AN EXAMINATION OF MENTAL HEALTH LITERACY AND STIGMA AGAINST MENTAL ILLNESS USING AN ITEM RESPONSE THEORY APPROACH

by

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This manuscript is dedicated to my husband Mark and our son Jeremey for their enduring patience and support during this process, and to my sister Cassie for her steadfast support, unwavering positive attitude, and constant reminders that there is always a silver lining.

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ABSTRACT

Mental illness is a leading cause of disease burden for college age individuals and impacts an estimated 43 million Americans annually. The individual burden of mental illness causes high physical morbidity and mortality that leads to a dramatically shortened lifespan. Mental illness is highly treatable, and early intervention leads to an improved long-term outcome. Regardless of level of disability, people displaying symptoms of mental illness are more harshly stigmatized than those with other non-mental health ailments. The latter stigmatization results in years long delay in mental health help-seeking.

Existing evidence indicates that health literacy is vital to maintaining good physical health. However, the knowledge and skills that facilitate one's ability to prevent, recognize, and manage mental health related issues has not been incorporated into traditional definitions of health literacy. Mental health literacy programming has been hypothesized to improve delays in mental health help-seeking through improved knowledge and awareness that results in reduced stigma against mental illness. The evidence base supporting this hypothesis is lacking mainly due to the need for theory-based psychometrically sound instruments that allow for reliable and valid measurement of mental health literacy.

The appropriate assessment of mental health literacy is critical to reducing the burden of mental illness stigma. Thus, this study uses advanced statistical and psychometric analyses, including item response theory, to examine items of a recently developed scale purporting to measure mental health literacy. Major scale revisions are

elucidated, and using theory-based test construction practices, a new mental health literacy scale is proposed.

The psychometric properties of the new scale are discussed, as is the extent to which mental health literacy is related to enacted mental illness stigma. The use of the new mental health literacy scale as part of evidenced-based interventions to improve mental health literacy should help lessen the burden of stigma against people with mental health problems.

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CHAPTER I: INTRODUCTION

Mental illness is the leading cause of global disease burden for those age 18 to 29 and accounts for over 30% of years lived with disability and over 10% of years of life lost due to illness, disability, or death (Vigo, Thornicroft, & Atun, 2016; Wei, McGrath, Hayden, & Kutcher, 2016). Specifically, depressive disorders are the leading cause of years lived with disability for women and the second leading cause for men, and accounts for 30% of disability adjusted life years attributed to mental illness (World Health Organization, 2014). In the United States, it is estimated that roughly one out of every five adults and children experienced a diagnosable mental illness in the past twelve months, and one in twenty-five experienced a serious mental illness such as schizophrenia, bipolar disorder, or major depressive disorder (Kessler et al., 2007; Kessler et al., 2008) This translates to an estimated 43 million Americans being impacted by mental illness each year.

Mental illness is highly treatable, and early recognition and intervention lead to increased odds of improved long-term outcome (Kelly, Jorm, & Wright, 2007). Yet, due to the personal, societal, and structural reasons, a large percentage of persons with mental illness fail to seek treatment and failure to seek treatment for mental illness results in significant social, economic, and personal cost (Wei et al., 2016).

The individual burden of mental illness is high. Those with serious mental illness die an average of 25 years younger than the general population, with 60% to 70% of the premature loss of life due to modifiable risk factors, with the remaining loss of life due to

suicide (Parks, Svendsen, Singer, & Foti, 2006). Suicide is a leading cause of death in all age groups in the United States and accounts for over 41,000 deaths per year, which approximates the death rate due to breast cancer, is three times the national homicide rate, and six times the death rate due to HIV (Insel, 2015). Compared to people without mental illness, those with a mental illness are less likely to be employed, more likely to have low quality employment, more likely to interact with the criminal justice system, more likely to live in substandard housing, and be at increased risk for all causes of early mortality (Corrigan, 2004; Kessler et al., 2008; Wei et al., 2016; World Health Organization, 2014).

The economic burden of mental illness in the United States is equally troubling and higher than the combined cost of cancer, diabetes, and respiratory illness (Insel, 2015; Kessler et al., 2008). When accounting for mental health care expenditure, combined with the cost of lost productivity and disability, it has been estimated that the financial cost of mental illness accounted for $467 billion (Insel, 2015). The World Health Organization estimates that the global cost of mental illness will be over $6 trillion by the year 2030 (World Health Organization, 2014).

What is Mental Health?

Mental health is more than the mere lack of illness or disability and is an essential component to overall health. It is a fundamental component of well-being that allows the ability to think, interact with others, enjoy life, and earn a living. Mental health is “a state of well-being in which an individual realizes his or her own abilities, can cope with the

normal stresses of life, can work productively and is able to make a contribution to his or her community" (World Health Organization, 2014, p.12).

Epidemiology of Mental Illness.

Globally, mental illness accounts for 37% of years lived with disability, and 13% of years of life lost due to illness, disability, or early death, otherwise known as disability adjusted life years (Vigo et al., 2016). The twelve-month prevalence of mental illness in the United States was found to be 6.5% to 22.6%, with projected lifetime risk from 20% to 69% depending on condition (Kessler et al., 2007; Kessler et al., 2008). Each year 20% of Americans (43 million) experience a mental illness, and 4% (10 million) experience serious functional limitation directly attributable to mental illness (Insel, 2015). Over 41,000 commit suicide each year and an estimated addition 350,000 deaths are due to early mortality attributable to mental illness (Insel, 2015; Parks et al., 2006).

Additionally, those with mental illness are up to two times as likely to develop a chronic physical condition than those who do not have a mental illness (Scott et al., 2016). Being diagnosed with one or more mental illnesses has been shown to be positively associated with the likelihood of developing a chronic disease with up to four times the risk of illness depending on the disease. Mental disorders account for as much as 13% of the predictive power of the onset of a physical condition (Scott et al., 2016). This further highlights the importance of early identification and intervention of mental illness.

Risk factors. Mental illness is attributable to a combination of biopsychosocial determinants, with poverty, low educational attainment, unemployment, and poor quality employment being the strongest global risk factors for developing mental illness (World Health Organization, 2014). Exposure to traumatic life events, such as racial, gender, or disability discrimination, social isolation, witnessing or being a victim of violence, or human rights violations are additional strong risk factors for mental illness of any type (Jorm, 2012; Kessler et al., 2008; Parks et al., 2006; World Health Organization, 2014). Beyond these well-known socioeconomic and environmental risk factors, little is known about modifiable predictors of mental illness in comparison to other chronic diseases, and the area of prevention is the least developed area of mental health research (Jorm, 2012).

Economic Burden of Mental Illness

Serious mental illness is the leading cause of lost productivity in developed countries. In the United States mental illness accounts for a massive loss of production capital, carrying with it an enormous social burden (Farrer, Leach, Griffiths, Christensen, & Jorm, 2008; Kessler et al., 2008). Failure to seek treatment when symptoms present results in significant social, economic, and personal cost. Results from the 2002 National Comorbidity Survey Replication, indicate that when controlling for known predictors of income (age, sex, race, census region, and urbanicity) serious mental illness accounted for an estimated $193 billion in lost earnings (Kessler et al., 2008). Seventy-five percent of the association between annual loss in earnings and serious mental illness was due to lower earnings among employed people with serious mental illness as compared to employed people without serious mental illness. The remaining twenty-five percent of

loss in earnings was due to a lower probability of having any earnings among those with serious mental illness (Kessler et al., 2008).

Social Determinants of Mental Health Help-Seeking

There are long delays between the first presentation of symptoms of a mental illness and time to treatment. People often experience their first symptoms of mental illness at an age when their knowledge and skills are underdeveloped. Fifty percent of mental illness presents itself by the mid teenage years, while 75% of onset occurs by the mid 20's (Kessler et al., 2008). Adolescents commonly report that peers are their first choice for help, but peers lack the experience and maturity to provide adequate mental health advice. This is evidenced by most adolescents and young adults reporting that they would not report a friend's suicidal ideation to a responsible adult (Jorm, 2012). A low level of mental health knowledge in the population leads to an inability to recognize symptoms and failure to identify evidence-based treatment options (O'Connor & Casey, 2015). Over 50% of people who meet the criteria for diagnosis of a mental illness fail to seek treatment (Reavley, Morgan, & Jorm, 2014).

Examining barriers to help-seeking requires a social ecological approach to elucidate the bidirectional relationship between the individual and the social environment in which they live. Individual are embedded within a complex system that exerts influence on lifespan development across and within subsystems at the micro, meso, exo, and macro level (Bronfenbrenner, 1979, 2005). Mental health and health behavior are shaped at multiple levels of analysis, such as intra- and inter-personal, organization,

community, policy, culture, and physical environment (Link & Phelan, 1995; McLeroy, Bibeau, Steckler, & Glanz, 1988). By examining this complex system, one begins to understand the complexity of the social determinants of mental illness.

Personal and structural barriers often prevent help-seeking when symptoms of mental illness present. Personal barriers include low perceived need for treatment, low perceived value of treatment, a desire to handle the problem on one's own, feelings of shame and embarrassment, and lack of knowledge and awareness (Andrade et al., 2014; Gulliver, Griffiths, & Christensen, 2010; Mojtabai et al., 2011). Structural barriers include accessibility of treatment, lack of coordinated and follow-up care, and complex referral processes (Gulliver et al., 2010; Mojtabai et al., 2011). Predictors of help-seeking include increased knowledge and awareness of mental health issues and treatment options, encouragement from others, social support, and positive past experiences (Gulliver et al., 2010; Jorm, 2012).

Mental Illness Stigma

Cultural belief systems within the general population shape beliefs and behavior toward mental illness, which in turn influences widely held stereotypes that guide social and health policy (Link, Phelan, Bresnahan, Stueve, & Pescosolido, 1999). The Social Cognitive Model of Stigma provides a paradigm for examining the compounding effect of societal attitudes and beliefs on the disabling consequences of mental illness (Corrigan, 2002, 2004; Link, 1982; Link et al., 1999).

Stigma toward mental illness can be broken down into stigma signals, stereotypes, and discrimination (Corrigan, 2000). Stigma signals are cues that an individual may be suffering from a mental illness, such as symptoms, labels, appearance, or skills deficits. Stereotypes are attitudes toward persons exhibiting cues, such as dangerousness, social restriction, authoritarianism, or benevolence. Discrimination and prejudice result from behaviors that directly and indirectly effect the lives of those with a mental illness, such as policies that causes deficits in access to treatment, quality housing, or affiliation, as well as a reduction in a sense of autonomy.

