64 and .30 with M = .46 hit rate. Forensic professionals miss 54% of risky dangerous persons.

This is close to the combined inaccuracy of background checks, interviews, physical and psychiatric exams, and short risk tests that have miss rate of 61%.



Figure 6. Interview-judgment in violence prediction miss rate 54% in finding at-risk persons

*Note*. Interviews and judgment as a percent converted to decimals (Sepejak, Menzies, Webster, & Jensen, 1983; Lidz, 1993; Monahan, 1996; Rice, Harris, & Quinsey, 1996), Background, credit checks (Quinsey, Harris, Rice, & Courmier, 1998, 2006, 2015).

With clinical judgment, Sepejak, Menzies, Webster, and Jensen (1983) discovered that providers over 2 years were only 39% precise in rating potential violence. Six months post discharge, Lidz (1993) showed that mental health clinicians correctly predicted only 53% of violent patients.

Likewise, 6 months after release, mental health care professionals predicted only 64% of "safe" patients. With dangerous, institutionalized patients, Monahan (1996) found that mental health professionals were only 30% accurate in prediction of violence which is a 70% miss rate.

One of the reasons for misdiagnosis or a lack of sensitive and specificity besides conventional inaccurate approaches, noted above, is deceptive self-presentation. There are seven reliable, valid scales of deceptive self-presentation (lie, infrequent responding, defensiveness, superlative self-presentation, response inconsistency, variable response inconsistency and infrequency at back end of test) on the Minnesota Multiphasic Personality Inventory Second Edition (MMPI-2) (Pope, Butcher, & Seelen, 2004).

Because there is a Poisson's distribution of deception (7 x 6 x 5 x 4 x 3 x 2), there are 42,300 deceptive self-presentations. As seen in Figure 7, when the deceptive self-presentations are multiplied times 1,000 neurological and psychiatric illnesses (Diagnostic Statistical Manual Fifth Edition (DSM-V), American Psychiatric Association, 2013); International Classification of Diseases (ICD-9/10) (World Health Organization, 1977, 2013), [40,300 x 1,000] there are 40,300,000 possible deceptive self-presentations.

With that many deceptive self-presentations, internet-based tests can match the complexity of the person coming before an examiner. No wonder current approaches of judgment, background checks, interviews, physical exams, and short tests are no match for objective, sensitive (finding the actually high-risk persons) and specific (avoiding falsely labelling low-risk persons) internet-based tests.



Figure 7. 40,300 kinds of self-deception with 1,000 illnesses producing 40,300,000 deceptive presentations

## 6. Internet-Based Test Are Sensitive and Specific: .94- .98



Figure 8. Sensitivity and specificity for BSS, MMPI, SP, QT and Ravens (records as the criterion) [N=236]

In Figure 8 for the total test battery (BSS, MMPI, SP, QT, Ravens), the True Positives (*TPs*) are 245 of 253 (97% sensitivity). The True Negatives (*TNs*) are 449 of 464 (97% specificity).

For suicide, the Beck (BSS) among the 236, the *TPs* are 2 of 2 (100% sensitivity). The *TNs* are 227 of 234 (97% specificity).

Test Battery <sup>a</sup>	Measure	Predictive Performance
True Positives (TPs)	False Negatives (FNs)	
248	8	Sensitivity 97%
False Positives (FPs)	True Negatives (TNs)	
18	906	Specificity 98%
BSS	Suicide Potential <sup>b</sup>	
True Positives (TP)	False Negatives (FNs)	
2	0	Sensitivity 100%
False Positives (TP)	True Negatives (TNs)	
7	227	Specificity 97%
MMPI-2/ MMPI-A	Mental Illness, Substand Deception	ce Abuse,
True Positives (TPs)	False Negatives (FNs)	
162	5	Sensitivity 96%
False Positives (FP)	True Negatives (TNs)	
4	65	Specificity 94%
Standard (Adult/Adolescent)	PredictorViolence/Abuse Potential	
True Positives (TPs)	False Negatives(FNs)	

Table 1. Sensitivity & specificity of internet-based tests for risks (N=236) with criterion of records

71	2	Sensitivity 97%
False Positives (FPs)	True Negatives (TNs)	
4	159	Specificity 98%
Ammons Quick Test (QT)	Communication or Left Brain Fun Receptive Vocabulary: IQ	ction:
True Positives (TPs)	False Negatives (FNs)	
6	0	Sensitivity 100%
False Positives (FPs)	True Negatives (TNs)	
2	228	Specificity 99%
Raven	Problem Solving or Right Function: IQ	Brain
True Positives (TPs)	False Negatives (FNs)	
71	1	Sensitivity 88%
False Positive (FPs)	True Negative (TNs)	
1	227	Specificity 99%

*Note.* Entries are the sum of positive or negative: <sup>a</sup> Test battery: TPs=2+162+71+6+7=248; FPs=7+4+4+2+1=18; FNs=0+5+2+0+1=8; TNs=227+65+159+228+227=906. <sup>b</sup> Entries are the sum: BSS TPs=2, items scored 0, 1, or 2 BSS total=20; FPs=7 total=15-19; Sensitivity, 100%; TNs few of 21 BSS items above 0; FNs=0; TN=227.

For mental illness, substance abuse and deception on the MMPI–2 or MMPI–A, the *TPs* are 162 of 167 (97% sensitivity). The *TNs* are 65 of 69 (94% specificity).

For violence on the Standard Predictor of Violence Potential Adult or Adolescent Versions (SP), the *TPs* are 71 of 73 (97% sensitivity). The *TNs* are 159 of 163 (97% specificity) (Zagar et al., 2013).

For vocabulary on the Quick Test, the *TPs* are 6 of 6 (100% sensitivity). The *TNs* are 228 of 230 (99% specificity).

For problem solving on the Raven, the *TPs* are 7 of 8 (88% sensitivity). The *TNs* are 227 of 228 (99% specificity).

In Table 1, the individual tests have sensitivity (88 to100%) and specificity (94 to 99%). The combined tests (Beck, MMPI–2 or MMPI–A, Quick Test, Ravens, and Standard Predictor) have *TPs* of 248 of 256 (97% sensitivity or finding the actually high-risk persons) and *TNs* of 906 of 924 (98% specificity or avoiding falsely labelling low-risk persons).

# 7. Executive Function Correlates with Other Tests and Test Item

To shorten test time, a series of studies were done to identify only the most essential elements; 4 subsamples received the Trail Making Tests A and B, Zagar Executive Function Test, and 1 Likert format item "I make poor decisions": (a) n=48 randomly selected from 181 abused children later homicidal teens with 181 controls, (Hughes, Zagar, Busch, Grove, & Arbit, 2009); and (b) n=48 randomly selected from 127 homicidal youth with 127 controls (Zagar, Busch, Grove, Hughes, & Arbit, 2009d).

Also these groups were studied: (c) n=48 randomly selected from 450 assaulting teens later homicidal adults with 450 controls (Zagar, Busch, Grove, & Arbit, 2009e), and (d) n=48 randomly selected from 646 sex offending (223 rapists, 223 molesters, 223 nonviolent controls) youth later sexual homicidal adults with 223 controls (Busch, Zagar, Grove, Hughes, Arbit, Bussell, & Bartikowski, 2009).

The Trail Making Test (TMT) is a measure of information processing speed, visual scanning ability, letter and number recognition and sequencing, ability to maintain two different trains of thought, and executive function that had significant (p<.01) Pearson product moment correlations (r) with Zagar Executive Function Scale, and the item on executive function in Table 2.

Table 2. Executive function	, Trail Making 7	Fest A & B, SP	decision making item	correlations ( $r = .82$ 95)	
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<b>Sest/Item:</b> Product-moment correlations (r) significant ( $p < .01$ )						
agar Executive Function: Abused Children Later Teens (n=48)						
Zagar Executive Function: Homicidal Youth (n=48)	.91					
Zagar Executive Function: Assaulters Later Adults (n=48)	.89	.87				
Zagar Executive Function: Sex Offenders Later Adults (n=48)	.88	.86	.84			
Trail making Tests A & B: total time: Seconds ( <i>n</i> =48)	.92	.95	.92	.94		
Standard Predictor Poor Decision Making Item (n=48)	.83	.85	.90	.84	.82	

*Note.* From 4 ground breaking studies on 181 abused children later homicidal teens with 181 controls (Hughes, Zagar, Busch, Grove, & Arbit, 2009), 127 homicidal youth with 127 (Zagar, Busch, Grove, Hughes, & Arbit, 2009d), 450 assaulting teens later homicidal adults with controls (Zagar, Busch, Grove, & Arbit, 2009e), and 646 sex offending (223 rapists, 223 molesters) teens later sexual homicidal adults with 223 controls (Busch, Zagar, Grove, Hughes, Arbit, Bussell, & Bartikowski, 2009)

The first beta testing was 236 individuals described above with male and female, adults and adolescents, working 120 job categories. A sample of 56 male and female adults (n=38) and teens (n=18) with the Mage =35.6 and 15.4 respectively were given the QT, BSS, MMPI-2 or MMPI-A, Raven, and SP. Another 57 male and female adults (n=30) and youth (n=26) with a Mage =41.6 and 14.4 respectively were given the same tests.

Fifty of the second sample were studied for comparing the internet scored tests versus the paper-and-pencil tests using r (.85-.99), sensitivity or finding the actually high-risk persons (.96-.98), and specificity or avoiding falsely labeling low risk persons (.96-.97) with the court and clinic records; in another beta test, n=6 graduate religious study students and 1 faculty member volunteers were also tested on the internet.

## 8. Avoid Losing Money by Targeting Jobs to At-Risk by Using the Internet-Based Test Model

A University of Chicago jobs program included 22,500 Chicago youth (R=14-24 years); n=350 were randomly assigned to 25-hour/week summer jobs; n=350 were given 15-hour/week jobs with 10-hour/week social-emotional learning classes. The remaining carried on with their lives as usual (Heller, 2014).

Arrests for violent crime decreased 43% among the 2 treatment groups compared with controls. The 3,000/student (1,400 for wages and 1,600 for administrative costs) had a yield of 1,700 in benefits from reduced crime with a return on investment or *ROI*=0.57 (Heller, 2014).

In layman's terms, this means a loss of \$0.43 for every 1 U.S. 2012 dollar spent.

In contrast, the "2009 to 2012 program within Chicago," a risk test regression was used to identify violent prone students with evidence-based diversions applied to 4,850 students with *ROI*=\$6.47. The difference in *ROIs* was \$0.57 versus \$6.42 with the latter targeting approach 11 times more cost beneficial and effective (Zagar, Grove, & Busch, 2013; Zagar et al., 2013).

