



# McNair Scholars Program

Journal of Research Reports  
2017-2018 - Volume 23

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WICHITA STATE  
UNIVERSITY



# McNair Scholars Program

Journal of Research Reports  
2017-2018 - Volume 23

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## Administration

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## From the Director

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I present Volume 23 of the Journal of Research Reports, “McNair, Graduate Super Power.” The articles featured in this journal represent the work of Program participants from the 2017-2018 grant year. As one reads through these articles, it is clear that the breadth of research interests is as diverse as the students served, and the quality is outstanding as well. My staff and I could not be more pleased with the efforts that went into producing this meaningful and scholarly body of work.

The Program can only achieve such great accomplishments with the support of University faculty, staff and administrators. These research mentors have guided and inspired the McNair Scholars in completing their research projects and reaching great heights.

Their efforts are applauded for their dedication to making undergraduate research a reality and supporting the students from the McNair Scholars Program. It has been said, “it takes a village to raise a child,” you are our “village,” **Thank You.**

This being the first year in a five-year grant cycle, 2017 – 2022, we are excited to continue the tradition of promoting undergraduate research on the campus of Wichita State University since 1995. Within this journal, you will find the work of thirteen undergraduate students who are being showcased for the work they have done and their commitment to go beyond the classroom. Within this journal are full manuscripts, summaries and extended literature reviews. These research activities serve many purposes; to cultivate and develop research skills, provide experience conducting scholarly research and to create and develop relationships with faculty that could potentially assist students in applying, being admitted and enrolling into graduate programs where they will pursue and complete a graduate degree. The high impact activity of conducting scholarly research is supported in an effort for students to develop these skills that make them more attractive to graduate degree granting institutions and lay a foundation that will assist McNair Scholars in their pursuit and completion of doctoral studies.

A special thank you is given to the staff for their dedication to the Program and the students that we serve. Ms. Shannon Nakai, research coordinator. Ms. Mercedes Lubbers who served as writing tutor. Ms. Ashley Cervantes, program counselor and student confidant. Ms. Neshia Greene, senior administrative assistant and all around Program support. Lastly, Ms. Deltha Q. Colvin, associate vice president for Non-Traditional Students; who provides unending support for me and the staff as a whole.

Finally, I congratulate the students for a job well done; their efforts do not go unnoticed. They have taken this opportunity to share their brilliance with the academic community. These scholars are the future of America and I thank them for the opportunity to serve as their director.

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# Research Manuscripts

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# Alzheimer's Disease: Blood Plasma Circulating microRNAs as Diagnostic Biomarkers.



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*Department of Medical Laboratory Sciences  
Wichita State University*

## Abstract

Alzheimer's disease (AD) is the most common age-related dementia. One of its biggest challenges is identifying signature molecular expressions that would detect it before the clinical symptoms manifest. With advances in technology related to next generation sequencing (NGS) of microRNAs, several avenues are being explored that may enable the identification of a unique diagnostic marker for early-stage AD. The main goal was to investigate the expression of a select group of miRNAs circulating in blood plasma of AD patients in search of diagnostic markers for Alzheimer's disease. Two select blood plasma miRNAs were profiled using miRCURY LNA miRNA qPCR plasma array on five AD samples. Results showed that the two target sequences hsa-miR-181b-3p and hsa-miR-21p were present in the AD samples with an increased expression (miR-181b Ct = 29 and miR-21p Ct = 27 respectively) compared to normal controls (xCt = 31). These outcomes suggest that aberrant expression of plasma miRNA has potential to be used to assess AD and that next generation sequencing technologies can be used as a viable tool for enhancing AD diagnosis.

*Keywords:* Alzheimer's disease, Dementia, Serum, Plasma, microRNA, Exosome, Biomarker, Diagnosis, Mild Cognitive Impairment, MCI, Polymerase chain reaction, real-time PCR, miRCURY LNA PCR.

## Introduction

Alzheimer's disease (AD), the most prevalent type and cause of age-related dementia worldwide, is a neurodegenerative ailment that causes progressive brain atrophy and memory loss. Globally it is found in over 47 million persons, with an expected rise to 76 million by 2030 (Qui 111). The international economic load of AD rivals that of cancer, heart disease, and diabetes, making it one of the major unresolved global health crises (Cornutiu 664). Among its many challenges, the lack of readily available, inexpensive, and less invasive methods for early detection of AD prevent clinicians and researchers from finding a cure. Thus, clinicians are left fighting AD with late diagnoses in which massive neuron loss has occurred and clinical symptoms are irreversible.

The clinical symptoms of AD include short-term memory loss, agitation, and poor judgment. Before these behaviors are exhibited, a preclinical asymptomatic pathogenic process takes place that can last ten or more years (Iqbal 476). The events in this dormant phase are characterized by the hallmark buildup of misfolded beta-amyloid proteins that form plaques around neurons and the accumulation of tau proteins that form tangles within the neuron. These tangles and plaques gradually destroy brain cells, beginning in the hippocampus and eventually spreading throughout the brain. This gradual destruction is the reason why most AD persons are unaware of their condition until several years after its onset. Once enough atrophy has taken place, clinical symptoms manifest. The early clinical

stage of AD does not occur in all patients, but in some with mild cognitive impairment (MCI) (Tarawneh 11). AD progresses from early and mild (minor memory changes), through moderate (clear-cut symptoms are present), to the severe and late stage (terminally ill). The recently updated clinical diagnostic criteria allow only for the probable or possible diagnosis of AD in patients with clinical dementia or MCI (Howe 34). A definite AD diagnosis is presently possible only based on the postmortem histopathological examination of the brain.

The current diagnostic measures for AD involve a battery of assessments beginning with a clinical examination and a neuropsychological test, such as the Mini-mental state exam (MMSE), although alternative tests do exist (Palsetia 2). These initial assessments are supported by cerebrospinal fluid (CSF) quantification of beta-amyloid (A $\beta$ ) protein, as well as the total tau and hyperphosphorylated tau proteins. The greater these are in concentration, the greater the severity of brain damage. Currently brain imaging in the form of PET, MRI, and CT scans are evolving in their utilization of brain and CSF analysis for amyloid accumulation. Although such advanced imaging has proven to be accurate, it is also expensive and requires high-level equipment and expertise in management (Snyder 170).

Furthermore, the CSF assays present other problems, due to the intrusive nature of lumbar punctures and the danger associated with such a procedure when performed on elderly immunocompromised persons (Dekker 6). Considering these factors, the current methods can be too invasive and expensive. This ultimately compromises the ability for researchers to complete large-scale projects for testing new fluid biomarkers and complicates clinicians' ability to administer these procedures, due to high cost for both clinical sites and the patients they serve. This necessitates advanced technologies to discover additional biomarkers that are robust (more molecular targets in addition to amyloid and tau), minimally invasive (examine different fluids besides CSF), less expensive, and can provide a signature expression before clinical symptoms appear.

The Food and Drug Administration identifies a diagnostic biomarker as a molecule used to detect or confirm presence of a condition of interest, or to iden-

tify individuals with a subtype of the disorder (FDA-NIH, Strimbu 464). The ideal diagnostic marker is one that is inexpensive and easy to access via practical non-invasive methods, such the Hb1AC molecule found in blood which is used to assess diabetes. Considering this idea, success in AD biomarker discovery relies heavily on finding novel molecules in fluids or tissues that are copious and easily accessible. Blood is a practical candidate to fill this need, as it is the most abundant bodily fluid whose changes reflect current disease status and is fairly easy to obtain. Several technologies are being implemented to identify new AD biomarkers by using blood as the primary investigative fluid.

A promising method for identification of blood-based AD biomarkers focuses on using next genetic sequencing (NGS) technologies and quantitative reverse transcription polymerase chain reaction (qRT-PCR) to find, sequence, and quantify microRNAs. MicroRNAs (miRNAs) are endogenous short (~22-nucleotides) non-protein-coding regulatory RNA molecules. MicroRNAs regulate gene expression at the posttranscriptional-level, and a single miRNA species can control different target mRNAs and consequently influence production of multiple proteins. The influence of miRNA on gene expression and ultimately protein development affects a variety of major biological events, such as cell division, apoptosis, differentiation, development, senescence, metabolism, control of hematopoiesis and tumorigenesis (Ghelani 224).

Possible application of miRNAs as AD biomarkers was prompted by increasing evidence of the significant regulatory functions of miRNA in different pathologies including neurodegeneration, several cancers, and the altered expression of miRNAs in the biofluids of these disease states (Maciotta 2, Quinlan 87). miRNAs are an excellent source for AD diagnoses, because they are abundant in the blood and can operate both in adjacent cells as well as in more distant areas of the body via a mechanism similar to hormones (Cortez 469). miRNAs are also stable in the peripheral circulation, can be free floating in solution and be protected through molecules such as exosomes or high-density lipoproteins (Kumar 1618). This versatility and stability makes it easier for technologies to be implemented for discovery of novel markers (Glinge 12). Up to this point, approximately 31 studies have discovered potential miRNA as biomarkers

in the blood in which over 30 sequences have shown significant signature expression (Moradifard 4; Hu 16). Of these, the miR and let family of miRNA have shown the most promise.

Despite such discoveries, broader, more diverse studies are needed that reproduce the same results. This includes patients who come from varied ethnic, educational, and environmental backgrounds. Additionally, validation studies are required that specifically target previously identified sequences instead of the traditional shotgun approach to biomarker discovery. The aim of this study is to partly address these voids and build on the potential of miRNA diagnostic power by validating specific miRNA targets from previously established studies and to locate any novel markers that can be identified using some the latest technologies for miRNA targeting.

## Methods

### Study Design

The main goal was to investigate the expression of a select group of miRNAs circulating in blood plasma of AD patients in search of diagnostic markers for Alzheimer's disease (Fig.1). The collection of circulating miRNAs was selected from previous literature based on >1 fold-regulation scores. Secondary plasma samples collected from patients diagnosed with Alzheimer's disease were analyzed individually for their expression of our choice group of free floating plasma miRNAs. To isolate plasma miRNA, an advanced phenol-free extraction technique was utilized. For miRNA profiling and quantification, the new miRCURY LNA PCR array technology was chosen due to its optimized sensitive and specific ability to express RNA in matrices such as plasma and plasma. Statistical analysis consisted of comparing the profiled plasma miRNAs of AD patients to age-matched healthy controls via fold regulation to ensure that any aberrant concentrative difference between the two groups were due to biological processes.

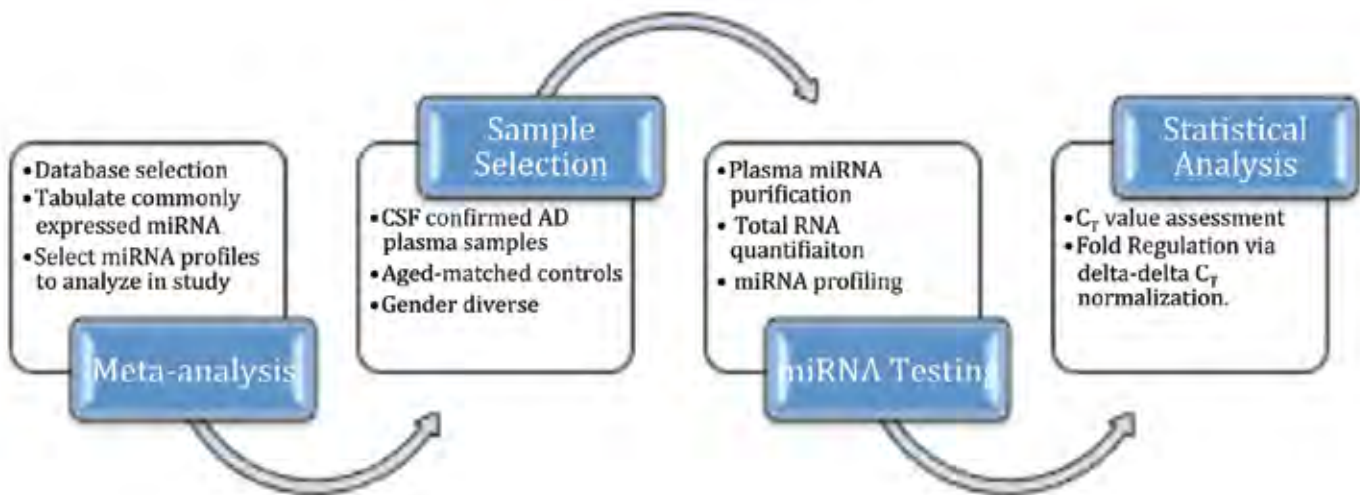


Fig. 1. Overview of Study Design.

### Samples/Subjects.

Samples were obtained from Discovery Life Science research sample biobank in Los Osos, California. All specimens were selected from the Human and Human Services/ Office for Human Research Protections (HHS/OHRP) compliant biorepository following ISBER/BBRB guidelines. AD diagnosis for such samples was confirmed by quantification of beta-amyloid and

tau proteins in the cerebrospinal fluid (CSF). Each specimen was selected using ethical standards and patient confidentiality was ensured through de-identification and provided with highly annotated demographic and clinical data. Upon order, the plasma samples were packaged and delivered on dry ice within 24 hours to ensure integrity of the matrix and in compliance with Department of Transportation Hazmat and

UN regulations (6.2).

Table 1

Annotated clinical characteristics of study participants

	Diseased Samples	Normal controls
Sex, F:M	3:2	3:2
Age, mean (range)	85 (75-89)	83 (74-91)
CSF diagnosis	Yes	yes

## Plasma Isolation

The plasma were secondary samples obtained from 10mL venipunctures using 21G needles and collected in EDTA tubes. The 10mL of blood was processed through centrifugation at 1000rpm for five minutes to collect the plasma. An average of 1.25 mL of plasma was collected in Eppendorf tubes with small filters and stored in a frozen environment at -80°C until shipped to the lab.

## MicroRNA Extraction

RNA was purified from 20 µl of plasma using miRNeasy extraction kits from Qiagen (figure 2). Plasma samples were vortexed in QIAzol lysis reagent followed by a room temperature incubation. Chloroform was added to separate the organic layer (unwanted proteins) from our desired aqueous phase containing target RNA molecules. 3.5 µl of a commercially prepared C. Elegans spike-in control with matching probes in solution was added to each mixture to ensure that our process was actually successful in recovering target RNA. Spike-in controls are target sequences with known concentration that were added to a solution sample at various stages in an extraction process. Monitoring the concentration of this control sequence throughout the purification process assessed recovery efficiency and to expose any errors in the extraction procedure. Ethanol was added to extract the aqueous phase containing RNA and the extract was transferred to 2 mL RNeasy MiniElute columns. A series of vacuumed washes and centrifugation was performed to further remove any unwanted material from the

extracted RNA. The purified sample was placed in RNase free water and stored at -70°C until the quantification step was ready.

