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Relationship Between Health Literacy and Self-Directed Learning Readiness of Older Adults

Robin Justice Dennis
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RELATIONSHIP BETWEEN HEALTH LITERACY AND SELF-DIRECTED
LEARNING READINESS OF OLDER ADULTS

by

Robin Justice Dennis

A Dissertation
Submitted to the Graduate School
and the Department of Educational Research and Administration
at The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

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ABSTRACT

RELATIONSHIP BETWEEN HEALTH LITERACY AND SELF-DIRECTED LEARNING READINESS OF OLDER ADULTS

by Robin Justice Dennis

May 2017

The primary purpose of this study was to determine if the health literacy level of older adults, age 65 and older, and the self-directed learning readiness score were correlated. After data cleaning, the number of cases was below the recommended rule of thumb. Deletion of cases indicated by the analyst of the self-directed learning readiness score (SDLRS-ABE), and imputation of missing data on the shortened test of functional health literacy (STOFHLA), limited the number of usable cases for analysis and presented a limitation to this study. A Pearson Correlation was then performed to determine any correlation between the scores on the STOFHLA and SDLRS-ABE. There were no significant findings. When analyzing the predictor variables with SDLRS-ABE scores, there were no significant findings. However, when taking the scores on the STOFHLA with the predictor variables, there was significance found between STOFHLA scores, education level, and age when taken together. Thus, analysis was focused on the significance of age and education level taken together on the health literacy level of the participants.

Due to presence of outliers when checking for assumptions, transformation of the data was indicated. After the log 10 transformation of the data was performed, the assumptions of normality of residuals, homoscedasticity, and multicollinearity were met and the model was used for analysis. Multiple regression was performed to analyze the

transformed data. Significant findings were found indicating that participants with a college degree have statistically significantly higher scores on log values of STOFHLA after transformation than a reference group of participants not having a high school degree, $t(df) = -2.92, p = 0.005$. At 10% significance, participants with some college had statistically significantly higher scores on log values of STOFHLA after transformation than a reference group of participants not having a high school degree, $t(df) = -1.94, p = 0.056$. Participants age 85 and older had statistically significantly lower scores on log values of STOFHLA after transformation than a reference group of participants age 65-74, $t(df) = 2.95, p = 0.012$.

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DEDICATION

This project is dedicated to the memory of Larry F. Justice, my husband of 23 years, who encouraged and persevered with me from 1983-1999 for my ADN, BSN, and MSN degrees in nursing. Although we were prepared to begin the journey of the doctoral degree, he was suddenly called home. I know in my heart that he would be pleased with our accomplishment.

Appreciation and acknowledgment is extended to my husband Buddy Dennis for his support and encouragement throughout this lengthy process. I would like to acknowledge my son Anthony Justice for his never-ending faith in me, for giving meaning to everything I do, and for just being a great son and champion for me. Above all things, all praise, honor, and glory be to our Lord, Jesus Christ.

TABLE OF CONTENTS

ABSTRACT	ii
ACKNOWLEDGMENTS	iv
DEDICATION	v
LIST OF TABLES	ix
LIST OF ILLUSTRATIONS	x
CHAPTER I - INTRODUCTION	1
Statement of the Problem.....	3
Theoretical Foundation	3
Research Questions	5
Definition of Terms.....	7
Assumptions.....	9
Delimitations.....	9
Limitations	10
Justification.....	10
CHAPTER II – LITERATURE REVIEW	12
Adult Learning and Health.....	12
Health Literacy and Health Outcomes	14
Health Literacy.....	15
Definition of Health Literacy	15

Concept of Health Literacy	16
Health Literacy and Health Outcomes	17
Self-Directed Learning.....	26
Adult and Lifelong Learning	32
Older Adult Learning	35
Summary	40
CHAPTER III - METHODOLOGY	41
Problem and Purpose Overview.....	41
Population and Sampling Plan	41
Research Design.....	43
Data Collection Procedures.....	44
Data Analysis	45
CHAPTER IV - ANALYSIS OF DATA.....	47
Univariate Outliers.....	49
Assumptions.....	50
Ratio of Cases to IVs	50
Normality	51
Model Fit.....	52
Bivariate Correlation.....	54
Multicollinearity	54

Multivariate Normality	57
Outliers.....	57
Normality of residuals.....	57
Explanation of Log Transformation and Reflection	63
CHAPTER V – DISCUSSION.....	65
Summary of Findings.....	65
Strengths and Limitations	66
Future Research	67
Implications for Practice.....	67
Conclusion	69
APPENDIX A – IRB APPROVAL	72
APPENDIX B - DEMOGRAPHIC QUESTIONNAIRE	73
APPENDIX C - ORAL CONSENT FORM.....	74
APPENDIX D - CONSENT TO PARTICIPATE	75
APPENDIX E - PERMISSION TO USE TOFHLLA.....	76
APPENDIX F - PERMISSION TO USE SDLRS	77
REFERENCES	78

LIST OF TABLES

Table 1 Descriptive Statistics.....	49
Table 2 Extreme Skewness and Kurtosis of STOFHLA	49
Table 3 Model Summary	53
Table 4 Omnibus table before transformation	53
Table 5 Model summary after transformation	54
Table 6 Omnibus table after transformation	54
Table 7 Assumption of Collinearity before transformation.....	55
Table 8 Assumption of Collinearity after transformation.....	56
Table 9 Descriptive statistics before transformation	57
Table 10 Descriptive statistics after transformation	60

LIST OF ILLUSTRATIONS

Figure 1. Skewed Distribution..... 50

Figure 2. Skewness of STOFHLA data prior to log-10 transformation 51

Figure 3. Normal distribution after log transformation 52

Figure 4. Negative skewness before transformation 58

Figure 5. Standardized residuals showing outliers 58

Figure 6. Regression standardized residual before transformation 59

Figure 7. Regression standardized residual showing normality of residuals 61

Figure 8. Observed cumulative probability after transformation 61

Figure 9. Studentized residual observed value 62

Figure 10. Standardized predicted value after log transformation 62

CHAPTER I - INTRODUCTION

The aging of the population has far-reaching implications for every aspect of American society. This influence will have profound implications for health care systems in the U.S. (CDC, 2013; Elliott, 2014). In today's complex health care system, individuals are expected to more actively perform self-care and independently navigate the health care system than in past years (Eichler, Wieser & Brugger, 2008; Escobedo & Weismuller, 2013; Parker 2000). Self-management of health care, or self-care, is becoming more complex in modern society and requires not only the knowledge, but the motivation, the ability, some level of health literacy, and self-direction to carry out the expectations of health care systems (Eichler et al., 2008; Escobedo & Weismuller, 2013; Paashe-Orlow & Wolf, 2007).

The normal aging process of older adults places this population at high risk of poor health outcomes for many reasons, including cognitive changes that impede the information processing speed and recall of information (Kaye, 2009; Sorrel, 2006; Speros, 2009). Physiological changes that normally occur with aging, such as decline in hearing and vision, can be a problem for older adults in being able to obtain, comprehend, or engage in self-care (Hester, 2008; Sorrell, 2006; Speros, 2009). The risk for poor health outcomes is further compounded with the addition of chronic diseases (Sorrell, 2006; Speros, 2009) such as chronic heart failure, chronic pulmonary disease, hypertension, chronic renal disease, arthritis, and diabetes mellitus.

Definitions of health literacy abound, but the most commonly recognized definition is that of the Institute of Medicine (IOM). As defined by the IOM (2004), health literacy is "the degree to which individuals have the capacity to obtain, process,

and understand basic health information and services needed to make appropriate health decisions” (Federman, Sano, Wolf, Siu, & Halm, 2009, p. 1475; Nielsen-Bohlman, Panzer, & Kindig, 2004, p. 32). Addressing problems caused by inadequate health literacy should be considered a national priority due to the link between poor health literacy and undesirable health consequences (Hill, 2011).

Although lack of health literacy occurs in all age groups, the lack of health literacy in the older adult is disproportionate to individuals in younger age groups in the U.S. (Speros, 2009; Wolf, Gazmararian & Baker 2005). In relation to health literacy levels, the results of the 2003 National Assessment of Adult Literacy (NAAL) indicated that the oldest age group of 65 and older had the lowest average of health literacy of other age groups (Kutner, Greenberg, Jin, Paulsen, & White, 2006).

Other factors associated with poor health literacy include low income (\leq \$20,000 annually) which can exclude individuals from necessary resources to understand health material, access services, and promote health needs (Heinrich, 2012; Kutner et al., 2006). Adults with a high school education or higher tend to have higher health literacy levels than those without a high school education (Heinrich, 2012; Kutner et al., 2006). White and Asian Americans tend to have a higher level of health literacy than those of Latin, African American, and Native American descent. These factors can shape health literacy in many ways. For example, an individual’s educational attainment can influence employment, income, and living in a safe, and resource-rich environment (Kutner et al., 2006).

Older adults with low or inadequate health literacy also have less effective compliance with prescription medications and self-care practices, less knowledge of their

disease process, and exhibit poor health care decision-making than younger adults (Chen, Hsu, Tung, & Pan, 2012; Egbert & Nanna, 2009; Roman, 2004). Health literacy decreases with age, making older adults at high risk of experiencing poor health outcomes (Schechter & Lynch, 2011). Further, older adults with poor or inadequate health literacy can encounter problems in accessing health care, being able to follow practitioner instructions, and self-care activities, whether preventative, actual treatment, or maintenance (Safeer & Keenan, 2005). For older adults with chronic disease who require frequent contact with health care systems, low health literacy can cause difficulty in following complex medical regimes, making important medical decisions, and lead to negative health outcomes (Lee, Arozullah, Cho, Crittenden, & Vicencio, 2009).

Statement of the Problem

In nearly every aspect of life in modern society, people are confronted with health questions and decisions about health care since the concept of health has gone beyond the borders of the health care system itself (Kickbusch & Maag, 2008). Having the necessary skills to understand and act upon health information promotes success in navigating the healthcare system, effective management of health, and thus improvement of health outcomes (Kickbusch & Maag, 2008). In addition, consequences of inadequate health literacy include poor disease management, poor health status, and more hospital admissions (Hester, 2008, Mancuso, 2009). Health literacy is a primary factor in an individual's ability to navigate through health care systems (Robinson et al., 2011).

Theoretical Foundation

Learning is central to human behavior, and a complex topic that defies easy definition and any one single theory (Merriam, Caffarella, & Baumgartner, 2007). The

origin of adult education, as a profession, dates to the early twentieth century (Merriam, 2001). During that period, the central question was whether adults could learn. During the mid-twentieth century, this question of whether adults could learn was abandoned because adult educators began to distinguish adult learning from childhood learning (Merriam, 2001). The central question then became how adults learn as opposed to whether adults learn (Merriam, 2001).

In the twenty-first century, there is still no one answer or theory that explains the process of adult learning (Merriam, 2001). However, one model that has sustained research interest through time is the self-directed learning model (Merriam, 2001). Self-directed learning has been important throughout history (Brockett & Hiemstra, 1991; Merriam et al., 2007), and has been of interest to researchers within adult education and within other disciplines beyond the adult education arena. Self-directed learning is a learning process that encourages independent navigation and evaluation of personal learning (Roberson, 2005b). Merriam et al. (2007) pointed out that adults have always learned on their own, and that learning could even be an invisible phenomenon within people's lives.

Adult learning is central to the health of an individual, group, or community (Hill & Ziegahn, 2010). Health and wellness activities are dependent upon the motivation of the individual and support from different interpersonal community and institutional settings (Coady, 2013; Hill & Ziegahn, 2010). Hill and Ziegahn (2010) suggest three contextual areas in which learning takes place. These areas are (a) individual learning, (b) individual and health professional interactions, and (c) community health learning. Individuals take a more self-directed approach to learning by initiating the learning,

defining individual learning goals, seeking resources, and evaluating the outcomes (Hill & Ziegahn, 2010; Roberson, 2005b).

There is opportunity for learning with any disease process, particularly those considered to be chronic (Papen, 2012). To meet the expectations of health care systems, individuals need to be motivated self-directed learners who either possess or can be successful in development of skills needed to maintain current health status or promote positive health outcomes when managing a chronic disease (Papen, 2012)

Research Questions

RQ1 Is there a correlation between health literacy levels and self-directed learning readiness scores?

H1: There will be a positive correlation between health literacy levels and self-directed learning readiness scores.

RQ2 Does age, race, and educational attainment when taken together, predict health literacy?

H1: Age, gender, race, and educational attainment, when taken together, predict health literacy.

RQ3 Does age predict health literacy, controlling for gender, race, and educational attainment?

H1: Youngest-old adults will have higher levels of health literacy than middle-old and oldest-old adults, controlling for gender, race, and educational attainment.

RQ4 Does gender predict health literacy, controlling for age, race, and educational attainment?

H1: Females will have higher levels of health literacy than males, controlling for age, race, and educational attainment.

RQ5 Does race predict health literacy, controlling for age, gender, and educational attainment?

H1: Whites will have higher levels of health literacy than blacks, controlling for age, gender, and educational attainment.

RQ6 Does educational level predict health literacy, controlling for age race, and gender?

H1: Those with some college or a college degree will have higher levels of health literacy than those with not college, controlling for age, gender, and race.

RQ7 Does age, race, and educational attainment when taken together, predict self-directed learning readiness?

H1: Age, gender, race, and educational attainment, when taken together, predict self-directed learning readiness?

RQ8 Does age predict self-directed learning readiness, controlling for gender, race, and educational attainment?

H1: Youngest-old adults will have higher levels of self-directed learning readiness than middle-old and oldest-old adults, controlling for gender, race, and educational attainment.

RQ9 Does gender predict self-directed learning readiness, controlling for age, race, and educational attainment?

H1: Females will have higher levels of self-directed learning readiness than males, controlling for age, race, and educational attainment.

RQ10 Does race predict self-directed learning readiness, controlling for age, gender, and educational attainment?

H1: Whites will have higher levels of self-directed learning readiness than blacks, controlling for age, gender, and educational attainment.

RQ11 Does educational level predict self-directed learning readiness, controlling for age race, and gender?

H1: Those with some college or a college degree will have higher levels of self-directed learning readiness than those with no college, controlling for age, gender, and race.

Definition of Terms

Adult learning - One of the most accepted definitions of adult learning is “The process of adults gaining knowledge and expertise” (Knowles, Holton, & Swanson, 1998, p. 124). Although there is limitation in this definition, for this project adult learning will be defined as gaining of knowledge leading to a change in behavior for individuals age 65 or older. Notation should be made that the terms adult learning and adult education are often used synonymously although the two terms are different. Adult learning can be considered as an individual process and as an outcome. Adult education can also be thought of as a process, however, for this study, the term refers to a discipline or a foundation or framework, to promote learning.

Chronic disease - A non-communicable, slowly progressing disease of long duration, which requires frequent encounters with health care providers and significant knowledge about prevention and/or maintenance of symptoms (WHO, 2014).

Health outcomes - Health outcomes will be defined as any result or alteration in health status which can be attributed to one or more interventions or lack of interventions. Health outcomes can include both positive and negative outcomes and focuses on what results from the intervention (U.S. National Institution of Medicine, 2011).

Health literacy - Health literacy is a definition synthesized from several available definitions. Health literacy is the ability utilize reading, numeracy, social, and communication skills in functioning successfully as a health care consumer; developing competencies to identify, comprehend, evaluate, and utilize pertinent health information to make informed choices (Estacio, 2013; Federman et al., 2009; Nielsen-Bohlman, Panzer, & Kindig, 2004, p. 32; Ratzan & Parker, 2000; Speros, 2005; Zarcadoolas, Pleasant, & Greer, 2003).

Lifelong learning - The definition of lifelong learning is synthesized from several definitions found in the literature. Lifelong learning will be defined as activities over an individual's lifetime that lead to the desired outcome of gaining the skills necessary to become competent in the effective management of personal and/or social needs (Hiemstra, 1976; Milic, n.d.).

Older adult - The older adult will be defined as any adult aged 65 or older. Older adult will be further categorized as the young-old adult between the ages of 65-75 years of age. The middle-old adult will be defined as ages 76-85, and the oldest-old adult will be defined as those 85 years of age or older (Bjorklund & Bee, 2007). For the purposes of this study, the older adult will be defined as any adult aged 65 year of age or older with at least one chronic disease.

Self-directed learning -The seminal definition of self-directed learning will be used for this study. The widely-used definition is that of Knowles (1975).