Targeting of jobs resulted in a positive investment while random selection which is what most providers and decision maker now employ did not.

Public programs can do more with less by shifting from remediation to prevention that is targeted, not randomly assigned (Zagar, Grove, & Busch, 2013; Zagar et al., 2013; Heller, 2014; City of Chicago, 2014). This random assignment of treatment which lost money is the current conventional intervention approach.

Current applications of evidence based diversions do not have benefit or effect, because conventional ways don't involve targeting highest at-risk to save lives of individuals and money.

## 9. Summary Saving of 324 Lives and \$2,005,848,548 by Targeting At-Risk with Jobs

Year	•	Lives ( <i>n</i> )	Expense	Age of Group	Intervention
2009	-2012	104	\$491,748,548	Teens	Targeting jobs to at risk
2011	-2012		480,000,000	Teens Adults	Moving 2,600 youth and 26,786 adult nonviolent to electronic bracelets with no return to court
2012	2	55	283,500,000	Teens	Target jobs to at-risk
2013	5	78	405,000,000	Teens	Target jobs to at-risk
2013	5	11	50,600,000	Adults	Target jobs to at-risk
2014	Ļ	76	380,000.000	Teens	Target jobs to at-risk
2009	-2015	N=324	\$2,089,848,548	Teens	Target jobs to at risk/Move 29,710 nonviolent
				Adults	moved to bracelets with no return to court offenders

Table 3. Year, lives saved, fund saved (2012 U.S. \$), age of group targeted, and intervention in Chicago

In Table 3, the savings are: (a) from 2009 to 2012, n=104 lives \$491,748,548 with the former Chicago mayor (Saulny, 2009; Shelton & Banchero, 2009; Kapos, 2014); (b) from 2011 to 2013, \$480,000,000 moving the nonviolent to electronic bracelets with the president of the county; and (c) in 2012, n=55 lives in 2012 and \$283,500,000 with the current Chicago mayor.

There are savings of: (d) in 2013, 89 lives and \$455,600,000; (e) in 2013, n=11 lives and \$50,600,000 from targeting adult at-risk with jobs; and (f) in 2014, n=76 lives and \$380,000,000 with the current city mayor.

The total savings from 2009 to 2015 is 324 lives and \$2,005,848,548 (Saulny, 2009; Shelton & Banchero, 2009; Kapos, 2014; City of Chicago, 2014; Zagar et al. 2013; Zagar et al., 2013).



Figure 9. Chicago homicides: Target jobs lowering murders & move nonviolent to electronic bracelets

In Figure 9, Chicago homicides drop from 2009 through 2015 partially due to the U.S. Department of Justice and Chicago Public Safety Fund efforts of targeting jobs to at-risk youth. Critically, there were no recidivists or persons who returned to court among 56% of the more than 29,710 nonviolent offenders released from prison to electronic bracelets that is still going on today.

A similar drop is projected in the federal prisons, the first since 1980, and a fall of 12,000 inmates over 2 years. Being aware of the Midwestern movement of nonviolent to electronic bracelets with no recidivists by the Chicago and Cook County leaders, there was a concerted effort to reduce long mandatory minimum sentences of nonviolent offenders in federal prisons (Grossman, 2014) with United States Presidential commutations.

In November, 2015, President Obama used more Presidential commutations to release 6,000 nonviolent drug

offending federal prisoners.

#### **10. Application to Various Work Groups**

There are ten work groups that could benefit from internet-based tests, namely airlines, corrections, education, energy infrastructure, health facilities, military, nonprofit-religious, police, transportation, and veteran organizations with savings, internet and paper and pencil costs and population in Figure 10.

■Savin,	gs Internet Test Cost Paper-and-Pencil Test Cost Population
Total of 10 Groups Workers Compensation Veterans Truckers, Port Workers Prisoners Police First Responders Personal Injury Nonprofit-Religious Clergy Seminarians Teachers Military Energy Airlines	\$104,206,500,000 \$114,000,000 60,000 \$22,000,000 \$41,800,000,000 \$22,000,000 \$19,000,000 \$19,000,000 \$19,000,000 \$2,280,000,000 \$1,200,000 \$19,000,000 \$19,000,000 \$19,000,000 \$11,358,500,0
	0 20,000,000,000 40,000,000 60,000,000 80,000,000 100,000,000 120,000,000

Figure 10. 10 U.S. groups, populations, current & internet test costs, savings, & Return On Investment (ROI)

In Table 4, as the reader will clearly see the 10 work groups make up 40% of the U.S. work force and 15% of the U.S. population. By employing internet-based tests, 1 to 10% of the at-risk can be found and targeted with evidence-based diversions. These abovementioned costly risks are mass murder, suicide, homicide, PTSD, mental illness, and substance abuse.

There is a saving sare \$104,206,500,000 with Returns On Investment (ROIs) of \$2 to \$323 for every \$1 spent on internet-based tests. Not employing internet-based tests and continuing to use conventional approaches of background checks, interviews, and exams only results in continued lost lives and money due to violence.

#### 11. Pilots

In the U.S., there are 104,000 commercial pilots and 613,000 private pilots. Internet-based tests are consistent with helping decision makers identify pilot health risks and terror actions (New York Times, 2010). Risks include Air Force pilots with depression, PTSD, substance abuse/dependence, and suicide attempts (Otto & Webber, 2013).

In September 2014, a technician at an air-traffic control center set fire to the work station, which caused airlines to lose hundreds of millions of dollars when the center was closed for weeks (Guy, 2014; Slodysko & Rossi, 2014). There is also the use of intoxicants in the cockpit.

For example, there are 18 positive tests for poor decision making or drugs in 1997, 35 (1998), 32 (1999), 38 (2000), 38 (2001), 39 (2002), 32 (2003), 31 (2004), 41 (2005), 28 (2006), 44 (2007), and 34 in 2008 (FAA, 2009; Johnson, 2009).

The emotional dysregulation or alcohol violations are 8 (1997), 6 (1998), 11 (2000), 9 (2001), 22(2002), 15 (2003), 8 (2004), 13 (2005), 13 (2006), 9 (2007) and 13 (2008). Between 1999 and 2010 there are 2,009,762 pre-employment alcohol-drug tests with 27,625 violations, 2,460,029 random tests with 14,835 positives, 6,701 reasonable suspicion tests with 528 violations, and 9,910 post-accident tests and 135 positives.

To address this issue, 3 agencies (Federal Aviation Administration (FAA), the International Civil Aviation Organization of the United Nations and the European Aviation Safety Agency) have pilots go through annual physicals, and biannual exams after age 40 years. In the British Commonwealth, namely Canada, there are annual physicals and biannual after age 60 years.

In Table 4, column 4, the annual screening costs are \$1,430,000,000—testing costs \$71,500,000 (column 5) \$1,348,500 (column 6) with *ROI*s from \$9 to \$58 for every \$1 spent (column 6). See Figure 11 for pilot suicides resulting in passenger deaths. There was the 1999 flight on 31 October with 217 deaths.

There was the 1997 flight 19 December killing 104. A 2013 flight killed 27. On 9 February, the 1982 flight

crashed murdering 174. The 2014 flight had 239. The 2015 flight lost 150 passengers (Jansen, 2015; Cox, 2015).

Table 4, 10 U.S.	groups, populations	. risks, test & internet	costs, savings, &	& Returns On I	nvestment (ROI)
	0- • • • • • • • • • • • • • • • • • • •	,,		• • • • • • • • • • • • •	

Group (1)	Population (2)	Risks (3)	Test Costs (4)	Internet Test Cos (5)	stsSavings (6) ROI( 7)
Pilots (A)	102,000 Commercial + 613,00 Private Pilo $N = 715,00$ Total Pilots	1 st 1 attempt, 00depressed, tssubstance 00abusers/dep ent, 23 1 P	uicide\$2,000/paper-and-per 571 test @ 715,000 40\$1,430,000,000 pend FSD <sup>1</sup>	ici \$100/ internet-bas =test @ 715,000 \$71,500,000	ed\$1,348,500,000 <b>\$9-58</b> =improving thefor quality ofevery pilots dollar spent
Energy (B)	n = 600,000	Nuclear p 1% n health is 1% subs abuse 1 later <sup>2, 3</sup>	ower:\$2,000/ nentalpaper-and-pencil test ssues,600,000 stance\$1,200,000,000 1-year	\$100 @internet-based to =@600,000 \$60,000,000	/\$1,140,000,000 <b>\$20 to</b> estreducing <b>90</b> =injuries and risks
Military (C)	200,000 Recruits 3,400,000 Active including Guard an Civilian Personnel <i>N</i> 3,600,000 Total	19.6% r +rejection psychiatric issues <sup>4,5,6,5</sup> boot nddrugs <sup>5</sup> sexual as =365 suicide =homicides year <sup>12</sup>	recruit\$2,000/ forpaper-and-penciltest 2 3,600,000 <sup>7</sup> 30%\$7,200,000,000 camp 672 ssault, es, 50 per	\$100/internet-base @test@ 3,600,000 =\$36,000,000	d \$7,164,000,000 <b>\$90 to</b> 0= <b>110</b>
Nonprofit Religious Clergy Seminarians (D)	4,000,000 Religious Nonprofit Total <i>N</i> 10,000,000	1% pedoph 20% n health is =4% subs abuse <sup>9</sup> pedophilia liability \$6 total settle: \$4.5B, 2 196 dic bankrupt, \$11.6B b receivables \$10.B expenses <sup>13</sup>	nilia <sup>8:</sup> \$2,000/paper-and-per nentalltest @ 10,000,000 ssues;\$20,000,000,000 stance 2007 515M, ments 1 of occeses pudget	nci \$100/internet-base =test @ 10,000,000 \$1,000,000,000	d/\$19,000,000,00 <b>\$250</b> =0 to screen for <b>to 323</b> crime, fraud, loss of productivity including homicide, suicide, pedophilia
Personal Inju (E)	ury <i>N</i> 2,000,000 Claimants	=\$16,000/cl nt \$32,000,00 09 <sup>15</sup>	aima \$2,000/paper-and-per orl test @ 2,000,000 00,00 4,000,000,000	ci \$100/internet-base =test @ 2,000,000 400,000,000	d \$3,600,000,000 <b>\$100+</b> =before depositions, trials dropping payouts
Police, F Public Saf (F)	ire,N ety1,200,000	=200 wro claims; mental h 1% subs abuse;	ongful\$2,000/paper-and-per 1%1 test @ 1,200,000 health;\$2,400,000,000 stance	tei \$100/ internet-bas =test @ 1,200,000 \$120,000,000	ed\$2,280,000,000 <b>\$20 to</b> =to reduce <b>100</b> wrongful claims improving