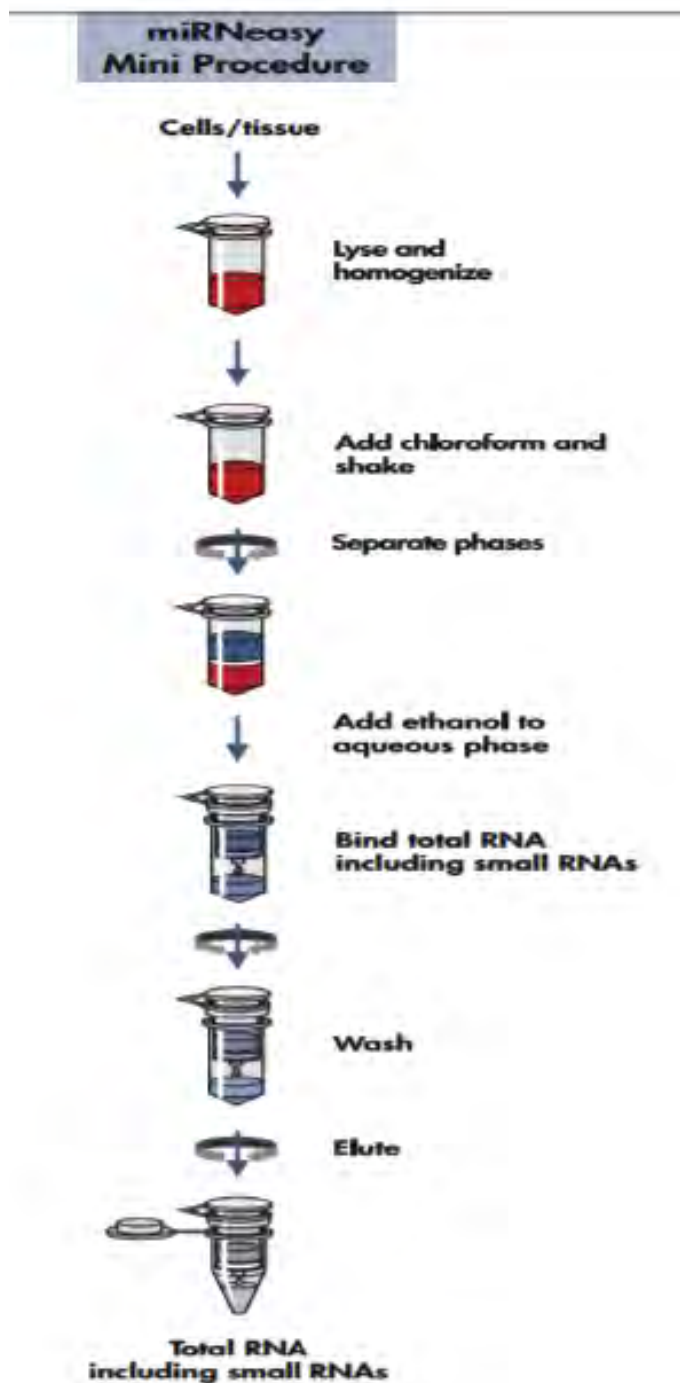


Fig. 2. Overview of purification process. The phenol free extraction of miRNA minimizes possibility of contamination with salts or phenol, which could interfere with later analyses.

A spike-in control standard curve was generated independent of our plasma samples. Each amount recov-

ered from our plasma-spike-in control mixture was compared to this standard curve to allow for estimation of our recovered sample (see fig. 4).

## MiRNA quantification

This study intended to quantify total RNA as well as quantify our two target sequences. However, quantification of total RNA would require advanced technologies that were not available for this investigation. To compensate for this deficit, a representative quantification was done by enumerating sequences that are known to be stable in plasma of all persons (i.e. endogenous genes). This was done by measuring miRNA stable sequence hsa-mir-10a in each sample using quantitative PCR. The amount of the hsa-mir-10a in each plasma sample was compared to aged-matched controls

## RNA Sequencing (Mature miRNA expression profiling)

This study only aimed to sequence two miRNA species to confirm their presence in plasma, and to assess if any differences existed in their concentration compared to normal controls and/or previously established values. The initial screening of miRNAs from previous literature identified miR-181b – 3p and hsa-miR-21a as viable candidates to target.

Using the purified AD plasma miRNA extract, miR-181b-3p and hsa-miR-21a were targeted using miRCURY LNA miRNA PCR array technology containing customized complementary primers for each sequence. As in the extraction process, an internal spike-in control (in this case Uni-Sp6) was used to ensure the presence of miRNA in all samples and that the sequencing technique was appropriately executed. The principle of miRCURY LNA miRNA is a 2-step process that entails universal reverse transcriptase of all RNA present (creation of cDNA) followed by an amplification process of our target sequences (Figure 3.). LNA or locked nucleic acids uses a special technology that is specific for miRNA, increasing sensitivity and specificity of our targets (Grunweller 237). This is exceptionally important because miRNAs are so small, yet vary by only one nucleotide. So, having a tool that prevents this misidentification is paramount in such profiling studies.

The creation of cDNA was achieved using an Edvocycler (EdvoTek), qRT-PCR was run on a 32-well Smart-Cycler (Cepheid), and amplification was analyzed using Qiagen's GeneGlobe data analysis software. To remove any technical and biological variation between samples that is not related to the biological changes from Alzheimer's disease, miRNA PCR array results were normalized by sequencing several endogenous genes. This method allows the establishment of a global mean for identified endogenous miRNAs in which target sequences could be referenced to assess any changes.

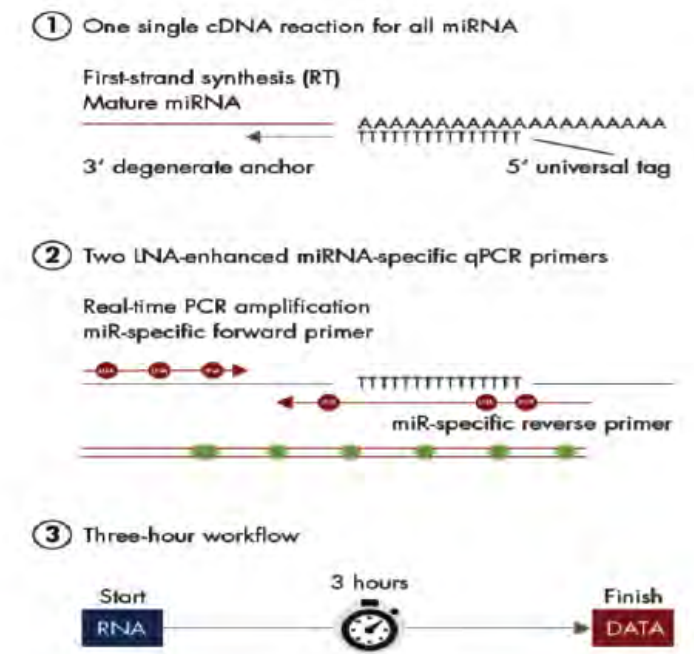


Fig. 3. Schematic outline for the miRCURY LNA miRNA PCR system. Step 1) The process begins with a mixture in which a poly(A) tail is inserted into mature miRNA sequences which leads to the synthesis of cDNA by way of a poly(T) primer consisting of a 3' anchor and 5' universal tag. Step 2) Synthesized cDNA gets amplified using miRNA specific and LNA enhanced primers in both directions. SYBR green dye is used for detection via fluorescent signals.

## Statistical Analysis

To confirm that target sequences were identified, and if their quantification revealed an increased or decreased concentration compared to normal values, fold regulatory calculations were used. Fold regulation

signifies in a biologically relevant way the numerical changes produced during miRNA expression profiling via qt-PCR. The fold change was calculated using the standard equation  $\Delta\Delta Ct$  or  $2^{-\Delta\Delta Ct}$ . Such calculation compares the changing expression values of internal controls to target sequences (in this case miR-181b-3p and hsa-miR-21a) during the amplification process. A change of less than 1 indicates miRNA is down-regulated, a change of greater than 1 shows upregulated sequences, and a change of 0 indicates no

change in concentration of target sequence.

## Results

Twenty-two sequences were identified from previous studies that showed statistically significant changes in concentration compared to normal controls (see table 2). Sequences from the let and miR families were the most commonly listed miRNA sequences, with miR profiles exhibiting higher fold regulation ( $\geq 1.23$  CT) scores than the let family (1.03 CT)

MiRNA sequence	matrix	Author	MiRNA sequence	matrix	Author
miR-34a/c miR-146a miR-132 miR-874 miR-134 miR-323-3p miR-137 miR-181c	Plasma	(Kumar 3608), (Bhatnagar 8), (Shonrock,328)	miR-137 miR-18c miR-9 miR-29a miR-29b miR-126 miR-34a miR-181b miR-200a let-7f let-7b	Plasma, PBMC, serum	(Schipper 268), (Tan 1024), (Geekiyana 8)

Table 2

List of blood miRNAs found to be significantly expressed among sequences profiled from analysis of 31 studies

## miRNA purification (Spike-in control standard Curve)

The spike-in standard curve was generated from various serial dilutions of cDNA synthesized of *C. Elegans* Ce-miR-39-1 and followed real time PCR. Ct values were obtained that met the recommended

guidelines for miRNA purification procedures. The more concentrated samples displayed lower Ct values, with the most and least abundant miRNA spike-ins having 19 and 35 Ct values respectively. Typically, Ct values below 29 cycles indicate an abundance of nucleic acids, and values greater than 38 cycles suggest minimal amounts (Porterfield).

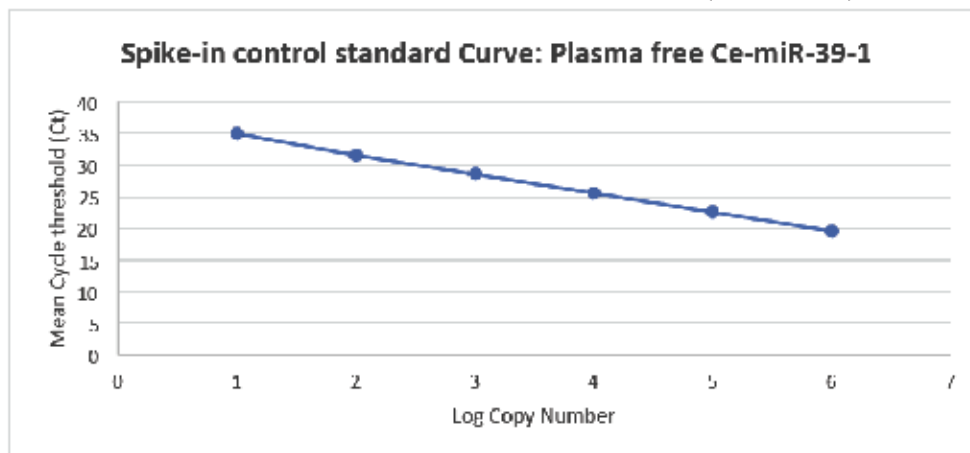
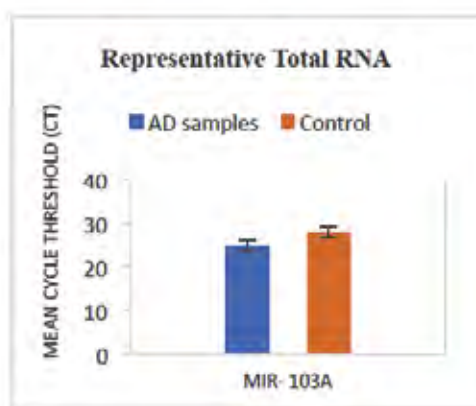


Fig. 2. The standard curve allows estimation of the recovery of spike-in controls when they are added to plasma samples that are subsequently used for RNA purification.

## miRNA Quantification

Total RNA quantification was assessed using a representative enumeration of endogenous RNA genes. MiR-103a is one a few endogenous genes, which are stable sequences found in all humans. AD samples showed an increased amount of mir-103a with an average Ct value of 23 compared to normal controls

having a Ct value of 27 (see fig. 5). Both groups achieved recommended threshold ct values based on the lab's normalized cutoffs. Most samples showed an abundance of nucleic acids  $ct < 29$ , and avoided high ct values for indication of contamination or errors in purification process (ct 38).



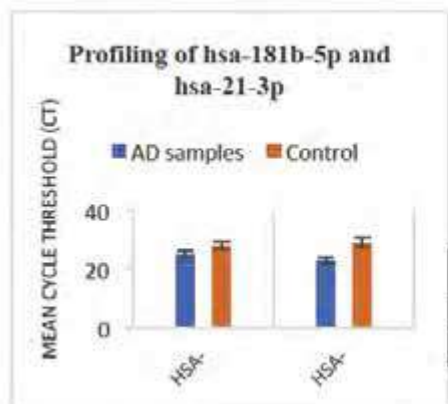
Sample	Channel Result	Ct	Endpoint
A1	Positive	21.6	1164
A2	Positive	19.3	1242
A3	Positive	29.4	1126
A4	Positive	20.2	1161
A5	Positive	27.2	900

Fig. 3. Comparison of average Cycle threshold (Ct) values for expression of stable plasma profile miR-103a for both AD and normal controls. The higher Ct value indicates lower amounts of nucleic acids. Here, AD samples have a higher expression of mir-103a compared to the normal controls.

## miRNA Profiling

Based on the previous research we selected hsa-181b-5p and hsa-21-3p as our target RNAs to profile in our plasma samples. Using the two-step process of miR-CURY LNA PCR, both profiles were confirmed in each of the cohorts via fluorescent detection. AD samples showed an average Ct value of 28 for hsa-

181b-5p and 27 for hsa-21-3p. The control group showed an average Ct value of 30 for hsa-181b-5p and 31 for hsa-21-3p. The delta-delta ct values for the plasma AD miRNA sequences were both greater than 1, with hsa-21-3p having a delta-delta value of 13.2 and 12.4 for hsa-181b-5p.



	Mean Ct value	Delta-Delta Ct value
hsa-mir-21-3p	28	13.2
hsa-181b-5p	29	12.4

## Discussion

This investigation tabulated the most common plasma miRNAs found aberrantly concentrated in Alzheimer's disease irrespective of stage or AD type from 31 previous studies. A select group of miRNA sequences were chosen, and their expression tested on randomly selected plasma samples to confirm their presence and to see if there were quantitative differences compared to normal controls. In deciding which miRNA profiles to pursue, a large list of sequences was available from which to choose, because this study was not limited to the test conditions of previous investigations (i.e. Caucasian males). Therefore, the selection of the hsa-21 and mir-181 miRNA was made via random selection processes.

Total RNA was representatively quantitated by amplification of endogenous miRNA sequence 1030a. Some studies that quantitate total RNA, do so by automated systems or nano-spectrophotometry. Due to limits in scope of this study, improvised means of total quantification were implemented. A relative approach that compared the expression of stable and ubiquitous endogenous nucleic acids between samples seemed to be the easiest and most logical way of achieving this. Endogenous reference genes are frequently used to normalize concentration levels of other genes, if such expression of the former is constant in all matrices (i.e. plasma) and different in diseased conditions (Jin 55). The representative quantification of endogenous gene miR-103a in AD samples was upregulated compared to normal controls. This is consistent with previous studies that also show increased aberrant concentration of total plasma RNA in AD persons. Most importantly, the fact that diseased samples showed a difference in concentration compared to normal controls, builds on previous knowledge that miRNA is a candidate molecule to be used as a marker or diagnosis and/or progression of AD.