The general lack of knowledge surrounding mental illness results in a high burden of stigma associated with being diagnosed with a mental illness. People labeled as mentally ill are more harshly stigmatized than those with any other health condition regardless of level of disability (Corrigan, 2004). Stigma can take many forms and has far reaching consequences on mental health outcomes. Enacted or "public" stigma is the embracing of prejudicial attitudes by the population that lead to the experience of unfair treatment of persons with mental illness (Corrigan, 2004; Gray, 2002; Michaels & Corrigan, 2013). Self-stigma results when a person with a mental illness internalizes the prejudicial and discriminatory attitudes and behaviors of others, and can result in diminished sense of self-worth, low self-efficacy, and further reduction in help-seeking out of fear of further discrimination (Corrigan, 2004).

Stigma has a profound and powerful influence on the life of a person with mental illness, and the consequences are dire given a high percentage of people with diagnosable symptoms fail to seek treatment (Wang & Lai, 2008). This is in part due to the

internalized shame associated with self-stigma, but in larger part due the influence of enacted stigma through social structure (Corrigan, 2004). The pervasive stigma and discrimination embodied in social structure leads to mental illness being often neglected by policy makers. This neglect affects healthcare structure and policy such that those with mental illness receive fewer medical services than those without mental illness for similar physical health ailments (Corrigan, 2004; Henderson et al., 2014). Those with a mental illness are similarly less likely to receive an equal level of health insurance benefits as those without a mental illness (Corrigan, 2004). Despite the enormous economic burden, in the United States less than 10% of healthcare spending is dedicated to treating mental illness (Kessler et al., 2008).

Enacted stigma also acts within the criminal justice system resulting in increased prevalence of serious mental illness in jails when police respond to mental health crises (Corrigan, 2004). Up to 60% of people expressed that a person with schizophrenia has an increased likelihood of violent behavior and up to 70% expressed an unwillingness to interact with a person showing symptoms of schizophrenia (Link et al., 1999). In a separate study, 40% felt that a person with a depressive disorder behaves unpredictably, and 20% felt that they were dangerous (Wang & Lai, 2008). Such erroneous perceptions of mental illness directly affect interactions between the person with mental illness, police force, and the criminal justice system.

Measuring Mental Illness Stigma

The direct measurement or observation of attitude is difficult in a research setting due to social desirability bias, which is the concealment of one's "true beliefs" in order to

conform to societal norms (Link & Phelan, 2001). For example, a person who believes that mental illness increases the risk of violent behavior may conceal their true feelings in the presence of a researcher to appear more tolerant or in line with cultural norms. In anti-stigma research, the use of a pre-post design results in added difficulty reducing social desirability bias, as exposure to the pre-test allows the individual an opportunity to discern the goal of the intervention (Link & Phelan, 2001).

One popular testing method for circumventing social desirability bias is the Error-Choice Test. Error-Choice Tests require participants to select from a set of response choices with no particular "correct" answer where the response set is distributed on a continuum of empirically based information (Antonak & Livneh, 1995a, 1995b; Clarke & Crewe, 2000; Hammond, 1948; Link & Phelan, 2001). The term "error choice" refers to the fact that although the truth lies somewhere on the continuum, neither response is correct and endorsing a specific response implies bias. For example, when asked 'What percentage of people with serious mental illness are considered dangerous in their lifetime?,' and offered a response set of 3% vs 15%, those with stigmatizing attitudes will choose 15% (Michaels & Corrigan, 2013). Most participants are unaware that Error-Choice Tests are a measure of prejudicial attitudes, because on the surface the instrument appears to be a measure of knowledge and thus prevents responses based on the respondent's perception of cultural norms (Link & Phelan, 2001).

Mental Health Literacy

Health literacy has been widely studied and is defined as one's ability to gain access to, understand, and use information in ways which promote and maintain good

health (Nutbeam, Wise, Bauman, Harris, & Leeder, 1993). The World Health Organization recognizes health literacy as a stronger predictor of health status than income, employment status, level of education, and race or ethnicity (World Health Organization, 2014). Although health literacy has been demonstrated to be vital to maintaining good physical health, it does not incorporate components of mental health and well-being. With projected lifetime risk of developing a mental health disorder as high as 69%, it is equally vital that focus be placed on mental health literacy (Jorm et al., 1997; Kessler et al., 2007).

Mental health literacy is defined as knowledge, attitudes, and behaviors pertaining to mental health that facilitate one's ability to prevent, recognize, and manage mental health related issues (Jorm et al., 1997). The components of mental health literacy include the following:

1. The ability to recognize mental illness.
2. Knowledge of how to seek mental health information.
3. Knowledge of risk factors and causes of mental illness.
4. Knowledge of effective self-help.
5. Knowledge of professional treatment options.
6. Attitudes that promote recognition.
7. Attitudes that promote help-seeking.

According to Jorm et al. (1997) mental health literacy encompasses a range of knowledge and beliefs that are related to one's ability to recognize signs and symptoms of mental health issues and seek appropriate and effective self or professional help, and to

date no alternative definition has been proposed. In the 1990's the focus of mental health literacy training was on expanding the ability of healthcare professionals to identify mental illness in their practice. This top-down approach to prevention places a high burden on health professionals and ignores the agency of the patient in health decision-making and behavior, which led to a shift in focus to improving population level knowledge of mental illness and treatment options in the 2000's (Jorm, 2012).

Prevalence and Determinants of Mental Health Literacy

Historically, dramatic deficits in the understanding of causes and treatments for common mental health issues have been and continue to be commonplace (Farrer et al., 2008). Although mental health literacy has improved in recent decades, these improvements have not kept pace with the population level improvements in general health literacy (World Health Organization, 2014).

The prevalence of mental health literacy in the United States can only be discussed in terms of individual research studies due to the lack of a national level survey. The largest study available (N ~ 275), used vignettes to assess knowledge of major depressive disorder and schizophrenia, as well as knowledge of causes and appropriate treatment (Farrer et al., 2008). Study participants ranged in age from 18 to 80, and it was revealed that knowledge regarding depressive disorders and schizophrenia was highest among younger adults and nearly non-existent in older adults with what appears to be a linear negative relationship between mental health literacy and age.

Similar findings were reported in a second study of those age 17 to 65+ (White & Casey, 2017).

It has also been shown that mental health literacy has a weak but positive relationship with level of education, where those who had a college education had slightly higher ability to recognize mental health conditions (Farrer et al., 2008; Gorczynski, Sims-schouten, Hill, & Wilson, 2017; Kessler et al., 2008). O'Connor and Casey (2015) found that those diagnosed with a mental illness, as well as mental health professionals, had higher mental health literacy than the general community. Likewise, mental health literacy is higher in members of the clergy than in the general community, and higher in woman than in men (Gorczynski et al., 2017; Vermaas, 2016). Despite these findings, it should be noted that knowledge of mental illnesses, including causes and treatment options, is severely lacking in all demographics (Farrer et al., 2008; Gorczynski et al., 2017; Jorm, 2012; Kessler et al., 2008; O'Connor & Casey, 2015; Vermaas, 2016; White & Casey, 2017).

Using vignettes, it has been discovered that in the U.S. there is a serious lack of ability to identify symptoms of illness or appropriate treatment options. Only three out of ten adults recognized a depressive disorder scenario as being "somewhat" or "very likely" to represent a mental illness (Link et al., 1999). In another study, 63% of adults were able to identify major depressive disorder, while only 33% were able to recognize schizophrenia (Farrer et al., 2008). Upon reading a major depressive disorder vignette less than 6% felt psychiatric medication could be useful as a treatment, 26% felt

counseling could be helpful, and 15% recommended a psychiatrist, with similar findings for schizophrenia.

Equally troubling was the recommendation for inappropriate treatments. Farrer et al. (2008) found that approximately 50% recommended vitamins, 45% thought alcohol would be a good treatment, and 30% felt sleeping pills would be a useful treatment for major depressive disorder. Additionally, upon reading a major depressive disorder vignette, over 85% of participants failed to recommend assessment for the risk of self-harm. Adolescents have also been shown to have deficits in mental health literacy similar to that found in adults (Kelly et al., 2007).

Consequences of Mental Health Illiteracy

Mental health literacy encompasses a range of knowledge and beliefs that are related to one's ability to recognize signs and symptoms of mental health issues and seek appropriate and effective self or professional help (Jorm, 2012). The first step to seeking help for a condition is the ability to recognize that a problem exists (Kelly et al., 2007). A major consequence of low mental health literacy is the delay in help-seeking that results in delayed treatment coupled with a reduced perception of the value of available treatment options (Kelly et al., 2007). Delays in help-seeking range from an average of 14 years for mood disorders, up to 18 years for substance abuse disorders, and 30 years for anxiety disorders (Jorm, 2012).

Those with reduced understanding of mental illness and treatment options have more negative views of psychiatric medications and tend to view psychiatric treatments

on par with other non-evidence-based treatments (Jorm, 2012). For example, adolescents and their parents tend to accept the myth that it is harmful to talk about suicide, a belief that can have devastating consequences when coupled with an adolescent's underdeveloped skillset and strategies for coping. Likewise, Jorm (2012) found that when presented with a major depressive disorder scenario, less than 15% recommended assessing the individual for risk of self-harm which can have disastrous consequences.

Less than 40% of people with a mental illness receive stable treatment, and over 40% fail to adhere to a treatment protocol (Corrigan, 2004). Those with symptoms of a depressive disorder who have a negative view of psychiatric medication are less likely to be prescribed medication, less likely to adhere to treatment once prescribed, and less likely to benefit from any treatment (Pyne et al., 2005). Failing to seek treatment or failing a treatment protocol has a direct effect on overall health and socio-economic outcomes. To prevent delays in treatment it is vital that individuals know how to recognize the signs and symptoms of mental illness, as well as to have an attitude or belief system that would promote seeking information about and recognition of mental health issues.

Mental Health Literacy and Mental Illness Stigma

Not only does mental health literacy impact the proportion of those who seek treatment, but is also impacts the cultural influences that drive mental health policy and healthcare structure (Corrigan, 2004; Link & Phelan, 1995). In comparison to having high mental health literacy, those with low knowledge of mental health issues are less

likely to be able to identify mental illness and more likely to attribute symptoms to weakness of personal character, which leads to inappropriate assumptions about the causes and treatment prospects for mental illness (Farrer et al., 2008). It has been shown repeatedly that the ability to recognize symptoms of mental illness is associated with increased help-seeking skills and improves the odds of early intervention (Jorm, 2012; Kelly et al., 2007; Kitchener & Jorm, 2008; Link et al., 1999; Pyne et al., 2005; Wang & Lai, 2008). Whereas, perceptions of shame and stigma, as well as low mental health literacy have shown to be strongly related to lack of help-seeking behavior when symptoms of mental illness arise (Rüsch, Evans-Lacko, Henderson, Flach, & Thornicroft, 2011).