	15%	substance	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
	40% Workforce	suicide, PTS	D,			
U.S. Total	N 54,675,000, 00	=1-10%mass 0 murder homicide,	\$109,350,000,000	\$5,143,500,000	\$104,206,500,0\$ 00 3	2 to 23
Workers Compensation (J)	N = 60,00 Claimants	00\$24B medical, \$58 property \$24 cash <sup>17, 23</sup>	in\$2,000/paper-and-per BBI test @ 60,000 IB\$1,200,000,000	nci \$100/internet-base =test @ 60,000= \$6 000,000	ed \$ 50,\$1,140,000,000 before depositions, trials lowering payouts	10+
Veterans (I)	N 22,000,000	=1-5% fatigu 2% suici- attempts, 5 suicidal pla 4-12% PTS 11% substan use 25% ment or behavi adjustment disorder 2 suicides daily	ne,\$2,000/paper-and-per del test @ 22,000,000 %\$44,000,000,000 m, D, ce tal or 22 18,	nci \$100/internet-base ) =test @ 22,000,000 \$2,200,000,000	ed \$41, \$ =800,000,000 to1 reduce behavior adjustment disorders, violence, PTSD, substance use, suicides, homicides	10 to 00
Transportation, Port, Rai EngineersTruck ers (H)	N 14,500,000	=1% ment health; 1 substance abuse; 200 lar truck accider \$40M <sup>15, 16</sup>	tal\$2,000/paper-and-per %ltest @4,500,000 9,000,000,000 ge nts	nci \$100/ internet-bas =test@4,500,000 \$450,000,000	ed\$8,550,000,000\$ =to drop mental1 health, substance abuse, accidents, lower payouts	10 to 00
Prisoners Probation (G)	N 10,000,000	=15% ment illness substance use	tal2,000/paper-and-pend ortest @ 10,000,000 <sup>11,</sup> 20,000,000,000	cil \$100/ =internet-basedtest 10,000,000= \$1,000,000,000	\$19,000,000,00\$ @0 te 2	3.33 D 0.41
		1% viole 515 suicid yearly <sup>10</sup>	ent es		safety	

*Notes.* <sup>1</sup> Otto and Webber (2013); <sup>2</sup> U.S. Nuclear Regulatory Commission (2013); <sup>3</sup> Bromet, Dew, Parkinson, and Schulberg (1988); <sup>4</sup> USDOD, AMSARA (2007); <sup>5</sup> USDOD, AMSARA (2008); <sup>6</sup> U.S. Department Sexual Assault Prevention and Response (2007); <sup>7</sup> USDOD, AMSARA (2009a); <sup>8</sup> Mokros, Osterheider and Neitchle (2012); <sup>9</sup> Virginia (1998); Knox, Virginia, and Lombardo (2002); <sup>10</sup> Fyfe and Kane (2005); <sup>11</sup> Teplin (1994); 12 U.S. Department of Defense (2009b); <sup>13</sup> U.S. Conference of Bishops (2014); <sup>14</sup> U.S. Bureau of Justice Statistics (2013); <sup>15</sup> Terry (2011); <sup>16</sup> Zaloshnja, Miller, and Spicer (2000); <sup>17</sup> Willingham, Gollogly, and Morrell (2000); <sup>18</sup> U.S. Department of Veterans Affairs Office of the Actuary, Veteran Population Projection Model (2014); <sup>19</sup> Kang, Natelson, Mahan, Lee, and Murphy (2003); <sup>20</sup> U.S. Energy Information Administration (2009, 2013); <sup>21</sup> Salamon, Sokolowski, and Geller (2012); <sup>22</sup> American Association of Port Authorities (2014); <sup>23</sup> Insurance Information Institute (2015). Boldface results represent the most important.

Of 2,758 aviation accidents recorded from 2003 to 2012 only 8 were suicides, a decrease of 50% from the prior decade with 12 (CAMI, 2006; 2014). The 2015 pilot who crashed the flight was seen by 46 physicians which is a demonstration of why internet-based tests are needed (Eddy & Clark, 2015).

Tests are consistent with replacement of inadequate conventional approaches of interviews, physical exams

including psychiatric assessment and short tests that have a miss rate of 54 to 61% of at-risk.



Figure 11. U.S. aircraft assisted pilot suicides and world commercial pilot suicides 1982-2015

#### 12. Energy Workers

4,000 U.S. nuclear power plant controllers supply 20% of the electricity. The probability of some depressed or suicidal individuals among these controllers is ample reason to consider internet-based tests (Bostok & Daley, 2007).

In the past, the senior author personally examined a cluster of 3 completed suicides at a Midwestern nuclear plant. There are about 600,000 workers involved in the various sectors of energy production (Bromet, Dew, Parkinson, & Schulberg, 1988; U.S. Energy Information Administration, 2009; U.S. Nuclear Regulatory Commission, 2013).

The cost for screening for all energy workers is \$1,200,000,000 (Table 4, Column 4) with internet test costs of \$60,000,000 (Table 4, Column 5) saving \$1,140,000 (Table 4, Column 6) with *ROI*s of \$20 to \$90 (Table 4, Column 7) for every \$1spent.

#### 13. Internet-Based Tests Can Help Lower Military Violence

There were psychiatric, substance abuse and violence issues in the military. In 2006, the U. S. Army had a rejection rate of 1,472 of 43,574 recruits after training; 19% of recruits were discharged for unidentified psychiatric issues; 1.2% of U.S. Marines were discharged because of substance abuse; 1.0% of enlisted recruits dropped out.

Recruitment interviews were consistent with 13.9% soldiers considering suicide, 5.3% with a suicide plan, and 2.4% attempted suicide with between 47-60% of these outcomes existing prior to joining the military. Often, PTSD issues led to suicide (Davidson, Hughes, Blazer, & George, 1991).

In 2006, the joint forces officers had recruits with an overall accession rate of only 46% meaning a 54% miss rate. In 2008, the joint forces, Reserves, and National Guard had 196,000 trainees and 1,450,000 enlisted (U.S. Department of Defense (USDOD), AMSARA, 2009a, 2009b, 2009c).

Costly offenses are perpetrated by military personnel. In 2004, there were 1,798 sexual assault claims, of which 672 resulted in punitive damages (USDOD Sexual Assault Prevention and Response, 2006); 32% of enlisted women felt sexually harassed (Bostok & Daley, 2007).

This could be explained by the fact that 13% of U.S. Navy enlisted men had committed sexual assault prior to service (Stander, Merrill, Thomsen, Crouch, & Milner, 2008). In Figure 12, the number of risks or incident diagnoses was going up, which was a good reason to use internet-based tests.



Figure 12. 2001-2011 U.S. military work incidents: Armed Forces Medical Surveillance Center (2012)

The top curve has total suicides from 1980 to 2013. There are 8,452 costing \$8,452,000,000. The middle curve has the total homicides from 1980 to 2013.

There are 2,341 costing \$2,341,000,000. In Figure 13, the mass murders, suicides and homicides in the active duty armed forces from 1980 to 2013 are presented. If one assumes that a life was worth \$1,000,000, then multiply each year's death by this amount.

There were a total of 30 mass murders from 1980 to 2013. These cost \$30,000,000. Recently, among the general U.S. population, there were 300 mass murders in one year.



Figure 13. U.S. Department of Defense (DOD) military 1980-2013 homicides suicides mass murders

Risk tests were consistent with more accuracy than drug testing (Non-Instrumented Drug Test) introduced to the U.S. Navy, which reduced positive boot camp drug tests by 30%, saving \$3,300,000 annually (Norbert, 2002). A risk test was consonant with detection of a far greater range of potential problems with better sensitivity and specificity.

The cost of finding, recruiting and boot camp training is \$46,000, with an attrition rate of 19%. So that was \$1,800,000,000 lost every year by training persons with mental health, substance abuse, or violent tendencies.

In Table 4 Column 4, the cost of paper-and-pencil tests is \$7,200,000,000. Internet-based tests cost \$36,000,000 (Table 4, Column 5) saving \$6,840,000,000 (Table 4, Column 6) with *ROIs* of \$90 to \$100 (Table 4, Column 7).

#### 14. Nonprofit and Religious Organizations

The Roman Catholic Church has 40,000 active priests, 3,000 active seminarians, 16,000 active permanent deacons, and 65,000 nuns plus monks. There were 7,000 Catholic schools with teachers and youth group

volunteers. Worldwide, some 0.5% to 1.0% of Catholic clergy, regardless of age, education, ethnicity, race, or socioeconomic class, were accused of sexual offenses (Zagar, 2013). Roughly 80% of these accused cases were in the U.S. although the rates of pedophilia are the same worldwide.



Figure 14. 1984 to 2013 U.S. Roman Catholic Church settlements for misconduct including pedophilia

Although pedophilia was a problem, in the E.U., the legal and the financial consequences were not so extreme. In 2007, the total pedophilia liability payout by the Roman Catholic Church was \$4,520,363,843.

In 2008, the annual U.S. cost was \$436,000,000. In Figure 14, Gallagher Insurance paid out \$1,500,000,000 (Wilhelm, 2012; United States Conference of Catholic Bishops, 2014). In Table 4, Column 4, the cost of paper-and-pencil testing of all nonprofit religious personnel (clergy, teachers, youth workers) is \$20,000,000,000. The internet-based tests cost \$1,000,000 (Table 4, Column 5).

The saving is 19,000,000 (Column 6). There are very high ROIs = 250 to 323 (Table 4, Column 7) for every 1 spent. Given the current rate of 21 bankruptcies since 1994 among 196 U.S. Roman Catholic dioceses, the projection is that by 2136 all 196 will declare bankruptcy as shown in Figure 15.



Figure 15. 196 U.S. Diocese will go bankrupt by 2136 given the current rate of 21 since 1994-2016



Figure 16. Catholics as a percentage of the U.S. population will drop to 0% in 5 centuries or by 2515

As seen in Figure 16, the percentage of Catholics in the U.S. population will drop to 0% in five centuries by 2515. These are case studies of the current approach of assessment that misses 60% of at-risk for violence. The result is loss of customer base and revenue accrued over centuries at the rate of over a hundred million in 2012 U.S. dollars in annual settlements. This could be a case study for all religious nonprofit groups. There are currently 196 U.S. Roman Catholic dioceses with 117,531 workers and 1% pedophilia which results in 1,175 pedophiles not identified with internet-based tests or 6 per diocese. The U.S. Roman Catholic diocese pays out \$123,000,000 yearly and has paid out, \$4,520,363,843 which is \$1,130,090 per pedophile priest complaint assuming 4,000 pedophile priests reported.