Lastly, this result is suggestive that some sort of pathological mechanism is occurring that involves an increased response in gene expression to the neurodegenerative process. To elucidate further the reasons for such response, advanced imaging and brain tissue studies need to be undertaken that focus on changes at the cellular level (i.e. inside the neuron). Select miRNA

profiling of AD plasma samples revealed the presence of miR-21-3p and miR-181b-3p in all samples tested, and their existence is consistent with previous studies (Nagaraj, 16122; Leidinger 12 ). Of the two, miR-181b-3p was the more abundant miRNA with higher Ct value score. As shown in previous reports, miR-181b-3p is increased in the plasma, and mononuclear cells of AD persons (Schipper et. al 2007). However, other studies found such sequence to be decreased in the hippocampus of various types of dementia (Rodriguez-Ortiz 1229). What this would suggest is that miR-181b-3p would not be a candidate marker for distinguishing the types of dementia, but could be a marker for neurodegeneration, which still holds diagnostic and therapeutic value for AD.

In addition to representatively quantifying total RNA in plasma and confirming the presence and aberrant concentration of select miRNA sequences, this study also showed that next generation sequencing through usage of qPCR is a strong tool that can be utilized for novel discovery of biomarkers and validation of previously implicated miRNAs. This leads us to briefly mention other methods and candidate biomarkers used for AD assessment. Technologies such as microarray computer based predictive analysis, and mass spectrometry have been used to identify miRNAs. In addition to miRNAs, other nucleic acids, protein, and lipid fluid biomarkers such as neurofilament light polypeptide, complement, autoaxin, and various cholesterol have shown promising diagnostic potential. However, deciding which markers and procedures are optimal, merits future investigation and discussion. Regardless of what set of molecules are to be convincingly used as the new diagnostic targets for AD, or state-of-the-art technology utilized to target them, miRNAs will continue to be vital players as they control the genes that are responsible for expression of such compounds. Thus, fully understanding their role and implementing advanced technologies such as NGS to sequence them will be integral in unlocking the mysteries behind AD and many other diseases.

Several limitations existed in each area of this investigation. The miRNA analysis was done on a relatively small cohort of plasma samples, as opposed to a larger external cohort that is highly diverse educationally,



ethnically, and environmentally, as these factors have been confirmed to influence the risk of onset and progression of AD. From a methodology standpoint, the biggest deficit lies in the use of relative quantification for total RNA. An actual calculation of total RNA by usage of nanodrop or automated technologies would provide a more accurate enumeration of RNA, and one that corresponds mainly to the percentage of RNA that is made up of miRNAs. Statistically, the analysis of sequenced profiles in the study primarily consisted of fold regulation to ensure that differences in miRNA concentration were due to biological changes.

Although such calculations do provide valuable insight, additional measures are needed that validate the integrity and expression of profiled miRNA sequence. These measures include, but are not limited to, assessing hemolysis for miRNA plasma integrity ratio-based statistical analysis for verifying our profiled targets, and using area under the curve analysis to assess sensitivity and specificity of our validated miRNA set.

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## Conclusion

Research findings show that this study's AD plasma cohort have an increased total RNA compared to normal controls, and miRNA sequences hsa-miR-181b and hsa-miR-21p were aberrantly expressed. Overall, considering the data presented, the results suggest that AD persons do exhibit aberrant abnormal miRNA concentrations in their plasma and possibly other fluids as well. The successful profiling of hsa-miR-21p and hsa-miR-181b miRNA sequences through next generation sequencing technologies was in correspondence with previous findings. This also corroborates the notion of using next-generation sequencing technologies as a viable tool for biomarker discovery and validation. Nevertheless, to build on the data presented here, future trials are needed that are multi-centered, with large-scale diverse cohorts that test additional matrices such as plasma. Moreover, supplemental studies that further elucidate the pathophysiological interaction between miRNAs and AD-related proteins would provide greater insight into the unique response of miRNAs to neurodegeneration.

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# Effectiveness of SUBTLEX-US Word Frequency Database in Predicting Human Behavior in Word Recognition



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## Abstract

Subtitle word frequency measurements have shown to be good predictors of human behavior (van Heuven et al., 2014). SUBTLEX-US is a word frequency database composed of 51 million word entries also containing part-of-speech (PoS) information (noun, verb, adjective etc.). The purpose of this study is to determine if word frequency measures based on a subtitle database can predict human behavior specific to lexical/word retrieval. To determine the percentage of the dominant PoS within the participant responses, 10 noun and verb heteronyms were presented in isolation to 48 participants (24 females and 24 males). A frequency table was established for noun and verb PoS. A two-sampled t-test and a Pearson correlation coefficient test were completed. A positive correlation between SUBTLEX-US dominant PoS and participant's dominant PoS would suggest the word-frequency database SUBTLEX-US could effectively predict participant's responses. The study failed to reject the null hypothesis. Therefore, there is no difference between group means. The two-sampled t-test didn't show a statistical difference. Further, the Pearson correlation coefficient test showed a positive correlation between group means. This positive correlation supports the hypothesis SUBTLEX-US can effectively predict human behavior regarding word recognition.

*Keywords:* noun, verb, heteronym, pronunciation, word frequency, part of speech (PoS), lexical, word retrieval, SUBTLEX-US

## Introduction

Words are well-described units that provide the link between perception and meaning (McClelland & Rumelhart, 1981). The relationship between orthography—the letters of the alphabet that represent the sounds of words—and lexical access—the cognitive ability to process and attach meaning to these letters—has long been a point of controversy within linguistic and psychological studies (Farmer, Monaghan, Misyak & Christiansen, 2011). For researchers interested in the lexical retrieval of word recognition, word frequency—or how many times a word appears in a certain language—is an imperative measurement (Brysbaert & New, 2009). Word frequency measurements are associated with three main factors: the size of the corpus, the sample of texts used in generating the

corpus, and individual differences in language experience (Gernsbacher, 1984).

Size of the corpus, or the size of the collection of words, is important, because a small corpus size could introduce considerable error in the estimates for individual word frequency (Gernsbacher, 1984). In 1998 Burgess and Livesay raised problems with a very popular word frequency database, Kučera and Francis (KF), regarding the size of the corpus: 1.014 million-word entries. To test KF, Burgess and Livesay selected two samples of 240 words of varying frequencies and asked participants to name them. They found a low correlation to the KF frequency norm, while they found a high correlation when using a corpus of approximately 131 million words. This high correlation shows that the larger corpus size was more likely to correlate to participants' naming of words.

Burgess and Livesay gathered the 131 million words from a large collection of notes and other user-submitted information regarding various subjects on the Internet, called Usenet. While written communication is typically more formal than verbal communication, Internet discussions like Usenet provide an informal form of communication similar to verbal communication. This quality of word frequency measures is directly related to the sources from which the corpus is made. For example, in the Usenet groups the corpus was formed from Internet users' messages.

For more than 40 years, written text was the main source for research on visual word recognition. These sources were thought to be the best source of input. However, the nature of an edited text does not accurately depict informal communication. Edited texts tend to exaggerate lexical variation (Brysbart & New, 2009). Written texts that have been edited will follow stricter rules of grammar, compared to verbal communication between individuals. For example, a written text may say, "Sally and Molly will be here from Nebraska in three hours," while an individual in a social interaction may say, "They will be here soon." To better approximate everyday language exposure in social interactions, New, Brysbart, Veronis and Pallier (2007) explored an alternative source of input for frequency measure corpus options beyond Usenet groups, including film and television subtitles.

Word frequency estimates derived from film and television subtitles have proven to be particularly accurate at predicting human performance in behavioral and motor tasks (van Heuven, 2014). New et al. (2007) were able to compile a corpus of nearly 50 million French words from 9,474 different films and television series, including French, English, and American films and television series, and non-English films from Europe. They found that the frequency measures derived from this corpus significantly outperformed those previously derived from books and Internet searches. Furthermore, word frequencies derived from subtitle corpora were shown to outperform estimates based on multiple written texts, including English (Brysbart & New, 2009), Dutch (Keuleers, Brysbart, & New, 2010), Chinese (Cai & Brysbart, 2010), Spanish (Cuetos Vega González Nosti, Barbón Gutiérrez, &

Brysbart, 2011), German (Brysbart et al., 2011), and Greek (Dimitropoulou, Duñabeitia, Avilés, Corral, & Carreiras, 2010).

To further validate the use of subtitle input, Brysbart and New assembled a subtitle corpus of American English called SUBTLEX-US (Brysbart & New, 2009). SUBTLEX-US is developed from over 51 million-word entries and has a 96-97% accuracy rate for determining PoS information (e.g., nouns, verbs, adjectives) by using CLAWS (Constituent Likelihood Automatic Word-tagging System), a tagging system created by the University Centre for Computer Corpus Research on Language in the United Kingdom (Shapiro & Axtel, 2007).

It has been verified that for all languages for which subtitle data is available, word frequency estimates based on a corpus of over 30 million words are the best available predictor of lexical decision and time spent naming words (Brysbart et al., 2011; Brysbart, Keuleers, & New, 2011; Cai & Brysbart, 2010; Cuetos, Glez-Nosti, Barbon, & Brysbart, 2011; Dimitropoulou, Dunabeitia, Aviles, Corral, & Carreiras, 2010; New, Brysbart, Veronis, & Pallier, 2007). Through inferential testing this study will determine the likelihood of SUBTLEX-US to effectively predict human behavior in word recognition.

## Methods

To study the effectiveness of SUBTLEX-US to predict word recognition in human behavior, heteronyms were used in isolation as visual word prompts. Heteronyms are words that have the same spelling, but different pronunciations and part of speech (PoS). Presenting these words in isolation removed all semantic information regarding the word's pronunciation. This allowed the participants to respond with the first word available to them via lexical retrieval. By relying on the participant's ability to recognize a word without semantic information, a dominant PoS, either noun or verb in this case, could be determined.

Each heteronym's PoS for SUBTLEX-US was extracted from Ghent University Department of Experimental Psychology via a zipped Excel file, while the percentage of each heteronym's dominant PoS was calculated from participants' responses. These became

the two groups from which mean information was taken and both a two-sample t-test and a Pearson correlation coefficient test were completed. To obtain the groups' means for the two-sample t-test, the percentages for both the dominant PoS from SUBTLEX-US and participant dominant PoS were converted to decimal format. This process applied to all ten heteronyms.

The two-sampled t-test was used to determine whether a statistical difference exists between group means. The null hypothesis states there is no difference between the percentage of dominant PoS from SUBTLEX-US and participant responses, which may suggest the groups' means are from a similar distribution. The alternative hypothesis states there is a difference between the percentage of dominant PoS from SUBTLEX-US and participant responses. This may suggest that the groups are not from a similar distribution. For this statistical test failing to reject the null is the hopeful outcome of data.

To determine if the means have a positive or negative correlation, a Pearson correlation coefficient test was performed in SPSS. The null hypothesis states there is not a relationship between the means. The alternative hypothesis states that there is a positive or negative linear relationship. A positive correlation would suggest a likelihood that SUBTLEX-US database PoS information may predict the participant responses. For this statistical test rejecting the null hypothesis was the hopeful outcome of data.

## Database Selection

Frequency counts are associated with measurement arising from factors such as the size of the corpus, the sample of texts used in generating the corpus, and individual differences in language experience (Gernsbacher, 1984). The SUBTLEX-US word frequency database, which compared participant responses from ten heteronyms, was chosen for this study for three reasons. First, the corpus size is large, which, as stated in the introduction, is an important asset in word frequency measurements. Second, the source for the corpus is based on subtitles, which has outperformed many frequency measurements based on multiple written languages (Brysbaert et al., 2011; Brysbaert, Keuleers, & New, 2011; Cai & Brysbaert,

2010; Cuetos, Glez-Nosti, Barbon, & Brysbaert, 2011; Dimitropoulou, Dunabeitia, Aviles, Corral, & Carreiras, 2010; New, Brysbaert, Veronis, & Pallier, 2007). Finally, the first two factors create validity in using SUBTLEX-US and this allows researchers to expand word frequency measurement research to include the study of how language experiences may impact such a database.

## Participants

Data for this study was collected from participants at Wichita State University, Wichita, Kansas, in a random manner. Individuals were approached at the Rhatigan Student Center, Ahlberg Hall, WSU West Campus, and shuttle bus stops across WSU campus. No assumptions regarding a participant's ability to pass the screening criteria were made upon approaching them across campus, but all participants selected were between ages 18-45, were native English speakers, and had no known hearing or language disorders.

Further, to prevent possible group mentality, only one person per section was approached and tested at the site. A section was an obviously marked study/break area outside of hearing range of the previous participant or on a separate floor within the building. There were 48 participants in total—24 women and 24 men—between the ages of 18-45, with the average age range of 18-23. Both gender and age range were gathered from a questionnaire at the end of the consent form.

## Heteronym Selection

To obtain the ten individual words for this study, a comprehensive list of English heteronyms available from the Internet was compiled. This list included words from different websites; repeats were removed. To meet the criteria for this study each word had both a noun and a verb meaning (PoS). All other words were removed from the initial online list. Next, the remaining words with only noun and verb PoS were randomized using Microsoft Excel 2010. Finally, the ten words, listed in Table 1.0, became the visual word prompts for this study. These words were printed in isolation on white cardstock and laminated to create a word rolodex, which were presented to all participants.

Table 1.0

Heteronym	PoS: Noun	PoS: Verb
Contest	I won the contest	Her intention is to contest.
Permit	You have a parking permit?	I won't permit it.
Project	Finish your project.	It's hard to project funding.
Object	Children love any object.	It's hard to object.
Console	Let's play the game console.	She tried to console the baby.
Attribute	Flexibility is a positive attribute.	We attribute their success to the program.
Conduct	Please read the code of conduct.	Metals conduct electricity.
Tear	A tear ran down the baby's face.	The cheap fabric will tear easily.
Resume	Let's see your resume.	Please resume your test.
Convict	She's a convict.	The jury will hopefully convict.

*Heteronym Visual Prompts with Examples*

## Administration

Individuals were asked for their participation in an honors study examining word pronunciation using the Examiner's Script. Participants who met the screening criteria were given a consent form and asked to answer two questions regarding age and gender.

Prior to beginning, participants were advised to respond with the correct word as quickly as possible. If a participant provided more than one pronunciation only the first word was accepted for testing and the following word was presented. There was no controlled order of word presentation. The participants started on a random word, at times moving forward through the rolodex and other times backwards. Results for either the noun or verb pronunciation were tallied on an Examiner's Documentation Sheet.

## Results

Microsoft Excel 2010 was used for this testing and SPSS was used to confirm findings. The two-sampled t-test at alpha level 0.05 showed the means between

SUBTLEX-US dominant PoS ( $M = 0.6954$ ,  $SD = 0.0249$ ) and the dominant participant PoS ( $M = 0.6791$ ,  $SD = 0.0141$ ) conditions;  $t(18) = 0.10$ ,  $p = 0.92$ , are not statistically different. Therefore, the results failed to reject the null hypothesis. This evidence supports the theory that the group means are from a similar distribution.