Social, economic, and physical environment factors shape mental health. While social inequity increases the risk of mental illness, focusing attention solely on inequalities will fail to achieve a population level reduction in mental illness disease burden (World Health Organization, 2014). As demonstrated in the body of work conducted in Australia by Jorm and others, increases in population level mental health literacy translate into increased access to treatment, better adherence to treatment protocols, and overall improvements in the quality of life for those with mental illness (Jorm, 2012).

Measurement of Mental Health Literacy

Mental health literacy was first measured by Jorm et al. (1997), and to date there have been numerous measures created to measure various aspects of the concept. However, none incorporate all proposed components of the conceptual definition of

mental health literacy, and few have had formal evaluation of the psychometric properties (O'Connor, Casey, & Clough, 2014).

Vignette and Qualitative Instruments

Historically, the most common measure of mental health literacy is the vignette (Moll, Zanhour, Patten, Stuart, & MacDermid, 2017; O'Connor et al., 2014). The first vignette used to assess mental health literacy was developed by Jorm et al. (1997). A vignette is a written or orally delivered description of a person exhibiting symptoms that would meet Diagnostic and Statistical Manual (DSM) criteria for a psychological diagnosis. The most commonly used vignettes in research settings include scenarios of major depressive disorder and/or schizophrenia, and less commonly assessed issues such as suicide, anxiety, and post-traumatic stress disorder (Jorm, 2012; Moll et al., 2017; O'Connor et al., 2014). After being exposed to the vignette the individual is typically asked a series of questions assessing their understanding of the scenario, understanding of the mental illness being portrayed, and likelihood of interacting with someone displaying the described symptoms (Jorm et al., 1997).

Scale-Based and Quantitative Instruments

O’Connor, Casey, and Clough (2014) identified 197 separate instruments that purported to measure knowledge of some aspect of mental health. Ninety of the instruments measured a single condition, 46 provided insufficient evidence of psychometric properties, 45 could not be used to generate a total or scale score that could be compared across settings and populations, and three were determined not to measure

any aspect of mental health literacy. Of the remaining 13 instruments, four used vignettes and the remaining nine used:

> "multiple-choice questions (Compton, Hankerson-Dyson, & Broussard, 2011), Likert-response questions (Evans-Lacko et al., 2010; Wood & Wahl, 2006), dichotomous-response questions (Fritschi, Ajdacic-Gross, Lauber, Stulz, & Rössler, 2005; Furnham, Cook, Martin, & Batey, 2011; Swami, Persaud, & Furnham, 2011) and a combination of these methods (Fraser & Pakenham, 2008; Jordans, Luitel, Poudyal, Tol, & Komproe, 2012; Yeap & Low, 2009)" [(O'Connor et al., 2014) p. 201].

An additional systematic literature review using the Preferred Reporting Item for Systematic Review and Meta-Analysis (PRISMA) protocol identified over 100 studies using measures of various attributes of mental health literacy (Wei et al., 2016). Application of Consensus-based Standards for the selection of health Measurement Instruments (COSMIN) was utilized to arrive at sixteen scales meeting some level of reliability and validity standards. The COSMIN Checklist provides a standardized method for assessing the psychometric quality of a measurement instrument and includes criteria for:

1. Internal consistency
2. Reliability
3. Measurement error
4. Content validity
5. Structural validity

6. Hypothesis testing
7. Cross-cultural validity
8. Criterion validity
9. Responsiveness
10. Interpretability

Of the sixteen scales identified by Wei et al. (2016), nine were designed to measure knowledge of a specific mental health condition and provided no utility for measuring mental health literacy. The remaining seven scales measured general mental health knowledge and were determined to have fair to poor psychometric properties with only one scale, the Mental Health Literacy Scale, meeting six of the ten COSMIN criteria with fair to excellent quality ratings (Wei et al., 2016).

Issues in Measuring Mental Health Literacy

A quality measurement instrument requires consensus on the conceptual definition of mental health literacy as well as strong psychometric properties. At best, vignettes provide a labor intensive qualitative assessment of one's ability to recognize specific symptoms of conditions with no assessment of level of mental health literacy. Vignettes do not allow the creation of a total or scale score, the ability to compare across settings or populations, or the ability to assess various components of mental health literacy (O'Connor et al., 2014). Most vignettes are several sentences long and the readers level of understanding or reading comprehension directly effects their ability to

respond (O'Connor et al., 2014). Results based on vignettes also vary based on country and culture of the respondent (Jorm, 2012).

Additional measurement issues with vignettes include the nature of the questions used to assess reader understanding. Most vignettes are followed by a series of questions designed with a dichotomous set (i.e. 'yes'/'no' or 'true'/'false'), leaving issues with ceiling effects in educated samples and no room to assess sensitivity to change over time (Moll et al., 2017). Criterion validity is rarely assessed in vignette-based studies, leaving a gap in understanding how vignettes responses are related to current or future behavior. Thus, a major measurement issue is that vignettes lack cultural sensitivity, the wording of the vignettes effects the outcome of the study due to the subjective nature of the readers understanding, a lack of predictive value, and lack of utility in contribution to the evidence base (Jorm, 2012; Moll et al., 2017; O'Connor et al., 2014).

O'Connor et al. (2014) found that none of the existing scale-based mental health literacy instruments measured all seven domains of mental health literacy as defined by Jorm et al. (1997). Recognition of disorders was the domain most consistently measured, while none of the studies assessed knowledge of self-treatment or how to seek information. On the surface the studies by Fraser and Pakenham (2008) and Jordans et al. (2012) appeared to be studies of mental health literacy, yet they utilized instruments that failed to measure any of the seven domains of mental health literacy (O'Connor et al., 2014). Twelve of the instruments measured two or less of the domains of mental health literacy, while in contrast many of the instruments measured attributes in addition to those proposed by Jorm et al. (1997).

Additionally, most studies failed to produce sufficient evidence of reliability and validity of measurement, and failed to provide sufficient detail about sample characteristics and/or development of the tool (O'Connor et al., 2014). The lack of information and diverse scoring methodology across studies makes it difficult to compare findings across studies or to generalize across setting and populations. O'Connor et al. (2014) found that the Multiple Choice Knowledge of Mental Illness Test (Compton et al., 2011) was the most robust of the identified instruments, yet no attempt at a systematic assessment to determine if it measures the seven domains of mental health literacy has been conducted.

Valid and reliable instruments to assess mental health literacy are necessary to develop the evidence base for mental health literacy programming. There are many vignettes and measurement scales that purport to measure various aspects of mental health (or illness) literacy, but little to no formal examination of their psychometric properties has been carried out (Moll et al., 2017; O'Connor et al., 2014). It is vital for an instrument to have a demonstrated ability to consistently and accurately measure mental health literacy across populations and settings, yet no current quantitative instruments has been shown to meet this requirement (O'Connor et al., 2014).

Project Purpose

In this two-part analysis we sought to examine the extent to which the Mental Health Literacy Scale conforms to the theoretical definition of mental health literacy by examining the scale structure using factor analytic techniques. An item analysis using polytomous item response theory modeling was utilized to examine the extent to which

the items measure the latent trait of mental health literacy and discriminate between those who are literate about mental health issues and those who are not. Scale revision are discussed and using the newly proposed Revised-Mental Health Literacy Scale, we build on the work of Michaels and Corrigan (2013) by examining the extent to which stigmatizing attitudes toward mental illness can be predicted by mental health literacy while controlling for social desirability bias and other known predictors of stigma.

CHAPTER II: PSYCHOMETRIC PROPERTIES AND ITEM ANALYSIS OF THE MENTAL HEALTH LITERACY SCALE

In the United States, it is estimated that roughly one out of every five adults and children experienced a diagnosable mental illness in the past twelve months, and one in twenty-five experienced a serious mental illness such as schizophrenia, bipolar disorder, or major depressive disorder (Kessler et al., 2007; Kessler et al., 2008) This translates to an estimated 43 million Americans being impacted by mental illness each year. Serious mental illness is the leading cause of lost productivity in developed countries, and in the United States mental illness accounts for a massive loss of production capital and carries with it an enormous societal burden (Farrer et al., 2008; Kessler et al., 2008).

Mental illness is highly treatable, and early recognition and intervention lead to increased odds of improved long-term outcome (Kelly et al., 2007). However, due to personal, societal, and structural reasons, over 50% of people with mental illness fail to seek treatment leading to significant social, economic, and personal cost (Wei et al., 2016). There are long delays between the first presentation of symptoms of a mental illness and time to treatment. People often experience their first symptoms of mental illness at an age when their knowledge and skills are underdeveloped. Fifty percent of mental illness presents itself by the mid teenage years, while 75% of onset occurs by the mid 20's (Kessler et al., 2008).

The World Health Organization recognizes health literacy as a stronger predictor of health status than income, employment status, level of education, and race or ethnicity

(World Health Organization, 2014). Although health literacy has been demonstrated to be vital to maintaining good health, it does not incorporate components of mental health and well-being. With projected lifetime risk of developing a mental health disorder as high as 69%, it is equally vital that focus be placed on mental health literacy (Jorm et al., 1997; Kessler et al., 2007). The current approach to improving mental health literacy takes into account the agency of the patient in health decision-making and behavior, and focuses on improving population level knowledge of mental illness and treatment options (Jorm, 2012).

Mental health literacy is defined as knowledge, attitudes, and behaviors pertaining to mental health that facilitate one's ability to prevent, recognize, and manage mental health related issues (Jorm, 2012). The components of mental health literacy include the following:

1. The ability to recognize mental illness.
2. Knowledge of how to seek mental health information.
3. Knowledge of risk factors and causes of mental illness.
4. Knowledge of effective self-help.
5. Knowledge of professional treatment options.
6. Attitudes that promote recognition.
7. Attitudes that promote help-seeking.

According to Jorm (1997) mental health literacy encompasses a range of knowledge and beliefs that are correlated with one's ability to recognize signs and symptoms of mental

health issues and seek appropriate and effective self or professional help. To date no alternative definition has been proposed.

Mental health literacy was first measured by Jorm et al. (1997), and to date there have been numerous measures created to measure various aspects of the concept. However, none have incorporate all proposed attributes of the conceptual definition of mental health literacy, and few have had formal evaluation of the psychometric properties (O'Connor et al., 2014). O'Connor, Casey, and Clough (2014) identified 197 separate instruments that purported to measure knowledge of some aspect of mental health. Ninety of the instruments measured a single condition, 46 provided insufficient evidence of psychometric properties, 45 could not be used to generate total or scale score that could be compared across settings and populations, and three were determined not to measure any aspect of mental health literacy.