Given the 6 pedophiles/U.S. Roman Catholic diocese not identified (a) 1,130,090 = projected loss \$6,780,540/diocese. The internet tests cost for 117,531 U.S. religious workers (a) \$100 each = \$11,753,100. There are \$11,900,000,000 U.S. Church annual receipts + yearly expense of \$10,700,000,000. Saving on settlements is crucial. For Poland, there are 28 dioceses and 28,457 priests (a) 1% pedophilia = 285 pedophiles not identified. The U.S. loss of \$1,130,000 per complaint projected upon Poland's Roman Catholic Church of 285 = \$11,300,000 loss. The internet test cost for 28,457 (a) \$100 = \$2,845,700 saving billions not to mention the victims lives.



Figure 17. U.S. Canadian and Polish Roman Catholic Church pedophile loss, yearly & 2002-13 revenue loss, total loss, future payout, 2014-24 revenue loss, total future loss, total past & future loss, internet test savings

Harvard trained economist and Microsoft postdoctoral fellow Perez-Truglia found yearly lost revenue by taking 1.3% x 3,000 scandals = \$1,770,000,000/year lost revenue (Rotondaro, 2016). Given each pedophilia-affected zip code/year, there is an estimated U.S. Roman Catholic loss of 1.3% in total charitable contributions. Non-itemized contributions are 25% of all giving. Perez-Truglia assumed a similar effect on non-itemized givers. Pedophilia scandal costs 590,000,000/year = \$1,770,000,000 + \$590,000,000 = \$2,366,000,000/year (Ruhl & Ruhl, 2016).Charitable giving does not bounce back. There is an estimated 9-14% decline in U.S. Roman Catholic affiliation due to the pedophilia scandals. Economic effects are localized to the area or diocese. People stop going to church, seized giving, and don't use U.S. Roman Catholic schools. Applying \$2,366,000,000 loss from 2002-2013 = 11 vears @ \$2,366,000,000 = \$26,026,000,000 loss + \$4,520,363,843 cumulative pedophilia settlement = \$30,546,363,843 current loss. Internet testing of 117,531 @ \$100 is \$11,753,100. Add future U.S Roman Catholic Church pedophilia settlements by applying 1% to total religious 117,531 using the \$1,130,090 per pedophile priest in the past gives \$1,328,985,848 + future revenue lost/year from 2014-2023 @ \$2,366,000 x 10 years = 23,660,000,000 + 1,328,985,848 = 24,988,985,848. Past and future loss is 55,535,349,691, potentially causing swifter bankruptcy. The Canadian Catholic population is 13,000,000, 39% of Canada. Canada has roughly 10% U.S. population (Catholic Hierarchy, 2011). For simplicity Canadian dollar = 2012 U.S. dollar. Canadian Church paid out \$1,100,000,000 for 375 cases (CBC, 2011). Based on the population difference, one applies the 10% to the U.S. loss revenue of 2,366,000,000 from 2002-2013 = 2,366,000,000 loss + 1,100,000,000 = pastloss +\$2,606,000,000. With 18 Canadian dioceses, 8,441 priests (1% pedophilic by fact) = 84 pedophiles (a) total Canadian settlements = \$1,100,000,000 divided by 375 = \$2,933,333. This is multiplied times 84 = \$246,400,000 future estimated payout. One adds future lost yearly revenue from 2014-2023 = \$2,366,000,000 + \$246,400,000 =future loss = \$2,612,400,000. That total present and future loss = \$6,315,000,000 for Canadian Roman Catholic Church. Internet test for 8,441 priests @ 100 = 844,100 saving billions not to mention the victims scared by abuse. E.U. Polish Roman Catholic Church has similar declines in giving and affiliations. Poland has roughly 10% of the U.S. population. Roman Catholic religion is the dominant affiliation among 95%. Poland provides for 95% of E.U. Roman Catholic priests who are missionaries to other E.U. nations (Catholic Hierarchy, 2011). For simplicity assume the E.U. dollars or Polish zloty = 2012 U.S. dollars. At 10% of the U.S. lost yearly revenue 2,366,000,000 = 236,600,000 is the lost revenue from 2002-2013. Add estimated future cost of 1% of Polish priests = 285 @ \$1,130,090 (the U.S. cost/pedophile priest) = \$11,300,000 + projected lost revenue from 2014-2023 for 10 years (a) \$236,600,000 = 2,366,000,000 = \$2,377,900,000. The total past and future loss is \$4,980,500,000. A study comparing English and Polish language on the tests was done on low and middle SES persons (similar to Zagar, Kovach, Basile, Hughes, Grove et al., 2013). There was a random sample of 100 bilingual English-Polish teens (63 boys, 37 girls) M age = 15.7 + 1.9 years and 100 bilingual English-Polish adults (62 males, 38 females) M age = 29.3 + 11.2 years. From the U.S. Department of Labor Dictionary of Occupational

Titles for the combined group of 200, there were 101 different jobs collapsed into categories making up 402 positions or student status in the life career. A single person could have more than one position, job, or status. These were accountant (2), chief executive (2), janitor (2), pilot (2), deliveryman (2), coach (2), energy plant controller (2), nurse (2), police officer (2), manager (2), truck driver (2), roofer (3), farmer (3), guard (3), realtor (3), professor (3), banker (4), programmer (4), teacher (6), babysitter or caretaker (12), minister, monk, priest, rabbi (11), Army Navy Air Force military (11), seminarian or religious graduate student (27), high school students (88), college, graduate or professional level students (120), and Army Navy Air Force veterans (22). Following established translation protocol of multiple sequential versions for improved accuracy (Butcher, 1996; Butcher et al., 2000), there was a teen and adult combined sample of 200, who were administered the final version of the 5 tests. Significant Pearson correlations (p < .01) for the English and Polish, teen and adult samples on the tests were Ammons QT form 1, .88, .91, form 2, .84, 90, form 3, .86, .85, Beck, .91, .93, MMPI-A/2, L, .88, .94, F, .92, .83, K, .82, .87, Hs, .85, 81, D, .80, 95, Hy, .79, .78, Mf, .76, .75, Pa, .91, .88, Pt, .87, .86, Sc, .81, .84, Ma, .77, .89, Si, .80, .75, Ravens, .76, 84, Standard Predictor, .88, .90. Internet based tests are useful.

## **15. Personal Injury Cases**

In the U.S. yearly, there are 2,000,000 personal injury cases. The average cost is \$16,000, with a 2 year time to trial or a mutually agreed upon settlement, representing \$32,000,000,000.

Over half involve automobile accidents, followed by medical malpractice and product liability. Auto accidents settle for a median \$16,000, medical malpractice, \$679,000, and product liability, \$748,000.

Plaintiff success rates are 60% for auto accidents, 40% for product liability, and 20% for medical malpractice (Terry, 2011). The cost of a paper-and-pencil exam is \$2,000.

The internet-based test costs \$100 resulting in savings to the insurance carriers. In Table 4, Column 5 the internet-based tests cost \$40,000,000 (Table 4, Column 6). The savings are \$3,600,000,000. There is an *ROI* of 10 + (Table 4, Column 7) for every \$1 spent.

#### **16. Public Safety and Police**

Annually, one of 154 police is accused of inappropriate or illegal violent behavior. One homicide out of 1,549 deaths caused by public safety personnel was inappropriate or illegal.

So roughly 1% of police may be assumed to be at-risk, given that accurate statistics were not collected. With 1,200,000 public safety officers, there are 200 yearly wrongful injury or death claims.

Between January 2009 and November 2011, the City of Chicago treasurer paid \$455,000 for 441 lawsuits—a rate of \$5.54 annually per city resident. Between 2009 and 2010, that is more than twice as much as in Los Angeles (\$2.66), and roughly half as much as in New York City (\$9.93) (Caputo, 2012). New York City officials paid out \$100,000 yearly, costing \$1,000,000,000 in a decade (Fields & Jones, 1999; Fyfe & Kane, 2005).

That is \$2,575,000,000 wasted human capital (direct and indirect expenditures) for the police lost in one year. Chicago has the highest police liability payout per citizen in the U.S.

Since 2004 misconduct legal claims against the Chicago Police Department cost \$542,000,000 (Schroeder, 2016) with 450 current outstanding police misconduct lawsuits. In Table 4, Column 4, the cost of screening for all public safety officers in the U.S. is \$2,400,000,000.

The internet-based tests cost \$120,000,000 (Table 4, Column 5). There is a saving of \$2,280,000,000 (Table 4, Column 6).

There are *ROIs* of \$20-\$100 (Table 4, Column 7) for every \$1 spent. See Figure 18 for the number of police officers killed and the suicides (Aamodt & Stainaker, 2006; Badge of Life, 2012; National Law Enforcement Fund, 2015).

For every police officer killed or police officer suicide multiply \$1,000,000 the minimum cost of training and replacing that public safety officer.



Figure 18. Annual U.S. police officers killed and suicides from 1998 to 2013

## **17. Prisons and Courts**

One third of the annual cost of crime in the US (\$37,000,000,000) is the expense of running the U.S. prison system. Imagine what could be done by moving 50 to 80% of the prisoners to electronic bracelets and the savings that would be generated.

Currently, because the Arnold Risk Test is free, it is being used in 16 states despite the fact that it has a miss rate of 30% of violent prone. To assure the safety of the community, internet-based sensitive and specific tests could be used to lower the risk and manage it.

Paper-and-pencil tests for all prisoners cost \$20,000,000 (Table 4, Column 5). Internet-based tests cost \$1,000,000,000 (Table 4, Column 4). The saving is \$19,000,000,000 (Table 4, Column 6).

In Cook County, the president released 56% nonviolent offenders to electronic bracelets with no recidivism and no lowering of community safety (Olson & Taheri, 2012; Zagar, Busch, & Grove, 2013). There is a cost incentive to releasing nonviolent offenders to electronic bracelets.

For example, in New York, the annual prison expense is \$3,267,105,290. Nonviolent prisoners make up \$2,705,422,825 of that cost. Internet-based testing and electronic bracelets would cost \$126,353,500.

From state to state, the *ROIs* of moving nonviolent offenders to electronic bracelets and assuring the safety of the community by using internet-based tests to screen these prisoners range from \$2 to \$20 (Table 4, Column 7). This allows states to release a majority of those behind bars thus freeing funds to spend on the decaying infrastructure.