A positive correlation would suggest a likelihood that SUBTLEX-US database PoS information may predict the participant responses. Again, the means from both SUBTLEX-US dominant PoS and participant dominant PoS were used as the test variables for correlation. Upon completion the null hypothesis was rejected as a positive correlation was found between group means  $r(18) = 0.3938$ ,  $p = 0.001$ . While the correlation was weak, a positive linear relationship existed between participants' dominant PoS and SUBTLEX-US dominant PoS.

## Discussion

The results from the two-sample t-test between all the

participant dominant PoS and SUBTLEX-US dominant PoS ultimately determined that the group means are not different. However, the findings to follow warrant further study. Male participants responded with the noun pronunciation 80% of the time, while their female counterparts responded with the verb pronunciation 70% of the time. Both men and women responded the same only 50% of the time.

In addition, men responded with the noun PoS for convict roughly 54% of the time, while the women responded with the verb PoS 79% of the time. Additionally, women responded with the verb PoS for console approximately 70% of the time, while the men responded with the noun PoS for console roughly 54%. It is not yet clear why men are drawn to the noun form and women to the verb form.

Table 2.0

<i>Female n=24</i>	Pronunciation		<i>Male n=24</i>	Pronunciation	
	Noun	Verb		Noun	Verb
Contest	11	13	Contest	20	4
Permit*	21	13	Permit*	16	8
Project*	22	2	Project*	23	1
Object*	19	5	Object*	16	8
Console	7	17	Console	13	11
Attribute	10	14	Attribute	13	11
Conduct	8	16	Conduct	20	4
Tear*	6	18	Tear*	9	15
Resume*	4	20	Resume*	7	17
Convict	5	19	Convict	13	11
<b>Total</b>	<b>113</b>	<b>137</b>	<b>Total</b>	<b>150</b>	<b>90</b>

Pronunciation Comparison between Genders

\*Denotes that genders shared the dominant PoS for that heteronym.

Gender norms are believed to be the reason behind each gender's collective response. Further research is

needed to determine to what extent language experiences specifically between gender impact a word frequency measurement.

## Conclusion

While the results warrant further research, this study provides evidence to support that SUBTLEX-US can predict behavior in word recognition. This study found that the participants' dominant PoS was from a similar distribution as SUBTLEX-US and the two groups share a positive correlation. However, differences within language experiences (e.g. age, gender, culture) require further research to determine to what extent language experiences have on a word frequency measurement. For instance, the differences found in this study between gender responses may have been impacted by gender norms. Many existing developmental norms are established for language acquisition that correlate to one's age, as age is a common factor in our language experience. For example, it is commonly accepted that a child will put together two words by 24 months. There is, however, a need to investigate developmental norms based on other language experiences, as found in this study for gender.

Additional research using SUBTLEX-US to predict human behavior could assist researchers in distinguishing developmental norms for language acquisition based on our language experiences. A better understanding of how gender impacts our language experiences allows researchers to better fit a word frequency database to their population.

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## Appendix A

### How to access SUBTLEX-US Database

SUBTLEX-US is available opensource from Ghent University Department of Experimental Psychology. Along with the Part-of-Speech information within SUBTLEX-US there are four other databases which provide word frequency measurements. All five databases are available opensource.

To access the various zipped files associated with SUBTLEX-US visit:  
<https://www.ugent.be/pp/experimentele-psychologie/en/research/documents/subtlexus>



Due to the high amounts of data within these databases it is highly suggested you download on a desktop or laptop with high levels of storage space.

### Part-of-Speech information added to the SUBTLEX-US word frequencies

We have now tagged the SUBTLEX-US corpus with the [CLAWS tagger](#), so that we can add Part-of-Speech (PoS) information to the SUBTLEX-US word frequencies. Five new columns have been added to the file:

1. The dominant (most frequent) PoS of each entry
2. The frequency of the dominant PoS
3. The relative frequency of the dominant PoS
4. All PoS observed for the entry
5. The frequencies of each PoS

You find more information about the tagging in [Brysbaert, New, & Keuleers \(Behavior Research Methods, 2012\)](#) 

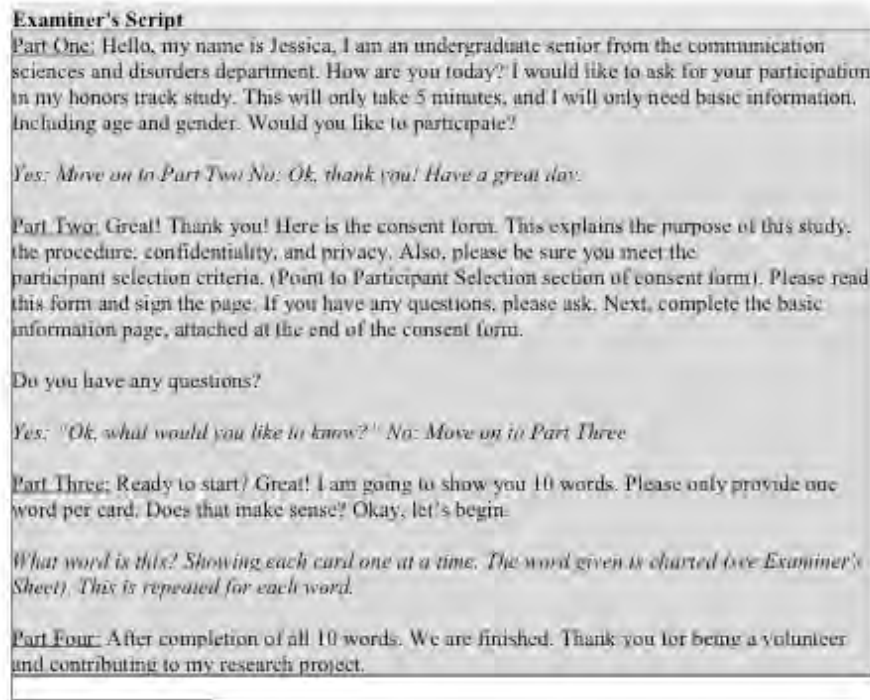
You find a zipped Excel version of the SUBTLEX-US word frequency file with PoS information [here](#).

You find a zipped text version of the file [here](#).

Picture above is a screenshot from the website showing where SUBTLETX-US database with PoS information can be found.

## Appendix B Examiner's Script

The examiner's script is an outline for interacting with participants. This ensured each participant met the screening criteria and was given similar instructions.



## Appendix C Examiner's Documentation Sheet

This sheet was used for each participant to tally their responses. This is how data was collected regarding PoS and later used to generate the participant dominant PoS.

Word & IPA Transcription	Noun Pronunciation	Verb Pronunciation
Contest / <u>kɒntest</u> / <u>kən'test</u>		
Permit / <u>pə'rmit</u> / <u>pə'rmit</u>		
Project / <u>prɒdʒekt</u> / <u>prə'dʒekt</u>		
Object / <u>əbdʒekt</u> / <u>əb'dʒekt</u>		
Console / <u>kən'soʊl</u> / <u>'kənsəʊl</u>		
Attribute / <u>ə'trɪbjut</u> / <u>'ætrəbjut</u>		
Conduct / <u>kəndʌkt</u> / <u>kən'dʌkt</u>		
Tear / <u>tɛr</u> / <u>'tɪr</u>		
Resume / <u>rezə'meɪ</u> / <u>rɪ'zʊm</u>		
Convict / <u>kən'vɪkt</u> / <u>'kɒnvɪkt</u>		
Total:		

# Why We Cannot Have Nice Things: The Ideology Behind The Destruction Of Cultural Heritage By The Islamic State



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## Abstract

The purpose of this critical discourse analysis is to examine ISIS, also known as IS—a militant jihadist terrorist group—and the violence, ideology, and religious extremism associated with the organization. ISIS, or the Islamic State in Iraq and Syria, made itself a global presence and threat in 2014 when the group began implementing violent measures against various interpretations of Islam and people of other faiths. Primarily, the topic of focus is the destruction that ISIS has imposed on cultural heritage sites as means of demonstrating their ideology, which is based off a Sunni interpretation of Islam, in which the group seeks to establish a caliphate, or the successor, to the Prophet Muhammad. This particular research examined the conditions which influenced ISIS to target and destroy cultural heritage sites and historical artifacts; essentially considering what forms ISIS' ideology and motivates their extremist belief system. Cultural, social, environmental, economic, educational, and religious factors were considered that influenced the ideology development. Based on previous research analyzed, it was hypothesized that the factors which contribute to ISIS' violent actions include: ideology, teaching, implemented beliefs, or political motives. These may be driving factors for the destruction of artifacts and sites.

*Keywords:* ISIS, IS, Islamic State, cultural heritage, destruction, jihad, artifacts

## Introduction

This study investigates ideology, religious extremism, and implemented violence associated with the militant jihadist terrorist group ISIS, also known as IS (Islamic State). ISIS, or the Islamic State in Iraq and Syria, emerged on a global stage in 2014 with unparalleled violence toward other interpretations of Islam and people of other faiths. The research examined the conditions which influence ISIS to target and destroy cultural heritage sites and historical artifacts, essentially considering what forms ISIS' ideology and motivates their extremist belief-system. It was hypothesized that ISIS members carry out their violent and destructive acts because they are adhering to an ideology which defines acceptable behaviors and dictates the actions they must take as part of the Islamic State. This research considered the cultural, social, environmental, economic, educational, or religious factors that influence the ideology development.

International awareness currently exists regarding ISIS and the groups' extremism within Islam. This research explores causation of such extremism, the factors that contribute to ISIS' violent ideology, as well as what can be done to avoid or counteract the destruction by ISIS. Gaps in the literature manifest a lack of commentary regarding the individual ISIS member's dispositions and thoughts about their terrorist acts. These terrorists are typically presented on a group front without depiction of the individual perceptions. If there are any individuals who feel regret or wish to back out of the organization, it appears to be unknown.

## Methodology

The critical discourse analysis relied solely on scholarly literature and prior research. Recurring topics and themes were utilized to shape an original framework of central ideas and theoretical concepts. These were then compared against existing sources and structured

around topics addressing the primary questions that drove this study.

When approaching a heavy topic, such as violent acts of terrorism, the elements which may attract the interest of scholars are the shock of the violent acts and the desire to understand the motives behind them. This study investigates the ideology of ISIS members used to justify their motives. To gain an understanding of the predominant ISIS ideology development, various sources of literature and their topics of discussion were collected and reviewed, including a source with insider access to ISIS members. The results of this study offer a discussion behind the possible creation of a terrorist identity for an individual and the collective belief system that forms a group identity.

## Building the Terrorist Identity

To examine how an ideology or extremist interpretation forms, one must consider the formation of a group identity. Michael Arena and Bruce Arrigo (2006) discussed their ideas on the sociological construct of an identity, particularly within a terrorist individual and how that translates into a group setting. They argued everyone possesses an Ego identity, or one's sense of self, used to define and recognize oneself within one's society. In the case of terrorist organizations, such as ISIS, when an individual is brought into a social environment, the group will help create a negative identity for that person by instilling feelings of pride for the group's identity. Individuals whom terrorists target for recruitment may be seeking meaning or a sense of wholeness in their lives, or they may be impressionable young people in the stages of developing an identity for themselves. Once these individuals are brought into a social environment with group membership, their identity may adhere to the collective group identity. They may develop a sense of belonging or acceptance and will fight to preserve the group.

Cultural preconditions may serve as foundational or structural pillars to the belief system practiced by ISIS members. Fathali Moghaddam and Anthony Marsella (2004) claimed the terrorist group is typically isolated or segregated from society, due to extremist opposition to the normalcy of current society. The organization, therefore, operates in secrecy with hopes to strengthen collective beliefs, facilitate cohesion within their group,

and stabilize leadership roles. The affirmed leaders may promote dichotomous categories to sustain the binary views of good versus evil and "us" against "them" for the sake of group cohesion.

Correspondingly, the belief system of the group acknowledges an idea that they are the justified "good guys" in a society that is unjust, illegitimate, and corrupted by their government. Therefore, the terrorist group seeks to replace the broken system and governing body. Given a perceived lack of legal means to change the system to an ideal form, they may use "alternative" or "nonnormative solutions," which they believe are necessary under the circumstances. These measures can include criminal activity, suicide, and murder. The group may believe that these acts of terror on the society will destabilize it and bring the illegitimacy and weaknesses of the current system to the attention of the general public. In short, the terrorist organization may hold the perception that they can bring about societal change that will improve the society.

## Jihad

The Islamic State possesses the idea to bring about change through a jihad. The term jihad is derived from Qur'anic Arabic, meaning to "put forth effort, struggle or strive for a commendable aim" (ISNA, 2006, pp. 31-32). Jihad can wrongly be associated with terrorist acts, due to ISIS and the organization's religious extremist interpretation of the Qur'an. The ISNA (Islamic Society of North America) explained that jihad has been commonly mistranslated as "Holy War," yet there is no mention of war or terrorism. Nor does an equivalent appear in the Qur'an, because war is deemed a hated and unholy act. (ISNA, pp. 31-32).

Instead, it is described that individuals have various types of jihad. The inward jihad refers to a struggle against evil dispositions within oneself. Likewise, the social jihad is the struggle to gain justice, charity, truth, and goodness within the social environment. The most controversial type (heavily disputed over its meaning) is the combative jihad, which represents a self-defense struggle against unprovoked aggressors or resistance to severe oppression. The ISNA explained that Muslims engaging in combative jihad may not have nationalistic or personal agendas, but rather enact them as a last resort for defending themselves. They articulated that

the religion of Islam does not advocate for violence against people of other faiths, nor are they considered “infidels” (ISNA, pp. 31-32). Instead, the Qur’an guides Muslims to live their lives as an example of the truth—which they wish to witness before all people—to be respectful and tolerant of other faiths as a community of believers. Therefore, Islam does not allow religious extremism, like ISIS’ ideology.

## Strategic Design

ISIS possesses an extremist ideology which is implemented into strategy. The feature of their strategic design is to use available resources to profit from accomplishing a goal. The strategy is used against those whom ISIS deems an enemy: “The West.” A prominent feature of ISIS’ display of extremist ideology is their intentional or strategic destruction of cultural heritage sites and artifacts in the Levant.

Several researchers have examined the political intentions of why heritage sites have been targets. Iconoclasm, derived from the Greek words *eikon* and *klasma* (to break), implies the destruction of valued imagery or a belief system connected to a site or physical objects. In Arabic, it roughly translates into breaking icons, images, or idols for a religious or political reason (Clapperton, Jones, & Smith, 2017, p. 1210). The destruction is not necessarily aimed at heritage; rather, the use of iconoclasm and violence as a strategy is instrumental in pursuit of a political goal, getting the attention of the Western audience.