In its broadest meaning, self-directed learning describes a process in which individuals take the initiative, with or without the assistance of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. (p. 18)

For this study, self-directed learning for health is the accountability for one's own knowledge of health care information in a formal or informal setting. The individual determines a need and seeks information on their own (Brockett & Hiemstra, 1991), for example, searching the internet for information about health concerns.

Assumptions

The underlying assumption in this study was that all participants would answer truthfully. Anonymity and confidentiality will be maintained and participants may withdraw from the study at any time.

Delimitations

One delimitation of this study is that the population consisted of only individuals who are age 65 or older who had at least one chronic illness. These delimitations exclude well older adults or those without a chronic illness. This also excluded individuals who are younger such as older adults at age 55 in the community. Study participants used English as their primary language which precluded non-English speaking individuals from this study. The findings cannot be generalized to older adults who do not use English as their primary language.

Limitations

The study included only those older adults who can go into the community and attend senior citizen activities. The study was limited to individuals who attended the senior citizen center function for that day. Attendance can be affected by poor weather conditions, illness, or lack of transportation. Further, the study included only those participants who have functional sight, hearing, and some level of literacy to read and follow instructions and complete the study instruments.

Justification

The findings from this research may provide adult educators, health care educators, and health care consumers with information that provides awareness of the process of adult learning, particularly of older adults. Definitions of health literacy abound and many suggest that understanding and acting on health instructions provided by health professionals, associated with definitions of health literacy, is the primary responsibility of the individual (Pleasant, 2011). However, over the last decade, health professionals have come to realize that adequacy of health literacy of the individual resides within health care professionals and systems, adult educators, researchers, and society (Pleasant, 2011).

This project has both theoretical and practical relevance. This research contributes to the current available knowledge of self-directed learning and the health literacy of a vulnerable and quickly growing population. The significance of this information will increase with the aging of the population and will be complicated in the future by growing expectations for self-care of older individuals by health care professionals. The practical relevance is that older adult health care consumer needs of the future will have a

noteworthy impact both on the health of the individual and on the economy in either increasing or decreasing health care costs to the nation. Older adult learners can benefit from improved health status based on the capacity to be self-directed in facilitating personal care.

Effective health care education for older adults can help in the reduction of the incidence of poor health outcomes, thus reducing health care costs. Findings from this research also helps to identify characteristics of individuals with low health literacy that can eventually lead to improvement of poor health outcomes in the older adult population.

CHAPTER II – LITERATURE REVIEW

Adult Learning and Health

The role of adult educators includes the facilitation of change in all aspects of individual and community life (English, 2012). Adult educators play a role in not only educating individuals and communities but for the education of health care professionals in formal programs of study (English, 2012). Adult educators can model effective teaching/learning strategies that due to time constraints and amount of information, are not a focus for health care professions education (English, 2012).

In the United States and Canada, there is wealth of available health information, yet few links between health and adult learning (Coady, 2013). In addition, there is much learning that needs to occur to better understand how to enable learners to have more control over their health. A model that was included in the Institute of Medicine (IOM) report by Nielsen-Bohlman et al. (2004), indicated several areas within which the responsibility for health literacy lies. Health literacy is found at the intersection of health and education. Partnerships between adult and health care educators should be a consideration in the promotion of positive health outcomes and better use of health care services (Parker, Ratzan, & Lurie, 2003). In addition, social and cultural contexts are vital to the overall goal of positive health outcomes by influencing and defining learning (Desjardins, 2003). Health literacy is both a health and a social issue and makes necessary the interactions between both health educators and adult literacy educators (Hill, 2011).

Learning has many aspects or dimensions. In the past, learning was conceptualized to be a way of survival and a life-long fundamental endeavor. In addition

to human nature, learning is now considered to be within the psychological and educational arenas and is both a process and an outcome (Merriam & Bierema, 2010). Past definitions of learning focused on a change in behavior. Learning is now conceptualized to be the acquisition of knowledge. Looking at both definitions, learning can be defined as gaining of knowledge leading to a change in behavior (Merriam et al., 2007). However, this definition is limited as noted by Hill (2002). Individuals can develop an attitude or an emotion that may not manifest as a clear change in behavior. This is pertinent to the learning that occurs in the health care arena and is necessary for effective navigation of the health care system (Merriam & Bierema, 2010).

Learning can be considered in a social context as well because of today's information and technological advances in promoting ways of knowing. Useful information is that which is broken down into meaningful units and become the foundation for building knowledge much like that of assessment process in nursing, and in an example of building a home used by Merriam and Bierema (2014). When information is to be used to promote a change in behavior such as when an individual is learning how to do a self-injection of insulin to control blood glucose levels, information can be overwhelming and lead to noncompliance, but when taught in small units, learning can occur.

With the changing demographics of population aging, the nation as well as small communities will see education as vital in meeting the needs of this population. In addition, the population is becoming more diverse and bringing new challenges to educators. In terms of health of the nation and communities, health care educators and

systems are being challenged with methods of promoting learning for self-care and management of chronic diseases (Merriam & Bierema, 2014)

In differentiating adult learning from childhood learning, the stage in the life cycle, and life experience of the individual should be considered. When exploring older adults' learning, these same aspects should be considered. Adults have more experiences and are in a more developed stage of the lifecycle than children, and the older adult is in even a further developed stage of the lifecycle and have more experiences, so older adult learning should be taken into consideration when exploring adult learning. Self-directed learning is thought of by researchers as an informal type of learning although it can be a self-directed assignment within a formal classroom setting (Merriam & Bierema, 2014)

Health Literacy and Health Outcomes

There is a high correlation between low literacy and poor health, and low literacy is considered a stronger predictor of mortality than either educational attainment or income (Baker et al., 2007). There is great focus on patient involvement in self-care in today's health care arena (Kickbusch & Maag, 2008). Individuals are inundated with information from the news, internet, family and friends, health care providers, health organizations, and health insurance providers (Kickbusch & Maag, 2008). Health literacy is now a requirement of daily life as opposed to an occasional necessity (Schechter & Lynch, 2011). There are two themes that emerge when dealing with health and aging of the population (Roberson & Merriam, 2005). One is the issue of health care and the fact that individuals are being expected by health care professionals to acquire, process, and act on information to make informed health care decisions (Roberson & Merriam, 2005). The second theme is the health literacy level of the individual. Roberson and Merriam

(2005) determined that there is a gap between this expectation and the ability of individuals to be self-directed due to the complex and multifaceted health care system and the inability or lack of motivation to obtain, understand, and act on information to make appropriate health care decisions. Motivation and interest are significant forces in learning, which is a goal-directed behavior that stems from the needs of the individual at a given point in time to a specific situation (Verner & Booth, 1967). Challenges and transitions are present in older adulthood just as in other stages of life (Verner & Booth, 1967). These challenges and transitions often become the catalyst that creates motivation for an individual to become more active and self-directed in individual learning (Roberson & Merriam, 2005).

Health Literacy

Definition of Health Literacy

As discussed in Chapter I, health literacy is defined by the Institute of Medicine as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions” (Federman et al., 2009, p. 1475; Nielsen-Bohlman et al., 2004, p. 32; Ratzan & Parker, 2000, p. 147). Past definitions of health literacy have included the ability to apply reading and numeracy skills to health care issues (Estacio, 2013). Health literacy is now thought to require social and communication skills in addition to those of numeracy and reading (Estacio, 2013). Current definitions include the ability to apply these various skills across the lifespan (Speros, 2005). Definitions of health literacy can provide a framework for the assumptions of the problem as well as the solution (Prins & Mooney, 2014).

Health literacy is the term used to define a set of skills that mediate health and clinical decision-making (Baker, 2006). As a set of skills, health literacy may be influenced by educational intervention (Nutbeam, 2008). Health literacy is context specific and can be influenced by the way that health care services are organized and delivered (Nutbeam, 2008). Health literacy is context specific and can be influenced by the way that health care services are organized and delivered (Nutbeam, 2008).

Concept of Health Literacy

The concept of health literacy has developed over time by attempts to define and quantify the functional literacy needs of adults (Berkman, Davis, & McCormack, 2010). The cause of poor health literacy is a point of confusion much like that of defining and conceptualizing health literacy (Prins & Mooney, 2014). The nature of health literacy changes as societal demands increase for individuals to be more accountable for self-care. An example is the Affordable Care Act, which will require adults to comprehend complex changes in health care policy (Kickbusch, Wait, & Maag, 2005; Prins & Mooney, 2014).

Nutbeam (2008) referred to the concept of health literacy as a risk factor which can be assessed and managed and can be viewed as an asset to the individual. Health literacy is not an action, but rather an outcome of health education and communication that can empower an individual in making appropriate and informed health care decisions (Nutbeam, 2008). Speros (2005) defined a health literate person as one who can apply the basic skills of reading, writing, and numeracy in the health care setting (Speros, 2005). The health literate person can provide self-care or self-monitoring for chronic medical conditions (Speros, 2005). The individual with adequate health literacy can

understand information provided by health care providers regarding health conditions, treatment options and potential health outcomes knows where to go for health care information, and can correctly follow health care provider instructions (Mancuso, 2009).

The attributes of the concept of health literacy can be defined as “reading and numeracy skills, comprehension, the capacity to use information in health care decision-making, and successful functioning as a health care consumer” (Speros, 2005, p. 636). Baker’s 2006 examination of the definitions of health literacy offered some insight into the continuing confusion and lack of agreement about the concept. If health literacy is about the person, reading and vocabulary skills are adequate measures. However, if health literacy is about the relationship between individual communication capacities, the health care system, and broader society, individual measures are not appropriate. This conceptual confusion can impede advancement of the concept and the implementation into policy and practice (Nutbeam, 2012). Health literacy should be approached more systematically and collaboratively in meeting the challenge of measurement of the concept (Nutbeam, 2012).

Health Literacy and Health Outcomes

Health literacy is a primary determinant of an individual’s ability to independently navigate the health care system (Parker, 2000; Robinson et al., 2011). Aspects of health literacy include the a) skills that individuals possess that are brought by the individual to the health care interaction, and b) ability of the health care professional and health care institution to provide usable health care information (Ronson & Rootman, 2012). The interactions of health professionals and institutions play an important role in

the interaction among individuals and their ability to access, comprehend, and utilize health information (Ronson & Rootman, 2012).

Functioning successfully in the health care system is primarily the responsibility of the individual, however, health care providers must work with individuals in improving health literacy (Ronson & Rootman, 2012). Prevention of poor health outcomes related to poor or inadequate health literacy are the responsibility of clinicians (Jepperson, Coyle & Miser, 2009). However, there must be joint responsibility in assuring that health information and services are understood and can be utilized by individuals (Jepperson et al., 2009). Adult educators should play a part in improving health literacy (Robinson et al., 2011). There is a need for health care providers and adult educators to understand how health and literacy work together, and to become aware of how research in this field would be beneficial to older adults (English, 2012; Robinson et al., 2011).

Adult education is also involved in health policy formation, social changes, and literacy campaigns (English, 2012). A conceptual model that highlighted the systematic, interactional, and self-care mechanisms that can lead to better health outcomes was proposed by Paasche-Orlow and Wolf (2007). Highlights of this work included areas for intervention research and identification of the gap in current knowledge that can define the link between literacy and health outcomes. Limited health literacy has strong associations with other predictors such as educational attainment, race, and age (Paasche-Orlow & Wolf, 2007). In addition, the model focused on the direct pathway between literacy and health outcomes but indicated that there are also indirect associations for future researchers to explore. As mentioned earlier, many definitions of health literacy

focus on the abilities of the individual. This conceptual model highlights not only the attributes of the individual but also system-level factors (Paasche-Orlow & Wolf, 2007).

Inadequate health literacy may be a significant barrier to chronic disease management due to the advances in health care technology that place greater self-care management demands on patients than in past years (Schillinger et al., 2002). Older patients are more commonly among the patients to have a chronic disease, poor health literacy, and the most likely to have difficulty keeping up with these changes (Schillinger et al., 2002).

Sudore et al. (2006) explored the association of health literacy and access to health care in a cross-sectional study to determine the prevalence of limited health literacy and the demographic factors and existing health conditions that are related to health literacy. Additional goals of the study were to evaluate the relationship between limited health literacy and to determine the relationship associated with lack of health care access. The participants were part of the Health, Aging, and Body Composition (Health ABC) prospective cohort study conducted between 1997 through 2000. Participants included well-functioning, community-dwelling Medicare eligible individuals ages 70-79. Prevalence of limited health literacy indicated that 24% of the sample had less than a 9th-grade reading level. Participants in the lower health literacy groups were African American males with less than a high school education, and less than \$10,000 yearly income. In addition, individuals with inadequate health literacy reported either fair or poor self-rated health. Symptoms of depression, hypertension, diabetes mellitus, and obesity were also reported. This same group reported having no primary physician or care facility, no influenza vaccination in the last year, and no

insurance for medications. Limited health literacy is associated with disparities in health and health care access, rendering the older adult with limited health literacy at greater risk for poor clinical outcomes than cohorts with adequate health literacy (Sudore et al., 2006). In addition, health literacy level of the individual and educational attainment showed a significant relationship (Sudore et al., 2006).

There are considerable implications of the issue of low health literacy, but confusion surrounding the concept and the implications for health care providers remains (Egbert & Nanna, 2009). While health information is now obtainable via the internet, those who have low educational attainment or low literacy skills, low financial means, and those of minority populations are more likely to have inadequate health literacy (Paasche-Orlow & Wolf, 2007).

In today's health care system, individuals often see several providers, making development of vital health care relationships of trust and communication difficult. Health care providers have limited time, and are pressured into seeing greater numbers of patients than in past years. Individuals do not feel comfortable asking questions, thus increasing the patient/provider knowledge gap (Egbert & Nanna, 2009). An additional barrier to adequate health care is the use of the internet and structuring of the information that is often too complex or inaccurate (Zarcadoolas, Pleasant, & Greer, 2006). One additional barrier lies in the individual's ability to process and comprehend information that has been delivered. Low health literacy is a problem that is widespread and older adults tend to have lower health literacy skills than younger counterparts (Zarcadoolas et al., 2006). This is in part due to declines in reading and cognitive skills related to aging, and the likelihood of diagnosis of at least one chronic disease that requires a significant

amount of regular self-monitoring. In short, the ones who are most in need of health care and health literacy are the least likely to be successful in gaining information in a productive manner (Zarcadoolas et al., 2006). Implications for research and practice include the development of a definition of the many aspects of health literacy that will lead to clarification of the concept, development of strategies that will aid individuals in understanding health care information and in turn decrease confusion (Egbert & Nanna, 2009; Zarcadoolas et al., 2006).

Limited health literacy, a common finding in individuals with the chronic disease process of diabetes mellitus (DM), has been found to be related to poor health outcomes (Kim, Love, Quistberg, & Shea, 2004). Although individuals with poor knowledge of diabetes often have limited health literacy, lack of knowledge alone is not necessarily found to be a primary predictor of poor health outcomes. Kim et al. (2004) conducted a prospective observational study to understand the association between health literacy and management of self-care behaviors in patients with DM. The participants were enrolled in a diabetes education class at a hospital facility in three-hour weekly sessions over a three-week period. Educators used questionnaires to determine if diabetes education improved management of self-care behaviors in patients with limited health literacy. The shortened version of the test of functional health literacy in adults (STOFHLA) was used to determine the individual's health literacy level. Lower health literacy was associated with older age, lower attainment of education, lower annual income, and more self-reported complications of DM than individuals with adequate health literacy. No difference was noted in years with DM or level of support from family or friends (Kim et al., 2004).

Mika, Price, and Villarreal (2005) found that diabetic patients with low health literacy were more likely to have poor control of blood glucose and retinopathy (a disorder of the eye that can lead to blindness). Only half of the diabetic patients with low health literacy knew the symptoms of hypoglycemia (low blood glucose), as compared to 94% of those with adequate health literacy. Overall population aging is a significant determinant of the diabetes epidemic in more than 25% of the U.S. population aged 65 and older (Kirkman et al., 2012). There is a link to limitations in function status, risk of being institutionalized due to both acute and chronic complications of the disease, and death rates. The amount of evidence from clinical trials has failed to determine standard intervention strategies that fit the needs of all older adults (Kirkman et al., 2012).