#### 18. Transportation (Ports, Rail Engineer, Truckers)

The cost of 200 yearly large truck accidents averages \$40,000,000 each, or \$8,000,000,000; 5,000 nonfatal truck accidents cost an average \$11,000 expense or \$55,000,000. That is an \$8,055,000,000 yearly expense.

Annual large truck crashes cost \$24,000,000,000 in 1977 (\$13,000,000,000 for quality of life, \$9,000,000,000 for productivity loss, \$1,000,000,000 for property loss, \$941,000,000 in expenses, and \$58,000,000 for emergency service) (Miller, 1997; Zaloshnja, Miller, & Spicer, 2000; National Center for Statistics and Analysis Advanced Research and Analysis, 2003; U.S. Department of Transportation, National Highway Traffic Safety Administration, 2014).

Imagine using internet-based tests to address the psychiatric, substance abusing and violence risk of transportation and port workers. Table 4, Column 4 has the \$9,000,000,000 cost for paper-and-pencil tests. In Table 4, Column 5, the internet-based tests cost is \$450,000,000.

The saving is \$8,550,000,000 (Table 4, Column 6). The ROIs are \$10 to 100 for every \$1 spent.

## 19. Veterans



Figure 19. Infant, child, teen and adult evidence based diversions compared in lives saved

In Figure 19, basically 48% of persons could be saved from homicide with empirical diversions because 8 + 8 + 14 + 18 = 48% out of 1,200. The largest effects of targeting evidence based diversions are in teen and adult years. If one converts the total diverted in infancy, 24/145 = .17, in childhood, 25/145 = .17, in adolescence, 42/145 = .29, and in adulthood, 54/145 = .37, then one can compare infancy-childhood, 17 + 17 = 34, adolescence, 29, and adulthood, 37 which add up to 1.00 allowing a clear comparison of the relative effects of targeting evidence based diversions across development.

Perhaps focusing on at-risk adults with the same evidenced based diversions of jobs, mentors, and anger management might be economical. With the increasing slope of the effect of evidence based diversions in adulthood, perhaps there might be a better *ROI* in adulthood. Also in the future targeting high risk infants-children is likely economical in lives and expenses saved.

Each year, newly discharged military personnel join with the 22,000,000 total veterans (Kessler et al., 2014; Army Study to Assess Risk and Resilience in Service members (Army STARRS), 2004-2009; Schoenbaum et al., 2014; Nock et al., 2014). Veterans have risks for mental illness, substance abuse and violence.

Among veterans, an astounding 60% are substance-abusing (U.S. Department of Veteran Affairs, Office of the Actuary, 2014). Kang, Natelson, Mahan, Lee, and Murphy (2003) found that among 20,000 veterans 1-5% had chronic-fatigue-syndrome, 2% attempted suicide, 5% had a suicide plan, 4 to12% had PTSD, 11% were substance abusers, 14% were depressed with suicidal thoughts, and 25% had mental illness or behavioral adjustment issues.

Coughlin, McNeil, Provenzale, Dursa, and Thomas (2013) confirmed these results among 529,000 veterans with 2% PTSD, 10% disability, and 19% mental illness challenges (U.S. Department of Veteran Affairs, Office of the Actuary, 2014).

If one could use internet-based tests, risks among veterans could be identified. With evidence based diversions, veteran homicides and suicides could be reduced.

The cost to give paper-and-pencil tests is \$44,000,000,000 (Table 4, Column 4). The internet-based tests cost \$2,200,000,000 (Table 4, Column 5).

The saving is \$41,800,000,000 (Column 6 in Table 4). The ROIs are \$10 to \$100 for every \$1 spent.

#### 20. Workers' Compensation

In 2009, there was over \$600,000,000 in workers' compensation claims. The medical payments made up 53% of the costs. Indemnity was the remainder. In 2013, there were \$106,000,000 in claims, \$24,000,000,000 in cash payments with an average weekly off work benefit of \$832, \$17,000,000,000 employer insurance premiums,

4,000 workplace deaths and 40,000 workplace injuries (Insurance Information Institute, 2015).

To get an idea of the diagnoses among workers' compensation claims one can look at medication. Among 60,000 claimants, the most common medication was a pain killer. Second were anti-depressants (Willingham, Gallogly, & Morrell, 2000). So pain was first and depression second.

In order to focus evidence-based treatments on the depression and to reduce the claims, perhaps internet-based tests could be used. Paper-and-pencil exams cost \$1,200,000,000 (Table 4, Column 4).

Internet-based tests are \$60,000,000 (Table 4, Column 5). The saving is \$1,140,000,000 (Column 6). The *ROI* is \$10 for every \$1 spent.

A case study might be the recent professional football player homicide case. During Hernandez's college career in Florida Tebow tried to intervene in a bar fight. The professional club had personality test results for the perpetrator during pre-employment screening.

These were consistent with an aggressive, angry and assaulting person "living on the edge of acceptable behavior". The football club was cautioned about him "becoming a problem for the team" according to Clegg (2013).

Jones (2013) noted that the East Coast professional football club losing \$15,037,000 in the signing bonus, and a major hit to their salary cap with his guaranteed salary despite being convicted of homicide and in jail, but Rishe (2013) believed the loss is closer to \$12,700,000. The *ROIs* for this case study are 150,370 and 127,000 respectively for every \$1 spent given the cost of \$100 internet-based test.

#### 21. Diverting At-Risk Individuals from ER Hospitalization

At-risk people come to hospital Emergency Rooms (ERs). In 2014, there were 136,300,000 ER visits Over 10% (16,200,000) resulted in hospitalization. Just over 10% (2,100,000) of those were psychiatric hospitalizations.

The average psychiatric hospitalization increased from \$5,800 in 2003 to \$6,400 in 2011. In 2003, the normal length for a psychiatric stay was 6.9 days, which went up to 7.4 days in 2011.

In 2003, there were 1,800,000 psychiatric discharges which rose to 2,100,000 in 2011. That is nearly a half a million psychiatric hospitalizations or 400,000 to 450,000 per calendar quarter.

Compared with maternal neonatal, medical, surgical, and injury hospital stays, the psychiatric hospitalization was the longest (Weiss, Barrett, & Steiner, 2014). Psychiatric ER visits cost \$56 which is more than all other ER visits.

One percent of all health expenditures were for mental health and substance abuse. In 2009, the spending on substance abuse prescription medications was \$887,000,000; \$171,720,000,000 was paid to providers for mental health and substance abuse.

This can be broken down into \$147,381,000,000 for mental health. The remaining was spent on substance abuse.

There was \$10,461,000,000 for inpatient, outpatient and residential services (U.S. Department of Health and Human Services, 2009; 2014). Clearly sensitive and specific internet-based tests are consistent with a lowering of the 2,100,000 psychiatric hospitalizations.

Not only could these hospitalizations be reduced but those psychiatric hospitalizations that are necessary would be shorter with improved sensitivity and specificity of diagnosis so that evidence based treatments could be applied. Given the inaccuracy and lack of precision of conventional approaches of background checks, interviews, physicals and short tests, the violence from mass murders, suicides and homicides would also decrease significantly.

Tests are also consonant with a lowering in the number of return psychiatric ER visits that do not result in hospitalization. So millions to billions could be saved yearly and money generated for health rather than funneled to the prison system.

Physicians are losing millions to billions of dollars in revenue. Communities are less save because of miss rates for violence.

#### 22. Moving Severely Mentally III from Hospitals to Prisons: 1959-2013

Deinstitutionalization of psychiatric patients began in the 1940s. Beginning in 1955, millions of mentally ill individuals were set free (Stroman, 2003).

What is more, the release of the 94% of severely mentally ill without a concomitant use of effective risk assessment (conventional approaches of interviews and physicals) was directly associated with a rise in

homicide, mass murder, active shooting incidents, and suicide rates. In Figure 20, one has the numbers that are consistent with the movement of psychiatric beds to jail cells over time with a significant inverse correlation of r = -0.852, p < .01 (U.S. Bureau Justice Statistics, 2014; Statistical Abstract).

Around 1980, poor without support migrated from psychiatric beds to jail cells. Today, the largest asylums are prisons.



Figure 20. 1900-2014 prison 1955-2011 psychiatric bed rate/100,000 with mentally ill moving to jail cells

In Figure 21, the increasing size of the U.S. prison population is shown. This is historically the largest ever in the history of mankind (U.S. Bureau of Justice Statistics, 2014)

Meanwhile, there are nearly 350,000,000 guns in the U.S. This might be related to the public perception that communities are unsafe because the release of mental patients and the current inaccurate approaches in evaluation has led to an increase in the mass murders, suicides, and homicides and a rise in the prison population.

Economics and science should be applied to the growing violence by using internet tests to assist in assessment to lower the violence rates rationally. By using internet-based tests, prisons would be safer for workers and courts safer for judges and personnel.

Furthermore, jobs would not be lost by prison and court personnel. There would be less spent per prisoner by using electronic bracelets rather than room and board in jail.



Figure 21. 1980-2014 jail parole prison and probation population

#### 23. Ten Prisoner Characteristics and Empirical Diversions from Violence

In Figure 22, there are ten characteristics of offenders. First, 90% of the prisoners are poor, so jobs would help.

Second, 77% did not graduate high school, so pre-kindergarten low income infant schooling and prison secondary education with *ROIs* of \$20.57 and \$11.09 respectively are shown to be effective diversions from violence. Third, almost 70% have special education issues, either learning disability (56%), cognitive delay (11%) or attention deficit/hyperactivity (9%) and thus nurse family partnership child training (ROI = 17.49) or parent training (ROI = 2.64), and prison secondary education (ROI = 11.09) or vocational training (ROI = 11.62)

can aid.

Fourth, 56% of prisoners had single parents so functional family therapy (ROI = 13.69), and prison family integrated solutions (ROI = 4.20) are evidence-based solutions. Fifth, 48% of jailed are substance abusers and the community cost effective approaches are adolescent diversion (ROI = 21.24) and community drug treatment (ROI = 17.92) and in jail, juvenile drug court (ROI = 1.61), adult drug court (ROI = 1.10), and prison drug treatment (ROI = 4.88).



Figure 22. Percent of criminal-delinquent population with characteristic or descriptor

Sixth, 45% were unemployed, so jobs (ROI = 6.42), job training (ROI = 10.99) and interagency coordination (ROI = 25.03), prison jobs (ROI = 22.64) and vocational training (ROI = 11.62) are solutions. Seventh, 40% have chronic illness so health education and treatment help.