In this context, cultural heritage can be associated with a pragmatic approach—to extract political value out of the site—or a dogmatic approach, which would exploit the ideological, political, or religious perspective connected to the site. Clapperton et al. argued these approaches may be utilized when terrorists attempt to delegitimize the present fabric of culture and society by destroying references to the present or past and reconstruct according to their ideology or totalitarian vision. Many destroyed sites and artifacts bear religious meaning or imagery within their culture. UNESCO (United Nations Educational, Scientific and Cultural Organization) deemed the iconoclastic strategy as cultural barbarism (Isakhan, B. and González Zarandona, J., 2018). Clapperton et al. explained that ISIS’ ideology upholds a desire to destroy heritage to prevent the

spread of any influences or symbols outside of the religious extremism. At the same time, among the destruction, ISIS is trying to reform and reconstruct a new ideal society consistent with their ideology and vision for how society should be governed under the Islamic State (Clapperton et al., p.1210).

Historically, the act of iconoclasm has been a common strategy among political powers to deface one and promote another. Ömür Harmanşah (2015) examined several sites destroyed by ISIS, along with the iconoclastic procedure in reference to historical context. Harmanşah proposed the destruction was an “archaizing re-enactment” of their ideology. The strategy of iconoclasm is a historical tactic to erase liveliness, agency, animacy, and any effective power within the symbols. He referenced Roman practices of *damnatio memoriae*, or condemnation of memories, such as Egyptian Queen Hatshepsut’s face erased from her statue in Deir el Bahari, and the eyes gauged out of the image of an Akkadian king from the Mesopotamian Bronze Age, both which aimed to reduce the influence of past political powers. The iconoclasm typically revolved around mutilating the head, eyes, and face, rendering them unrecognizable.

Harmanşah noted the unconventional approach taken by ISIS. They have destroyed the imagery and idols rather than simply mutilating their power. He cited a term by Bruno Latour known as *iconoclash*, referring to the conflict within a public sphere about lasting imagery and contemporary influences due to new technologies, hypermodernity, globalization, and media. Through *iconoclash*, Harmanşah explained ISIS’s action is not a religious phenomenon, but rather arises from a “super-modern movement” within a dynamic culture. He suggested that, in opposition to ISIS, we must, and are able to, develop the intellectual tools to counter this phenomenon of religious extremism (Harmanşah, 2015, pp.175-176).

Heritage destruction may also feed into a “scorched-earth” strategy, in which the Islamic State enacts specific place-based violence with the goal to destroy the community’s memories, belongings, and societal order. Harmanşah argued that ISIS specifically choreographs the place-based violence to showcase their apparatus and imagery through means of media sources of communication and visualization. The spectacles are

aimed at the artifacts and heritage sites to display ISIS' potential for violent acts. Harmanşah has reflected on the organization's practices since the summer of 2014. They have targeted a list of museums, archaeological sites, holy places, and shrines, and continue to threaten other locations through their disseminated reports and videos.

## Shirk

Idolatry may be the reasoning for ISIS' hostility toward image, site, or artifact reverence, because it feeds into their ideology that Allah is the only one to be feared or shown reverence. Shirk in Arabic means to carry out the act of idolatry or worshipping an image (Clapperton et al., 2017, p. 1212). Along with implementing their extremist ideology, ISIS members seek to prevent the spread of shirk. They stated that shirk is associated with symbols of the kuffar (non-believers) or belong to polytheistic religions. Also, ISIS members fear Muslims will come to fear or revere the symbols of the kuffar more than they do Allah. Consequently, Harmanşah asked:

*How is it that we are convinced of ISIS militants' hatred of idols and representations, while we consume the very powerful images that constantly flow through the global media, and those videos that have since ironically become some the most iconic representations of contemporary violence against humanity? It is correct that ISIS's own severe and obsessive ideology of shirk (the worship of images or false gods as equals to Allah) will also deny these videos as representations. But this selective and paradoxical understanding of representation must be read precisely as a power discourse, and if we are to be critical of ISIS, we must challenge that power discourse, not accept it. (Harmansah, 2015, p. 173).*

Harmanşah argued that since ISIS distributed videos of their destruction, they have, ironically, become symbolic representations or imagery. He challenged others to counter the terrorist group by being critical of their own work and the imagery that their actions produce.

## The Islamic State Goals

ISIS' motivations can be religious, economic, or political. They must develop strategies to sustain and

support their acts due to the group's unconventional approaches and isolation from most of society. According to Harmanşah, violent operations are supported by looting and trafficking antiquities from the targeted heritage sites. The aftermath of the performative heritage destruction may also be used by ISIS to gain patrons, fanatics, or sympathizers, while pursuing a multi-directional aim of demeaning the targeted local communities and offending the "Humanitarian West." Essentially, they hope to recruit sympathizers who fear change and the deviation from traditional religious values of Islam. The terrorists aim to halt progressive changes in "modern Islam," and instead promote traditional rigidity through forms of extremism.

From the propaganda ISIS can be considered the most violent terrorist organization in the world with many past and probable future destructions (Yazdi & Massoudi, 2017, p. 448). The annihilation of heritage sites and ruins are propagated like an execution ceremony killing the livelihood of that culture. Yazdi and Massoudi explained that by vandalizing ancient sites, ISIS creates "ruins from ruins." From these ruins, ISIS may salvage pieces and sell them for profit as a part of their antiquities trafficking. Yazdi and Massoudi noted that the sites and artifacts destroyed are often large, cumbersome, and recognizable—antiquities difficult to transport out of Iraq or Syria, and thus may not find many buyers, because they could be easily identified as stolen and be confiscated. Nonetheless, through "cultural looting," ISIS can secure around 200 million (USD) dollars per year from various markets (Yazdi and Massoudi, p. 449). It has been reported that ISIS is involved with networks of antiquities traffickers who may request types of artifacts or works. Yazdi and Massoudi claimed that the revenue generated is used to disseminate more violence, increase fear, and extend terror.

## ISIS' Demonstrations

In the summer of 2014, ISIS made their presence known through the distribution of videos depicting the annihilation of cultural heritage sites. Clapperton et al. discussed two examples of sites the organization had targeted that gained international attention and much discourse through media. They explained that with heritage comes a symbolic power that places meaning on images or objects. The meaning creates an "imag-

ined community” of a shared idea throughout a nation, binding each member to the community.

ISIS’s assault on the site Palmyra in Syria was considered an attack on the local heritage as well as on “culturally pluralist values” that secular western sources had attributed to it. Clapperton et al. indicated that ISIS utilized the attack and orchestrated a campaign as a pragmatic strategy to gain political leverage over the western reverence for cultural heritage. The Islamic State used the opportunity to advance their extremist ideology, create a pragmatic lever by controlling the site, and force the Syrian government and western sympathizers into negotiations for resources, such as petroleum and power supply. ISIS created a media narrative in response to explicate the religious basis for their ideology. They attributed their actions to following the Prophet Muhammad’s life and his mission to “disavowal towards shirk,” ridding the site of idolatrous elements. The distributed videos have been publicized as challenging “western, secular liberal democracy,” with hopes of transforming peaceful Muslims into “jihadists” or “holy warriors” (p. 1226). Clapperton et al. believed that the Islamic State sought to persuade Muslims to eliminate any aspects of secularism, in relation to the West, and to affirm Allah as the only revered image. Many Muslims follow a simple statement of faith known as the shahada, meaning, “there is no god but God, and Muhammed is his Prophet” (Macris, 2016, p. 244). The Islamic State, however, interprets this statement as a strict guideline from which no deviations were permitted.

The second example provided by Clapperton et al. was the capture of the city of Mosul in Iraq. Within the first five days, much of the population fled or was executed, and ISIS distributed to the remaining residents a charter called wathiqat al-madina, which outlined how ISIS would govern the city according to Shari’a law with the implementations of the extremist ideology (Clapperton et al., 2017, p. 1222). This action was considered an attempt to degrade society by expelling much of the population and destroying any imagery or symbols related to Christianity or polytheistic beliefs. Meanwhile, the terrorist group sought to reform and reconstruct the society under their ideals.

## Analysis and Discussion

### The Islamic State’s Groundwork

A theoretical way to investigate the inspiration of IS ideology is to look at the foundation of their own sources and framework. Whitney Carter (2016) focused on the implications of cultural relativism as a framework to study the Islamic State’s intentions and actions of destroying cultural artifacts and sites within their own cultural context. The leaders of the Islamic State derived their ideology from the teachings and interpretation of Muhammad ibn Abd-al Wahhab, an 18th century Muslim scholar in the eastern Arabian Peninsula. Abd-al Wahhab and his followers adopted a “purer and more correct understanding of the tenants of Islam centered on protection and promotion of the concept of strict monotheism,” in which they rejected the traditional understanding of Islamic scholarship (Carter, 2016, p.1). He promoted a “puritanical” analysis of the Qur’an in which there is not an acceptance of God, but rather Allah and Muhammad as the Prophet. This idea flows into tawhid or the recognition of “oneness of Allah,” in which absolute monotheism is implemented into the ideology. Carter suggested that its use as a “unifying code” serves as a basis for world order and knowledge within the Muslim world. Also, the ideology stems from shirk. The IS has targeted various sites to destroy false idols which may be considered historical artifacts, monuments, and sites that are significant within Jewish, Christian, Muslim, and even secular culture. Their motives stem from the cultural framework which influences their interpretation and ideology.

### Dynamics within the Islamic State

As shocking as the IS actions are, even more surprise comes when Westerners join the organization. This begs the question concerning what induces people to join the IS, knowing its consequences. While over 50 million Muslims live in the West, the vast majority do not engage in terrorist activities, contrary to stereotypical and bigoted beliefs (Haque, Choi, Phillips, & Bursztajn, 2015, p. 1). Even those who do possess radical Islamic beliefs rarely engage in the more extreme option. Many Islamic institutions across the world have

denounced the IS as a violation of Islamic law; even Al-Qaeda has not recognized the IS as an enforcer of Islamic law.

So, what is a cause of people joining the Islamic State? It is a psychological and sociocultural progression of “the interaction of conscious and unconscious processes with unique features of ideologies like ISIS, and existential (but not material) vulnerabilities inherent in contemporary American life” (Haque et al., 2015, p. 1). In other words, as individuals face the social struggle to fit in and establish their individual identity, unique ideologies may capture attention. When people seek to define themselves, an ideology can be used as a groundwork on which to build themselves. “The heart’s longings lead the mind, and the existential filler of ISIS nourishes the desperate and vulnerable soul” (p. 1). Therefore, everyday people experiencing an identity crisis or social transition may have their attention captured by a unique ideology, even a violent extremist one.

In a collective case study, Smith et al. illuminated the ascension of new networks for terrorism via social media to broaden its reach and impact on the world by the Islamic State. Smith et al. defined the concept of terrorism as involving violent actions with the aim to invoke emotional and psychological impact within the targeted audience under the motivations of a religious, social, or political cause. They also discussed the umma, the global Muslim community, and how terrorist networks flow throughout a social community and focus recruitment on socially isolated individuals. In other words, the terrorist organization is seeking like-minded people to adhere to an ideological cause. “Affective communities are those that are bound through common constellations of sentiments, moods, feelings or emotions and in which individual identities are confirmed through their interactions. Terrorist organisations can thus become ‘attractive outlets for those seeking solidarity’” (Smith et al., p. 168).

Through this recruitment, social media becomes especially effective as a global grassroots platform for spreading ideas, images, events, and experiences. Smith et al. described three types of strategies employed by the Islamic State revolving around the destruction of cultural heritage. First, a “smoke and

mirrors” effect through mock destruction exaggerates potential power and shapes perceptions of the organization’s potential. Second, the Islamic State exploits shock value by destroying heritage to provoke awe and outrage from the targeted audience and portray the organization as invincible and enemies as weak. Third, a business forms through the looting of archaeological sites to fund the Caliphate.

The first and second strategies rely solely on psychological response. Terrorists intend to incite a psychological and emotional response. Motives stem from a religious, political, or social cause. This ties into the Islamic State’s recruitment process, focusing on locating individuals both socially isolated and idealistic to bring into a social group, formulate bonds, and create a commitment to an ideological cause. “Terrorists are rational people who use violent acts to build strong affective (sic) ties with like-minded individuals” (Smith et al., p. 168). Therefore, the terrorist organization becomes an attractive outlet for individuals looking for camaraderie.

Meanwhile, recruiting and communicating with individuals for the Islamic State heavily relies on the Internet as a platform. Media networks reach across global and individual audiences, including potential or current followers. The technological platform provides the Islamic State the opportunity to network, recruit, data mine, fundraise, and even mobilize supporters to action. This revolutionary contribution to promoting their ideology and propaganda further adds dimension to the IS as a terrorist group (Smith et al., pp. 168-169). The organization posts shocking images and videos on the Internet which rouses virtual warriors among followers who are later invited to become actual warriors. The Islamic State interweaves its strategies of garnering recruits through social media networking with an estimated 90,000 messages a day through websites like Twitter, Instagram, YouTube, and Facebook, according to the U.S. Department of State (Smith et al., p. 172). The geographical sources of Islamic State messaging were primarily traced to Syria, Iraq, the US, UK, India, Saudi Arabia, and India. Using Twitter, the IS’ profiles have created hashtag campaigns to further ideas and hijacked hashtags to gain further attention by inserting propaganda in trending conversations. An



example of a hijacked hashtag is #PrayForNice, following the terrorist attack in Nice, France, in 2016. While many were sending condolences for victims of the attack, Islamic State hijackers inserted propaganda like, “Oh France, you and the (sic) all Europe will never be secure until we will live secure on every inch in the land of the Caliphate,” or, “This is the beginning of the attack to take the holy revenge for the killing of Abu Omar Shishani, may Allah accept him” (Griffin, 2016). This further demonstrates the Islamic State’s strategy for disseminating shock and provoking the Western audience to “over-react” with aims to destroy their aim to resist the IS’ demonstration of power (Smith et al., p. 174).

The element of camaraderie plays a key role during the recruitment process of ISIS members, particularly during the fusion process of integrating individuals into the social group. The ISIS recruiters heighten the feelings of “oneness” among the group members, which, in turn, creates a social and psychological phenomenon that collectively motivates the members to perform extreme behavior (Kunst, Boos, Kimel, Obaidi, Shani, & Thomsen, 2018, p. 2). In other words, members of a group will feel a sense of solidarity and belonging, which fuels their need to protect the solidarity and ideology. This feeds into the theory of identity fusion. “Extreme group behavior occurs because people experience being ‘one’ or fused with a group and, thus, perceive an overlap between their personal selves and their group,” causing them to show intense support for their faction through self-sacrificing and life-threatening behavior as a contribution to the organization (Kunst et al., pp. 2-3).

Identity fusion also causes individuals in a group to perceive other members as kin or a part of “imagined communities,” a process which generalizes genetic and kin relations among national, cultural, gender, and political groups. The social process of “extended fusion” occurs when group members are treated as kin based on a common ideology or political cause (Kunst et al., p. 3). In short, identity fusion directly ties into the strategies implemented by ISIS recruiters to create a sentiment of a larger communality among ISIS members.