Omachi, Sarkar, Yelin, Blanc, and Katz (2013) examined the association between health literacy, health outcomes, and health status of patients with chronic obstructive pulmonary disease (COPD) of U.S. adults over the age of 55. COPD requires frequent interaction with health care providers and self-care monitoring. Inadequate health literacy was found to be associated with severity of COPD symptoms, greater degrees of self-reported helplessness, and deterioration of respiratory symptoms in relation to quality of life as compared to individuals with adequate health literacy. Controlling for socioeconomic status, low-literate individuals reported a higher likelihood of hospitalizations related to COPD and visits to the emergency department than individuals with adequate health literacy.

Efforts made towards determining how to address the health literacy issue are necessary to help those who experience health disparities in the U.S. Four steps were defined to approach health literacy as a public health issue by Mika et al. (2005). The

steps included: (1) surveillance or identification of the problem, (2) identification of the cause or risk factors, (3) identification of what works, and (4) determination of how to implement the necessary actions. They determined that individuals must have access to health care in addition to having information, and must strive to become active participants in health care. This, in turn, will empower the individual in making informed health care decisions (Mika et al., 2005). Hill (2011) agrees that health literacy is a health and social issue and will require interactions and actions from health and adult educators.

Robinson et al. (2012) explored the health literacy of patients with chronic heart failure (CHF), a disease primarily found in older adults. CHF is a disease that requires a high degree of self-care and monitoring. The sample included 58.8% males and a mean age of 66. These individuals are often categorized as having low to marginal health literacy. The Short version of the Test of Functional Health Literacy in adults (S-TOFHLA) was used at the recommended 7-minute limit and again with no time limit to determine health literacy levels of the participants who have varying degrees of cognitive function. Approximately 28-58% of patients with CHF have some impairment of cognitive function that does not meet the diagnostic threshold of dementia (Robinson et al., 2012). Findings indicated a 15% improvement in scores between the no time limit and the 7-minute timed test. In addition, approximately 25% of patients improved one literacy level on the no timed limit test. Assessing health literacy in older adults with some degree of cognitive impairment is challenging and new instruments need to be developed to accurately detect health literacy, particularly for older adults with some cognitive impairment. These instruments could better serve in determining which patients can perform self-monitoring that is prompted by diagnosis of this chronic disease, and

which patients need more structured or specific teaching materials and support in management of CHF (Robinson, et al., 2012).

Wang et al. (2013) explored health literacy in asthma patients to develop a causal model to determine the relationship of outcome-related factors and health literacy. This cross-sectional survey included asthma patients ages 20 years and older with a mean age of 51 ± 18.3 years. The outcome of structured questionnaires indicated that there is a positive association between health literacy and asthma knowledge, attitudes, and proficiency in use of the metered dose inhaler commonly employed in the treatment for asthma. Health literacy did have an indirect effect on management of self-care behaviors (Wang et al., 2013).

Although the impact of health literacy on an individual's health is acknowledged, von Wagner, Steptoe, Wolf, and Wardle (2009) question whether health literacy has directly effects health outcomes. They propose that health outcomes are more likely to depend on varying health actions such as (a) health promotion, (b) disease prevention, and (c) compliance with treatment (von Wagner et al., 2009).

In a study by Paasche-Orlow and Wolf (2007), causal pathways between inadequate health literacy and poor health outcomes were proposed. The domains were not only defined by patient factors, but also by external factors that can be attributed to health care providers, or the health care system. Inadequate or poor health literacy skills have a significant influence on interactions with health care providers (von Wagner et al., 2009).

Inadequate health literacy is a primary barrier to health care-related patient education for chronic diseases. Further, efforts to address this barrier appear to have been

unsuccessful. (Williams, Baker, Parker, & Nurss, 1998). Williams, Baker, Parker, and Nurss (1998) conducted a cross-sectional survey of patients with hypertension and diabetes mellitus in two general medicine clinics. The test of functional health literacy in adults (TOFHLA) was used as the instrument and knowledge was assessed using hypertension and diabetes questionnaires that were developed using education materials found in the clinics. There was a total of 402 patients with hypertension and 114 with diabetes. In the group with diabetes, 50 patients had inadequate, 13 had marginal, and 51 had adequate health literacy. Williams et al. (1998) further evaluated the association of patients with inadequate health literacy levels to knowledge of chronic disease control markers, such as HbA_{1c} (a test that determines the average blood glucose level over the preceding two to three months), and blood pressure. Findings indicated that having a functional level of health literacy was correlated with adequate knowledge of disease markers. Patients with inadequate health literacy did not possess knowledge about the recommended lifestyle factors affecting blood pressure control. Despite the correlation between inadequate health literacy skills and lack of knowledge of the disease, no significant relationship between disease knowledge and health outcomes existed. Other factors are believed to affect adherence and disease outcomes, such as an individual's belief about health and the amount of control the individual had on their own health and how much is controlled by the external factors. Results did show that patients with inadequate health literacy, even those who were educated about the disease, did not comprehend the basic information of the disease process or self-care management skills needed to control untoward effects of the disease (Williams et al., 1998).

Atrial fibrillation (AF) is a common arrhythmia (abnormal heart rhythm) seen in medical practice (Goli et al., 2012). Goli et al. (2012) found an association between lack of employment, low educational attainment, and being non-Caucasian with more severe symptoms of AF, and inadequate health literacy was found to be a factor in the relationship. In addition, lower income and being over 65 years of age was correlated with decreased health literacy. Improvement in a patient's understanding of AF symptoms and self-care management can lead to better patient compliance and improved health outcomes (Goli et al., 2012).

Over the past two decades, there has been a surge in health care decisions being made by insurance companies and health care regulations that have changed the patient-physician interactions and responsibilities (Grover, Miller, Swearingen, & Wood, 2014). A significant link exists between self-directed learning and personal health as individuals are expected to take more responsibility for their own self-care than in years past (Rager, 2009). In addition, technology has become significant element in the link between self-directed learning and an individual's personal health. Self-directed learning plays a vital role in informed decision-making about health care (Rager, 2009).

Self-Directed Learning

The proliferation of information and technology makes lifelong self-directed learning a necessary skill for survival. One of the primary aims of adult education in the past few decades has been promotion of self-directed learning skills (Grover et al., 2014; Williamson, 2007). Because of rapid changes in the world, particularly in health care, there is a need for self-directed and lifelong learning (Valente, 2006).

The most lasting and most productive type of learning is self-initiated learning that involves physical, social, and psychological aspects of the learner in addition to the individual circumstances in which learning occurs (Knowles et al., 1998; Roberson, 2005b). The most teachable moments are those which immediately precede a need and are used immediately (Knowles et al., 1998; Valente, n.d.). In addition, learning is facilitated by the learners' responsibility to participate in the learning process. Staying open to experience, and incorporating that experience into the process of change is a significant part of learning (Knowles, 1998). Motivation and interest are significant factors in learning, and an individual at a specific point of time in a specific situation can learn (Guglielmino, 2008; Verner & Booth, 1967). Every form of adult education changes as the condition or nature of the need changes and the intensity of the motivation determines the extent to which learning occurs (Knowles, 1998).

Some individuals need assistance in assuming responsibility for the development of skills for self-directed learning. Other individuals will pursue self-directed learning skills considering personal circumstances (Guglielmino, 2008). Particularly in health care, those who are responsible for education and assisting in skill development for self-directed learning need to have self-directed and lifelong learning as the aim of teaching. This will improve the abilities of citizens to function in a world that is ever-changing and becoming more demanding than in past years (Guglielmino, 2008).

Self-directed learning can be thought of as a process, a personal characteristic, and a goal (Guglielmino, 2008; Merriam et al., 2007). The process of self-directed learning requires individuals take the initiative in identifying their own learning needs, developing personal goals, identifying needed resources, acting on the implementation of

learning strategies, and evaluating outcomes. Self-directed learning as a personal characteristic can indicate an individual's readiness to learn and promote confidence in overcoming barriers to learning (Guglielmino, 2008). As a goal, self-directed learning can result in change (Guglielmino, 2008; Merriam et al., 2007).

The self-directed learner is accountable for learning, and for selecting the objectives, activities, and priorities of learning. Further, self-directed learning can take place in a variety of settings from the classroom to a self-planned project (Guglielmino, 2008). This is much like the self-care practices of an individual with a chronic disease process. The individual is responsible for setting the goals and choosing learning activities needed to accomplish the goals. Successful learning will take place when the learner determines the information is relevant (Knowles et al., 1998).

The adult learner must carry out the same tasks that would normally be carried out by the instructor of a course or session (Guglielmino, 2008; Tough, 1978). Self-directed learners must first determine that there is a problem. Next, the learner must become aware that there is a need to plan and participate in some type of learning activity (Tough, 1978). After the establishment of objectives for the learning activity, the learner obtains the necessary resources. The learner retains the responsibility for the learning task (Guglielmino, 2008), and collaborates with at least an average of 10.6 persons regarding the task (Tough, 1978).

Rager (2009) offered a method of self-directed learning in which she proposed the emotional component as being a significant part of self-directed learning. Emotion is important in all types of learning and particularly in the context of health care (Rager, 2009). Oftentimes a person's emotions create the motivation to learn, while at other

times, for example, the emotion of fear when diagnosed with a chronic or terminal disease, can be a barrier to learning (Rager 2009). This model is cyclical in nature rather than linear, and the context of the model is the environment in which learning takes place. The content of the model represents the subject of the experience. The process component of the model is learning that includes the event, determination of need, setting of goals, identification of available resources, decision-making, action, and evaluation. In addition, Rager (2009) proposed that emotion is a factor in the process content because past and present experiences with self-directed learning can influence learning.

Chronological age does not have a link to self-directed learning (Brockett, 1985). However, there is a link between years of educational attainment with the more years of schooling indicating higher scores on the self-directed learning readiness scale (SDLRS) (Brockett, 1985). Intentional self-planned learning is at least as important, and just as successful as professionally planned activities, and adults can choose, planning, and conducting their own learning activities (Tough, 1979).

The adult learner must possess skills for self-directed learning in order to realize their full potential (Williamson, 2007). The learner must monitor progress, identify areas of weakness, and make the effort towards self-improvement. Self-directed learners take initiative, rather than passively wait to be taught (Williamson, 2007). Further, self-directed learning is relevant, purposeful, and promotes greater retention of information than other methods of learning.

There has been recent interest in the processes that individuals use to self-regulate their health and abilities for maintaining good health or controlling progression of a chronic disease process (Clark & Zimmerman, 2014). Clark and Zimmerman (2014)

described a self-regulated learning model as a triad of personal, behavioral, and environmental factors necessary to reach a goal. The model implies that individual's self-regulate their health using self-care strategies, setting pertinent goals, and evaluating the effectiveness of goal attainment. One limit to this model is that even if individuals are capable of self-regulating, they will differ in their level of motivation. Self-efficacy is a strong determinant of learning and is a primary indicator of motivation to attempt and persist in completing a task in each situation (Clark & Zimmerman, 2014). The relationship between specific behaviors and self-efficacy is well established (Purdie & McCrindle, 2002).

Self-regulation can be considered a part of self-directed learning because learners need to use self-regulation in the learning process. Self-directed and self-regulation are similar in some aspects, but they are not synonymous (Loyens Magda, & Rikers, 2008). Both have similarities in terms of the need for active engagement of the learner, goal setting, analysis of one's own learning skills, and self-motivation (Loyens et al., 2008).

Self-regulation is considered a characteristic of the learner while self-direction is both a learner characteristic and a feature of the learning environment (Loyens et al., 2008). To the lay-person, the term self-directed learning is often used synonymously with self-regulated learning (Cosnefroy & Carré, 2014). The two concepts are different but do have overlapping characteristics. The aim of both concepts is toward an individual's learning efforts, active involvement in goal-oriented behavior, and responsibility and control of learning (Cosnefroy & Carré, 2014). The scope of application is toward learning activities (Cosnefroy & Carré, 2014). Self-directed

learning focuses on the covert or internal person. Self-regulated learning often applies to the attitudes of the learner in a learning opportunity.

Ellis and Zimmerman (2001) described SRL cycles in terms of forethought (task analysis), performance (self-control), and self-reflection (self-judgment / evaluation). Theories of SDL also recognize and integrate the interaction between the learner's private and public worlds. The historical strength of SRL is its cognitive and motivational features of learning, while the strength of SDL is its external control features. The dominant field of reference for self-directed learning is adult education, and the dominant population is the adult learner which implies engagement in learning projects not necessarily within the formal education confines. The field of reference for self-regulated learning is educational psychology, and the dominant population is children, adolescents, and students. Self-regulated learning focuses on the overt such as behavior or environment of the educational setting.

Knowles et al. (1998) offered a model that described adult learners as being in control of learning and making choices to be responsible for the learning. There are four different lenses through which self-directed learners can be viewed: a) need, b) create, c) implement, and d) evaluate. This becomes a way of life for the self-directed learner (Brockett & Hiemstra, 1991). The idea of independence and autonomy in learning has been embraced by adult education (Brockett & Hiemstra, 1991), and has been referred to as self-planned learning, and self-directed learning readiness, which also emphasizes the role of the individual learner in the learning process (Brockett & Hiemstra, 1991).

The foundation of self-direction in the learning process is the responsibility of the learner, but the willingness of an adult learner to accept responsibility varies among

learners (Brockett & Hiemstra, 1991; Guglielmino, 2008). The role of the educator is to help learners develop skills to become able to assume responsibility for their own learning. One misconception is the assumption that when learners participate in learning experiences they do so with a high level of self-direction (Brockett & Hiemstra, 1991). However, self-direction in learning considers the social context in which learning takes place. Optimal learning results when there is proper proportion of between the level of self-direction of the learner, the extent to which self-directed learning is possible, and chances that successful learning will occur are high (Brockett & Hiemstra, 1991).

Adult and Lifelong Learning

Although the older adult population is the focus of this discussion, learning of health care information must begin at younger ages and be reinforced throughout the lifespan (Peterson, Thornton, & Birren, 1986). The topic of lifelong learning is appropriate to consider in this discussion because teaching and learning of health care information needs to occur across the lifespan. The concept of lifespan or lifelong learning has been believed to be an implementation of a planned activity to promote planned change (Peterson et al., 1986). This concept can be investigated at two levels. The first level occurs when society intervenes with programmatic change such as schooling for childhood and earlier adulthood. At the second level, individuals engage in self-education or self-directed learning to accommodate efforts directed toward intentional change, growth, and adaptation to life changes (Peterson et al., 1986).

Most early research regarding self-directed and lifelong learning did not focus on a specific age group (Brockett & Hiemstra, 1991). However, there were some projects that were conducted with participants of the older age population. Older adults are often

active learners and learning activity is primarily focused on self-planned projects. In a study of older adults 55 years of age or older, 29 out of 77 participants conducted a mean of 9.7 learning projects per year, of which 78% were self-planned activities (Brockett & Hiemstra, 1991). However, results obtained from using the self-directed learning readiness scale (SDLRS) in the study did not support the question of whether those with higher levels of self-directed learning readiness participated in any more learning projects than those with lower self-directed learning readiness (Brockett & Hiemstra, 1991). There was a positive relationship between life satisfaction and learning activities, and participation in learning as a method for enhancing life satisfaction in the later years of life (Brockett & Hiemstra, 1991).

Lifelong learning requires older individuals to become engaged in adult education in some manner (Wister, Malloy-Weir, Rootman, & Desjardins, 2010). Whether it be formal learning, such as attending seminars or training, or informal learning such as participation in social activities or searching the internet, knowledge, and skills are promoted (Wister et al., 2010). Wister and colleagues (2010) explored a set of predictors of health literacy with a specific focus on the role that lifelong learning plays in the process of obtaining health literacy in older adults. The association between reading comprehension and learning and life course engagement in learning is a strong indicator of health literacy in older adults (Desjardins, 2003). Using the data specific to Canada from the 2003 International Adult Literacy and Life Skills Survey (IALSS), the sample consisted of senior adults, aged 66 and older who are more likely than younger adults to experience health issues, use the health care system frequently, and manage prescriptions and appointments for one or more chronic illnesses. Findings indicate that only 12% of

older adults in the study had adequate health literacy. The likelihood of having a higher level of health literacy was found in older adults who had formal education extending beyond primary schooling, and in those who participated in self-study, such as searching the internet or library for health information. Findings also indicate that those who read for leisure or otherwise, and those who participated in volunteer activities, were more likely to have a higher level of health literacy. Informal learning, particularly use of the internet, is the strongest predictor of health literacy (Wister et al., 2010). Overall, this study indicates that even though there is a wide spectrum of activities that an older adult can participate in, lifelong learning can foster health literacy in this fast paced, changing and complex society. With multiple demands, limited dedicated medical care, and health care needs in an aging society, there is great need for new paradigms of lifelong learning and personal health care (Wister et al., 2010).