An additional systematic literature review using the Preferred Reporting Item for Systematic Review and Meta-Analysis (PRISMA) protocol identified over 100 studies using measures of various attributes of mental health literacy (Wei et al., 2016). Application of Consensus-based Standards for the selection of health Measurement Instruments (COSMIN) was utilized to arrive at sixteen scales meeting some level of reliability and validity standards. Of the sixteen scales identified by Wei et al. (2016), nine were designed to measure knowledge of a specific mental health condition and therefore provide no utility for measuring mental health literacy. The remaining seven scales measured general mental health knowledge and were determined to have fair to poor psychometric properties with only one scale, the Mental Health Literacy Scale,

meeting six of the ten COSMIN criteria with fair to excellent quality ratings (Wei et al., 2016).

The Mental Health Literacy Scale

O'Connor and Casey (2015) developed the first scale-based instrument (Mental Health Literacy Scale) to measure general mental health literacy grounded in mental health literacy theory. The Mental Health Literacy Scale was designed in consideration of the investment of time and funding in evaluation of mental health literacy interventions and intended to capture all attributes of mental health literacy.

Item development of the Mental Health Literacy Scale was guided by field experts using an iterative process to capture the following aspects of mental health literacy (a) the recognition of specific mental disorders; (b) ability to seek mental health information; (c) knowledge of mental illness risk factors and causes; (d) self-treatment knowledge; (e) professional help knowledge; (f) attitudes that promote mental illness recognition; and (g) attitudes that promote appropriate help-seeking behavior (O'Connor & Casey, 2015). The Mental Health Literacy Scale provides an alternative to the large number of scale and vignette based measures of mental health literacy that fail to measure attitudes related to mental health literacy, lack a coherent scoring system, are time consuming or cumbersome to administer, and based on limited psychometrics (O'Connor & Casey, 2015; O'Connor et al., 2014).

During scale development O'Connor and Casey (2015) consulted with experts in the field to create an operational definition for each attribute as defined by Jorm et al.

(1997). They developed items based on the operational definitions and administered a pilot study with 79 items. After psychometric analysis, a second pilot study was initiated with 51 items. The data from this study were used to assess the structure, reliability, and validity of the scale. The authors arrived at a scale with decent psychometric properties, which assesses six of the nine areas suggested by COSMIN standards, and six of the seven areas suggested by Jorm et al. (1997).

Psychometric Properties

O'Connor and Casey (2015) found that the final 35-item scale had strong test-retest reliability (.80), was positively correlated with a measure of help-seeking (.23), had low standard error (5.7), and met six of the ten components of the COSMIN criteria. It was also determined that the items of the scale had low average factor loading (.25) and met the criteria for unidimensional structure. Unfortunately, after the scale was reduced from 51 to 35 items it was never validated in a separate sample, so it is yet to be seen if psychometric results will hold across settings and samples.

Purpose of Current Study

Although research examining the Mental Health Literacy Scale in the framework of classical test theory (CTT) has shown that the scale has sound psychometric properties, to understand the underlying characteristics of mental health literacy it is important to understand how each item of the scale functions independent of scale and sample characteristics. Given the high stakes involved in using a funded public health approach to reduce the mental illness related disease burden, assessment of mental health literacy

programs necessitates availability of a psychometrically sound measure of mental health literacy grounded in mental health theory. Therefore, the goal of the current study is to examine the extent to which the Mental Health Literacy Scale conforms to the theoretical definition of mental health literacy by examining the extent to which the items measure the latent trait of mental health literacy and discriminate between those who are literate about mental health issues and those who are not.

Pitfalls of Classical Test Theory

Traditionally, the construction and refinement of psychological and health related measurement scales has been conducted using the properties and analyses of CTT (Lord & Novick, 1968). In CTT analyses the observed score is presumed to be a function of the individual's true score plus error in measurement. The assumptions of CTT are weak and easy to meet leading to reliability, standard error, and item difficulty estimates with numerous limitations (Embretson & Reise, 2000).

In CTT the characteristics of individual items are not closely examined leaving it impossible to analytically separate person ability and item difficulty (Hambleton, Swaminathan, & Rogers, 1991). Due to sample and test dependency, the properties of the measurement instrument and the individuals to which the items are administered influence the outcome of the analyses, resulting in scores that are unequally precise (Hambleton et al., 1991). The precision of the estimate varies by ability level and the results are not generalizable to a population that differs from the sample.

Principles of Item Response Theory

A major advantage of favoring item response theory (IRT) over CTT is dramatic improvement in the ability to produce accurate and efficient measurements of psychological and health related outcomes. In IRT, the single estimate of scale reliability (Cronbach's α), is replaced with a rich set of item and person parameters that are test and group invariant (Hambleton et al., 1991). Regardless of the population, IRT links the probability of an individual's response on a specific item to their level of the latent trait being measured. As an example, in CTT an individual's score on a test of their mental health literacy is a function of the difficulty of the items on the scale despite underlying knowledge of mental health issues remaining constant. While in IRT, item difficulty is factored into the scoring process resulting in an invariant estimate of an individual's knowledge of mental health issues.

Among its many other advantages, IRT has a limited number of strong assumptions, namely local independence and unidimensionality (Lord & Novick, 1968). Local independence is met when scale items are uncorrelated after controlling for the latent trait, and unidimensionality is met when a single latent trait determines item responses (Hambleton et al., 1991; Lord & Novick, 1968). According to Hambleton et al. (1991) unidimensionality is a difficulty assumption to meet due to testing and cognitive factors. IRT has been shown to be robust to violations of unidimensionality given a dominant first factor accounting for greater than 20% of the variance with relatively small secondary factors that are highly correlated (Drasgow & Parsons, 1983; swam, 1979; Reckase & McKinley, 1991).

Dichotomous item response theory models. In educational assessment dichotomous IRT models are frequently used for calibration of item responses, commonly the one, two, or three parameter logistic model (Hambleton et al., 1991). In the one-parameter logistic model the *b-parameter,* item difficulty, is an estimate of the latent trait at the .50 probability of a correct response, thus the probability of a correct response is a function of the level of the latent trait and item difficulty. This relationship is shown in the item response curve. where the probability of a correct response increases monotonically as the latent trait increases, as seen in Figure A1 (Hambleton et al., 1991).

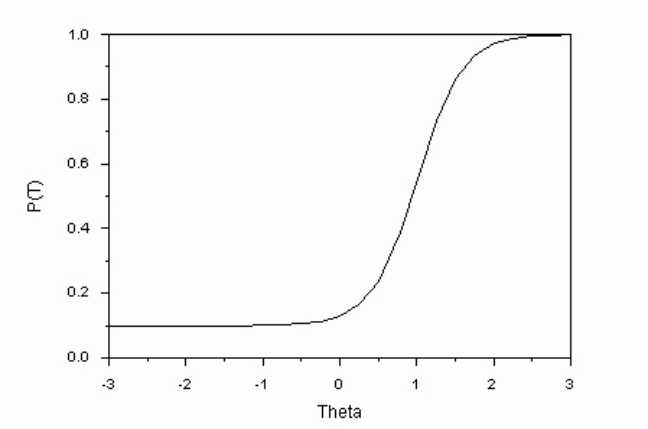


Figure A1. Example of an item characteristic curve where the .50 probability of a correct response is at θ = 1.0. This depicts that individuals at the upper end of the ability scale are more likely to generate correct responses for this item

In the one-parameter logistic model item discrimination is fixed and assumed not to vary. Whereas, in the two and three parameter logistic models item discrimination (*a-parameter*) is estimated in addition to item difficulty (Hambleton et al., 1991). Higher estimates for item discrimination translate to a steeper item information curve, where higher estimates represent items better able to discriminate between trait levels above and

below the point of inflection. The range of values suggested by Baker (2001) for interpreting item discrimination can be seen in Table A1.

Table A1
Interpretation of the discrimination parameter in the two and three-parameter logistic model

Interpretation	*a-parameter*
No Discrimination	.01 - .34
Low	.35 - .64
Moderate	.65 - 1.34
High	1.35 - 1.69
Very High	> 1.70
Perfect	$+\infty$

In three parameter logistic models, in addition to estimates of difficulty and discrimination, the *c-parameter* is added. The *c-parameter* is known as the pseudo chance guessing parameter and is an adjustment for the impact of guessing the correct response (Hambleton et al., 1991). The utility of the *c-parameter* in psychological and health research has been debated and could represent "faking good" or simple response error (Hays, Morales, & Reise, 2000).

Polytomous item response theory models. In contrast to educational research, social and behavioral research instruments are often scored using multiple-ordered response categories referred to polytomous scoring, such as 'strongly disagree' to 'strongly agree'. Polytomous IRT models provide for the item analysis of instruments with such polytomous scaling procedures. The probability of a correct response in dichotomous IRT models is replaced by a series of boundary location parameters that

describe the probability of reaching response category threshold (Embretson & Reise, 2000). Each of the polytomous IRT models described below approximates the corresponding dichotomous IRT model.

The Partial Credit Model is an extension of the one-parameter logistic model, where for polytomous items the categorical response function represents the threshold on the latent trait continuum where a response in a specified category is more likely than a response in a prior category (Masters, 1982). The Partial Credit Model makes no assumptions about the number of response categories and can be used with test items scored on differing scales. Its name is derived from assuming partial credit for the level of the latent trait required to cross each category threshold. In contrast, the Rasch Rating Scale Model is also an extension of the one-parameter logistic model and assumes ordered categorial responses with equal distance between category thresholds, with a single location parameter estimating average difficulty (Andrich, 1978).

Samejima's Graded Response Model is an extension of the two-parameter logistic model which generates estimates of the conditional probability of crossing a category threshold (Samejima, 1969). Each item has common slope and *k*-1 boundary locations where the goal is to determine the level of latent trait required to pass the boundary location threshold. One operational characteristic curve is generated for each between category threshold with an estimate of the level of latent trait required to reach a .50 probability of responding above the threshold (Embretson & Reise, 2000). A category response curve mapping the probability of response in each category is generated using the combined operational characteristics curves for each item, with the location and shape

of the function determined by item parameter estimates. In general, it is expected that the category response function for quality scale items will have high slope parameters resulting narrow and peaked curves in the center of two category thresholds (Embretson & Reise, 2000).

Methods

Participants

Upon approval of the Institutional Review Board, data were collected from 1200 participants recruited from the psychology research pool of a Southeastern University. When asked about gender, 59.6% of participants identified as women, 25.3% men, and 15.2% chose not to respond. Most participants (95.7%) were age 18 to 24 years old, 3.4% were age 25 to 34, and less than 1.0% were age 35 or older. Regarding race and ethnicity, 65.0% were Caucasian, 21.5% were Black or African American, 6.8% were Asian, and 6.7% were Native Alaskan, Hawaiian, Indian, or “Other Not Listed”, while 93.3% of participants indicated that they were not of Hispanic descent.