## On the Inside

This very phenomenon is detailed in Rukmini Callimachi and Andy Mills’ (2018) investigative research for an insider’s perspective of the Islamic State recruitment process. Through various networking, via social media and online chat groups, Callimachi located a former recruit who had escaped, was residing in Canada, and was willing to be interviewed, despite knowing the consequences of association with the terrorist group. The recruit, Abu Huzayfah, described his background as part of a Muslim-Pakistani family. Huzayfah learned the basics of Islam, the Qur’an, and prayer, although his family was not outwardly religious. They faced no factors of persecution in their lifestyle, so the element of persecution was ruled out as a later influence for Huzayfah joining the Islamic State.

Instead, his reason for joining was the desire to be a part of something bigger than his quiet life. Huzayfah mentioned his childhood struggles of being targeted for being an immigrant and not feeling “fully Canadian” among his peers (Callimachi & Mills, 2018). Huzayfah was seeking to form an identity for himself. During this time, he observed the “War on Terror” in Afghanistan and the attacks on countries who identified as predominantly Muslim. This led Huzayfah to ask questions like, “Who are these bad guys?” and “Why is the American Army after them?” (Callimachi & Mills). To answer his questions, Huzayfah turned to the Internet and found groups chats and forums where he engaged with others asking the same thing about the war on Islam. He came across various sources of Muslim literature and scholars, like Sayyid Outb and Abu Muhammad al Maqdisi, who justified violent jihad based on concepts taken from Islam. Callimachi referred to this process as a “funnel of radicalization,” in which the Internet and social media provides watering holes for people searching for an identity and community. After joining these communities, they are given a family or a brotherhood and develop a “sense of adventure, going through survival for the sake of God,” in which the members could live outside their quiet, comfortable lives (Callimachi & Mills).

Within these formed communities, a common cause was derived; an ideology was promoted as a framework

for their collective principle and used as a technique in the recruiting process. Jessie Morton, an American recruiter for Al-Qaeda, explained that Al-Qaeda taught recruits three concepts derived from various interpretations of the Qur'an, which the ISIS recruiters follow. The recruiters teach the concepts and manipulate recruits to believe the only choice that have is to join an armed jihad.

The first concept, *Tawhid al-Hakimiyyah*, emphasizes that there is only one god, Allah, the legislator who developed the law, and that Muhammad is his messenger. In Huzayfah's interview, he explained during his training as a recruit, he learned that if he did not uphold this strict belief, he was not considered a true Muslim and did not understand his religion. The second concept, *Tawhid*, is the rejection of false gods and idols, modeled after the story of Muhammad. Upon his travels to Mecca, he entered the Kaaba and destroyed all the idols he found there. Huzayfah explained that an idol is anything that takes away from the idea that Allah is the law-giver; a president, ballot box, or even the act of voting can be considered an idol. The third concept, *Al Wala' Wal Bara'*, means loyalty and disavowal. Essentially, it is defining line of loving and hating everything that Allah loves and hates (Callimachi & Mills). These three initial principles are drilled into the recruits to strictly uphold as their defining ideology as they transform into active members of the Islamic State.

## Financial Assets

The Islamic State acquires extraordinary wealth from its various operations. Iraqi intelligence seized IS files prior to the Mosul attack in 2014, which noted the organization possessed over \$684 million in resources and cash. This wealth was derived primarily from captured Syrian oil facilities, black market sales of artifacts, and levied taxes on its controlled regions. The oil production generates revenue of \$800 million annually and receives funding from private donors in Kuwait (Singer, 2015, p. 3), making the IS the richest terrorist group in the world. This suggests that the Islamic State enacts destruction for economic, as well as religious, purposes.

Strategies include exploiting unemployed youth by creating incentives for them to assist in the pillaging of

archaeological sites. The IS also issues digging permits to local people and collects a percentage of whatever they find. According to The New York Times, the IS engages in mafia-like crime networks and trafficking, in which they can accommodate buyers seeking specific antiquities. The illicit looting is systematic in that the IS has created a "license-and-tax looting regime," in which they collect a tax called khums (Carstens, 2016, p. 40). This tax also helps fund the organization and expand its financial horizons. Commentators have even theorized that the Islamic State may pick archaeologically rich sites to destroy in order to make a profit off of the looting.

## Conclusion: Taking on the Ideology

This study supports the hypothesis that members of the Islamic State participate in planned violence and destruction because they follow an ideology which defines the actions and behaviors they must take as part of the organization. Those who are recruited fall into a typical category: individuals who are in the process of forming their identity or experiencing an existential crisis in which they seek to discover how they define themselves and what they believe. In addition, three principles emerged from this research that uncover how ISIS recruits justify their actions and beliefs: *Tawhid al-Hakimiyyah*, *Tawhid*, and *Al Wala' Wal Bara'*. Lastly, this study outlined the economic and political motives of the Islamic State, which they conceal with distorted religious justifications.

In response to the violence toward cultural heritage performed by the Islamic State, one may examine ways to counter it. As a Western audience, it is important to consider what instruments or tools can be used to understand and interpret the extremist practice of the Islamic State. Anthropologists or observers of the socio-cultural world might assess the intellectual toolkit based on their framework from which people look at the world, according to Harmanşah (2015). Though a Western audience may not ascertain all the cultural implications of a non-Western multifaceted issue, further studies investigating the motives of ISIS may not only uncover answers to their actions, but also produce a framework for how the Western audience perceives the world, and the consequences of such perceptions.

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# Research Summaries

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# Cognitive Function of Older Adults Can Be Improved through Computerized Training



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## Introduction

As people age, their cognitive and sensory abilities decline (Glass, 2007). Basic cognitive functions, such as contrast sensitivity and orientation detection, begin to deteriorate. These declines make daily activities that were once effortless more difficult to perform and may contribute to issues in driving performance among the older population, who are more prone to traffic accidents. In addition, their growing population will substantially increase the number of older drivers as the years go by (Ball, Edwards, Ross & McGwin, 2010). Therefore, it is important to continue to find ways to help the elderly live normal lives among their community and on the road.

Studies have found that practice can sharpen perception, thus enabling an observer to distinguish between stimuli that were formerly indistinguishable (Ball & Sekuler, 1986). This type of practice can help remediate age-related visual losses, as the more practice people do, the more improvement they will see in perception. This study on perceptual training for older adults aims to determine if any advantages exist in completing computerized training. It was hypothesized that completing perceptual training could potentially reverse age-related deficits for older adults ages sixty and older who have normal or corrected-to-normal vision.

## Method

This study was conducted at Wichita State University in two different locations: Shocker Studios and Jabara Hall. A total of thirty-seven participants, five men and thirty-two women at least sixty years old, were

recruited from assisted living facilities around the Wichita area and through newspaper advertisements. Two participants did not complete the study, so their information was excluded. The study lasted one hour a day for five days in a dark room. A series of screening tests were administered on the first day to ensure participants' eligibility. Participants also completed eight pre-tests on the first day. These pre-tests measured threshold levels for each participant, who were given eye patches and headphones for the test. Days two through four consisted of orientation detection training on the computer. Orientation detection training required each participant to indicate the direction of the first grating compared to the second; responses were recorded on the number keypad on the keyboard. Headphones and 3-D glasses were used while training was completed. A post-test was given on the final day, the procedures of which were conducted in the same format as they were on the first day. Threshold levels on the pre-test and post-test were compared to determine whether computerized training had any effect on an individual.

## Results

The present study examined a convenience sample. Threshold levels were evaluated on contrast detection for both left and right eyes. A dependent samples t-test was conducted on pre-test and post-test scores to see if there were any significant results. For contrast detection 45 degrees on the right eye, pre-test scores ( $M = .11$ ,  $SD = .06$ ) were significantly different to post-test scores ( $M = .08$ ,  $SD = .06$ ),  $t(27) = 3.14$ ,  $p < .05$ , Cohen's  $d = 0.5$ . For contrast detection 45 degrees on the left eye, Pre-Test scores ( $M = .094$ ,  $SD = .07$ ) were

also significantly different from Post-Test scores ( $M = .07$ ,  $SD = .05$ ),  $t(29) = 2.5$ ,  $p < .05$ , Cohen's  $d = 0.39$ .

## Discussion

Results were consistent with the prediction of the hypothesis: cognitive functions can be improved with computerized training. The study successfully achieved its goal to utilize a computer-training program from which older adults could benefit and transfer effects to their daily lives. Results showed a significant difference in threshold levels from pre-test to post-test scores on contrast detection at 45 degrees for both left and right eyes. This means that computerized training did have a significant effect on participants as threshold levels decreased from Pre-Test to Post-Test.

Some limitations from this study should be noted. First, many technology issues interfered with and delayed progress from running a full session with some participants efficiently and accurately. Shocker Studios, a new location, was introduced halfway into the study. Therefore, the new location was not fully equipped prior to running sessions with participants. Finally, apart from verbal instructions, there was not a trial run a participant could perform prior to beginning an actual session. Consequently, they were not able to practice a task to understand how it was done before they actually

started. In spite of these limitations that interfered with the study, results suggested that improvements still occurred in threshold levels. Therefore, the hypothesis deserves a closer study in computerized training for older adults.

## Conclusion

Many cognitive functions deteriorate as individuals age. As people continue to live longer, it is vital to continue to search for ways to help the older community so they can continue to engage in activities they have enjoyed all their lives. Computerized training programs have been developed to help with this problem, as they may help older adults remediate age-related losses. As researchers continue to develop studies using computerized training with the older community in mind, future research may likewise improve this computerized training program's procedures and ensure smoother, more effective outcomes. Future research should investigate computerized training and potential applications for improving. One future addition could involve implementing a driving stimulator. Older adults may then be tested in real-life scenarios to see if driving performance improves. This may improve driving performance among the elderly and help create a safer environment for all drivers on the road.

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# The Effects of Drug and Substance Abuse Among Homeless Veterans



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## Introduction

In 2017, the Annual Homeless Assessment Report (AHAR) to Congress stated that veterans constituted 9.1% of the homeless population in the United States. Homelessness can be defined as “an individual who lacks a fixed, regular, and adequate nighttime residence” (National Health Care for the Homeless Council, 2018, para. 5). Although Veteran Affairs (VA) provide numerous services, such as healthcare, disability services, education, and loan forgiveness, over 17,480 veterans are homeless (National Survey of Homeless Veterans, 2011), and this number is expected to grow as the baby boomers reach retirement age. Veterans’ war experiences increase their risk of developing addictions that have been linked to homelessness (Bremner, Southwick, Darnell & Charney, 1996), but substance abuse and mental health are often overlooked in veteran services.

This study aims to raise awareness of the impact of homelessness on the veterans in Wichita, KS, by exploring the effects of PTSD on civilian life. It was hypothesized that a link exists between PTSD and the duration of veteran homelessness, as well as between substance abuse and the duration of veteran homelessness. While prior research has investigated the cause-and-effect links on the national level, this study focused on the local level of veteran homelessness.

## Methodology

This study utilized data from a cross-sectional study performed by Dr. Kyoung Lee, Professor of Social Work at Wichita State University, and his constituents. The data was from a 2009 homeless survey taken in Wichita, Kansas; of the 159 homeless adults surveyed, 29 were

veterans and were included in this analysis. Survey questions regarded depressive symptoms, drug abuse, alcohol abuse, PTSD, and socio-psychological and demographic information. The CES-D, DAST-10, SMAST 13, 10-item PTSD checklist, and GSE tests were used to measure the variables, respectively.

## Results

Six correlations were identified in the data set. Depression and PTSD had the highest positive correlation of .698; alcohol and drug abuse showed the second highest positive correlation with a score of .535. PTSD and duration of homelessness had a notable relation, .470. On the other hand, alcohol abuse and depression showed the lowest positive correlation with a score of .407. Age and PTSD, along with age and depression, showed negative correlations—when one variable increased, the other decreased. For example, as age increased, PTSD and depression decreased.

## Discussion

This study identified a moderate correlation between PTSD and the duration of homelessness, supporting the hypothesis in part. There was not a strong correlation between substance abuse and the duration of veteran homelessness. The link between alcohol and drug abuse suggests a similarity in coping mechanisms. A larger sample size may have generated a stronger connection between PTSD and veteran homelessness, as well as PTSD’s relationship with the other variables. Future research should explore PTSD in depth to determine its link to the other variables, as well as diversify the veteran population to determine if different war experiences have different effects on veteran homelessness.

Another limitation of this study stemmed from the fact that the origin of PTSD was not assessed. However, any pre-war PTSD could have been exacerbated from the emotional and physical turmoil of war, which, as mentioned earlier, can lead to substance abuse and dependency (Bremner, Southwick, Darnell & Charney, 1996).

## Conclusion

The study shows a link between PTSD and the duration of veteran homelessness. Further research is

needed regarding these issues in order to inform the need for services and treatment to combat veteran homelessness. As studies like this identify the common issues that veterans face, the VA should reevaluate how effectively they are meeting the needs of their veterans, promote research that aims to break the cycle of veteran homelessness, and provide sufficient aid in the readjustment period. Continued research on veteran homelessness will improve support and promote awareness on veterans' needs.

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# The Rise and Fall of Empires: Common Themes of Nation Building and Collapse



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## Introduction

This study aimed to determine the common themes of an empire's formation, survival, and decline, which fit into a global pattern of the rise and fall of societies throughout history. Empires are formed from a conglomerate of nations, usually a territory of greater extent than the core nation, or from people ruled by an emperor or other powerful sovereign or government. Political and cultural features that enable the undermining of a long-standing governing authority can cause a shift away from traditional institutions and governments, thus creating a catalyst for the steady deterioration of a political system. The twentieth century alone saw the collapse of seven great empires, and numerous empires before them had already ceased to exist.

While the initial rise of each nation was rooted in natural bonds based on language, history, territory, or culture, the notion of national identity slightly shifted to economic and cultural exchange as a basis for unifying such diverse regions. As nations and empires grew and thrived within their geographical boundaries and forged new identities, new patterns of social and political life soon faced radical changes. It was hypothesized that an empire's key to formation, survival, and decline is their use of surplus income and resources, and that empires regularly unravel from efforts at self-expansion.

## Methodology

The examination of the Roman Republic and Empire and the French monarchy and revolution demonstrates the political, social, and economic factors that enabled the evolution and displacement of longstanding politi-

cal institutions. The Roman Republic and Empire and France's monarchy, revolution, and empire were analyzed due to their importance as greater powers and enduring influence both within and beyond their borders.

The Roman Empire adeptly borrowed from and improved upon inventions or concepts used by the native populace of the regions they conquered. In effect, the Romans made significant developments and advances in the fields of medicine, law, religion, government, and warfare.

France, at its apex, was one of the largest empires in history. Between 1789 and 1850, the French Revolutionary ideals had greater influence and longer lasting effects on Europe and modern-day western political culture than did their armies. Consequently, France provided a model for revolutions across Europe by distinguishing itself from all previous political revolutions by the nature of their claims: the destruction of existing political and social orders. This study provides an interpretation of past events in an attempt to provide possible answers to current issues and problems and produce recommendations for future research.