Recommendations for adult educators to promote adult learning include, (a) interspersing health topics throughout the adult basic education curriculum (Prins & Mooney, 2014), (b) establishing partnerships with health care practitioners (Diehl, 2011), and (c) teaching health information in a manner that is culturally sensitive and safe to the learner (Papen, 2009). Papen (2009) recommends teaching general literacy skills to support health literacy that includes internet searching, critical reading and thinking, reading charts, and assertiveness training. Diehl (2011) recommends the use of authentic contexts for real life purposes that build upon prior knowledge. Critical health literacy, as an issue of social justice, is a means of acknowledging dignity and empowering individuals in making decisions (Diehl, 2011). Traditional education relies heavily on written materials which are most often written above the reading level of low-literate

persons, making information difficult to comprehend (Williams et al., 1998). This is one explanation as to why some patient education programs have not been successful and individuals with inadequate literacy may not benefit from these efforts.

Older Adult Learning

Elliott (2014) referred to Knowles' basic adult learning theory, also known as andragogy (Knowles, 1984), as an important consideration in older adult learning. Gerogogy, meaning Knowles' adult learning theory with a focus for older adults (Hayes, 2005), must be considered because older adults learn differently than younger adults. The basic difference is that gerogogy addresses the psychological and physical changes that occur as a normal part of the aging process that can affect learning (Elliott, 2014; Knowles, 1984).

Many older adults have a need and a desire to learn and are motivated for reasons of self-fulfillment and pleasure (Boulton-Lewis, 2010). In addition, there are some older adults who desire to remain physically active and intellectually stimulated (Boulton-Lewis, 2010). Motivation and confidence are major characteristics of learners of any age, particularly in the older years. Some of today's older adults are the most affluent and educated generation to date (Weinstein, 2004). Further, some older adults are astute consumers who demand more information to satisfy needs and desires for lifelong learning (Weinstein, 2004). Older adults need to be active participants in learning to remain physically, mentally, and socially active (Purdie & Boulton-Lewis, 2003). There is a potential for a great amount of growth in the older adult that can often go unacknowledged. Randall (2012) refers to *inside aging* which includes continuing

development of knowledge and wisdom as opposed to the limitation of biological or physical *outside aging*.

Older adults are described as a homogenous group (Chen, Kim, Moon, & Merriam, 2008). However, this statement does not take into consideration the diversity of the population in terms of race, gender, educational attainment, socioeconomic status, and physical and cognitive abilities. In addition, the image of the older adult is often one of being retired and financially comfortable (Chen et al, 2008). Older adults are further characterized as motivated adult learners with the desire to participate willingly in educational activities. These findings clearly indicate a need for adult educators to look at the older adult population as one with diversities that make a difference in learning motivation, readiness, and physical and mental abilities. Adult educators need to look at the life context and learning preferences of the older adult from a lifetime of learning or lifelong learning (Chen et al., 2008; Weinstein, 2004).

In another study, seventeen older adults were interviewed to identify present learning needs, current barriers, and ability and willingness to learn (Purdie & Boulton-Lewis, 2003). The themes that emerged from the study included the desire for technical skills, such as how to use a computer, knowledge of health issues, and how to manage health problems. In addition, the participants indicated an interest in learning more about leisure and entertainment activities, such as gardening or learning to play golf. Purdie and Boulton-Lewis (2003) further discovered that participants identified learning needs as being financial in nature, such as managing affairs and using a checkbook. Transportation, health, and safety were first among the identified learning needs. Even though there was a desire to learn more about technology, computer literacy was low on

the list of needs, as compared to transportation, health, and safety needs (Purdie & Boulton-Lewis, 2003).

Older adults participate in learning to enable them to adjust to life changes (Roberson, 2005a; Roberson & Merriam, 2005). Findings from a qualitative study indicated that learning pursuits were not just random, but were triggered by personal educational pursuits needed to adjust to life changes (Roberson & Merriam, 2005). Findings from the study identified three major changes in later life that motivated self-directed learning. These changes included retirement, transitions in later life like friendships, and experiences of losses of a social and physical nature (Roberson & Merriam, 2005).

Conflict between prior experience and a new situation are often the motivation that leads the older adult to seek out learning experiences. Adults feel the need to learn when they are in conflict between prior experience and a new situation (Papen 2012). Using real-life experiences such as health issues can motivate an adult learner to participate in learning (Schechter & Lynch, 2011). Teaching about health issues was once the primary role of health care providers. Teaching about health issues is now a role for adult educators as well and particularly those adult basic education and family literacy programs (Prins & Mooney, 2014).

Health education is defined as “any combination of learning experiences designed to help individuals and communities improve their health, by increasing their knowledge or influencing their attitudes” (World Health Organization, n.d.). Adult educators can play a role in influencing how education is delivered in professional health programs (English, 2012). Professionals in health and education can improve the health education

of adults by recognizing the importance of the relationship between low literacy skills and poor health outcomes, and by becoming familiar with examples of how research in this field can facilitate improvement in practice (Ronson & Rootman, 2012).

Learning is a major component in coping with chronic illness. Due to the estimated increase of U.S. adults affected by at least one chronic disease, learning will be integral to coping with self-care management (Baumgartner, 2011). Literacy issues are most profound in relation to adult health learning, and successful models of incorporating adult learning and health learning are non-existent (Schechter & Lynch, 2011). As a means of highlighting the practical concerns of literacy and health care learning, Schechter and Lynch (2011) proposed a community of practice model. The possible contribution of the model includes promoting adult educators' understanding of learning outcomes in health, and societal health challenges. Traditional approaches to health education that are not associated with real-life situations have been unsuccessful in producing positive results (Schechter & Lynch, 2011).

Historically, individuals relied on health care providers to take responsibility to provide information and spend time discussing and advising them about medical treatment (King, 2014), but in the present-day health care arena, this is no longer the case. Demands of insurance companies, legal issues, health care regulations, and changing policies have negatively affected the physician-patient relationship (King, 2014). Individuals can no longer depend on the adage that the "doctor knows best" (King, 2014). Thus, individuals must use self-directed learning skills to effectively navigate the health care system. The primary responsibility of an individual's health care has now shifted to the individual. King (2014) explored self-directed learning through the ten-year

journey of a female in her mid-forties who suffered with chronic back pain from degenerative disc disease. The method of research was a qualitative, autoethnographic model, and the purpose of the study was to determine if self-directed learning and self-teaching occurred. The participant was able to use self-directed learning skills to find resources, look at alternative treatments, discuss options, and advocate for her personal choice of treatment. Data from this situation revealed that the individual was a self-directed learner who was independent and persistent in taking the initiative in learning. In addition, she acknowledged personal learning as a challenge as opposed to a barrier. She also found that she needed to possess the ability to be self-disciplined and inquisitive.

Older adults maintain the ability to learn (Peterson et al., 1986). In addition, learning occurs primarily when a challenge is presented, and when physical health can be improved or maintained. With multiple demands on health care providers and progressing health concerns of a society of rapidly aging older adults, there is a need for new methods for individuals taking responsibility for their personal health care (Collins, 2009). This provides further support for the development of self-directed learning skills in children and younger adults to lay the foundation for self-directed and lifelong learning. Health literacy evolves across the lifespan and is a generative process rather than a stable skill (Collins, 2009). Therefore, it is difficult to discuss adult learning of the older adult without including information related to the need for individuals to be lifelong learners. Learning occurs throughout life, whether formally or informally. Therefore, education cannot be considered finished when one completes mandated education, such as completing high school (Collins, 2009).

Summary

In consideration of the rate at which the population is aging, there is clearly a need for adult educators and health care providers to partner in creating a healthier and more health literate society. Adult learning is multifaceted, particularly considering the advancements in technology. This will be observed both in the use of individual use of computers to find information and in the larger picture of making decisions based on accurate information from health care providers.

Learning can be affected by an individual's health status, and can, therefore, affect the desire to learn, and the ability to take initiative in learning. To obtain positive health outcomes, individuals who are educated and informed about their health are more likely to change behaviors (Chervin, Clift, Woods, Krause, & Lee, 2012). Today's health care learners need more advanced health literacy skills than in past years to experience positive and beneficial patient-provider interactions (Chervin et al., 2012) that will, in turn, promote compliance (Chervin et al., 2012). An educated population is a healthier population, therefore, knowing how the population becomes educated about health should be a priority for health care providers and adult educators alike (English, 2012). Education is a source of health promotion and provides a foundation for a thriving society (Parker et al., 2003).

CHAPTER III - METHODOLOGY

Problem and Purpose Overview

The goal of this research was to provide information to inform and further advance the knowledge base for professionals in both adult education and health care to recognize the need to partner in society to develop programs that meet the needs of a rapidly growing older adult population. Further, findings from this project were to provide needed information to motivate older adult to become accountable and self-directed in identifying their own learning needs and to seek accurate resources that would be of benefit when making informed health care decisions. In addition, the findings from the research were designed to determine if there was a relationship between individual health literacy levels and an individual's tendency towards being a self-directed and lifelong learner.

Population and Sampling Plan

This study addressed the population of older adults, aged 65 and older, with at least one chronic disease who live in one of the three southern-most counties of Hancock, Harrison, and Jackson counties in Mississippi. A factor contributing to the focus on this population was the devastation and long-term repercussions for public health and the medical infrastructure from Hurricane Katrina in 2005. August 29, 2015, marked the 10-year anniversary of Hurricane Katrina that devastated the three southern-most counties in Mississippi with Hancock County now known as ground zero and the most devastated of the three counties.

The destruction of the medical infrastructure had wide-ranging effects on many individuals and communities with one of the most vulnerable being older adults with

chronic disease. Health departments, clinics, hospitals, pharmacies, and physician offices, were destroyed making this disaster one of the greatest in the history of the U.S. Issues that faced older adults were magnified due to the magnitude of the disaster. For the older adult with poor health literacy, disease self-management was further magnified by lack of access to health care and medications needed to manage chronic diseases. Older adults in general, particularly during a time of disaster, need accurate, understandable, and accessible information and health care regarding disease management.

Senior centers were chosen as the setting for data collection because of the population of community-dwelling older adults with a self-managed chronic disease who are most in need of frequent interactions with health care professionals and may have been affected by the destruction. To have access to the older adult population who were physically able to attend senior citizen activities, permission was obtained from Harrison County Board of Supervisors, City of Pascagoula, Hancock County Senior Center and the Jackson County Civic Center Supervisor to conduct research using questionnaires regarding health literacy and self-directed learning readiness.

A convenience sample of older adults attending senior citizen centers was obtained. The calendar of events at each facility was used to determine a date to administer the surveys. Field (2009) suggests several methods of calculating sample size including the use of G*Power. Using the G*Power 3.1.9.2 for linear multiple regression with a medium effect size, α of 0.05, and power of 0.80, a sample size of 92 participants was determined. Tabachnick and Fidell (2013) offer a rule of thumb for calculating sample size for correlations using a regression which is $N \geq 50 + 8m$ (m is the number of IVs). Using this rule of thumb the sample size should have been 82. The actual sample

size of 74 is below the criteria of both methods which presents a limitation for the data analysis.

Research Design

This research employed an exploratory design to determine if relationships existed among variables. The methodology of data collection was via survey method using three questionnaires. Three instruments were employed to measure the independent variable (IV) and dependent variables (DV). Demographic data was captured in a short questionnaire and included age, race, gender, educational attainment, and what chronic disease was currently being managed (Appendix B).

Self-directed learning readiness was measured by the adult basic education version of the self-directed learning readiness scale (SDLRS-ABE). The SDLRS-ABE is a 34 item, 5-point Likert scale. The SDLRS-ABE, also known as the Learning Preference Assessment (LPA), is the most often used quantitative measure in self-directed learning (Merriam et al., 2007). The instrument was developed by Lucy Guglielmino in 1989 and was designed to measure the attitudes, skills, and characteristics that determine an individual's current level of readiness to manage his or her own learning. This instrument was developed from the SDLRS instrument by removal of some verbiage that reduced the reading level of the questions. The SDLRS-ABE was specifically developed for adults with limited literacy and was felt to be appropriate for older adults (L. Guglielmino, personal communication, March 2, 2016).

Health literacy was measured by the Short version of the Test of Functional Health Literacy in Adults (STOFHLA). The STOFHLA instrument measures the individual's ability to read and comprehend health-related materials (Baker, Williams,

Parker, Gazmararian, & Nurss, 1999). The STOFHLA is considered a practical measure of functional health literacy and has good reliability and validity (Baker et al., 1999). High correlation was found between the STOFHLA and the rapid estimate of adult literacy in medicine (REALM) instrument of 0.80, and with the TOFHLA of 0.91 (Baker et al. 1999). Construct validity was established with the REALM ($r = 0.80$) total, REALM ($r = 0.61$) numeracy, and REALM ($r = 0.81$) reading (Mancuso, 2009). The STOFHLA is scored using the same three levels of health literacy used when scoring the TOFHLA. There were some limitations in data analysis that could have affected the results of the study. Cases not analyzed for the SDLRS could not be analyzed for the STOFHLA, thus limiting potentially valuable data. One additional limitation was that one of the instruments was timed and the other was not. To account for this potentially problematic factor, the order in which the instruments were administered was alternated at each facility. The instrument was comprised of reading comprehension components and was administered in 12 minutes although the recommended time to administer the STOFHLA is 7 minutes. Because older adults normally experience a natural decline in sensory changes as part of the aging process, information processing speed and recall of information is impeded (Kaye, 2009; Sorrel, 2006; Speros, 2009). Therefore, the decision was made to extend the time frame of the STOFHLA to 12 minutes. Changing the time frame for administration may have altered the reliability of the instrument and presented a limitation to this study by potentially inflating the scores on the STOFHLA.

Data Collection Procedures

The purpose of the study, the inclusion criteria, and notification that participation was voluntary was explained. Anonymity and confidentiality of all information was

explained and notification that no personal identification information or financial information would be requested. Participants were informed that they could withdraw from the study at any time without consequence (Appendix D). Due to the population of older adults and the potential that low literacy skills may have existed among the participants, oral consent was utilized. Participants were asked to sign a simple statement of agreement to participate (Appendix E). These were collected and kept in a separate folder so participants could not be identified. Following the consent process, participants were given a pocket folder that was numbered with a case number. Each numbered folder contained a demographic questionnaire and both instruments with a number that coincided with the number on the folder. Administration of the test instruments was alternated at each facility.

Data Analysis

The Statistical Package for the Social Sciences (SPSS) software was used to analyze and report the data from this study. The data were first screened for missing data or outliers. Frequency tables were used to determine if any data was missing or miscoded. Descriptive statistics were used to provide information about age, race, gender, and highest education level which provided information about the characteristics of the sample.

Data on gender was recoded with dummy variables. Race was collapsed from five categories to two because there were so few cases in three of the categories ($n = 4$). Because the SDLRS is a proprietary instrument, scoring was conducted by a data analyst employed by Guglielmino and Associates, LLC. Through email communication with the analyst regarding the method used for imputing missing data, the determination was

made to use a more statistically sound method of imputation. The SDLRS consists of both positively and negatively stated items. Before analysis of the data and the determination of imputation, the negatively stated items were recoded. Once the data were recoded and imputation was done, the decision was made to use a log transformation model for further analysis. Chapter IV will further describe the analysis of data and results.

CHAPTER IV - ANALYSIS OF DATA

The purpose of this study was to determine if there was a correlation between health literacy and self-directed learning of the older adult population. A Pearson Correlation was performed and the determination was made that there was no correlation between the data collected to investigate the two concept ($p = .929$). Further investigation of the data was then explored to determine if there was any relationship between health literacy and self-directed learning readiness individually with the predictor variables of race, age, gender and educational attainment. There was no correlation among the SDLRS-ABE scores and gender ($p = .5$), race ($p = .283$), age ($p = .385$), or education ($p = .556$). There was no correlation among the STOFHLA instrument among gender ($p = .078$), race ($p = .084$), age ($p = .085$), or education ($p = .230$). However, when taken together, there was a correlation among STOFHLA, age, and education. Therefore, the remainder of this discussion of data analysis will focus on the relationship among health literacy of the older adult population and the variables of age and education.