Eighth, 22% have an unknown religious affiliation consistent with socialization and executive function issues, so the community anger management training (ROI = 16.34) and prison cognitive behavior therapy (ROI = 98.09) are cost-effective. Ninth, 22% come from violent families or have violent relatives so community based, multi-systemic therapy (ROI = 4.27) or treatment oriented intensive supervision (ROI = 1.62) are solutions.

Tenth, 22% have severe mental illness challenges, which can be addressed with multidimensional foster care (ROI = 11.20), teen courts (ROI = 9.83), low risk offender restorative justice (ROI = 8.03 in the community or within the prisons' cognitive behavior therapy (ROI = 98.09) and treatment oriented intensive supervision (ROI = 1.62). This set of ten descriptors is similar to Standard Predictor algorithm for predicting homicide, pedophilia, and violence for both adults and youth (Zagar & Grove, 2010).

This set of ten characteristics is consonant with confirming the hypothesis of the sensitivity and the specificity of the cross validated and thrice replicated Standard Predictor predictive equation in the percentages of the offender population having these characteristics. In Figure 23, there a sample of at-risk first presented in Table 3 of Empirical risk factors for delinquency and bests treatments: Where do we go from here? (Zagar, Busch, & Hughes, 2009).



Figure 23. Infant, child, teen and adult evidence based diversions compared in lives saved

In Chicago applying the teen and adult solutions together, alternate thinking, life skills, quantum opportunity and job corps saved 324 lives and over \$2,089,000 in Chicago from 2009 to 2013 with a ROI = 6.42 for every \$1 spent. If one converts the total diverted in infancy, 24/145 = .17, in childhood, 25/145 = .17, in adolescence, 42/145 = .29, and in adulthood, 54/145 = .37, then one can compare infancy-childhood, 17 + 17 = 34, adolescence, 29, and adulthood, 37 which add up to 100.

Perhaps focusing on at-risk adults with the same evidenced based diversions of jobs, mentors, and anger management might be economical. With the increasing slope of the effect of evidence based diversions in adulthood, perhaps there might be a better *ROI* in adulthood. Also in the future targeting high risk infants-children is likely economical in lives and expenses saved.

But what is the larger picture of why tens of thousands die and tens to hundreds of billions are spent, if not a trillion, because of inaccurate conventional approaches of assessment and inadequate monitoring of interventions that are not evidence-based? In Figure 24, there are three triangles, the first small, the second bigger, and the third largest representing risks, assessments, and diversions and interventions.



Figure 24. Three triangles of risks, assessments, and diversions, missing at-risk and lowering diversions



Figure 25. Current ways miss 60% risks & diversions work 36, 27 and 39 with violence exiting

The first triangle has the 7% combined at-risk: (1) abuse or violence; (2) severe mental illness; and (3) substance abuse (with brain damage, cognitive delay-retardation, deceptive self-presentation, and pedophilia-sex offending in the center of the triangle of illness or lowered functioning).

The second bigger triangle has the assessments that miss 60% (rounding out the 54-61%): (1) background-credit checks with a gap of 75% miss rate; (2) interviews-judgment with a gap of 54% miss rate; and (3) physical and psychiatric exams with a gap of 51% and short tests with a gap of 27 contrasted with 97% sensitive and 97% specific internet-based tests. The third largest triangle of diversions: (1) infancy-childhood, 34 (Figure 24); (2) adolescence 29 (Figure 24); and (3) adulthood, 37 (Figure 24).

These three triangles are nested in each other with the small risks in the center, followed by the bigger current approaches of assessment, and finally on the outside, the largest for diversions. The three triangles are spinning together around in a circle with the assessment triangle acting as a net to catch the risks and the diversions to intervene and prevent the violence (mass murders, homicides and suicides for escaping) or loss in lives and expense.



Figure 26. Internet-based tests have a 3% miss rate when added to current ways reducing violence

The present interventions of 34 for infants and children, 27 for teens, and 39 or a combined would thus lower violence or the mass murder, homicide and suicide victims that escape the whiffle ball holes. Current ways of assessment miss 60% who are victims of violence costing lives and funds.

In Figure 25, there are the three triangles for the risks, current ways of assessment, and diversions.

In the first triangle at the corners are costly violence, mental illness, and substance abuse with traumatic brain injury, cognitive delay, lying and sex offense-pedophilia in the center making up 7% of any population. Second are the current ways of assessment interview, background check, and physical-psychiatric exam on the corners of the triangle. The arrows are a way to show that these current ways miss roughly 60%. Third are the diversions and interventions which help divert infants-children, 34, teens, 29, and adults, 37. Fourth, there are three triangles, small with risks, bigger with current ways, and largest with diversions and interventions. With the miss rate of 61% the persons at-risk have the wrong diagnosis or assessment.

In Figure 26, the 97% sensitive 97% specific internet-based tests will result in less violence, namely fewer mass murders, homicides, and suicides or victims escaping out of the whiffle ball. The three triangles are the risks, current ways of assessment plus internet-based tests, and diversions.

In the first triangle at the corners are costly violence, mental illness, and substance abuse with traumatic brain injury, cognitive delay, lying and sex offense-pedophilia in the center making up 7% of any population. Second are the current ways of interview, background check, and physical-psychiatric exam on the corners of the triangle. The arrows are a way to show that these current ways with internet-based tests only miss roughly 3%.

Third are the diversions and interventions which help infants-children, 34, teens, 29, and adults, 37. Fourth, there are three triangles, small with risks, bigger with current ways, and largest with diversions and interventions. Diversions will likely improve with better assessment.

Lifetime risk and diversion expenses and *ROI*s were given earlier (Zagar, Zagar, Bartikowski, & Busch, 2009, Zagar et al., 2013; Zagar et al., 2013).



Figure 27. The annual number of U.S., E.U., & U.S. + E.U. victims of violence

Violence is rising in the U.S. and E.U. due to 60% miss rate of current ways of assessment. In Figure 27, there are estimates given the vagaries of precision in accounting for violence rates in the U.S. and E.U. that may not be equal. There are 1,200 deaths from 300 annual U.S. mass murders, 14,100 homicides, and 41,100 suicides with a total of 56,400 victims. The E.U. has double the population, so there are the estimates of 2,400 deaths from 600 E.U. mass murders, 28,200 homicides, and 82,200 suicides with a sum of 114,800 victims. There are an estimated total of U.S. and EU mass murders or 3,600 total, 42,300 homicides, and 112,300 suicides with a total of 158,200 victims every year.



Figure 28. The annual work product loss of victims of violence in the U.S., E.U. & combined U.S. + E.U

There are also increasing U.S. and E.U. worker productivity losses likely due to 60% miss rate of current ways. In Figure 28 with the work productivity of a life at \$1,000,000 U.S. 2012 dollars, the U.S. yearly loss from mass murders is \$1,200,000,000, homicides, \$14,100,000,000, and suicides, \$42,100,000,000 with a total of \$56,400,000,000. With the work productivity of a life at \$1,000,000 U.S. 2012 dollars, and the E.U. population double that of the U.S., the E.U. yearly work productivity loss estimate from mass murders is \$2,400,000,000. With the work productivity of a life at \$1,000,000 with a total of \$112,800,000,000. With the work productivity of a life at \$1,000,000 with a total of \$112,800,000,000. With the work productivity of a life at \$1,000,000 with a total of \$112,800,000,000. With the work productivity loss estimate from mass murders is \$3,300,000,000, homicides, \$32,300,000,000, and suicides, \$86,600,000,000 with a total \$160,400,000,000.

Table 5. The low and high costs and <i>ROIs</i> for current ways vs. current ways + inte	ernet-based tests
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Current Ways	Low Cost	High Cost	Low Cost ROIs	High Cost <i>ROI</i> s
Background-credit check	\$33	75		
Interview-Judgment	33	75		
Physical-psychiatric	250	500		
Short risk tests	33	75		

Total time 1 e.g., infant-child: clinic	350	725	0.78 or -0.22	1.14
Total: time $1 + 2$ e.g., teen: school	700	1,450	1.55	1.76
Total: time $1 + 2 + 3$ e.g., adult: military	1,050	2,175	2.33	2.64
Total: time $1 + 2 + 3 + 4 + 5$ e.g., adult: court-jail	1,400	2,900	3.11	3.52
Total: time $1 + 2 + 3 + 4 + 5$ e.g., adult: job	1,750	3,625	3.88	5.39
Internet-based tests	100	100		

In Table 5, there is an increasing return on investment with repeated use of tests during lifetime of productivity. As seen in Table 5, over a lifetime the person is assessed 5 times in a lifetime. At time 1 to a clinic as an infant or child the cost has R = \$350 to \$725.

The second time, as a teen the combined cost for the first and second times have the R = \$700 to \$1,450. The third time, as an adult in the military the combined cost of the first, second, and third has R = \$1,050 to \$2,175.

The fourth time as an adult in the court or jail, the combined cost for the first, second, third, and fourth has R = \$1,400 to \$2,900. The fifth time as an adult for a job selection, promotion, fitness-for-duty, crisis-debriefing, or discharge, the combined cost has R = \$1,750 to \$3,625.

There is an increase in the return on investment for each assessment, starting with .78 to 1.14, 1.55 to 1.76, 2.33 to 2.64, 3.11 to 3.52, and 3.88 to 5.39. The is the savings in thousands to tens of thousands of lives and billions to tens of billions of dollars, the use of internet-based tests plus the current approaches is an improvement.



Figure 29. The low and high costs and ROIs with current ways + internet-based tests



Figure 30. Low and high costs of current ways + internet-based tests in 2012 U.S. dollars

In Figure 29, there is the increasing return on investment over lifetime of productivity of lowering violence risk by using internet-based tests. In a life a person appears many times at clinics-hospitals, courts-jails, schools-hospitals, and jobs-military-police with current way versus current way and internet-based tests at low *ROIs* R = .78-3.88 and high cost *ROIs* R = 1.14-5.39.

So for those with more risk, the return on investment is greater. For example internet-based tests are used in infancy-childhood, teen years, along the life span to lower costs of risks to agencies, government, individuals, and insurance companies as seen in Figure 29.

In Figure 30 and Table 5 the cost of current ways in 2012 U.S. dollars were: (1) background-credit check (\$33-\$75); (2) interview-judgment (\$33-\$75); (3) physical-psychiatric exam (\$250-\$500), short test (\$33-\$75 summing to \$283-\$575), with a 60% miss rate totaling \$350-\$575. These are contrasted with 97% sensitive, and 97% specific internet-based tests costing about \$100.

As shown in Figure 30, there are important economic and management issues that are consistent with using internet-based tests. Internet-based tests have a legal, financial and defensible position of saving lives and funds.