## Results

*Geography as Modified by Human Action*, George Perkins Marsh challenges the myth that the resources on this earth are inexhaustible. Multiple historians ascribe the political, social, and economic difficulties of empires and their slow, inevitable decline to efforts to expand. In his work *The Rise and Fall of the Great*

<sup>1</sup>Renan, E. *What is a Nation? In Becoming National: A Reader*, edited by Geoff Eley and Ronalds Grigor Suny, New York, 1996.

*Powers: Economic Change and Military Conflict from 1500- 2000*, Paul Kennedy emphasizes that productivity increase, based on systematic interventions, led to economic growth and prosperity. Rome's strategies parallel those of other European imperialistic powers, such as the use of their military as an aggressive tool for expansion. With each victory Rome grew to become the most powerful Mediterranean state, gaining notable amounts of wealth and influence in the region.

Expansion by territorial acquisition and establishment of economic and political hegemony were also demonstrated in France, as the great powers' needs and desire for wealth and raw materials led to alliances and aggression. *In Man and Nature: Or, Physical*

Military overstretch remains a consistent threat facing powers whose ambitions and security requirements are greater than their resource base can support. The fall of

the Roman Republic and Empire and French Monarchies and Republic can also be linked to the structure of the nations themselves, as ideological changes, foreign pressures, and economic decisions hasten the demise of the once powerful states. Failure to secure political, social, and economic reforms provokes the criticism and dissatisfaction of groups within the nations, which will allow for subversion of old regimes and the rising of new ones into existence.

## Conclusion

These themes provide models for revolution and can be considered a catalyst for the destruction of existing political and social orders as the current political climate leads to dissatisfaction amongst multiple social and demographic classes.

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# Mentors' Perspectives on Mentoring Young Men



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## Introduction

Mentoring can be a powerful intervention for the mentor and the mentee (or protégé). As popularity for mentoring has increased in the last decade, more data has emerged to define the role of the mentor. A mentor possesses more experience than their mentee, guides their mentee, and establishes an emotional bond with their mentee (DuBois & Karcher, 2014, p. 3). The relationship can take shape in an informal mentorship or a formal mentorship, stemming from programs like Big Brothers Big Sisters (James, Rayner, & Bruno, 2015, p. 536). Informal mentoring is ideal for mentoring relationships that cannot be sustained long-term and thus require flexibility; it can adopt many forms, such as peer or situational mentorship, and may not have clear goals outlined, but the relationship does require two people who can work together (p.536).

This research focused on male-to-male mentoring, which focuses on male preference to perform shared activities as a means of bonding (Spencer, 2007, p. 185). Building an emotional connection based on trust will help boys become “competent, confident, and well-rounded adults” (187). Trust forms best when the mentor and mentee are the same sex, producing a greater sense of similarity in values, attitudes, and social factors, to name a few (Burke, McKeen, & McKenna, 1990, p. 1018).

While current research supports the benefits of being mentored, few studies have focused on the benefits of mentoring others. Thus, this study addresses the deficit by gathering data through interviews that highlight success stories and the ways that mentors have benefited from mentoring. The hypothesis states mentors will want to continue to mentor because they are positively impacted by the experience.

## Methodology

Three male mentors of young men between 18-25 years old were selected from a convenience sample. Participants were contacted by email to confirm their consent to be interviewed for the study and were not compensated. They were asked eight questions, including: “What are some positive and negative lessons you learned about yourself through these experiences with your mentees?”, “Please share your most successful and your least successful mentoring experiences,” and “What motivates you to continue mentoring?” The answers from these questions were coded for overarching themes, which were then organized in groups based on similar thoughts or phrases. The results included the amount of times a theme was mentioned when using this grouping technique.

## Results and Discussion

Seven themes emerged from the interviews: “Mutuality and Team Effort,” “Legacy and Age,” “Building of Mentees,” “Communication,” “Spirituality,” “Rewarding,” and “Trust and Vulnerability.” “Mutuality and Team Effort” highlighted the two-way relationship of giving between mentor and mentee. “Building of Mentees,” which focused on the mentor’s ability to guide the mentee in areas such as life struggles and self-improvement, also revealed self-satisfaction and motivation among the mentors as progress was made. As one mentor noted, “You never know what you like until you try [mentoring]. If you have the courage to try it, you may experience something that opens you up to worlds that you haven’t experienced.”

There were some limitations to this study, including the small sample size. For future studies, a larger sample size may produce results that can be general-

ized and applied to larger populations. Also, if more direct and specific questions focusing on why mentors enjoyed mentoring were asked, more detailed results could be reached. A questionnaire submitted to each participant over personality characteristics and correlations to mentoring and enjoyment in mentoring would bring this entire project together as a future study.

## Conclusion

This study supported the hypothesis that mentors

experienced a positive impact in their role and were motivated to continue. The mentors' responses provided information detailing how they were impacted, with as many as 330 mentions of ways they gained intrinsic rewards from their experience in guiding and seeing progress in their mentees. Despite the struggles they faced, all three mentors recognized the importance in their role and found their experience to be valuable, humbling, and rewarding.

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# Etiological Perspectives of Mental Illness as a Function of Religiosity and Ethnic Minority Status



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## Introduction

Etiological perspectives of mental illness are defined as beliefs about the causes of mental illness that may influence treatment-seeking behavior. Some minority groups in particular, such as Blacks, have been shown to underutilize mental health services and instead seek religious faith leaders. The practice of seeking ministerial assistance in place of professional mental health services has become so commonplace in some communities that the American Psychiatric Association (2018) has revised its cultural competency guides by recognizing “spiritual dimensions” as an aspect of cultural competency and encouraging collaboration between psychiatrists and faith leaders by launching a “Mental Health and Faith Community Partnership.”

This study examined whether university students’ etiological perspectives of mental illness vary depending on religiosity and ethnic minority status. An online survey, completed by 233 students at Wichita State University, assessed religiosity, perspectives of mental illness. It was hypothesized that ethnic minorities would differ in etiological perspectives.

## Methodology

A total of 233 students volunteered to complete an online survey for one credit through SONA, the experiment participation system for the Psychology Department at Wichita State University. Participant requirements included English fluency and an age range of 18-65 years. The 30-item survey was composed of three sections that measured demographic variables, religiosity, and etiological perspectives of mental illness. Statistical analysis included use of canonical correlation and one-way ANOVA.

## Results and Discussion

The present study examined a convenience sample collected through the university experiment participation system, SONA. Differences related to treatment preference and etiological perspectives were identified among the five ethnic groups: Asian/ Pacific Islander, Black, Hispanic/ Latino, White, and Other. The study found that Blacks were significantly less likely than other ethnic minorities to report that professional healthcare would help them get better if they were dealing with a mental health problem. White participants were significantly less likely to support supernatural forces, such as witchcraft or hexes, as causes of mental illness. Although Black participants were most likely to support supernatural forces as causes of mental illness, this finding was not significant. Lastly, Black participants were significantly less likely to support chemical imbalance as a cause of mental illness, while White participants were most likely to support this cause.

In order to examine the variability in etiological perspectives, religiosity, and ethnicity as they relate to treatment and support preferences, a canonical correlation was conducted. Results indicated that religiosity was a significant predictor of both treatment and support preferences. Variables measuring religiosity were frequency of religious attendance, frequency of private religious activity, intrinsic religiosity, and religious versus non-religious affiliation. Participants who were highly religious were more likely to prefer treatments such as spiritual advice, as well as forms of religious support (e.g., religious leaders, fellow church member).

## Conclusion

Religiosity was found to be a significant predictor of treatment and support preferences. If preferences of current and potential mental health consumers are to be considered, highly intrinsically religious individuals should be offered religious support in addition to healthcare services offered by mental health professionals. This is not to say that mental health professionals should be the ones to administer religious support, but that religious support be made more available to consumers of mental health services. Intrinsic religiosity may need to be measured in mental health service screening processes, especially among minority groups for whom intrinsic religiosity is predictive of other factors. Identifying a consumer as intrinsically religious

may also aid mental health professionals in providing culturally competent services and addressing clients' religious perspectives more thoroughly.

This study aids mental health professionals to effectively identify strategies for engaging and reconnecting with minority communities with the goal of increased mental health service utilization. Mental health systems should strive to adapt in the face of increasing populations of ethnic minorities, particularly in the U.S. One particular adaptation is the liaison between mental health professionals and religious leaders or religious institutions. The integration of these entities may increase the overall strength of communities and allow for identification of localized mental health issues.

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# Assessment of Student Attitudes and Knowledge About Older Adults



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## Introduction

The demand for adept, caring health professionals for older adults is increasing. By 2050 the population of older adults aged 65 and older in the United States is expected to be 83.7 million, nearly doubled from 43 million in 2012 (U.S. Census Bureau, 2014), (Lowey, 2017). Two of every three older adults live with multiple, ongoing medical conditions and nearly 80% have one or more chronic illnesses (Lowey 2017). Global estimates show that by 2020, nurses will spend 75% of their working hours caring for older adults (Potter, Clarke, Hackett & Little, 2013). These statistics have moved geriatric care to the forefront of healthcare concerns in the United States, the U.K., Canada, and Japan (Koh, 2012).

The knowledge health professionals possess about the health and emotional needs of older adult will be a critical component in providing an effective, caring environment (Brown and Bright, 2017). Primary care physicians are reticent to take on older people, and doctors provide less information to older people. Some researchers have found that college students who lack knowledge or experience with older adults feel higher levels of anxiety and exhibit more negative attitudes during interactions with older adults than students who possess such knowledge or experience. Undergraduate nursing students often find clinical placements involving caring for older adults to be unsatisfactory or unsettling and, thus, experience anxiety (Abbey, Bridges, Elder, Lemcke, Liddle and Thorton, 2006). This study examined the relationship between knowledge of and attitudes towards older adults among students at Wichita State University. It was hypothesized that the greater the students' knowledge were, the more positive their attitudes would be towards the older population.

## Methodology

### Participants

A convenience sample was taken from 123 students, ages 18-60, enrolled in the fall 2017 semester at Wichita State University College of Health Professions. The demographic composition of the participants were primarily women (79%), with a median age of 32 years old. Race/ethnicity was (71%) white or non-Hispanic, Hispanic or Latino (10%), and (9%) Asian or Pacific Islander. The majority were in their fourth year in college (52.5%), while less than 1% were in their first year, and 13.3% were in graduate school. Most (76%) participants had taken one or more aging classes.

### The Study Design

This was a pilot study to investigate whether a relationship exists between the level of knowledge regarding aging and ageist attitudes. This study included a cross-sectional design of prospective data collected from a compilation of three, self-report surveys to assess knowledge and opinions about older adults. Participants accessed the survey online or by paper through their course instructor. Data collection was performed using Qualtrics™ software.

### Data collection methods

Participants were asked to self-report their knowledge and opinions regarding older adults using a test-survey that included the Fraboni Scale on Ageism (Fabroni, Saltstone and Hughes, 1990), the Palmore Knowledge quiz, (Snyder & Tyler, 2001), and demographic information. This study received approval by the university Institutional Review Board for human subjects' protection.

## Results

The analysis of the self-report survey data was at a

group level only. The participant population and outcomes were described with descriptive frequencies for each categorical variable run, in addition to the measures of central tendency for continuous variables.

Differences in participant outcomes (e.g., changes in knowledge, attitudes, and beliefs) were assessed using the independent t-test (between genders and by type of study and level of education. Overall the score of knowledge was low ( $M = 10.65$ ,  $SD = 2.99$ ). Attitudes towards older adults were mostly positive ( $M = 51.70$ ,  $SD = 8.2$ ).

Correlation coefficients were computed among knowledge, ageism, major, gender, and age. Results indicated a significant negative relationship between age and ageism:  $r(114) = -.234$ ,  $p < .05$ ; the greater the age, the lower the FSA score, suggesting more positive attitudes among older students.

## Discussion

A significant negative relationship between knowledge and ageism indicated that students possessing greater knowledge of older adults were more positive about them. This positive attitude and lower FSA score appeared among older students as well. These findings indicate that students with greater knowledge and

more life experience tend to express increased positive attitudes toward older adults.

The participants in this study were Midwestern college students across a variety of disciplines, mostly health studies. More women than men took the survey, as there were more women per class than men. A larger sample size would be helpful to test the hypothesis and establish the effect size for future studies.

## Conclusion

The results of this pilot study necessitate additional research to establish an effect size and expand existing research findings on the influence of aging knowledge and interactions with older adults on student attitudes toward older adults. Previous research has shown that knowledge about and interaction with older adults and can increase positive attitudes in students and reduce ageism. Educating university students, particularly those in health professions, about the aging process and providing interactive opportunities with older adults within the curricula may improve attitudes towards the aging population and ultimately impact the level of care they provide this population as they enter the workforce.

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# Assessing Compassion Fatigue Among Professional Helpers Who Work With Intellectual and Developmentally Disabled Individuals



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## Introduction

Nearly 50% of professional helpers in the United States experience compassion fatigue (Zeidner, Hadar, Matthews, & Roberts, 2013). Compassion fatigue was first described in nursing literature as the conditions associated with long-term work stressors (Matey, 2016), such as long work hours, a hectic work environment, and contact with traumatized clients. Without intervention, professional helpers can develop feelings of dread and anxiety associated with their work and even allow such feelings to spill into their personal lives. Compassion fatigue occurs over time, eventually leading to burnout and secondary traumatic stress.

Research suggests that a coexisting relationship exists among compassion satisfaction, the personal gratification one gets from helping others, and compassion fatigue. A study on Icelandic NICU nurses noted that while they felt satisfaction in helping others, professional pride, and love for children (Barr, 2017), they also experienced certain work-related feelings that were connected to compassion fatigue. These thoughts were referred to as “predictors,” which are linked to compassion satisfaction and fatigue. Labor and delivery nurses, as well as pediatric intensive care nurses, reported signs of compassion fatigue (Barr, 2017) brought on by everyday interactions with both sick newborns and their traumatized parents. Police officers are also constantly exposed to high levels of stress throughout the day; over time such exposure could lead to compassion fatigue (Turgoose, Glover, Baker, & Maddox, 2017).

This study investigated possible predictors of compassion fatigue among four professional helpers. It was hypothesized that those who had constant exposure to

work stressors and did not take measures to protect their emotional well-being would show signs of possible compassion fatigue.

## Methodology Procedure

This study included four semi-structured interviews with professionals who work directly with individuals with disabilities. Participants were first given a demographic survey and the Professional Quality of Life Scale (ProQOL) to assess their compassion fatigue. The ProQOL survey, which took five minutes to complete, could be answered with “5 – Very often,” “4 – Often,” “3 – Sometimes,” “2 – Rarely,” or “1 – Never” (Stamm, 2010). After completing the survey, participants were then asked twelve questions, including what initially attracted them to their field and how they dealt with stress. The interviews lasted approximately 30 minutes. Responses were recorded and later transcribed onto a computer and reviewed.

## Participants

Four female professional helpers, between 18-65 years of age, who work for the Sedgwick County Developmental Disability Organization (SCDDO) were interviewed. Three of the interviewees were white, and one was black. In addition, three had worked for SCDDO for a year and a half, and one had worked one year.