Most participants (78.0%) indicated that they did not hold a college major or minor in psychology, and 79.8% indicated that they were currently enrolled their first psychology course. Finally, 53.0% indicated that they or a close loved one had prior experience with a mental health professional such as a Social Worker, Psychologist, Psychiatrist, or Mental Health Counselor.

Materials

Demographics. Participants completed a demographics form requesting their age, gender, race, ethnicity, major, number of semesters enrolled in a psychology course, and experience with mental health professionals. Demographic questions can be seen in Appendix A.

Mental Health Literacy Scale. The Mental Health Literacy Scale (MHLS) (O'Connor & Casey, 2015) is a measure of one's ability to recognize mental health disorders, knowledge of causes and risk factors, knowledge of help-seeking information, knowledge of self and professional treatments, and attitudes toward help-seeking and promoting mental health. The MHLS is a 35-item scale with Likert type items scored on 4 and 5-point scale, with a possible point range of 35 to 160 where higher scores indicate increased mental health literacy. Questions 9 and 10 were modified by replacing "Australia" with "United States". The MHLS has strong internal consistency ($\alpha = .87$) with good test-retest reliability ($r = .79$) and is scored by summing the responses after reverse scoring 12 items. Items and scoring pattern of the MHLS can be seen in Appendix A.

Procedures

All data were collected online using the online survey utility, Qualtrics (Qualtrics, 2005). Upon obtaining informed consent, each participant was asked to complete: demographic information and the Mental Health Literacy Scale. Four decoy items instructing the participant to select a specified response were randomly placed throughout

the study to detect participant attentiveness. A list of decoy items can be seen in Appendix A.

Data Analysis

Data cleaning. Data were cleaned and validated based on a priori criteria. Items were reverse scored as necessary and scale scores were tabulated as previously outlined. Items and scale scores were assessed for patterns of missingness, normality, dimensionality, and outliers. Data from 354 participants were removed during the data cleaning process based on failure to correctly answer validity check items or failing to meet a priori criteria for minimum response for participation. The final sample for analysis included the remaining 846 participants.

Factor Analysis. Prior to conducting an item response analysis, the dimensionality of the Mental Health Literacy Scale was assessed. Factorability and sampling adequacy were assessed by an examination of the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test of Sphericity. The KMO assess suitability for factor analysis by providing a proportion of the variance across the included variables that can be accounted for by underlying factors, where values greater than .60 are desired (Tabachnick & Fidell, 2013).

Using data from a pilot analysis, an exploratory factor analysis was conducted to determine the factor structure of the Mental Health Literacy Scale. Based on eigenvalues greater than 1.4, an examination of the scree plot, and factor loadings, the unidimensional structure suggested by O'Connor and Casey (2015) was not supported and a five-factor

structure was retained (Smith & Miao, 1990). Using a separate sample, a confirmatory factor analysis (CFA) with maximum likelihood (ML) estimation (Jöreskog, 1969) was conducted with the expectation of a five-factor structure measuring *Knowledge of Disorders and Treatment, Confidence in Help-Seeking Ability, Attitudes Related to Enacted Stigma*, *Attitudes Related to Personal Stigma*, and, *Attitudes Related to Social Distance*. To determine dimensionality a combination of model fit indices was assessed.

Classical Test Theory. To assess internal consistency, coefficient alpha was calculated (Cronbach, 1951). Corrected item to total correlations were examined, as well as the expected value of alpha if the item was removed.

Item Response Theory. The associated items of each factor of the of the Mental Health Literacy Scale were analyzed using the principles of item response theory (IRT), under Samejima's graded response model (SGRM) (Samejima, 1969). Parameter estimates were generated using expected a posteriori (EAP) estimation (Uebersax, 1993). Prior research has indicated that measures of attitude and personality do not perform in a similar fashion as measures of cognitive ability under SGRM, and that model/data and model/item fit were best measured using the χ^2/df ratio rather than relying on chi-square values alone (Chernyshenko, Stark, Chan, Drasgow, & Williams, 2001). The overall model fit (χ^2/df ratio) was examined to determine the appropriateness of the SGRM model and was expected to be below 3.0 per the recommendations of Chernyshenko et al. (2001).

The test information function (TIF) and item information function (IIF) were examined, and due to the nature of the scale it was expected to indicate that unique

information was provided at a range of mental health literacy. It was also expected that quality items would provide unique information, and therefore discriminate well between various levels of mental health literacy. Category response functions were examined for each item to determine where the item functioned in terms of mental health literacy and how well the item discriminates across categories of responses. The associated boundary location parameters (*b-parameter*) is said to indicate the level of latent trait required to score at or above a categorical threshold, thus each item's categorical responses were examined to determine the point of overlap between each response category (Embretson & Reise, 2000). Quality items were expected to provide unique information at each level of response and therefore have distinct boundaries.

Although the *a-parameter* is not considered as a discrimination parameter in the graded response model, it is an indication of "how quickly the expected item scores changes as a function of trait level" [(Embretson & Reise, 2000)(p. 103)]. Therefore, items with higher *a-parameters* should have a category response function that is more narrow and tall, and when combined with the item information function provides a measure of the items ability to discriminate between levels of mental health literacy. It was expected that scoring in a higher category on an item would indicate an increased presence of mental health literacy. Additionally, items that discriminated well were expected to have tall and narrow category response functions and item information functions that indicated information was present at a range of mental health literacy.

Results

Exploratory Factor Analysis

Using IBM SPSS v23 an exploratory factor analysis (EFA) as well as Cronbach's alpha (α) were conducted to determine the structure and internal consistency of the Mental Health Literacy Scale using a pilot sample of 312 participants (M = 128.80, SD = 12.29). The internal consistency of the 35-item scale was α = .83, with corrected item to scale correlations ranging from r = .02 to r = .58. Corrected item to total correlations, expected value of coefficient alpha if the item was removed, and item level descriptive statistics can be seen in Table A2.

An EFA with maximum likelihood estimation and Promax rotation revealed that the KMO measure of sampling adequacy was .81 which is above the recommended cut-off of .60. Based on an examination of the eigenvalues, the scree plot of eigenvalues, and factor loading pattern, five factors accounting for 40.65% of the variance in mental health literacy were retained. Items 1, 3 and 9 through 12 were suggested for removal from further analysis based on estimated improvement in internal consistency and the factor loading pattern with a liberal cut-off of .32 (Tabachnick & Fidell, 2013) showing that the items did not load on any factor. The inter-factor correlations, loading patterns, and communalities can be seen in Tables A2 and A3.

Table A2

Item level descriptive statistics, item-total correlations, α if item removed, communalities, and factor loading pattern for the Mental Health Literacy Scale: Pilot N = 312

Item	*M*	*SD*	Corrected Item-Total Corr.	*α* If Removed	λ^2	ξ_1	ξ_2	ξ_3	ξ_4	ξ_5
1	3.20	0.67	.17	.83	.21	--	--	--	--	--
2	3.36	0.62	.33	.83	.33	.35				
3	3.14	0.77	.17	.83	.20	--	--	--	--	--
4	3.39	0.74	.33	.83	.26	.35				
5	3.11	0.71	.26	.83	.28	.34				
6	3.10	0.79	.23	.83	.27	.43				
7	3.74	0.53	.26	.83	.27	.47				
8	3.45	0.72	.26	.83	.24	.43				
9	2.87	0.80	.28	.84	.14	--	--	--	--	--
10	2.74	0.71	.02	.84	.13	--	--	--	--	--
11	3.28	0.77	.04	.84	.12	--	--	--	--	--
12	2.70	0.94	.23	.83	.22	--	--	--	--	--
13	3.16	0.63	.25	.83	.18	.33				
14	3.51	0.68	.33	.83	.34	.40				
15^R	3.31	0.82	.21	.83	.21			.35		
16	3.78	1.16	.35	.83	.42		.65			
17	4.11	1.09	.24	.83	.37		.59			
18	3.86	1.16	.20	.84	.25		.44			
19	4.24	0.95	.30	.83	.46		.80			
20^R	4.54	0.75	.41	.83	.40			.68		
21^R	4.46	0.91	.47	.83	.45			.71		
22^R	4.59	0.81	.42	.83	.48			.71		
23^R	3.62	1.06	.41	.83	.31					.42
24^R	4.59	0.81	.51	.83	.42				.33	
25^R	3.69	1.20	.24	.83	.43				.76	
26^R	4.51	0.94	.41	.83	.39				.41	
27^R	4.25	1.04	.19	.83	.40				.74	
28^R	4.42	0.91	.37	.83	.34				.47	
29	3.76	1.03	.50	.82	.49					.74
30	4.18	0.84	.57	.82	.53					.69
31	4.18	0.89	.55	.82	.58					.69
32	3.80	1.10	.58	.82	.66					.81
33	3.72	1.17	.48	.82	.51					.77
34	2.86	1.34	.43	.83	.44					.66
35	3.60	1.14	.51	.82	.50					.73

Note: β = Standardized Regression Weight λ^2 = Communality, ξ_1 = Knowledge of Disorder and Treatments, ξ_2 = Attitudes Related to Help-Seeking, ξ_3 = Attitudes Related to Enacted Stigma, ξ_4 = Attitudes Related to Personal Stigma, ξ_5 = Attitudes Related to Social Distance, R = Item was reverse scored, -- = item did not load on any factor at the .32 cut-off.

Table A3
Intercorrelation of the Mental Health Literacy Scale Factors: Pilot N = 312

Factor	ξ_1	ξ_2	ξ_3	ξ_4
ξ_2	.22			
ξ_3	.38	.21		
ξ_4	.06	.13	.29	
ξ_5	.29	.19	.51	.21

Note: ξ_1 = Knowledge of Disorder and Treatments, ξ_2 = Attitudes Related to Help-Seeking, ξ_3 = Attitudes Related to Enacted Stigma, ξ_4 = Attitudes Related to Personal Stigma, ξ_5 = Attitudes Related to Social Distance.

After removal of the poorly fitting items, the 29 items scale (*M* = 110.97, *SD* = 11.62) produced an internal consistency estimate of .84 with corrected item to scale correlations ranging from *r* = .19 to *r* = .60. An EFA with maximum likelihood estimation and Promax rotation revealed that the KMO measure of sampling adequacy was .83. Based on an examination of the eigenvalues, the scree plot, and factor loading pattern, five correlated factors accounting for 48.24% of the variance were produced with a dominant factor accounting for 20.81% of the variance. Item 15 failed to meet the factor loading cut-off of .32 but was retained to limit the effects of sample dependent data exploration. Inter-factor correlations, loading patterns, and communalities can be seen in Tables A4 and A5.