These internet-based tests are at or above the standard-of-care compared with current ways. Knowing the risks of insured persons allows agency managers to calculate reserves for accidents and other risks.

Internet-based tests are consistent with a lowering of risk and consonant with giving decision makers opportunity to make precise fund allocations for risk. Internet-based tests allow doing something about the unknown risks, violence, substance abuse, and mental illness with traumatic brain injury, cognitive-delay-retardation, deception or lying, and sex offense-pedophilia.



Figure 31. The administrative, insurance, legal and management advantages of internet-based tests

Table 6. Secto	ors for sa	aving live	s and fu	inds by i	ising i	nternet-based	tests
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Use of internet-based tests at	Less mass murders	Less homicides	Less suicides
Selection, promotion, discharge	Airlines	Airlines	Airlines
Intake, presentencing, parole, probation	Corrections	Corrections	Energy

	Education	Education	
Admission, health issues	Education	Laucation	Corrections
Selection, promotion, fitness-for-duty, discharge	Energy	Energy	Education
Emergency room/psychiatric admission, discharge	Health	Health	Energy
Personal injury, workers compensation	Insurance	Insurance	Health
Selection, promotion, post-deployment, discharge	Military	Military	Insurance
Selection, promotion, crisis-debriefing, fitness-for-duty, discharge, citizen complaint	Police-Public Safety	Police-Public Safety	Military
Selection, promotion, congregation-parish complaint, discharge	Religious-nonprofit	Religious-nonprofit	Police-Public Safety
Selection, promotion, fitness for duty, discharge	Transportation	Transportation	Religious-nonprofit
Discharge from military, ER/psychiatric admission, discharge, suicidal complaint, PTSD	Veterans	Veterans	Transportation

Internet tests reduce business and government payouts to the opposing side. Internet tests aid in freeing up capital or funds for other use. Internet tests free up management time 90% spent on 10% of personnel with challenges sensitively and specifically identifying what is the issue.

Internet tests limit liability settlements and risk to co-workers, co-patients, co-students, and co-prisoners. Internet tests are equation-based, non-discriminatory, and objective.

See Table 6 for the reduction in mass murders, homicides and suicides by the use of internet-based tests in selection, retention, promotion, crisis-debriefing, discharge, sentencing, probation and parole release, fitness for duty, and citizen complaint. The work groups include airlines, corrections, education, health, insurance, military, police-public safety, religious-nonprofit, transportation, and veterans.

There are 1,200 deaths from 300 annual U.S. mass murders, 14,100 homicides, and 41,100 suicides with a total of 56,400 victims. In Figure 31 by using internet-based tests the 50% reduction in the U.S. is 600, 7,050, 20,550, and 28,200 lives saved yearly.



Figure 32. Internet tests lower 50% loss of lives to violence in the U.S., E.U. & combined U.S. + E.U./year

The E.U. has double the population so there are estimates of 2,400 deaths from 600 EU mass murders, 28,200 homicides, and 82,200 suicides with a sum of 114,800 victims. By using internet-based tests the 50% reduction in the E.U. is the estimate of 1,200, 14,100, 41,100, and 57,400 lives saved yearly in Figure 32. The E.U. has double the population so there are estimates of 2,400 deaths from 600 EU mass murders, 28,200 homicides, and 82,200 suicides with a sum of 114,800 victims. By using internet-based tests the 50% reduction in the E.U. is the estimate of 1,200, 14,100, and 57,400 lives saved yearly as seen in Figure 32.



Figure 33. Internet tests lower 50% violence work product loss (U.S., E.U. & combined U.S. + E.U./year)

In Figure 33 with the estimated work productivity of a life at \$1,000,000 U.S. 2012 dollars, the U.S. yearly estimated loss from mass murders is \$1,200,000,000, homicides, \$14,100,000,000, and suicides, \$42,100,000,000 with a total of \$56,400,000,000. The estimated 50% reduction with internet-based tests is \$6,000,000,000, 7,050,000,000, 21,050,000,000 summing to 28,200,000,000.

With the work productivity of a life at \$1,000,000 U.S. 2012 dollars and the E.U. population double that of the U.S., the E.U. yearly estimated work productivity loss from mass murders is \$2,400,000,000, homicides, \$28,200,000,000, and suicides, \$84,200,000,000 with a total of \$112,800,000,000. The estimated 50% reduction with internet-based tests is \$12,000,000,000, 14,100,000,000, 42,100,000,000 that have a sum 56,400,000,000.

With the estimated work productivity of a life at \$1,000,000 U.S. 2012 dollars and the E.U. population double that of the U.S., the estimated U.S. combined with E.U. yearly work productivity loss from mass murders is \$3,300,000,000, homicides, \$32,300,000,000, and suicides, \$86,600,000,000 with a total \$160,400,000,000. The estimated 50% reduction with internet-based tests is \$1,650,000,000, \$16,150,000,000, \$43,300,000,000 that has a sum \$14,100,000,000.

In Table 7, there is the success August, 2008 meeting with Chicago Mayor and the resulting U.S.D.O.J. \$78,000,000 grant that saved lives and funds by targeting high risk teens with evidence based diversions using the internet-based test model that was thrice replicated once independently. Next, was the 2011 meeting with Cook County President sharing the same materials; this resulted in 56% reduction of nonviolent offenders from court to electronic bracelets without return to court.

Third, the internet-based model was shared in 2012 with the new Chicago Mayor and the Allstate CEO with the \$50,000,000 Chicago Public Safety private fund. Fourth, from 2012, the U.S. President begins releasing federal prisoners by presidential commutation lowering the population for the first time in two decades.

Fifth, in 2015, the internet-based model was shared with the new Illinois governor, who used the materials for the prison reform to release prisoners statewide. Sixth, based on the Cook County President's success with prisoner release, the U.S. President began using presidential commutation in 2012 through 2014 to release federal nonviolent offenders. There was a lowering of the prison population by 6,000 in November, 2015.

Year	Lives (n)	Expense	Age of Group	Intervention	Action
2009-2012	104	\$491,748,548	Teens	Target jobs to at risk	Zagar and Busch with Chicago Mayoral
2011-2012		480,000,000	Teens	Move 2,600 teen & 26,786 adult	team Zagar shared Predicting and Preventing
2012	55	283,500,000	Adults Teens	nonviolent to electronic bracelets Target jobs to at-risk	Homicide with County President Zagar shared success with New Chicago Mayoral team
2012				U.S. House of Representatives Judiciary Subcommittee Testimony	Zagar shared Predicting and Preventing Homicide with U.S. President, U.S. Congressional leaders U.S. Supreme

Table 7. Success with internet-based test model to lower violence, save lives and funds

					Court Justices
2013	78	405,000,000	Teens	Target jobs to at-risk	Chicago Mayor continued Zagar approach
2013	11	50,600,000	Adults	Target jobs to at-risk	Chicago Mayor continued Zagar approach
2012-2014					Obama releases nonviolent federal prisoners lowering federal prison population
2014	76	380,000.000	Teens	Target jobs to at-risk	Chicago Mayor continued Zagar approach
2015					Chicago Mayor continued Zagar approach
2015					Illinois Governor Rauner Prison Reform Goals
					Based On Preckwinkle success and Zagar sharing Predicting and Preventing Homicide
2015					Coalition for Peace Initiative combines Arthur, Ford, Koch Industries, MacCarthur Foundation to reform justice system and Zagar participates
2015					Obama releases 6,000 nonviolent federal prisoners
2016					U.S. Supreme Court goal to release 150,000 to 2,500 juveniles from life sentence for murder

Seventh, there was a Coalition for Peace Initiative in Washington, D.C. that combined the assets of the Arthur, Ford, Koch Industries, and MacCarthur Foundation to reform the justice system. Finally, after Zagar testified in the U.S. House of Representatives, the internet-based test model was shared with the U.S. Supreme Court Justices, who announced potential release of 2,500 juveniles who were sentenced to life in prison for homicide without parole based on Miller vs. Alabama and Graham vs. Florida cases if these are safe to release (Clay, 2016).

#### 24. Discussion and Barriers to Entry

What's new and what does it all mean? There are 4 questions that were posed as hypotheses. These must be addressed. First, violence, namely mass murders, active shooting incidents, suicides and homicides, is related to economic trends. With fewer jobs, suicides increase. With more jobs, homicides decrease.

Due to deinstitutionalization of psychiatric patients, combined with inaccurate conventional assessment and a lack of monitoring, mass murders and active shooting incidents, suicides and homicides increased.

The 20% to 59% of these violent prone had mental illness. And current approaches had a miss rate of 60%.

Second, mental illness, substance abuse, and violence can be sensitively and specifically found with internet-based tests, which are better than conventional approaches (which have a miss rate of 54% to 61%). In this literature review of internet-based testing, the sensitivity (finding the actually high-risk persons) and specificity (avoiding falsely labelling low-risk persons) are 97%.

Mean test time is 2 to 4 hours compared with the paper-and-pencil 7 to 8 hours. In this review of the literature, there is an example, a study. For illustration if among the 236 there are 207 nonviolent and violent offenders in the sample of 236 had been diverted with the empirical treatment of a job, mentor, and anger management training, there would have been savings of 2 lives and \$9,999,992 in resources.

This is the cost of offenses prevented for an *ROI* of \$6.64 for every dollar spent (Zagar et al., 2013). Just looking at the violent offenders and excluding the nonviolent, the *ROI* is \$17.14 return for every \$1 spent.

Extending these estimated savings of using internet-based tests or predictive analytics to various industries presented in this paper would result in *ROIs* from \$2.33 to \$323.00 for every \$1 spent. Third, severely mentally ill individuals can be diverted from expensive psychiatric hospitalization or expensive return ER visits using sensitive, specific internet-based tests.

Fourth, the first ever historical demonstration of targeting at-risk youth and diverting them from crime is the U.S.D.O.J.-sponsored Chicago from 2009 to 2012 programs (Zagar, Busch, & Hughes, 2009a; Zagar, Busch, & Grove, 2013) and the 2012 to 2015 Chicago Public Safety Fund Programs saving of 324 lives and \$2,005,848,548 (Saulny, 2009; Shelton & Banchero, 2009; Ihejirika, 2014; Yaccino, 2014; City of Chicago, 2014; Kapos, 2014).

Also, since September 25, 2011, the President of Cook County diverted 56% nonviolent offenders from jail to electronic bracelets and other alternatives without return to court or danger to the community. President Obama copied this approach in granting presidential commutations to nonviolent, drug offending federal prisoners, most recently releasing 6,000 in November, 2015.