The original sample consisted of 112 older adults aged 65 or older with at least one chronic disease who attended a senior citizen activity on that day. After deletion of cases of individuals who were less than 65 years of age, those who withdrew from the study, missing test packets, and those with four or more missing data items on the SDLRS, there were 79 usable cases for the analysis.

The remaining sample ($n = 79$) consisted of 16 or 20.3 % males and 63 or 79.7 % females which presented limitations to this study. Differences were noted in the amount and type of activities focused towards females as opposed to males. The activities observed during the time of data collection and on monthly calendars of events were

primarily focused on females as compared to males such as quilting, sewing, shopping trips, and flower arranging. This gender difference, in terms of the general population of older adults in the U.S., is noted in a document developed by the Administration on Aging (AOA, 2014). Statistics showed that in 2013 there were 25.1 million older women compared to the 19.6 million men and a gender ratio of 128:1 women for every 100 men (AOA, 2014).

Age of the participants ranged 65-93 years of age. Over half or 53.2% of the sample were in the young-old category (65-74), 34.2% were in the middle-old category (74-84), and 12.7% were in the old-old (85 and older). Race was collapsed into two categories due to small number of cases in all but two categories. Over half or 54.4% reported being white while 40.5% reported being black.

Screening to check for accuracy of data entry, missing data, skewness and kurtosis were conducted using descriptive data. Table 1 shows that greater than 5% of the cases were found to have missing values. Therefore, imputation methods were employed. Based on the researcher's prior knowledge/educated guess, a method of handling missing data suggested by Tabachnick and Fidell (2013, p. 66), was used for imputation. Missing values were replaced using a score that factored in the age of the individual, and education level.

Descriptive statistics were inspected for each variable after correction of missing data. Table 1 shows that all values were found to be within the minimum and maximum values for each variable. Missing values remained which were Race_R (n = 4) which could be due to the recoding of data, and STOFHLA (n = 1) which could be randomly missing. Analysis was conducted with missing data excluded by listwise deletion (N=74).

Table 1

Descriptive Statistics

		Age_coded	Race_R	EDUC	SDLRS	STOFHLA
N	Valid	79	75	79	79	78
	Missing	0	4	0	0	1
Mean		1.59	.43	2.51	130.16	30.44
Std. Deviation		.707	.498	1.024	20.899	6.886
Skewness		.769	.303	.166	-.168	-2.066
Std. Error of Skewness		.271	.277	.271	.271	.272
Kurtosis		-.634	-1.961	-1.107	-.046	4.944
Std. Error of Kurtosis		.535	.548	.535	.535	.538
Minimum		1	0	1	81	0
Maximum		3	1	4	170	36

Univariate Outliers

The distribution of each variable was inspected to test for the assumption of Normal Distribution. Pseudo z scores and histograms were inspected for skewness and extreme kurtosis. Skewness statistics were less than +/-3 for SDLRS, age, race (slight -3.58), and gender were normally distributed. Table 2 shows the STOFHLA was highly negatively skewed, -7.60, and kurtosis, 9.19.

Table 2

Extreme Skewness and Kurtosis of STOFHLA

Variable	Skew	St. Error of Skew	Pseudo Z Statistic	Kurtosis	St. error of skew	Pseudo Z Statistic
Age_coded	0.769	0.271	2.84	-.634	0.535	-1.19
Race_R	0.303	0.277	1.09	-1.961	0.548	-3.58
Educ	0.166	0.271	0.61	-1.107	0.535	-2.07
SDLRS	-0.168	0.271	-0.62	-0.046	0.535	-0.09
STOFHLA	-2.066	0.272	-7.6	4.944	0.538	9.19

Figure 1 provides visual support for these findings. An inspection of Z scores revealed outliers for case ID #34 and 78, thus indicating a need for transformation.

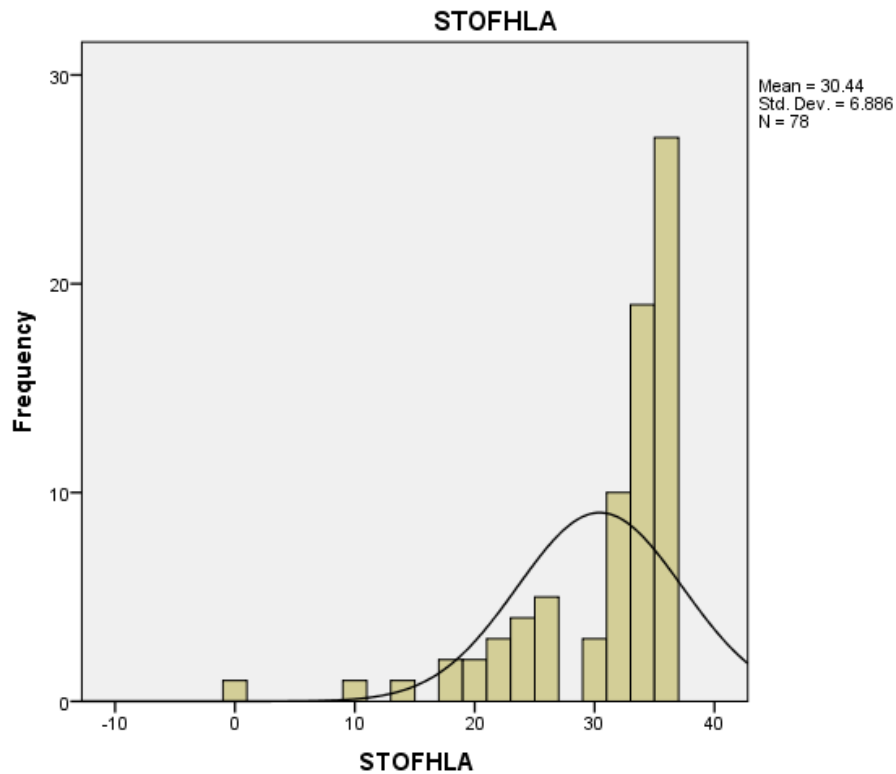


Figure 1. Skewed Distribution

Assumptions

Ratio of Cases to IVs

A rule of thumb suggested by Tabachnick and Fidell (2013) is $N \geq 50 + 8m$ (where m is the number of IVs). Per the rule of thumb, the sample size should be 82. A sample size of 92 participants was determined using G*Power 3.1.9.2 for linear multiple regression using a medium effect size, α of 0.05, and power of 0.80. The current sample size ($n=74$) was below the rule of thumb and G*Power estimates, and therefore, presents a limitation for the analysis.

Normality

To test for normal distribution, univariate normality was first inspected to determine distributions of each variable. Histograms were used and pseudo z scores were calculated to inspect for skewness and kurtosis. Age, Race, Education, and the SDLRS appeared to be normally distributed and the analysis was supported by histograms and scatter plots. The STOFHLA was highly negatively skewed (skewness = 7.60 (2.07/0.27). Kurtosis = 9.19 (4.94/90.54). The negative skew indicates that scores on the STOFHLA fall towards the higher end of the scale. These findings were supported through visual inspection of the histogram in Figure 1 before transformation.

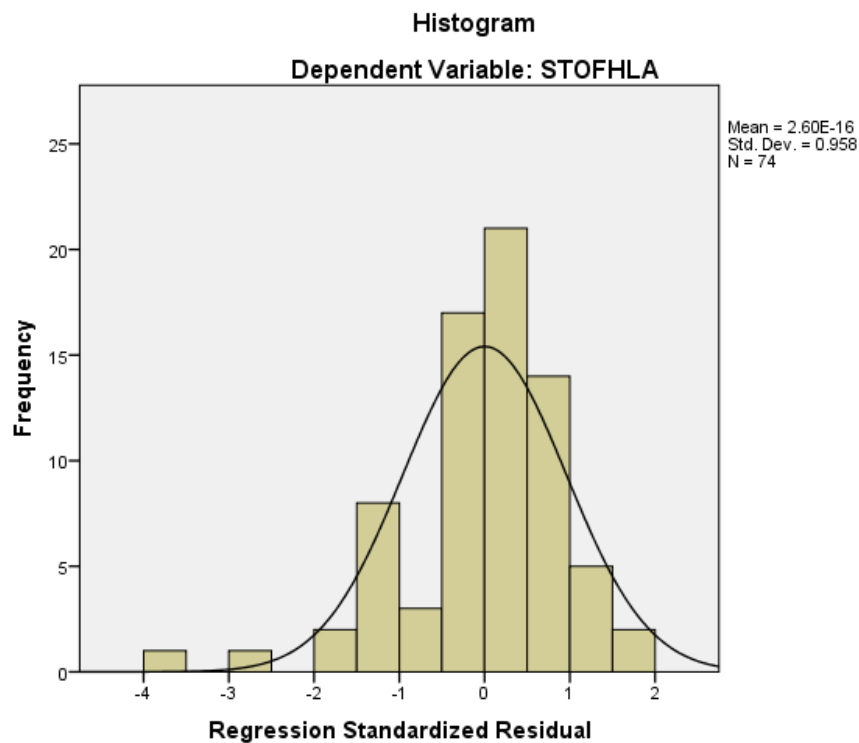


Figure 2. Skewness of STOFHLA data prior to log-10 transformation

After log 10 transformation a more normal distribution can be observed. These results are shown in Figure 2. To correct for skewness, and present outliers (case ID# 34

and 78), a log 10 transformation was conducted on the STOFHLA variable using a constant of 37 log (K-X), (where K is the smallest score + 1) as recommended by Tabachnick and Fidel (2013).

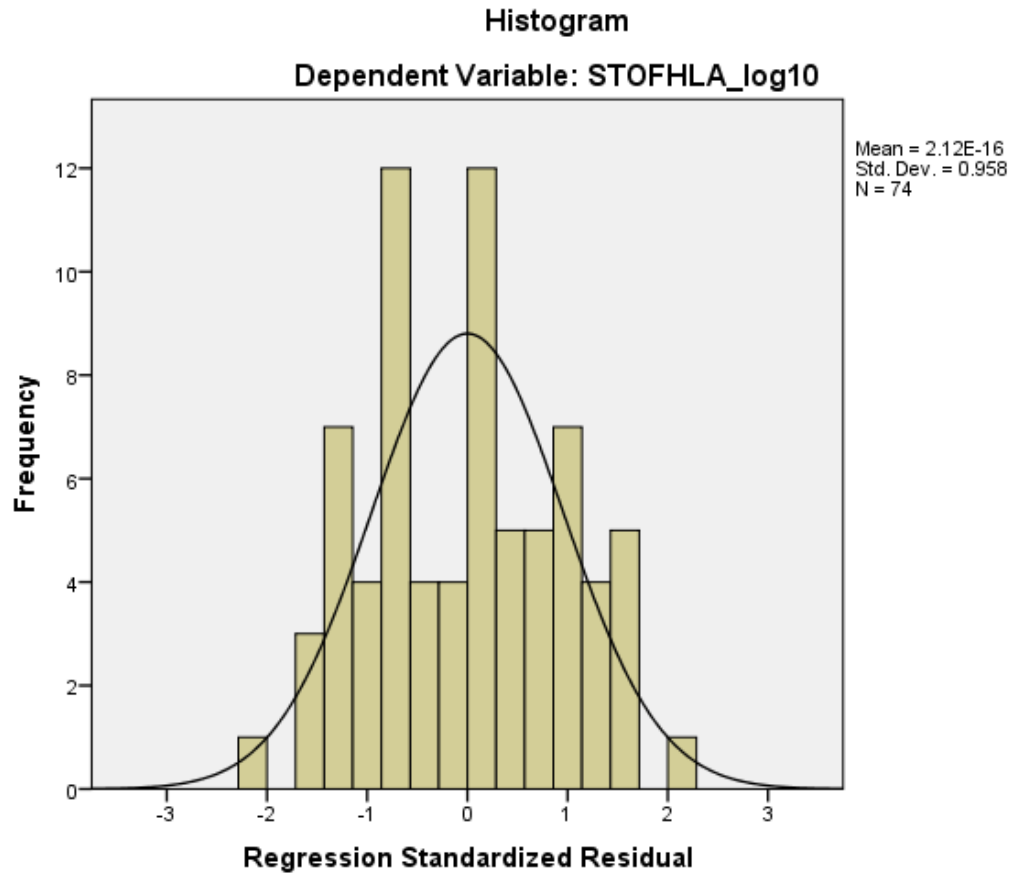


Figure 3. Normal distribution after log transformation

Model Fit

Before transformation, the IVs identified for the study were found to be significant at $p = 0.003$. The summary in Table 3 indicates that predictor variables explained 24.7% of the variance in the model ($R^2 = .274$). Table 4 shows an omnibus table using the dependent variable of STOFHLA that indicates statistical significance ($p = 0.003$).

Table 3

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.497	.247	.180	6.375	2.165

Predictors: (Constant), EDUC=College degree, Age_coded=75-84, EDUC=Some College (no degree),

Age_coded=85 and older, Race_R, EDUC=HS_a

Dependent Variable: STOFHLA_b

Table 4

Omnibus table before transformation

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.497 ^a	.247	.180	6.375	2.165

a. Dependent variable: STOFHLA

b. Predictors: (Constant), EDUC=College degree, Age_coded=75-84, EDUC=Some college (no degree), Age_coded=85 and older,

Race_R, EDUC=HS

After transformation, the model was significant at $p = 0.001$. After log transformation, the model summary in Table 5 shows that the model explained 28.4% ($R^2 = .284$) of the variance in the model. The Omnibus table in Table 6 was found to be statistically significant ($p = 0.001$). The Omnibus table indicates that there is a significantly positive degree of prediction of the outcome variables in the model, but does not indicate the overall contribution of each predictor variable.

Table 5

Model summary after transformation

Model Summary					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.533	.284	.220	.35691	2.030

a. Predictors: (Constant), EDUC=College degree, AGE_coded=75-84, EDUC=Some college (no degree), Race_R, EDUC=HS, AGE_coded=65-74

b. Dependent Variable: STOFHLA_Log10

Table 6

Omnibus table after transformation

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.388	6	.565	4.433	.001
	Residual	8.535	67	.127		
	Total	11.923	73			

a. Dependent Variable: STOFHLA_log 10

b. Predictors: (Constant): EDUC=College degree, Age_coded75-84, EDUC=Some college (no degree) Race_R, EDUC=HS, AGE_coded 65-74

Bivariate Correlation

The correlation between STOFHLA and AGE, as well as STOFHLA and Education were statistically different that zero, indicating significant effects. Table 7 indicates these findings before transformation.

Multicollinearity

As shown in Table 7 and Table 8, the assumption of collinearity was met as none of the variables had a tolerance statistic of less than 0.2 before or after transformation.

Table 7

Assumption of Collinearity before transformation

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1 (Constant)	30.015	2.202		13.630	.000	25.619	34.410					
Age_coded=75-84	-2.460	1.723	-.163	-1.428	.158	-5.899	.979	-.145	-.172	-.151	.864	1.158
Age_coded=85 and older	-7.408	2.333	-.362	-3.175	.002	12.065	-2.751	-.305	-.362	.337	.863	1.159
Race_R	-1.997	1.595	-.141	-1.252	.215	-5.181	1.188	-.213	-.151	.133	.879	1.138
EDUC=HS	2.308	2.261	.160	1.021	.311	-2.205	6.821	-.145	.124	.108	.457	2.189
EDUC=Some College (no degree)	3.679	2.439	.217	1.508	.136	-1.190	8.547	.062	.181	.160	.545	1.836
EDUC=College degree	5.411	2.483	.326	2.179	.033	.455	10.367	.285	.257	.231	.503	1.986

a. Dependent Variable: STOFHLA

Table 8

Assumption of Collinearity after transformation

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1 (Constant)	1.039	.168		6.173	.000	.703	1.375					
Age_coded=65-74	-.339	.131	-.420	2.593	.012	-.600	-.078	-.312	-.302	-.268	.408	2.449
Age_coded=75-84	-.224	.144	-.258	1.555	.125	-.511	.063	.166	-.187	.161	.389	2.572
Race_R	.167	.089	.206	1.873	.065	-.011	.346	.300	.223	.194	.879	1.138
EDUC=HS	-.185	.127	-.224	1.463	.148	-.438	.067	.130	-.176	.151	.457	2.189
EDUC=Some College (no degree)	-.265	.137	-.272	1.943	.056	-.538	.007	-.062	-.231	.201	.545	1.836
EDUC=College degree	-.406	.139	-.426	2.922	.005	-.684	-.129	-.344	-.336	.302	.503	1.986

a. Dependent Variable: STOFHLA_log10.