Table A4

Corrected item-total correlations, α if item removed, communalities, and factor loading pattern, for the 29-Item Mental Health Literacy Scale: Pilot N = 312

Item	Corrected Item-Total Corr.	*α* If Item Removed	λ^2	ξ_1	ξ_2	ξ_3	ξ_4	ξ_5
2	.31	.84	.29	.34				
4	.30	.84	.24	.34				
5	.25	.84	.25	.36				
6	.22	.84	.26	.48				
7	.24	.84	.24	.51				
8	.26	.84	.21	.46				
13	.23	.84	.17	.35				
14	.30	.84	.30	.46				
16	.34	.84	.40		.63			
17	.25	.84	.35		.59			
18	.21	.84	.24		.43			
19	.31	.84	.45		.80			
15^R	.19	.84	.17	--	--	--	--	--
20^R	.42	.84	.39			.68		
21^R	.48	.84	.44			.72		
22^R	.43	.84	.45			.73		
24^R	.51	.84	.40				.35	
25^R	.25	.84	.42				.74	
26^R	.42	.84	.38				.37	
27^R	.19	.85	.39				.75	
28^R	.38	.84	.33				.47	
23^R	.41	.84	.30					.41
29	.51	.83	.48					.74
30	.57	.83	.52					.68
31	.57	.83	.57					.67
32	.60	.83	.64					.80
33	.51	.83	.50					.77
34	.43	.84	.43					.67
35	.54	.83	.49					.73

Note: λ^2 = Communality**,** ξ_1 = Knowledge of Disorder and Treatments, ξ_2 = Attitudes Related to Help-Seeking, ξ_3 = Attitudes Related to Enacted Stigma, ξ_4 = Attitudes Related to Personal Stigma, ξ_5 = Attitudes Related to Social Distance, R = Item was reverse scored, -- = item did not load on any factor at the .32 cut-off.

Table A5
Intercorrelation of the 29-Item Mental Health Literacy Scale factors: Pilot N = 312

Factor	ξ_1	ξ_2	ξ_3	ξ_4
ξ_2	.19			
ξ_3	.44	.20		
ξ_4	.07	.14	.28	
ξ_5	.36	.24	.50	.19

Note: ξ_1 = Knowledge of Disorder and Treatments, ξ_2 = Attitudes Related to Help-Seeking, ξ_3 = Attitudes Related to Enacted Stigma, ξ_4 = Attitudes Related to Personal Stigma, ξ_5 = Attitudes Related to Social Distance.

Confirmatory Factor Analysis

With a new sample (N = 534), IBM SPSS AMOS v23 was used to model a five-factor solution with a higher-order factor of mental health literacy using the remaining 29 items of the Mental Health Literacy Scale (MHLS). The hypothesized model can be seen in Figure A2, with circles representing the structural model of latent constructs, squares representing the measured items of the MHLS, and lines connecting items to latent constructs indicating the assumption of a direct effect.

Support for the five-factor hypothesized model was indicated, χ^2 (372 N = 534) = 733.41, $p < .001$, χ^2/df *ratio* = 1.97, with the Comparative Fit Index (CFI) = .90, Tucker Lewis Index (TLI) = .89, and RMSEA = .04. Given the large sample size (N = 534), a significant χ^2 for model fit was expected. A good fit between the hypothesized model and observed data was indicated by the χ^2/df *ratio* below 2.0, and RMSEA below .05. Marginally good fit was indicated by CFI and TLI values around .90, with desired values above .95. Standardized regression weight representing the combined direct and indirect effects of mental health literacy and the associated factors on each item can be seen in Table A6, along with communalities and factor loadings.

Figure A2. Path diagram depicted the hypothesized factor structure of the Mental Health Literacy Scale. Large circles represent latent constructs, rectangles represent measured scale items, small circles represent error in measurement/estimation. KnowDis&Tx = Knowledge of Disorders and Treatments; HelpSeeking = Confidence in Help-Seeking Ability; EnactedStigma = Attitudes Related to Enacted Stigma; PersonalStigma = Attitudes Related to Personal Stigma; SocialDistance = Attitudes Related to Social Distance

Table A6

Item level and test level descriptive statistics, item-total correlations, and reliability for the 29-Item Mental Health Literacy Scale: N = 534

Item	*M*	*SD*	Corrected Item-Total Corr.	α If Removed	β	λ^2	ξ_1	ξ_2	ξ_3	ξ_4	ξ_5
MHL	111.43	11.43					.61	.33	.91	.60	.61
2	3.39	0.62	.30	.86	.61	.25	.50				
4	3.43	0.71	.29	.86	.33	.19	.44				
5	3.09	0.70	.23	.86	.94	.17	.41				
6	3.08	0.77	.22	.86	.60	.14	.37				
7	3.76	0.51	.22	.86	.61	.18	.42				
8	3.47	0.69	.20	.86	.50	.14	.38				
13	3.18	0.63	.21	.86	.44	.14	.38				
14	3.54	0.68	.30	.86	.41	.17	.42				
16	3.82	1.14	.33	.86	.37	.50		.71			
17	4.15	0.99	.26	.86	.42	.38		.62			
18	3.87	1.17	.21	.86	.38	.21		.46			
19	4.27	0.93	.34	.86	.38	.60		.77			
15^R	3.31	0.80	.18	.86	.42	.06			.24		
20^R	4.52	0.80	.43	.86	.71	.38			.61		
21^R	4.49	0.89	.47	.86	.62	.43			.66		
22^R	4.62	0.81	.44	.86	.46	.40			.63		
24^R	4.64	0.64	.49	.86	.77	.33				.57	
25^R	3.67	1.20	.21	.86	.24	.26				.51	
26^R	4.56	0.87	.43	.86	.61	.34				.58	
27^R	4.26	1.03	.22	.86	.66	.29				.54	
28^R	4.48	0.84	.41	.86	.63	.39				.63	
23^R	3.61	1.06	.40	.86	.57	.23					.48
29	3.72	1.07	.53	.85	.51	.50					.71
30	4.19	0.82	.56	.85	.58	.51					.71
31	4.20	0.86	.57	.85	.54	.49					.70
32	3.83	1.08	.58	.85	.63	.62					.79
33	3.77	1.17	.52	.85	.48	.48					.69
34	2.87	1.33	.45	.86	.71	.40					.64
35	3.64	1.12	.57	.85	.71	.51					.72

Note: β = Standardized Regression Weight λ^2 = Communality, ξ_1 = Knowledge of Disorder and Treatments, ξ_2 = Attitudes Related to Help-Seeking, ξ_3 = Attitudes Related to Enacted Stigma, ξ_4 = Attitudes Related to Personal Stigma, ξ_5 = Attitudes Related to Social Distance, R = Item was reverse scored.

CTT Results

The remaining 29 items of the Mental Health Literacy Scale (M = 111.43, SD = 11.43) produced an internal consistency of α = .86, while corrected item to total correlations ranged from r = .18 to r = .58, and communalities ranged from λ^2 = .06 to λ^2 = .62. As in the pilot study, item 15 had a corrected item-total correlation below the .20 cut-off suggested by Nunnally and Bernstein (1994), (r = .18; λ^2 = .06). Detailed results can be seen in Table A6.

IRT Results

Due to low endorsement of specific response categories of the remaining 29 items of the MHLS, responses were collapsed into adjacent categories prior to IRT analysis. Collapsing adjacent low response categories of polytomous IRT models is not expected to have a negative effect on the information provided by items (Lecointe, 1995). Responses on items that were previously scored on a 4-point scale were combined such that category 1 (*Very Unlikely* or *Very Unhelpful*) was collapsed into response category 2 (*Unlikely* or *Unhelpful*), resulting in a 3-point scale. Similarly, items that were previously scored on a 5-point scale were combined such that category 1 (*Strongly Disagree*) and category 3 (*Neither*) were collapsed into response category 2 (*Disagree*), also resulting in a 3-point scale.

Prior to IRT analysis the assumption of unidimensionality was tested using IBM SPSS v23. Five correlated factors (Table A7) with a single dominant factor accounting for 20.72% of the variance was found with the remaining minor dimensions each

accounting for less than 10% of the variance (4.69% to 8.56%). IRT parameter estimates have been shown to be robust to violations of unidimensionality when it can be demonstrated that the factors are correlated and a single dominant factor accounting for a minimum of 20% of the variance can be identified (Kirisci, Hsu, & Yu, 2001; Reckase, 1979). Therefore, a unidimensional structure was assumed for the remaining 29 items.

Table A7
Intercorrelation of the Revised-Mental Health Literacy Scale factors: N = 534

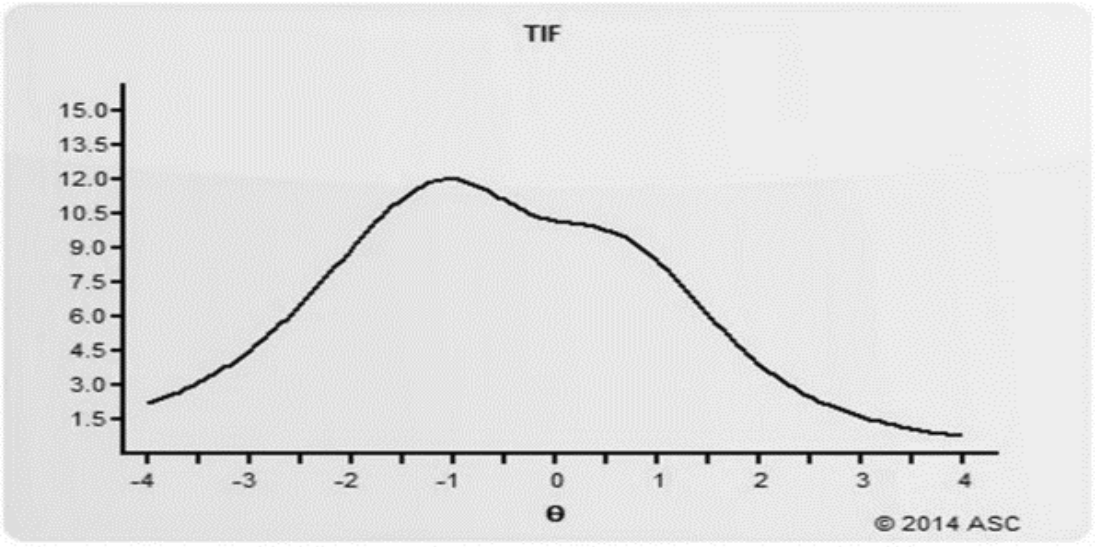
Factor	ξ_1	ξ_2	ξ_3	ξ_4
ξ_2	.30			
ξ_3	.41	.19		
ξ_4	.12	.21	.31	
ξ_5	.33	.16	.54	.21

Note: ξ_1 = Knowledge of Disorder and Treatments, ξ_2 = Attitudes Related to Help-Seeking, ξ_3 = Attitudes Related to Enacted Stigma, ξ_4 = Attitudes Related to Personal Stigma, ξ_5 = Attitudes Related to Social Distance.