## Results

Four umbrella categories were identified after reviewing interview transcriptions: self-care, work and compassion satisfaction, work-related challenges, and professional boundaries. While self-care was viewed as

important, the participants admitted they did not regularly practice it. All participants reported being fairly satisfied with their job; Participant 2 stated that receiving thanks from her clientele especially motivated her. Each participant described work-related challenges, such as the overwhelming nature of their jobs and their large caseloads; they reported having monthly debriefing sessions with their supervisors or coworkers to address these challenges, though none were aware of any policies at SCDDO to address compassion fatigue. All participants were able to keep their work separate from their personal lives, though two participants identified a “slipping” in their set boundaries in which they experienced the stress and pain of their consumers. Participant 3 stated, “I remember one incident in which I just was crying, because it was so traumatic.”

## Discussion

Results from the interviews suggested that participants did not display significant levels of compassion fatigue, but that to an extent, each participant was experiencing work-related exhaustion. Secondary findings from the ProQOL results showed that the participants’ compassion satisfaction, burnout, and secondary traumatic stress were within normal levels. Due to the presence of some work-related exhaustion, their susceptibility to compassion fatigue may increase

over time if left untreated. While the responses of the four interviewees corroborated the study’s hypothesis, the small sample size and lack of diversity among participants pose some limitations, as well as the short time that each participant had worked in her current position.

## Conclusion

This study supported the hypothesis that predictors of compassion fatigue appeared in professional helpers who were constantly exposed to work stressors. To further understand compassion fatigue among helpers, further study should include a larger sample size with diversity in age, gender, ethnicity, and years of experience in the field.

Understanding compassion fatigue can ultimately help people to better cope with its symptoms. People who have constant exposure to traumatized clientele are more susceptible to developing compassion fatigue. To combat compassion fatigue, organizations like the SCDDO may need to examine their caseloads. By utilizing different coping strategies, such as debriefing, breaks, and fun activities, organizations will be able to help their employees deal with their stress. It is important to examine and understand the impact of compassion fatigue on all professionals who help others for a living.

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# Idioms-of-Distress Among Individuals Under Criminal Justice Supervision



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## Introduction

Individuals in the criminal justice system are more likely to experience depression than the general population (Hochstetler, Murphy, & Simons, 2004). Victimization and violence are a prominent part of life for those who are incarcerated, making them susceptible to severe psychological effects due to experienced distress (Hochstetler et al., 2004). Major Depressive Disorder (MDD) among inmates has been linked to distress derived from their living environment (Cooper & Berwick, 2001). Diagnosing individuals within the criminal justice system for depression based on assessments designed for the general population could prove to be ineffective.

## Idioms-of-Distress and Culture

Idioms-of-distress refer to one's response to affliction based on one's cultural context (Nitcher, 2010). Some cultures may report somatic complaints such as dizziness, instead of admitting they are distressed (Hinton & Lewis-Fernández, 2010). Correction facilities are environments with their own norms and values creating a culture unique to them. This necessitates further research devoted to the criminal justice culture, instead of applying findings originating from the general population. It is hypothesized that idioms-of-distress will serve as better predictors of MDD for individuals within the criminal justice system than the traditional assessments.

Research sensitive to culture covers areas that impact an individual's perception, such as interaction with others, the community, beliefs, and institutional practice (Kirmayer, 2001). One's ability to express emotion is mediated by these factors, including healthcare

worries and standards which are contingent to culture (Nitcher, 2010). Correction facilities have their own set of standards, which creates the opportunity to develop community norms, values, and perceptions of health (Kirmayer, 2001). The application of idioms-of-distress in clinical assessment ensures that correct diagnoses and recommendations are sensitive to the social and cultural context of the individual (Nitcher, 2010).

The purpose of this study is to identify predictors that are more applicable to the criminal justice system when diagnosing MDD. The application of idioms-of-distress in clinical settings enable diagnoses to be culturally sensitive and identify distress factors.

## Methodology

### Participants

The Mini International Neuropsychiatric Interview (MINI) was used to identify participants who met MDD criteria. The following questionnaires measured idioms-of-distress: Perceived Stress Scale (PSS-10), physical pain questionnaire, and the Centers for Epidemiological Studies on Depression (CES-D). PSS-10 assessed stress experienced within a one-month time frame. The physical pain questionnaire measured level and type of pain (i.e., sleep problems, pain, gastrointestinal symptoms). The CES-D evaluated severity of depression. The Addiction Severity Index (ASI) was a second interview from this study used to reveal the criminal history of the sample. Questions covered in the ASI included length of incarceration, violent offenses committed, family dysfunction, substance abuse, and physical/sexual abuse.

### Procedure

Clinicians conducted the MINI and ASI interviews with

the participants. Participants also completed PSS-10 and CES-D to assess pain and severity of depressive symptoms. A univariate comparison test was used to determine if further investigation was necessary. After the variables in the univariate comparison showed a correlation, a logistic regression test was used to identify which items were significant predictors of MDD.

## Results

Stress was the most significant predictor of MDD; the second most significant predictor was CES-D, followed by pain complaints. There were no significant findings for sex, age, race, abuse history, number of arrests, or history of substance dependence, as predictors of MDD.

## Discussion

Reported symptoms of stress could be the best predictor of MDD within the criminal justice population. This may stem from the fear of being perceived negatively by other inmates if MDD was manifested in a less acceptable way for the prison culture. Also, the rates of victimization experienced in correction facili-

ties are severe, which could explain the third best indicator, physical symptoms.

Limitations to this study include the concentration of male participants under community correction supervision. Future research should broaden the sample by including those in federal prisons and incorporating more females.

## Conclusion

The results of this study show that being sensitive to prison culture when researching this demographic may be beneficial and should be considered when making more accurate assessments than those used for the general population. Idioms-of-distress significantly predicted MDD with the criminal justice sample, with stress being the number one way to respond to distress. With further understanding of idioms-of-distress, psychologists can better identify those who are at risk and provide treatment. Future treatment of MDD could decrease recidivism rates by improving how formerly incarcerated individuals react to distress when they are integrated back into the community.

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# Effectiveness of Foreign Aid Channels in Boosting Economic Growth in Developing Economies



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## Introduction

Since the end of World War II foreign aid has been used by many countries as a foreign relations tool. It was first used by the U.S. to counter the spread of communism, help grow export markets available to U.S. manufacturers, and stabilize fragile countries (Ruggie, 1982). After the fall of communism, aid focused on developing the economy of the recipient country, rather than fueling political motivations. Foreign aid is allocated by either bilateral or multilateral transfers. A bilateral transfer occurs from the donor government to the recipient government, while a multilateral transfer occurs from an international organization to the donor government. These bilateral and multilateral transfers adopt different approaches to distribution.

## Foreign Aid Effectiveness Debate

Studies analyzing the effectiveness of foreign aid have been inconclusive, thus necessitating further investigation between bilateral and multilateral transfers' impacts on the growth of recipient countries (Bourguignon & Sundberg, 2007). Additionally, the different incentives and goals of the bilateral and multilateral aid transfers suggest differing results (Qian, 2014). Previous research regarding foreign aid literature have culminated into three main positions. First, aid has been ineffective and may have harmed the development of emerging economies, due to foreign aid being sent to corrupt governments that do not grow the economy and to foreign aid making the recipient government too dependent (Muyo, 2009). Second, aid levels have been too low and that more is needed to

reduce global poverty. Experts championing foreign aid's effectiveness argue that millions of lives have been saved through economic development, better health services, and humanitarian intervention (Sachs, 2006). The third position, a middle ground, emphasizes the lack of good data available to measure properly the effectiveness of foreign aid. This position posits that analysis on the effectiveness of foreign aid needs to focus more on gathering good data and a deeper analysis into the links between foreign aid, its execution, and its effects (Banerjee & Duflo, 2011).

This study hypothesized that bilateral and multilateral transfers will have positive but differing impacts on growth due to their different approaches and incentives.

## Methodology

This study included 69 countries with seven independent variables for each country: Net ODA as a percent of GNI, Multilateral ODA, Bilateral ODA, GDP per capita, population growth, capital formation as a percent of GDP, and secondary education years. For the dependent variable GDP per capita growth was used. All variables were gathered from the World Bank Open Data database. The Multilateral Aid Report published by the Organisation for Economic Co-operation and Development was used to find the proportions of multilateral and bilateral aid in the total net aid. The time interval used for the study was from 1990 to 2015.

## Results

Results show that net, bilateral, and multilateral

foreign aid negatively impacted the economic growth of recipient countries. This result invalidated the initial hypothesis that aid would have a positive impact, but it is consistent with previous research that posits that foreign aid is ineffective in boosting economic growth. Additionally, the variables of capital formation, initial GDP per capita, population growth, and level of secondary education attainment were all consistent with previous research regarding their impact on the economy. However, there may be an endogeneity problem in which GDP per capita growth and the amount of foreign aid distributed are explained by another variable that simultaneously explains GDP per capita growth and foreign aid distribution (Doucouliagos, Paldam, 2009). Future research will attempt to avoid the possible endogeneity by using an instrumental variable that allows the relationship between the two variables to be analyzed and subsequently removed.

## Conclusion

Foreign aid is an important mechanism to alleviate global poverty through bilateral and multilateral organizations. Despite the efforts throughout the decades, it is still unclear whether it is effective or not. This study hypothesized that a positive linear relationship exists between net, bilateral, and multilateral foreign aid on the recipient countries economic growth. However, the findings suggest that foreign aid hinders a countries economic growth. These findings are consistent with previous research that found foreign aid to be ineffective. To further analyze the results, future research will attempt to remove the possibility of endogeneity by using an instrumental variable and more advanced econometric tools.

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# Assessing Health Literacy and Stroke Symptomatology in Older Adults



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## Introduction

The likelihood of experiencing a stroke is high among adults aged 65 and older. The Centers for Disease Control (CDC) estimate that strokes kill 140,999 Americans on an annual basis (CDC, 2018). Based on a recent CDC survey 93% of respondents recognized unilateral facial numbness as a sign of stroke, but only 38% were aware of all indications and knew to call 911 when someone is having a stroke. The high statistical probability of stroke makes education on symptomatology and subsequent action steps among this demographic paramount.

Between 2000 and 2017 there were only 127 total publications on health literacy and older adults. A lack of overall health literacy may be a contributing factor. The 2003 National Assessment of Adult Literacy (NAAL) estimates that only 3% of older adults, 65 and older, were proficient with health literacy skills (NAAL, 2003). Past published research concentrates on overall health literacy with little emphasis on stroke literacy, in particular, among older adults. A significant amount of the available literature concentrates on pharmaceutical protections, heart health, and general literacy improvement. Howard, Brainard, Loke, and Salter (2017) found that there was a missing link between literature for health workers and the general public. It is important for health workers to remain apprised of new and evolving medical news and for patients to be educated on their own health as well. The purpose of this study was to increase stroke health literacy and recognition of stroke signs and symptoms, and to educate on the importance of calling 911. It was hypothesized that stroke literacy could be improved with a succinct visual presentation.

## Methodology

This study was conducted at the Oxford Grand Assisted Living and Memory Care in Wichita, KS. The average resident age made this location prime for the demographic of interest. The research was conducted in three phases. The first phase was composed of non-medical personnel who have daily interaction with the residents. The second phase was composed of residents of the facility, all aged 65 and older. The third phase focused on family and friends whose interpersonal relationships with the residents puts them in company with one another on a frequent basis. These participant groups were purposely defined as a means to differentiate between pre-test and post-test knowledge in these varying populations.

The pre-test assessment gathered each participant's demographic information, including income, education, healthcare coverage, and age; it also determined a baseline of general stroke knowledge. Each participant was asked basic stroke questions to establish if there was a common knowledge standard, such as the use of the mnemonic device FAST, (Facial drooping, Arm numbness, Speech—slurred or difficulty speaking, and Time to call 911). This provided a baseline to determine improvement following treatment.

The treatment consisted of a visual presentation administered in the form of a twenty-minute PowerPoint slideshow. The presentation provided a thorough but simplified explanation of the different types of stroke; hemorrhagic, ischemic, and transient ischemic attack (TIA or mini-stroke). Delayed treatment can occur due to failed recognition by patients, family, and general bystanders. Sixty percent of stroke-related

deaths occur outside of the hospital. For this reason, the presentation included a section on the importance of calling 911 immediately after recognition of stroke symptoms. Participants received information about the availability of life-saving intervention. Alteplase (IV-tPA), a clot-busting medication, is the only medication proven to reduce disability in ischemic stroke at 90 days post-stroke (Marler et al., 2000). Success rates are greatly improved when administered within four hours of onset.

The post-test mirrored the pre-test knowledge section. The questions were identical and determined if there was an increase in knowledge on stroke symptomatology and action steps. There were 30 total participants, but two participants declined participation in both the post-test and pre-test; therefore, the data reflects 28 participants as opposed to the full 30 involved in the study. All of the testing was conducted manually with pen and paper, rather than electronic entries directly into Qualtrics. A participant identification number was assigned to protect participant anonymity.

## Results

Results supported the hypothesis. Participant knowledge increased following the treatment. The pre-test assessment determined that a majority of respondents sometimes find written health information easy to understand (32.26%, n = 10) yet the same number of respondents only reach out to family members and caregivers for assistance deciphering their health information (32.26%, n = 10). Due to the non-normality of the outcome variables and small sample size the nonparametric Wilcoxon Signed Rank test was used to compare post-test and pre-test values.

Each of the phases had comparable baseline knowledge prior to treatment and each showed marked improvement on the points that scored low in pre-test assessment; notably the question about the correct course of action when a stroke is detected. Some participants opted not to call 911 at first, but at the post-test all participants selected calling 911 as the best option.

**Table 1. Results**

	Minimum	Maximum	Mean	S.D.
Knowledge of symptoms at pre-test	0	5	3.18	1.91
Knowledge of symptoms at post-test	0	5	4.00	1.66
Knowledge of prevention at pre-test	0	8	5.46	2.69
Knowledge of prevention at post-test	0	8	6.46	2.62

## Discussion

Based on the pre-test to post-test data, it was determined that participants are able to understand a visual presentation on stroke symptomatology and retain a majority of the key points as presented. A significant increase appeared in post-test knowledge of both symptoms and prevention, and that increase in knowledge can result in life-saving measures by groups who are susceptible to stroke and those in close proximity to them. Limitations in this particular study can be attributed to low participation numbers and the lack of the six-week follow-up. A longer study that includes long-term retention results would further prove the efficacy of this treatment plan. A six-week post-test follow-up was initially scheduled to determine long term retention, but the number of available participants after the short-term post-test fell to a negligible amount. It was decided that the data collected was sufficient for analysis.

## Conclusion

Based on the final data analysis it can be concluded that a strong relationship exists between education and short-term retention across varying participant phases. When introduced with a concise informative presentation, participants were able to identify all of the most prevalent stroke symptoms and the appropriate course of action for treatment. The results of this study suggest that short presentations may be an effective way to increase stroke literacy and increase the likelihood that individuals will seek immediate treatment after the onset of stroke symptoms.

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