Note: Table notes always go below the table and should be Times New Roman 8 pt. font. If the note extends to a second line (or beyond) it should be doubled.

Multivariate Normality

Outliers. The Mahalanobis statistic was used to evaluate outliers using a chi-square with 3 degrees of freedom. Using the criterion of $p < 0.01$, the transformation did not show any probabilities that were less than 0.01, with the lowest being $p = 0.01$. Therefore multivariate normality can be assumed.

Normality of residuals. Table 12 shows skewness (-4.37) and kurtosis (5.74) indicating normality of residuals is not met. Visual inspection of the histogram in Figure 3 supports the lack of normality before transformation. Figure 4 indicates the presence of outliers. Figure 5 also indicates the presence of outliers.

Table 9

Descriptive statistics before transformation

		Statistic	Std. Error
Standardized Residual	Mean	.0000000	.11136792
	95% Confidence Interval for Mean	Lower Bound Upper Bound	
		-.2219559 .2219559	
	5% Trimmed Mean	.0525265	
	Median	.0979224	
	Variance	.918	
	Std. Deviation	.95802308	
	Minimum	-3.90812	
	Maximum	1.89521	
	Range	5.80333	
	Interquartile Range	.94040	
	Skewness	-1.220	.279
	Kurtosis	3.170	.552

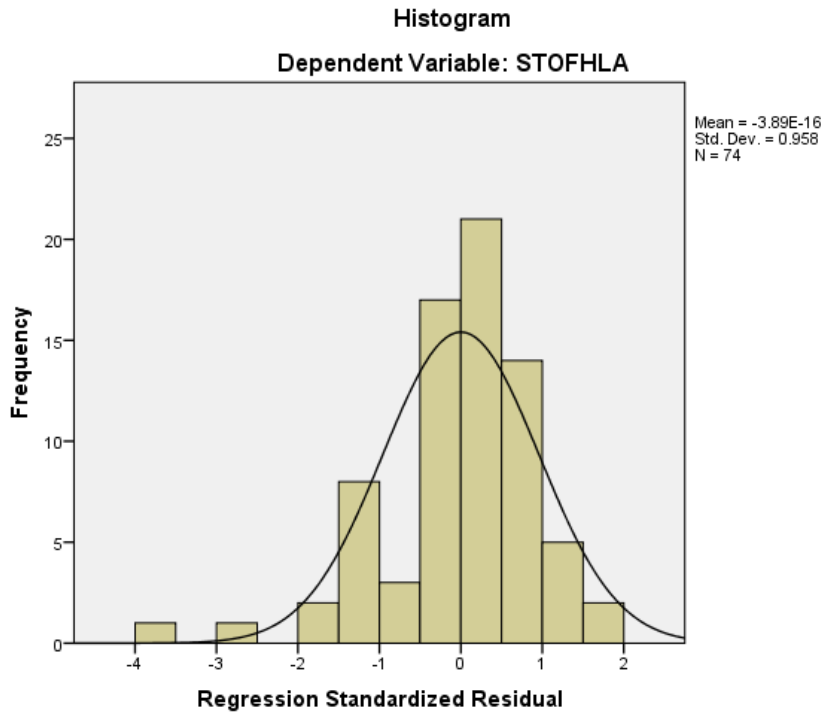


Figure 4. Negative skewness before transformation

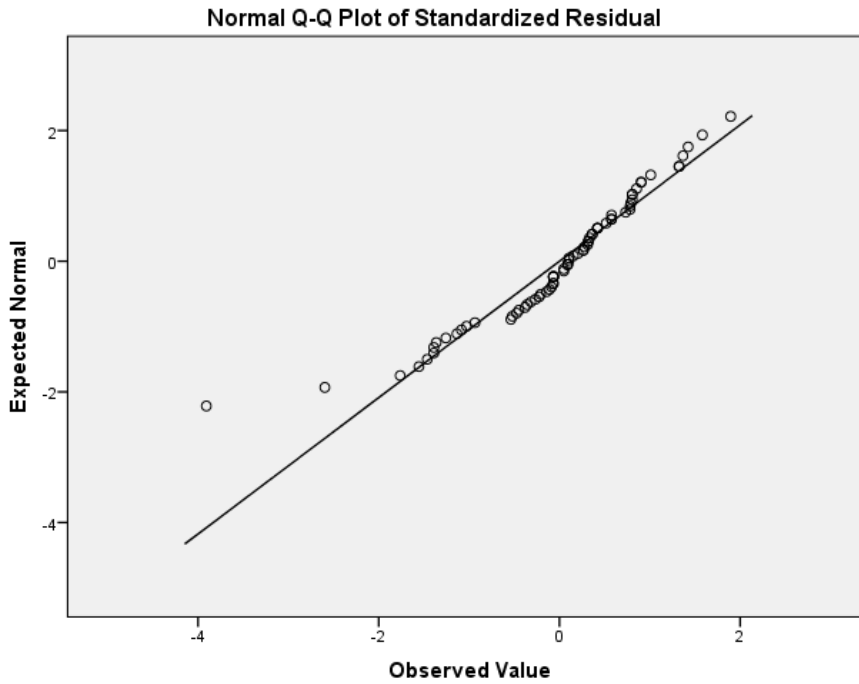


Figure 5. Standardized residuals showing outliers

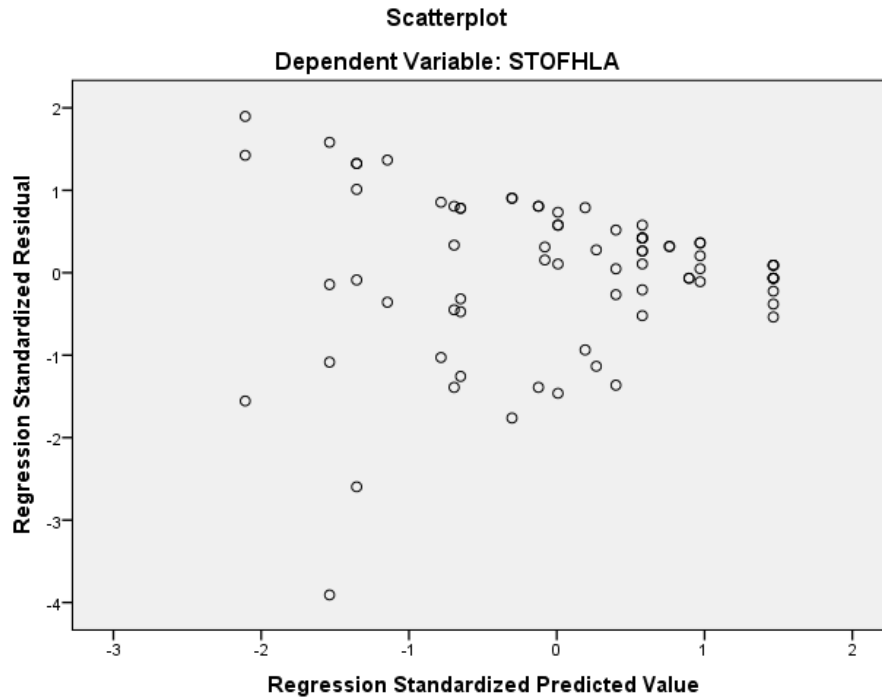


Figure 6. Regression standardized residual before transformation

With a skewness score of less than ± 3 standard deviations, the assumption of normality of residuals is met after transformation. Table 10 shows skewness (0.16) and kurtosis (-1.59) which indicates normality of residuals. Visual inspection of the histogram in Figure 7 of regression standardized residual supports normality of residuals. Figure 8 supports the normality of residuals

Table 10

Descriptive statistics after transformation

		Statistic	Std. Error	
Studentized Residual	Mean	.0004464	.1175664 4	
	95% Confidence Interval for Mean	Lower Bound	-	
		Upper Bound	.2347559	
	5% Trimmed Mean	.0006719		
	Median	.0199076		
	Variance	1.023		
	Std. Deviation	1.011344 76		
	Minimum	-2.16965		
	Maximum	2.12520		
	Range	4.29485		
	Interquartile Range	1.63949		
	Skewness	.045	.279	
	Kurtosis	-.883	.552	

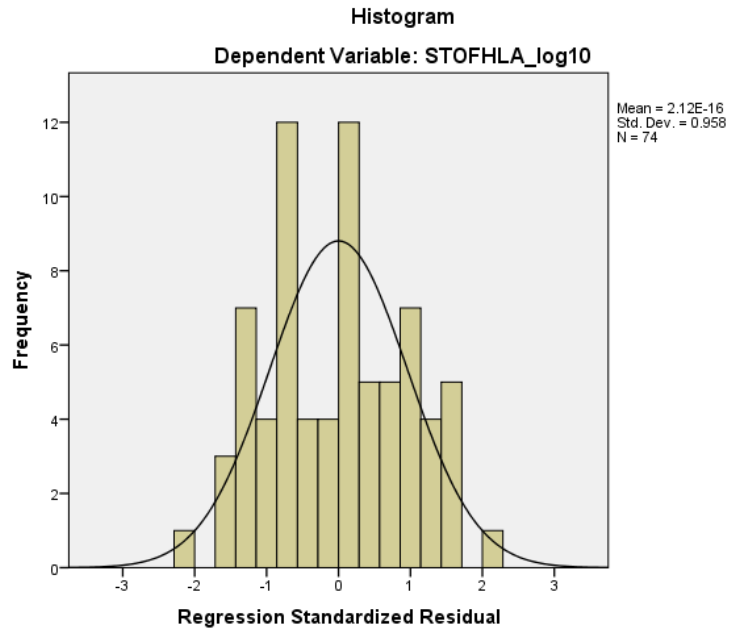


Figure 7. Regression standardized residual showing normality of residuals

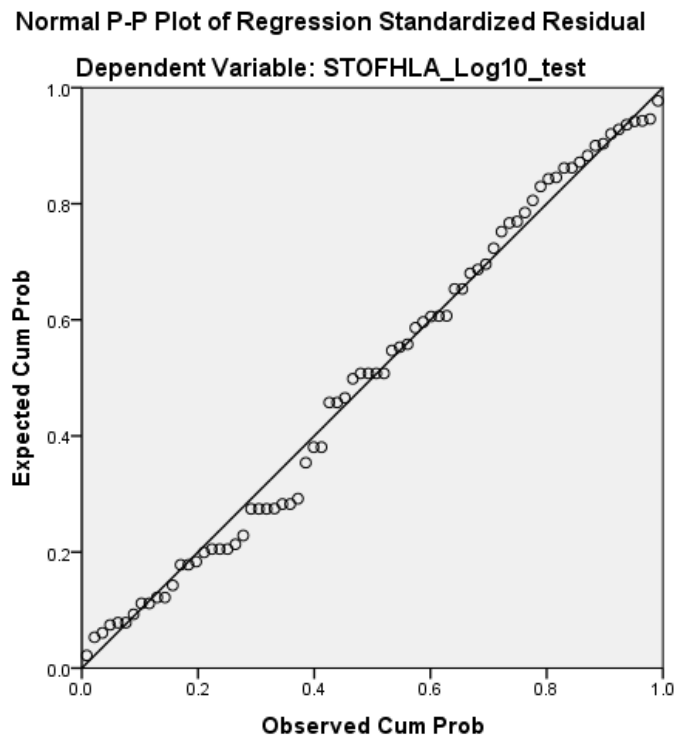


Figure 8. Observed cumulative probability after transformation

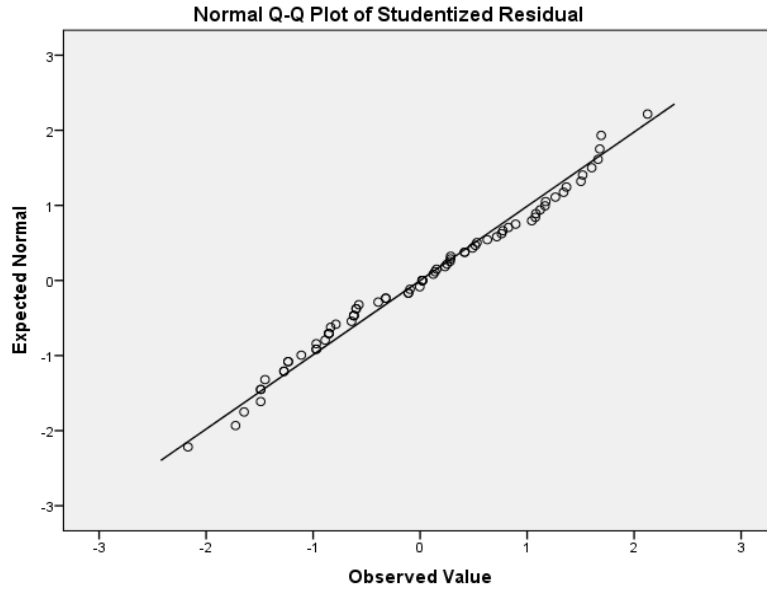


Figure 9. Studentized residual observed value

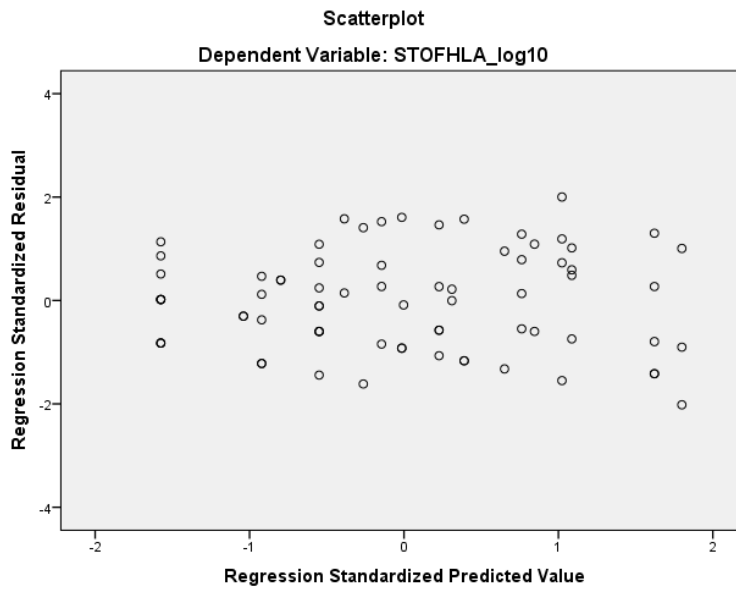


Figure 10. Standardized predicted value after log transformation

The scatter plot of standardized residuals plot in Figure 8 shows that the variance of errors is scattered across predicted values, indicating lack of homoscedasticity. Figure 11 indicates the assumption of homoscedasticity can be assumed as the plot produces a

rectangular shape. Normality can be assumed as the errors of prediction appear to be scattered around zero. Therefore, the log 10 transformation produced a model that meets all the assumptions for analysis to be conducted.

The regression was run excluding the lowest or first levels of the education and age IVs for use as a reference group. For education, the group omitted was EDUC = Less than HS, and for Age_coded = 65-74.

Transformed Model

Overall the data was adjusted for the extreme negative skewness, and adjusted for non-normality. Thus, the interpretation has been reversed as lower values from the original data represent higher values in the transformed data, and likewise higher values in the transformed data represent lower values in the original data.

Explanation of Log Transformation and Reflection

Interpretation was reversed due to the correction to significant negative skewness where values were reflected by taking the highest number in the dataset plus one and subtracting it from each observed value on the STOFHLA which mean the lowest observed number will be the highest observed number, Therefore, a unit increase in the predictor variable is associated with a decrease in log value of the outcome variable corrected for skewness.

Results from this study show that participants with a college degree have statistically significantly higher scores on log values of STOFHLA after transformation than a reference group of participants not having a high school degree, $t(df) = -2.92, p = 0.005$. At 10% significance, participants with some college had statistically significantly

higher scores on log values of STOFHLA after transformation than a reference group of participants not having a high school degree, $t(df) = -1.94, p = 0.056$. Participants ages 85 and older had statistically significantly lower scores on log values of STOFHLA after transformation than a reference group of participants ages 65-74, $t(df) = 2.95, p = 0.012$.