Items were analyzed using Xcalibre v4.2 (Assessment Systems Corporation, 2014). IRT model fit was tested for Samejima's Graded Response Model (SGRM) and the Rasch Partial Credit Model (RPCM) to determine the best fitting model for the data. The overall fit of the RPCM was [χ^2 (812, N = 534) = 1340.24, p < .001; $\chi 2/df$ = 1.65], while the SGRM was [χ^2 (783, N = 534) = 891.72, p = .004; $\chi 2/df$ = 1.14], which indicated that the SGRM fit the data significantly better than the RPCM, ($\Delta\chi^2$ (29) = 448.52, p < .001). As revealed by the Test Information Function (Figure A3) and the distribution of theta estimates (Figure A4), the scale performed best at a theta range of -2.5 to 1.5 with maximum information (12.00) provided at θ = -1.05. The results indicated

that items performed moderately well at a range of the latent trait but provided the most information for those with low levels of literacy. Items 5, 6, and 28 were flagged for having low *a*-parameters.

For each item, the model fit, *a-parameter*, boundary locations (*b-parameter*), item information function (IIF), and category response function (CRF) were examined to determine if the item provided information across a range of the latent trait and discriminated between those with higher versus lower mental health literacy. Examples of an IIF and CRF from a poor item and moderately good item can be seen in Figures A5 and A6



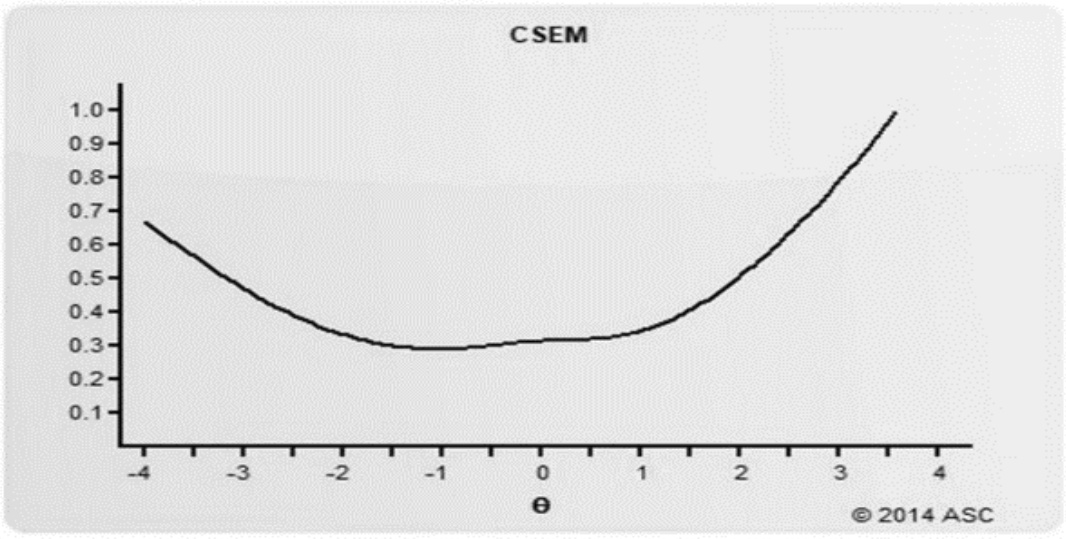


Figure A3. Test information function and standard error of measurement showing the rang of theta producing the most information

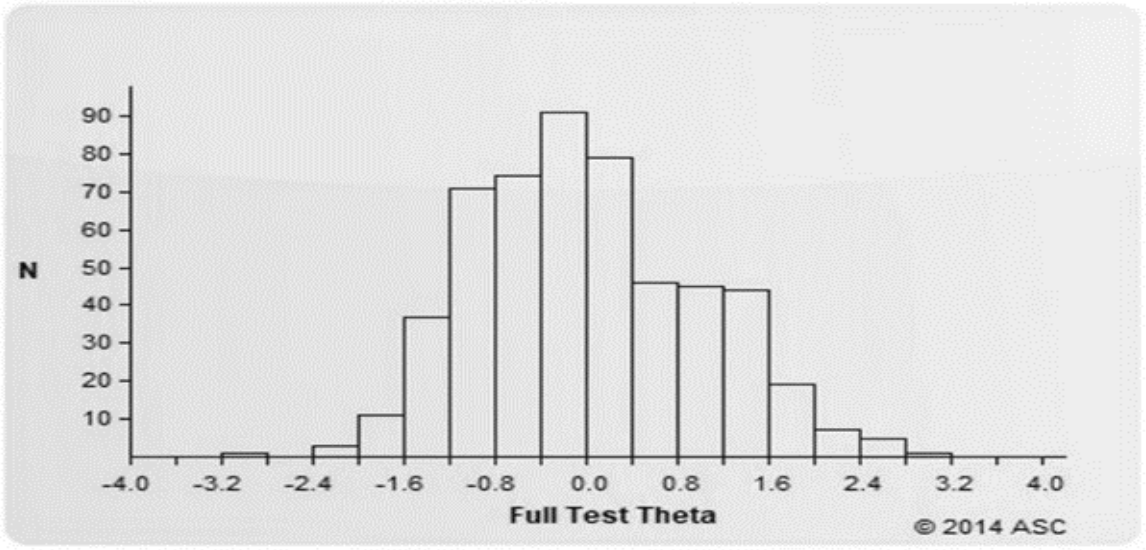


Figure A4. Sampling distribution for observed theta estimates

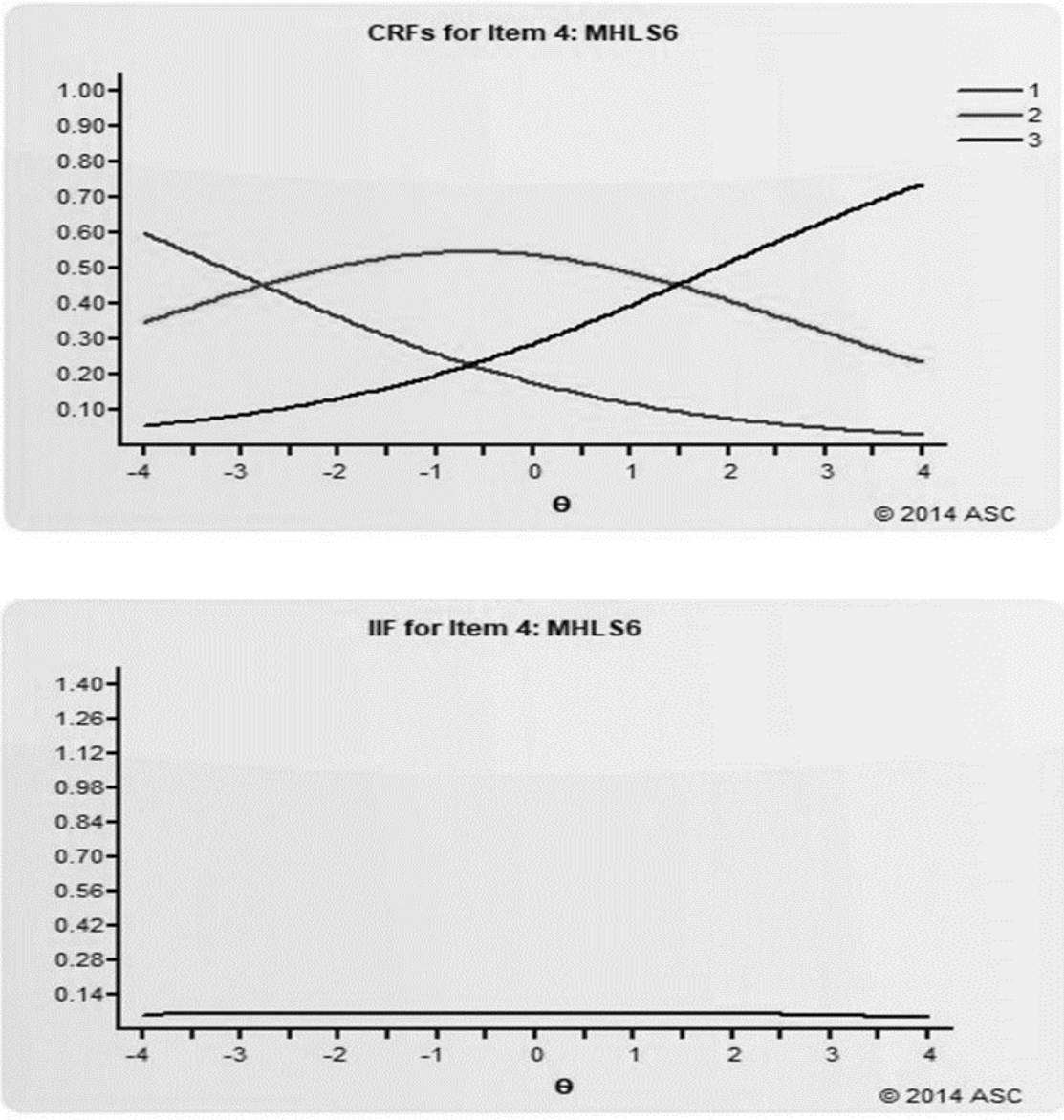
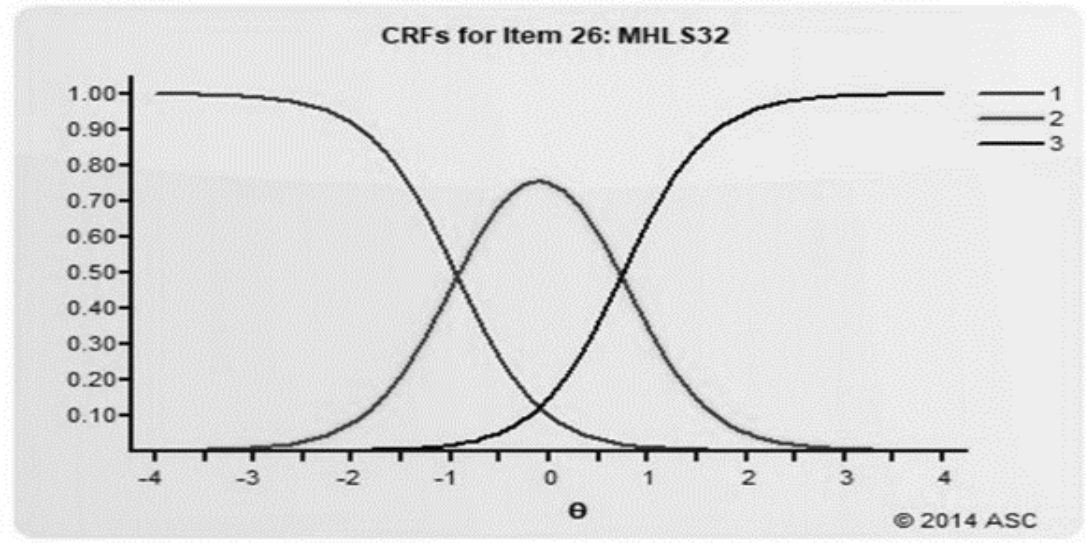