So the best way to stop a bullet is with a job while screening nonviolent prisoners for release to electronic bracelets and other alternatives can save funds. And business could save losing workers using predictive analytics.

By applying internet-based tests with current approaches to the various sectors of airlines, corrections, education, energy, health, military, police, religious, transportation, veterans, and understanding the concept of the risk triangle inside of the assessment triangle inside of the intervention triangle, one can see that lowering the escape of half to two-thirds of the high risk persons.

This would improve the diversion rates at infancy-childhood, 33%, teen, 27% and adulthood, 36%, to yearly save the combination of the U.S. violent deaths, 28,100 (1,200 mass murder victims, 41,000 suicides, 14,000 homicides) and given double the E.U. population, the E.U. violent deaths of 56,200 (2,400 mass murder victims, 82,000 suicides, 28,000 homicides) rescuing even at 50% of 84,300 or 42,150 lives and costs @ \$1,000,000,000 in 2012 U.S. dollars, an expense of \$42,150, 000,000,000 *nearly forty-two trillion dollars in worker potential*.

Doing something novel always faces the reluctance of organizations and their leaders to adopt a different strategy. Tests have been used for over 80 years and have excellent reliability, sensitivity, specificity and validity.

On the insurance company side, 10% of current employees must be freed up to teach new ones about processing claims. This is an extra added saving to the payer for psychiatric inpatient hospitalization. There are government regulations and the growing hospital and prison business that may be less likely to change.

The validity of this battery of tests for identification of unique risk factors among adults and adolescents gives administrators more options to save lives and lower costs proactively because the prediction of violence, especially homicide and pedophilia, is practical, reliable, and valid. Analyses comparing this sample with the demographics of the E.U. and U.S. populations are consistent with the suggestion that the cross-validated and replicated risks for violence, homicide, and pedophilia are generalizable to those broad areas (Zagar, Busch, Grove, & Hughes, 2009a).

# 25. Limitations

There are of course limitations and threats to validity. There may be issues with the size of the sample of only 236 adults and adolescents in that there was not true random sampling, but neither is there in the standardization of tests.

In any such study, there are validity threats due to history, selection, and expectancy bias. Official records may not accurately represent the amount of abuse, delinquency, crime, or other risks, the criteria upon which the accuracy of results are judged.

There may be some bias in the referral for examination. Perhaps other risks may be observed in larger samples and at different rates. There was heterogeneity of variance on some measures or risks, although for most risks, the assumptions of normality and homogeneity of variance were met.

With over 60 years of successful empirical treatments, some with 27 to 35% diversion rates, perhaps the diversion rate of 52% found in Zagar, Busch, and Grove (2013) in the "Chicago from 2009 to 2012" program might be high, but violence rates were greatly decreased and associated costs were saved; it is hard to argue with those facts. The fact that this was replicated in 2013 and again in 2014 gives this empirical, evidence-based approach to lowering violence more credibility.

## 26. Summary and Policy Implications

Because internet-based tests are much more sensitive and specific than current approaches (background checks that have a have a miss rate of rate of 75%, interviews that have a miss rate of 54%, physical exams that have a miss rate of 51% and short tests that have a miss rate of 27%), more widely employed internet-based tests could lower homicides, mass murders and suicides, and thus save lives and money.

In the past sixty years, conventional approaches of inadequate assessments and ineffective monitoring of high risk persons (e.g., inappropriately releasing of the poor, severely mentally ill to the community) have led to unnecessary suffering and expense. This suffering and expense includes: (1) 300 mass murders yearly (with 59% of perpetrators demonstrating psychiatric conditions); (2) 1-6% of personnel having costly human resource challenges in businesses, churches, and schools; (3) 2,100,000 annual "revolving door" ER psychiatric admissions with 41,149 suicides (90% related to severe mental illness); and (4) 10,000,000 prisoners, parolees and probationers with 14,146 homicides (22% associated with mental health challenges).

This failure to identify high risk persons is consonant with about 22 daily suicides among military veterans. While conventional metrics generally fail [with success rates ranging from 20% to 73% such as for background checks (25%), interviews (M = 46%), physical exams (M = 49%), and other short tests (M = 73%)], internet-based tests are simultaneously sensitive (97%) and specific (97%), non-discriminatory, objective, and inexpensive: \$100 per test, requiring 2 to 4 hours to complete.

A Chicago field test with high risk youth from 2009-2015 prevented 324 homicides (saving \$2,089,848,548). Homicides, suicides, mass murders and active shooting incidents are economic. Mental illness, substance abuse and violence or abuse can be sensitively and specifically predicted, treated and diverted beginning with internet-based tests and evidence-based interventions.

Psychiatric patients can be diverted from expensive psychiatric hospitalization or expensive return ER visits with sensitive, specific internet-based tests. Nonviolent offenders can be screened with internet-based tests and released with electronic bracelets and other alternatives without compromising community safety.

Predictive analytics or internet-based tests are cost beneficial for settings with high expense for personnel failure such as airlines, corrections, education, energy infrastructure, health facilities, military, nonprofit-religious, police, transportation, and veteran organizations. Confidence in the usefulness of risk tests should be high now that the risk test model has been applied three times in a large urban setting (Saulny, 2009; Shelton & Banchero, 2009).

Imagine \$49,248,700,000 projected yearly saving nationwide with approximately 1,000 lives annually saved to work efficiently and provide for their families. The optimistic estimate is 42,150 lives and costs @ \$1,000,000,000 in 2012 U.S. dollars, an expense of \$42,150, 000,000,000, nearly forty-two trillion dollars in worker potential.

Giving jobs, mentors and anger management to nearly 10,000 youth from 2009 to 2016 diverted 27% of them from violence. With adults there is a projected 36% diversion and lowering of homicides. By lowering the gaps in assessment and diversions with science makes a peaceful, safer family, community, job, military, police and religious group area for better economic efficiency and productivity.

From a purely economic view that places a premium on human safety, the alternative of using targeted tests with diversions is not a choice but a necessity for a financially healthy, peaceful, predictable, safe, and stable global society.

# Acknowledgement

Authors thank Professor Jack Arbit, Neurology Department, Loyola and Northwestern University Medical Schools, Professor Boris Bartikowski, Euromed Management, Marseille, Professor Jim N. Butcher, University Minnesota Twin Cities, Professor Mike Marasco, and Professor Bob Shaw, Robert Farley Entrepreneurship Center, McCormick School of Engineering and Kellogg School of Management, Northwestern University, Northwestern graduate students, Dave Beseda, Neeta Boga, Mike Dinnon, Scott Eisfeldt, Pete Gariepy, Roopa Natarajan, Kristin Powell, Arshad Syed, Jake Wilson, Ling Wang, and Lei Zhao, Professor Alan Mead, Professor Roya Ayman, Industrial Psychology Organizational Behavior Department, Illinois Institute of Technology (IIT), IIT graduate students, Mike Zablocki, Bill Osnowitz, Jonas Neuhengen, and Yutong Liu, Professor Dan Lowery, Brother Ben Basile, Professors Tina Ebinger and Michael Spiccia, Calumet College of Saint Joseph, Professors Fred Bryant and Mike Garanzini, S.J., and Seminary Rector Kevin, Flaherty, S.J., Loyola University at Chicago, Lakeshore Campus, Professor King and Professor Cooke, University of Illinois at Chicago Business College, Professor Joel Milner, Child Abuse Potential Questionnaire, Psychology Department, Northern Illinois

University, Judy Perkinson, Aurelio Prifitera, Tina Sheldon, Pearson Assessment, Stephanie Ammons Isbell, Marni Ammons, Ammons Scientific, Lawyers Randy Stark, and Brooke Whitted, Chief Hearing Officer Nancy Hablutzel, James Cardinal Harvey, Francis Cardinal George, Joseph Cardinal Ratzinger, Karol Cardinal Wojtila, Sean Cardinal O'Malley, Pope Francis, Most Reverend Thomas J. Paprocki, Most Reverend Blaze Cupich, Scott Trubow, Olympia Laboratory, Lieutenant Colonel Scott Johnson, Lieutenant Colonel Mike Stewart, Glen Miller, Ph.D., Substance Abuse and Subtle Screening Inventory Institute, Springville, Indiana, Air Canada Pilots Robert Warman and Bob Fenn, Barrister, American Airline Pilot Colonel Paul McKay, Marine Colonel Paul Weaver, Bob Seritella, Excelon Nuclear Power, Chicago, Tom Adamski, First One Logistics, New Jersey, Programmer Wyatt Sutherland, Peter Perscuitti, Gallagher Insurance Nonprofits and Religious, Pat Neal, Virtus, National Guard of the U.S., Illinois Air and Army National Guard, Jesse White, Illinois Secretary of State, Alderman Ed Burke, City of Chicago Finance Committee, Illinois Appellate Court Judge Anne Burke, Chicago Mayors Rahm Emanuel and Richard Daley, Presidents Clinton and Obama, Speakers Boehner, Gingrich, Hastert, Eric O'Keefe, Mrs. Laura Arnold, Arnold Foundation, Edith Schiller Neurology Fund, Neurology and Psychiatry Department, Northwestern University, Judges Julia Quinn Dempsey and Chief Judge Arthur Hamilton, Robert E. Bussell, M.D., Juvenile Division Cook County Circuit Court for providing data. Senior author funded current analysis. We thank clergy, military, patients, prisoners, students, and workers, children and families for making the world safe and secure, volunteering time and energy to this project and the Omilian, Pikul, Szkotak, Zagajewski, and Zagar families for support. Presented at U.S. House Representatives, Judiciary Subcommittee Crime, Terrorism, and Homeland Security Hearing, Rayburne Building, 24 July 2012, Washington, D.C. with Virginia's Representative Bobby Scott Michigan's Representative John and Convers accessed at: https://www.youtube.com/watch?v=AHUEJ11woTo&list=UUdNNcpw8arCsUp55Jwk QAA minute 19 & at end, and Society of American Military Engineers (SAME) and The Infrastructure Partnership (TISP) Conference, 8 April 2014 Colorado Springs, accessed at: http://www.tisp.org/index.cfm?pid=13346 and the Illinois Psychological Association, 6 November 2015, Skokie, Illinois. Internet-based tests available through PearsonAssessment.com, (MMPI-2/A personnel version or clinical interpretative report, MMPI-RF report, Ravens, and Beck) at 1-800-627-7271 and Testrac.com, (ART, LLC: Ammons Quick Test, Ravens, Beck, and Standard Predictor report) at 952-953-6292 or dbodell@testracom.

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