CHAPTER V – DISCUSSION

The discussion in this final chapter of the dissertation highlights the overall findings of the analysis of data, and limitation and strengths of the study. Because health literacy is a multifaceted concept, there is a discussion of future implications and research for providers of health care, adult educators, and policy makers. The findings from this study do support the present body of knowledge regarding health literacy and the older adult in the health care and the education arenas.

Summary of Findings

To determine if there was a correlation between health literacy scores and self-directed learning readiness, a Pearson's correlation was performed. Results showed no correlation between the two variables. However, there were some statistically significant interactions between STOFHLA scores, age, and education as discussed in Chapter IV.

Using a checklist for standard multiple regression as seen in Table 5.19 of Tabachnick and Fidell (2013, p. 173), standard multiple regression was performed on STOFHLA scores as the dependent variable, and age and education as the independent variables to evaluate assumptions. After evaluating the assumptions, a decision was made to transform the data to determine best model fit. Log Transformation was determined to be the best model for analysis and interpretation because all assumptions were met.

Interpretation of the data was reversed indicating that the lowest observed number prior to transformation is the highest observed number after transformation. The lowest observed number in the dataset plus one (1), subtracted from each observed value

indicates that a unit increase in the predictor variable is associated with a decrease in log value of the outcome variable corrected for skewness.

Strengths and Limitations

The study showed a significant effect between age, educational level, and health literacy level of the individual learner. Although the findings are not surprising, they do further support research in identifying characteristics of one of the most vulnerable populations in the U.S today (Schechter & Lynch, 2011; Speros, 2009; Wolf et al., 2005). Primarily, participants stated their eagerness to participate in the study and afterward voiced concerns of their issue in understanding what they are told by the health care providers and often feeling that their concerns are not being considered in the decision-making processes.

As discussed earlier there were limitations to this study. The study included only functional and active individuals who had either personal or city transportation to travel to the facilities to attend senior citizen activities. This precludes individuals who are confined to their home or skilled facilities. Further, the data was collected at the end of the year when some senior activities involved going on outings from the facility which limited participation in the study. Further data might provide useful information in identifying the population at each type of facility. For example, there tended to be more young-old, white older adults at the larger more active facilities, while the smaller less-active facilities were more likely to be old-old and primarily black.

One limitation to the study is the lack of support for the body of literature indicating self-directed learners are more likely to have functional health literacy than

less self-directed learners which is understandable due to the small sample size. Even after providing and repeating instructions, some participants still stated they did not understand what the study was about. More attention and assistance was needed for some participants than others. There were significant number of cases that had to be deleted due to missing data on the SDLRS which may have significantly affected the data from the STOFHLA has the cases been included in the study.

A shorter assessment for health literacy than the STOFHLA would be advantageous for the older adult population due to cognitive deficits, sensory deficits, and willingness to participate for any longer than 15 minutes as was experienced in the data collection for this project. Also noticed was the enthusiasm or lack of enthusiasm of the director of the center also made a difference in the attitude of the participants.

Future Research

Future research might include the development of a brief, valid, and reliable measurement instrument of health literacy for use in the older adult population. More significant data than that obtained in this study might be elicited from a qualitative study with individuals in a face-to-face interview with a brief tool than to rely on individual written response time for reading and responding to the questions.

Implications for Practice

Once primarily a focus for health care providers, inadequate health literacy is now a focus for today's adult educators as well (Prins & Mooney, 2014). The population of marginalized adults, such as those in adult basic education and family literacy programs,

are the same population that health care professionals have identified as being at risk for health disparities and poor health outcomes (Prins & Mooney, 2014).

There is a need for adult educators and health care educators to collaborate on the development of methods of improving health literacy including the development of partnerships between health agencies and institutions of higher learning (Ronson & Rootman, 2012). Such collaborations should include health professionals and adult educators working together in adult basic education literacy programs, advocating for older adults in universities and colleges for educational programs, and working with community agencies in creating social policies regarding literacy and health care (Ronson & Rootman, 2012). In addition, adult educators can be a vital part in the education of health care students in focusing on methods to promote learning to support more positive health outcomes for patients, families, and communities (Ronson & Rootman, 2012). In addition, future research should include study of the use of internet sources and literacy in relation to older adult learning because society is textually and technology focused.

Through informal means, such as workshops and training sessions, the adult educator can influence the health of individuals and communities (English, 2012). Incidental or informal teaching is a means through which adult educators can reach individuals and communities that are the most at risk for poor health outcomes (English, 2012). Learning opportunities for the lower social class and the older adult is limited and are primarily operated within the community (English 2012). In addition, this population has more difficulty in gaining access to health care services, and therefore have a greater need for community education (English, 2012). Adequate or functional health literacy is

vital to the facilitation, promotion, and maintenance of actual self-care and positive health outcomes. (Eichler et al., 2008; Escobedo & Weismuller, 2013; Paashe-Orlow & Wolf, 2007). Therefore, the theory of self-directed learning was considered as a foundation for this research. Although this project was conducted with an older adult population and showed no correlation with self-directed learning readiness, this research may be more useful if conducted with a different population of younger individuals in English as second language (ESL), adult basic education (ABE), and general education development (GED) programs, and personal development courses.

Conclusion

There is no doubt that the concept of health literacy has evolved over the last two to three decades. Pleasant et al. (2016) developed a discussion paper on the multidimensionality of health literacy as opposed to the current definitions which focus primarily on the individuals' health literacy skills or skills deficiency. Focus on the importance of a new and focused definition of health literacy to ensure there is reflection of current complexities and multidimensionality of the concept. Learners may be individuals; however, they may also be family members, health care providers, health care insurance organizations, health care policy makers, and pharmaceutical companies. There are 4- components of health literacy proposed by Pleasant et al. (2016). The first component includes system demands and complexities in addition to individual skill/abilities. The second component includes measurable components, processes, and outcomes. The third component recognizes potential for an analysis of change. The fourth component includes the demonstration of a link between informed decision and actions.

“The promise of health literacy is the promise of improved health” (Pleasant et al, 2016, p. 5).

Health professionals often overestimate an individual’s health literacy and make inaccurate judgments about what patients can understand. This overestimation is most prevalent in the population of older adults ages 65 and older which is the fastest growing population of individuals and major users of health care. This population also tend to have the lowest health literacy skills when compared to individuals less than 65 years old (Speros 2009). Opportunities are many for individual learning, particularly for those individuals with chronic disease. Health literacy and learning is of major importance in prevention of disease as well as the promotion of wellness and maintenance of symptoms. Health policies now promote accessible health care and health care information for individuals, and promotion of being an informed individual through the process of self-learning being the expectation for health care (Papen, 2012). In a project by Papen and Walters (2008), *Literacy, Learning, and Health* (LLH), results showed that informal and self-directed learning depends on the situation and the individual which is a key characteristic of Knowles’ theory of androgogy. In a society with rapid technological changes and unprecedented growth in the older adult population, there are many choices, particularly in the health care arena. Less self-directed and less educated individuals may choose to just allow health care choices to be made for them (Brockett, 2006). This further supports the belief that individuals benefit from becoming self-directed and life-long learners to become well-informed and motivated decision-makers. Adult educators

can join with health educators in teaching and creating new and usable information that can improve the health outcomes for individuals and communities (English, 2012).

APPENDIX A – IRB APPROVAL



THE UNIVERSITY OF
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INSTITUTIONAL REVIEW BOARD

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NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
 - Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the “Adverse Effect Report Form”.
 - If approved, the maximum period of approval is limited to twelve months. Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 15110303

PROJECT TITLE: Relationship between Health Literacy Level and Self-Directed Learning Readiness of Older Adults

PROJECT TYPE: New Project

RESEARCHER(S): Robin Justice Dennis

COLLEGE/DIVISION: College of Education and Psychology

DEPARTMENT: Educational Studies and Research

FUNDING AGENCY/SPONSOR: N/A

IRB COMMITTEE ACTION: Exempt Review Approval

PERIOD OF APPROVAL: 11/16/2015 to 1/15/2016

Lawrence A. Hosman, Ph.D.

Institutional Review Board

APPENDIX B - DEMOGRAPHIC QUESTIONNAIRE

Demographic Questionnaire

1. **Gender:** Male_____ Female_____

2. **Age:** _____

3. **Race:** ____Caucasian ____ African American ____ Hispanic
____Asian ____Other

4. Highest level of education:

Less than high school education_____

High school graduate_____

Some college (but no degree) _____

College graduate (specify highest degree)

Associate's _____

Bachelor's _____

Master's _____

Doctorate_____

5. Circle the chronic illness you manage

Diabetes mellitus	Heart disease
Hypertension	Respiratory disease
Arthritis	Chronic renal failure
Lupus	Other

APPENDIX C - ORAL CONSENT FORM

Oral Consent Script

My name is Robin Dennis. I am a doctoral student at The University of Southern Mississippi. I am conducting research on health literacy in the older adult population in Hancock, Harrison, and Jackson counties. I would like to ask you to participate in my research.

Participation will involve filling out three questionnaires: 1) a short questionnaire about your age, race, educational attainment, gender, and any chronic diseases you are managing, 2) a second questionnaire that will provide information about your health literacy level, and 3) a third questionnaire that will indicate whether you have a tendency towards being a self-directed learner. Participation will take no longer than 1 hour of your time.

Your privacy is important to me. Therefore, I will not be asking any information that can identify you in any way. To ensure confidentiality and anonymity, no information will be asked that can link you to your questionnaires. I will not record your name, and only a number will be used when analyzing the information. This means I will not be able to identify you with your questionnaire or return them to you.

Only minimal risks are anticipated from participation in this research. While there will be no direct benefit for participating in this study, I hope to learn more about the health literacy needs of the older adult population.

It is completely up to you whether you decide to participate, and you may withdraw from the study at any time. If any of the questions make you feel uncomfortable or you feel you cannot answer a question, you can skip that question.

You will be entered into a drawing for a \$25 gift card to compensate for your time commitment. You will also be given a small token of appreciation for participation. If you decide to withdraw from the study before completion you may do so without consequence.

Do you have any questions you would like to ask before we get started? I am providing you with a card containing contact information should you have questions after participating in the study

APPENDIX D - CONSENT TO PARTICIPATE

My signature below indicates that I volunteer and agree to participate in this research. I understand that my information will remain confidential and anonymous, and I can withdraw from the study at any time.

Name: _____ Date: _____

APPENDIX E - PERMISSION TO USE TOFHLA

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APPENDIX F - PERMISSION TO USE SDLRS

This email certifies that Robin Dennis has purchased the use of 101 copies of the SDLRS-ABE and has my permission to print that number of copies from the attached pdf file.

Lucy Madsen Guglielmino

REFERENCES

- Administration on Aging. (2014). *A profile on older Americans: 2014*. Department of Health and Human Services. Retrieved from http://www.aoa.gov/Aging_Statistics/Profile/2014/docs/2014-Profile.pdf
- Baker, D.W. (2006). The meaning and measure of health literacy. *Journal of General Internal Medicine, 21*(8), 878-883. Doi: 10.1111/j.1525-1497.2006.00540.x
- Baker, D.W., Williams, M.V., Parker, R.M., Gazmararian, J.A., & Nurss, J.R. (1999) Development of a brief test to measure functional health literacy. *Patient Education and Counseling, 38*, 33-42. Doi:10.1016/S0738-3991(98)00116-5
- Baker, D.W., Wolf, M.S. Feinglass, J., Thompson, J. A., Gazmararian, J.A., & Huang, J. (2007). Health literacy and mortality among elderly persons. *Archives of Internal Medicine, 167*(14), 1503-1509. Doi:10. 1001.archinte.167.14.1503
- Baumgartner, L.M. (2011). The role of adult learning in coping with chronic illness. *New Directions for Adult and Continuing Education, 130*, 8-16. Doi: 10.1002/ace.40
- Berkman, N.D., Davis, T.C., & McCormack, L. (2010). Health literacy: What is it? *Journal of Health Communications, 15*, 9-19. Doi: 10.1080/10810730.2010.499985
- Bjorklund, B.R. & Bee, H.L. (2008). *The Journey of Adulthood*. Upper Saddle River, NJ: Prentice Hall.
- Boulton-Lewis, G.M. (2010). Education and learning for the elderly: Why, how, what. *Educational Gerontology, 36*, 213-228. Doi: 10.1080/036012709031821877
- Brockett, R.G. (1985). The relationship between self-directed learning readiness and life

satisfaction among older adults. *Adult Education Quarterly*, 35, 210-219.

Retrieved from <http://web.a.ebscohost.com.lynx.lib.usm.edu>

Brockett, R.G., & Hiemstra, R. (1991). *Self-direction in adult learning: Perspectives on theory, research, and practice*. New York, NY: Routledge, Chapman and Hall, Inc.

Brockett, R.G. (2006). Self-directed learning and the paradox of choice. *International Journal of Self-Directed Learning*, 3(2), 27-33.

Centers for Disease Control (CDC) and Prevention. The State of Aging and Health in America 2013. Atlanta, GA: Centers for Disease Control and Prevention, US Department of Health and Human Services; 2013

Chen, J., Hsu, H., Tung, H., & Pan L. (2012). Effects of health literacy to self-efficacy and preventive care utilization among older adults. *Geriatrics Gerontology International*, 13, 70-76. Doi: 10.1111/j.1447-0594.2012. 00862. x

Chen, L., Kim, Y., Moon, P, & Merriam, S.B. (2008). A review and critique of the portrayal of older adult learners in adult education journals, 1980-2006. *Adult Education Quarterly*, 29(1), 3-21. Doi: 10.1177/0741713608325169

Chervin, C., Clift, J., Woods. L., Krause, E., & Lee, K. (2012). Health literacy in adult education: A natural partnership for health equity. *Health Promotion Practice*, 13(6), 738-746. Doi: 10.1177/1524839912437367

Clark, N.M., & Zimmerman, B.J. (2014). A social cognitive view of self-regulated learning about health. *Health Education & Behavior*, 41(5), 485-492. Doi: 10.1177/1090198114547512

- Coady, M. (2013). Adult health learning and transformation: A case study of a Canadian community-based program. *Adult Education Quarterly*, 63(4), 321-337.
Doi: 10.1177/0741713612471419
- Collins, J. (2009). Lifelong learning in the 21st century and beyond. *RadioGraphics*, 29(2). Doi: <http://dx.doi.org/10.1148/rg.292085179>
- Cosnefroy, L., & Carré, P. (2014). Self-regulated and self-directed learning: Why don't some neighbors communicate? *International Journal of Self-Directed Learning*, 11(2), 1-11.
- Delahaye, B., & Smith, H.E. (1995). The validity of the learning preference assessment. *Adult Education Quarterly*, 45(3), 159-173. Retrieved from <http://aeq.sagepub.com/content/45/3/159.full.pdf+html>
- Desjardins, R. (2003). Determinants of literacy proficiency: A lifelong-lifewide learning perspective. *International Journal of Educational Research*, 39, 205-245.
Doi: 10.1016/j.ijer.2004.04.0044
- Diehl, S. (2011). Health literacy education within adult literacy instruction. *New Directions for Adult and Continuing Education*, 130, 29-42. Doi: 10.1002.ace.408
- Egbert, N., & Nanna, K. (2009). Health literacy: Challenges and strategies. *Online Journal of Issues in Nursing*, 14(3), 1-15.
- Eichler, K., Wieser, S., & Brugger, U. (2008). The costs of limited health literacy: A systematic review. *International Journal of Public Health*, 54, 313-324. Doi: 10.1007/s00038-009-0058-2
- Elliott, R. W. (2014). Educating older adults with chronic kidney disease. *Nephrology Nursing Journal*, 41(5) 522-528.

- English, L. M. (2012). *Adult Education and Health*. Toronto, Canada: University of Toronto Press.
- Escobedo, W., & Weismuller, P. (2013). Assessing health literacy in renal failure and kidney transplant patients. *Progress in Transplantation*, 23(1), 47-54.
- Estacio, E.V. (2013). Health literacy and community empowerment: It is more than just reading, writing, and counting. *Journal of Health Psychology*, 18(8), 1056-1068. Doi: 10.1177/1359105312470126
- Federman, A.D., Sano, M., Wolf, M., Siu, A.L., & Halm, E.A. (2009). Health literacy and cognitive performance in older adults. *Journal of American Geriatrics Society*, 57, 1475-80.
- Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). Los Angeles, CA: Sage Publications.
- Goli, N.M., Thompson, T., Sears, S.F., Mounsey, J.P., Chung, E., Schwartz, J....Gehi, A.K. (2012). Educational attainment is associated with atrial fibrillation symptom severity. *Pacing and Clinical Electrophysiology*, 35, 1090-1096. Doi: 10.1111/j.1540-8159.2012.03482.x
- Grover, K.S., Miller, M.T., Swearingen, B., & Wood, N. (2014). An examination of the self-directed learning practices of ESL adult language learners. *Journal of Adult Education*, 43(2), 12-18. Retrieved from <http://web.a.ebscohost.com.lynx.lib.usm.edu/>
- Guglielmino, L.M. (2008). Why self-directed learning? *International Journal of Self-Directed Learning*, 6(1), 1-14. Retrieved from <http://www.sdlglobal.com/journals.php>

- Hester, E.J. (2008). An investigation of the relationship between health literacy and social communication skills in older adults. *Communication Disorders Quarterly*, 30(2), 112-119. Doi: 10.1177/1525740108324040.
- Hiemstra, R. (1976). *Lifelong learning*. Lincoln, NE: Professional Educators Publications, Inc.
- Hiemstra, R. (2003). More than three decades of self-directed learning: From whence have we come? *Adult Learning*, 14(4), 5-8. Doi: 10.1177/104515950301400402
- Heinrich, C. (2012). Health literacy: The sixth vital sign. *Journal of the American Academy of Nurse Practitioners*, 24(4), 218-223. Doi: 10.1111/j.1745-7599.2012.000698.x
- Hill, L.H. (2002). Health literacy is a social justice issue that affects us all. *Health Literacy in Adult Education*, 15(1), 4-6. Retrieved from <http://web.a.ebscohost.com.lynx.lib.usm.edu/>
- Hill, L. H. (2011). Health education as an arena for adult educators' engagement in social justice. *New Directions for Adult and Continuing Education*, 130, 99-104. Doi: 10.1002/ace.414
- Hill, L.H., & Ziegahn, L. (2010). Adult education for health and wellness. In C. Kasworm, A.D. Rose, & J. Ross-Gordon (Eds.), *Handbook of adult and continuing education*. San Francisco, CA: Jossey-Bass.
- Jeppesen, K. M., Coyle, J.D., & Miser, W.F. (2009). Screening questions to predict limited health literacy: A cross-sectional study of patient with Diabetes Mellitus. *Annals of Family Medicine*, 7(1), 24-31. Retrieved from www.annfam.org

- Kaye, M. (2009). Health literacy and informatics in the geriatric population: The challenges and opportunities. *Online Journal of Nursing Informatics*, 13(3), 1-19. Retrieved from http://ojni.org.13_3/Kaye.pdf
- Kickbusch, I., & Maag, D., & Health Literacy (2008). In K. Heggenhougen and S. Quah (Eds.), *International Encyclopedia of Public Health* (pp. 204-211). San Diego, CA: Academic Press.
- Kickbusch, I., Wait, S., & Maag, D. (2005). Navigating health: The role of health literacy. Alliance for Health and the Future. International Longevity Centre, London. Retrieved from http://www.ilcuk.org.uk/files/pdf_pdf_3.pdf
- Kim, S., Love, F., Quistberg, D.A., & Shea, J.A. (2004). Association of health literacy with self-management behavior in patients with diabetes. *Diabetes Care*, 27(12), 2980-2982. Retrieved from <http://care.diabetesjournals.org/content/27/12/2980>
- King, J., & Taylor, M.C. (2010). Adults living with limited literacy and chronic illness: patient education experiences. *Adult Basic Education and Literacy Journal*, 4(1), 24-33. Retrieved from <http://web.a.ebscohost.com.lynx.lib.usm.edu>
- King, K.P. (2014). A journey with chronic pain: Self-directed learning as survival. *New Horizons in Adult Education & Human Resource Development*, 26(2) 5-18. Retrieved from <http://web.a.ebscohost.com.lynx.lib.usm.edu>
- Kirkman, M.S., Briscoe, V.J., Clark, N., Florez, H., Haas, L.B. Halter, J.B. ...Swift, C.S. (2012). Diabetes in older adults: A consensus report. *Journal of American Geriatrics Society*, 60, 2042-2356. Doi: 10.1111/jgs.12035
- Knowles, M. (1975). *Self-directed learning: A guide for learners and teachers*. Chicago, IL: Association Press/Follett.

- Knowles, M. (1984). *The adult learner: A neglected species*. Houston, TX: Gulf Publishing.
- Knowles, M.S., Holton, E.F., & Swanson, R.A. (1998). *The adult learner: The definitive classic in adult education and human resource development*. Houston, TX: Gulf Publishing Company.
- Kutner, M., Greenberg, E., Jin, Y., & Paulsen, C. & White, S. (2006). The Health Literacy of America's Adults: Results From the 2003 National Assessment of Adult Literacy (NCES 2006-483). U.S. Department of Education. Washington, DC: National Center for Education Statistics.
- Lee, S.D., Arozullah, A.M., Cho Y.I., Crittenden, K., & Vicencio (2009). Health literacy, social support, and health status among older adults. *Educational Gerontology*, 35, 191-201. Doi 10.1080/03601270802466629
- Loyens, S.M., Magda, J., & Rikers, R.M. (2008). Self-directed learning in problem-based learning and its relationships with self-regulated learning. *Educational Psychology Review*, 20, 411-427. Doi: 10.1007/s10648-008-9082-7
- Manafa, E., & Wong, S. (2012). Health literacy programs for older adults: A systematic literature review. *Health Education Research*, 27(6), 947-960. Doi: 10.1093/her/cys067
- Mancuso, J.M. (2009). Assessment and measurement of health literacy: An integrative review of the literature. *Nursing and Health Sciences*, 11, 77-89. Doi: 10.1111/j.1442-2018.2008.00408.x
- Merriam, S.B. (2001). Andragogy and self-directed learning: Pillars of adult learning theory. *New Directions for Adult and Continuing Education*, 89, 3-11.

- Merriam, S.B., & Bierema, L.L. (2013). *Adult learning: Linking theory and practice*. San Francisco, CA: John Wiley & Sons.
- Merriam, S.B., Caffarella, R.S., & Baumgartner, L.M. (2007). *Learning in adulthood: A comprehensive guide*. San Francisco, CA: Jossey-Bass.
- Mika, V.S., Price, M. A., & Villarreal, R (2005). The ABCs of health literacy. *Family Community Health*, 28(4), 351-357. Retrieved from <http://web.a.ebscohost.com.lynx.lib.usm.edu/>
- Milic, S. (n.d.). The twenty-first-century university and the concept of lifelong learning, 151-170. Retrieved from <http://files.eric.ed.gov/fulltext/EJ1008889.pdf>
- Nielsen-Bohlman, L., Panzer, A.M., & Kindig, D.A. (2004). Institute of Medicine of the National Academies. *Health literacy: A prescription to end confusion*. Washington, DC: The National Academies Press.
- Nutbeam, D. (2008). The evolving concept of health literacy. *Social Science and Medicine*, 67, 2072-2078. Doi: 10.1016/j.socscimed.2008.09.050
- Nutbeam, D. (2012). *Where do we go from here? The evolving concept of health literacy*. PowerPoint presentation at the University of Southampton. Retrieved from <http://www.iom.edu/~media/Files/Activity%20Files/PublicHealth/HealthLiteracy/2012-SEP-24/Donald%20Nutbeam.pdf>
- Omachi, T.A., Sarkar, U., Yelin, E.H., Blanc, P.D., & Katz, P.P. (2013). Lower health literacy is associated with poorer health status and outcomes in chronic obstructive pulmonary disease. *Journal of General Internal Medicine*, 28(1), 74-81. Doi: 10.1007/s11606-012-2177-3

- Paasche-Orlow, M.K., & Wolf, M.S. (2007). The causal pathways linking health literacy to health outcomes. *American Journal of Health Behavior*, 31(1), S19-S26.
- Papen, U. (2009). Literacy, learning, and health: A social practices view of health literacy. *Literacy and Numeracy Studies*, 16(2), 19-34. Retrieved from http://eprints.lancs.ac.uk/27978/1/Papen,_LNS_2008-9.pdf
- Papen, U. (2012). Informal, incidental and ad hoc: The information-seeking and learning strategies of health care patients. *Language and Education*, 26(2), 1050119. Doi: 10.1080/09500782/2011/642878
- Papen, U., & Walters, S. (2008). *Literacy, learning, and health: Research report*. London, UK: NRDC.
- Parker, R. (2000). Health literacy: A challenge for American patients and their health care providers. *Health Promotion International*, 15 (4), 277-283.
- Parker R., Ratzan, S., & Lurie, N. (2003). Health literacy: A policy challenge for advancing high-quality health care. *Health Affairs*, 22, 147-153. Retrieved from <http://web.b.ebscohost.com/lynx.lib.usm.edu>
- Peterson, D.A., Thornton, J., & Birren, J.E. (1986). *Education and aging*. Upper Saddle River, NJ: Prentice-Hall.
- Pleasant, A. (2011). Health literacy: An opportunity to improve individual, community, and global health. *New Directions for Adult and Continuing Education*, 130, 43-53. Doi: 10.1002/ace.409
- Prins, E., & Mooney, A. (2014). Literacy and health disparities. *New Directions for Adult and Continuing Education*, 142, 25-35. Doi: 10.1002/ace.20092

- Purdie, N., & Boulton-Lewis, G. (2003). The learning needs of older adults. *Educational Gerontology, 29*, 129-149. Doi: 10.1080/03601270390157088. 92002
- Purdie, N., & McCrindle, A. (2002). Self-regulation, self-efficacy and health behavior change in older adults. *Educational Gerontology, 28*, 379-400. Doi: 10.1080/03601270290081353
- Rager, K. (2009). I feel, therefore, I learn The role of emotion in self-directed learning. *New Horizons in Adult Education and Human Resource Development, 23*(2). 22-33. Retrieved from <http://education.fiu.edu/newhorizons>
- Randall, B. (2012). Beyond healthy aging: The practice of narrative care in Gerontology. In L.M. English (Ed.), *Adult Education and Health* (pp. 178-192). Toronto, Canada: University of Toronto Press.
- Ratzan, S.C., & Parker, R.M. (2006). Health literacy-Identification and response. *Journal of Health Communication, 11*, 713-715. Doi: 10.1080/10810730601031090
- Roberson, D. N. (2005a). Masters of adaptation: Learning in late life adjustments. *International Journal of Aging and Human Development, 61*(4), 265-291.
- Roberson, D. N. (2005b). The potential of self-directed learning. *Activities, Adaptation, & Aging, 29*(3), 1-20. Doi: 10.1300/Jo16v29n03_01
- Roberson, D. N., & Merriam, S.B. (2005). The self-directed learning process of older, rural adults. *Adult Education Quarterly, 55*(4), 269-287. Doi: 10.1177/0741713605277372
- Robinson, S., Moser, D., Pelter, M., Nesbitt, T., Paul S., & Dracup, K. (2011). Assessing health literacy in heart failure patients? *Journal of Cardiac Failure, 17*(11), 887-892. Doi: 10.1016/j.cardfail.2011.06.651

- Roman, S.P. (2004). Illiteracy and older adults: Individual and societal implications. *Educational Gerontology, 20*, 79-93.
- Ronson, B., & Rootman, I. (2012). Literacy and health: Implications for health and education professionals. In L.M. English (Ed.), *Adult Education and Health* (pp. 107-122). Toronto, Canada: University of Toronto Press.
- Safeer, R.S., & Keenan, J (2005). Health literacy: The gap between physicians and patients. *American Academy of Family Physicians, 72*, 463-468.
- Schechter, S.R., & Lynch, J. (2011). Health learning and adult education: In search of a theory of practice. *Adult Education Quarterly, 61*(3), 207-224. Doi: 10.1177/0741713610383438
- Schillinger, D., Grumbach, K., Piette, Z.J., Wang, F., Osmond, D., Daher, C. ... Bindman, A.B. (2002). Association of health literacy with diabetes outcomes. *Journal of the American Medical Association, 288*(4), 475-482. Doi: 10.1001/jama.288.4.475
- Sorrell, J. M. (2006). Health literacy in older adults. *Journal of Psychosocial Nursing, 44*(3), 17-20. Retrieved from <http://web.a.ebscohost.com.lynx.lib.usm.edu/>
- Speros, C. L. (2005). Health literacy: Concept analysis. *Journal of Advanced Nursing, 50*(6), 633-640. Retrieved from <http://tinyurl.com/pmnnxk5>
- Speros, C.L. (2009). More than words: Promoting health literacy in older adults. *Online Journal of Issues in Nursing, 14*(3), doi: 10.3912/OJIN.Vol14No03Man05
- Sudore, R.L., Mehta, K.M., Simonsick, E.M., Harris, T.B., Newman, A.B., Satterfield, S. ... Yaffe, K. (2006). Limited literacy in older people and disparities in health and

- health care access. *Journal of American Geriatric Society*, 54, 770-776. Doi: 10.1111/j.1532-5415/2006/0069.x
- Tabachnick, B.G., & Fidell, L.S. (2013). *Using multivariate statistics*. [Kindle for PC version]. Retrieved from http://www.amazon.com/Using-Multivariate-Statistics-6th-Edition/dp/0205849571/ref=dp_ob_title_bk
- Tough, A. (1978). Major learning efforts: Recent research and future directions. Toronto Department of Adult Education, Ontario Institute for Studies in Education. Retrieved from <http://files.eric.ed.gov/fulltext/ED156828.pdf>
- Tough, A. (1979). Choosing to learn. Ontario Institution for Studies in Education, Toronto. Retrieved from <http://files.eric.ed.gov/fulltext/ED190741.pdf>
- U. S. Census Bureau. (2011). *The older population: 2010*. Retrieved from <http://www.census.gov/prod/cen2010/briefs/c2010br-09.pdf>
- U. S. National Institute of Medicine. (2011). Health Outcomes Core Library Recommendations. Retrieved from <https://www.nlm.nih.gov/nichsr/corelib/houtcomes-2011.html>
- Valente, J.S. (2006). The role of self-directed learning in older adults' health care. Retrieved from <http://www.adulterc.org/Proceedings/2006/Proceedings/Valente.pdf>
- Verner, C., & Booth, A. (1967). *Adult Education*. New York, NY: Library of Congress.
- von Wagner, C., Steptoe, A., Wolf, M., & Wardle, J. (2009). Health literacy and health actions: A review of a framework from health psychology. *Health education Behavior*, 36, 860-877. Doi: 10.1177/1090198108322819

- Wang, K, Chu, N., Lin., S., Chiang, I., Perng, W., & Lai, H. ((2013). Examining the causal model linking health literacy to health outcomes of asthma patients. *Journal of Clinical Nursing*, 23, 2031-2042. Doi: 10.1111/jocn.12434
- Weinstein, L.B. (2004). Lifelong learning benefits older adults. *Activities, Adaptation & Aging*, 28(4), 1-12. Doi: 10.1300/J016v28n04_01
- Williams, M.V., Baker, D.W., Parker, R.M., & Nurss, J.R. (1998). Relationship of functional health literacy to patients' knowledge of their chronic disease: A study of patients with hypertension and Diabetes. *Archives of Internal Medicine*, 158(2), 166-172. Doi: 10.1001/archinte.158.2.166
- Williamson, S.N. (2007). Development of a self-rating scale of self-directed learning. *Nurse Researcher*, 14(2), 66-83. Retrieved from <http://tccl.rit.albany.edu/knilt/images/3/39/Williamson.pdf>
- Wister, A.V., Malloy-Wier, L.J., Rootman, I., & Desjardins, R. (2010). Lifelong educational practices and resources in enabling health literacy among older adults. *Journal of Aging and Health*, 22(6), 827-854. Doi: 10.1177/0898264310373502
- Wolf, M.S., Gazmararian, J.A., & Baker, D.W. (2005). Health literacy and functional health status among older adults. *Archives of Internal Medicine*, 165(17), 1946-52. Doi: 10.1001/archinte.165.17.1946.
- World Health Organization. (n.d.). Retrieved from http://www.who.int/topics/health_education/en/
- Zarcadoolas, C., Pleasant, A., & Greer, D. (2003). Elaborating a definition of health literacy: A commentary. *Journal of Health Communication*, 8, 119-120. Doi: 640.10.1080/10810730390224965

Zarcadoolas, C. Pleasant, A., & Greer, D. (2005). Understanding health literacy: An expanded model. *Health Promotion International*, 20(2), 195-203.