Figure A5. Category response function for poorly performing item 6 of the Mental Health Literacy Scale, with low flat overlapping categories that indicate poorly defined boundary locations, and the associated low flat item information curve indicating little information is provided at any level of the latent trait



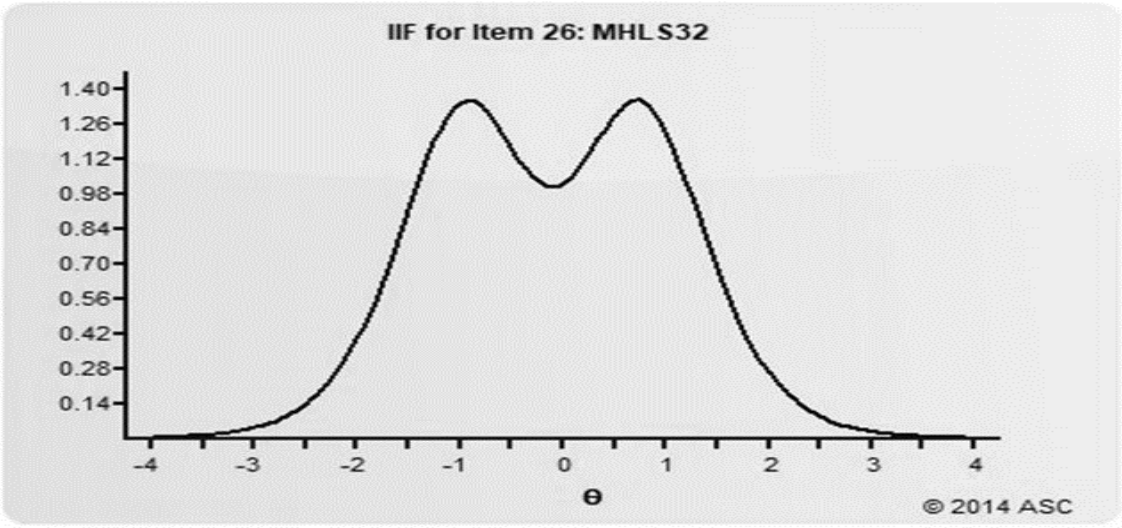


Figure A6. Category response function for moderately well performing item 32 of the Mental Health Literacy Scale, with mildly overlapping categories that indicate defined boundary locations, and the associated item information curve indicating information is provided at of -2.0 to 1.5 on the latent trait scale

Based on an *a-parameter* below 0.35, low flat item information function, and flat overlapping curves in the category response function, items 4, 5, 6, 8, 13, 16, 19, 26, and 28 provided no information at any level of theta, and no ability to discriminate between those who choose high versus low response categories and were candidates for removal. Items 2, 7, 14, 15, 17, 18, and 23 produced *a-parameters* in the 0.35 and 0.64 range, with low information in the -4.0 to 1.0 theta range, and slightly raised overlapping curves in the category response function indicating a low amount of information was provided at low end of the latent trait scale, and low ability to discriminate. Finally, items 20, 21, 22, 24, 25, 27, and 29 through 35 produced *a*-parameters in the 0.65 to 1.34 range, category response function with distinct peaked curves, and each produced information at a theta range of -3.5 to 2.0. The totality of the evidence suggests that these 12 items provide information at a range of the latent trait and discriminate moderately well between those who select low versus high response categories. Details of the model fit indices and item parameters can be seen in Table A8.

Table A8
Item fit indices, a-parameter, and boundary location parameters for the Revised-Mental Health Literacy Scale

Item	X^2/df	*a-parameter*	*b1*	*b2*	Θ for IIF	Level of Information
2	0.87	0.39 (0.34)	-4.22 (0.26)	0.28 (0.13)	-4.0 – 1.5	low
4	1.08	0.33 (0.04)	-4.19 (0.25)	-0.32 (0.15)	-4.0 – 0.0	very low
5	0.82	0.30 (0.03)	-3.07 (0.22)	1.91 (0.19)	-.- – -.-	none
6	0.61	0.29 (0.03)	-3.17 (0.22)	1.88 (0.19)	-.- – -.-	none
7	1.06	0.38 (0.04)	-5.90 (0.40)	-2.19 (0.16)	-4.0 – 0.5	low
8	1.29	0.33 (0.04)	-4.23 (0.25)	-0.62 (0.15)	-4.0 – 0.5	very low
13	0.86	0.31 (0.03)	-4.13 (0.26)	1.72 (0.18)	-.- – -.-	none
14	1.21	0.45 (0.05)	-3.82 (0.23)	-0.77 (0.12)	-4.0 – 1.0	low
16	1.04	0.30 (0.03)	-3.52 (0.22)	0.00 (0.16)	-3.0 – 0.0	very low
17	0.82	0.40 (0.04)	-1.87 (0.15)	1.37 (0.14)	-3.0 – 2.5	low
18	2.11	0.41 (0.04)	-2.94 (0.18)	0.49 (0.13)	-4.0 – 2.0	low
19	1.38	0.31 (0.03)	-2.48 (0.19)	1.19 (0.17)	-2.5 – 1.0	very low
15^R	0.86	0.47 (0.05)	-3.00 (0.18)	0.13 (0.11)	-4.0 – 2.0	low
20^R	1.23	0.89 (0.09)	-2.09 (0.11)	-0.62 (0.07)	-3.0 – 0.5	moderate
21^R	0.74	0.92 (0.10)	-1.90 (0.09)	-0.73 (0.06)	-3.0 – 0.5	moderate
22^R	1.17	1.00 (0.11)	-2.08 (0.10)	-1.03 (0.06)	-3.0 – 0.0	moderate
24^R	0.76	0.66 (0.06)	-1.04 (0.09)	1.85 (0.12)	-2.0 – 3.0	moderate
25^R	1.01	1.01 (0.11)	-2.40 (0.13)	-0.78 (0.06)	-3.0 – 0.5	high
26^R	1.20	0.31 (0.03)	-1.88 (0.18)	2.20 (0.18)	-2.0 – 2.5	very low
27^R	1.08	0.83 (0.09)	-2.19 (0.11)	-0.98 (0.07)	-2.0 – 0.5	moderate
28^R	1.23	0.30 (0.03)	-3.73 (0.23)	-0.32 (0.16)	-3.0 – 0.5	very low
23^R	1.43	0.60 (0.06)	-2.80 (0.16)	-0.57 (0.09)	-3.0 – 0.5	moderate
29	1.63	1.19 (0.12)	-0.92 (0.06)	1.10 (0.07)	-2.0 – 2.0	high
30	1.53	1.29 (0.13)	-1.60 (0.08)	0.38 (0.06)	-2.5 – 1.5	high
31	1.48	1.26 (0.12)	-1.57 (0.08)	0.28 (0.05)	-2.5 – 1.0	high
32	1.28	1.36 (0.13)	-0.95 (0.06)	0.75 (0.06)	-2.0 – 2.0	high
33	1.20	1.11 (0.11)	-0.93 (0.06)	0.74 (0.06)	-2.0 – 1.5	high
34	0.94	0.90 (0.09)	0.14 (0.07)	1.96 (0.10)	-1.0 – 3.0	high
35	1.13	1.17 (0.11)	-0.85 (0.06)	1.20 (0.07)	-2.0 – 2.0	high

Note: *b* = boundary location estimate, R = Item was reverse scored.

Discussion

Globally, for those age 18 to 29 mental illness is a leading cause of disease burden, with depressive disorders being the leading cause of years lived with a disability (Vigo et al., 2016; Wei et al., 2016; World Health Organization, 2014). In the United States roughly 20% of the population will experience a mental illness each year, and it is widely accepted that about 75% of the onset of occurs by age 25 (Kessler et al., 2007; Kessler et al., 2008; Parks et al., 2006). The high prevalence of mental illness exerts a large societal burden due to loss of productivity, health care expenditure, and direct or indirect premature loss of life (Parks et al., 2006).

Mental illness is highly treatable and early intervention helps to mitigate the individual and societal consequences of illness, yet less than 50% of those with a diagnosable illness choose to seek treatment (Reavley et al., 2014). Understanding barriers to help-seeking requires a social ecological approach and an examination of the complex system in which individuals are embedded (Bronfenbrenner, 1979, 2005; Link & Phelan, 1995; McLeroy et al., 1988). The World Health Organization recognizes health literacy as a social determinant of health with stronger predictive power than income, employment status, level of education, and race or ethnicity (World Health Organization, 2014). Health literacy is a key determinant shown to improve health outcomes at the individual and population level (World Health Organization, 2013). As a component of health literacy, it follows that mental health literacy could be expected to have a similar impact on mental health outcomes.

Mental health literacy has been defined as knowledge, attitudes, and behaviors pertaining to mental health that facilitate one's ability to prevent, recognize, and manage mental health related issues (Jorm et al., 1997). As such, mental health literacy is expected to be related to one's ability to recognize signs and symptoms of mental health issues and seek appropriate and effective self or professional help. Efforts to improve mental health literacy at the individual and population level have been ongoing for over 20 years, yet little is known about the psychometric properties of the evaluation tools used in mental health literacy programming (Jorm, 2012; Jorm et al., 1997; O'Connor et al., 2014). The Mental Health Literacy Scale was created in consideration of the theoretical definition of mental health literacy using a psychometrically sound process of scale development (O'Connor & Casey, 2015). However, the final 35-item scale was not validated in a new sample, nor was an item level analysis conducted.

The current study used a combination of classical test theory and item response theory analyses to determine the extent to which the Mental Health Literacy Scale aligned with the theoretical definition of mental health literacy, measured the latent trait of mental health literacy, and discriminated between those who have a high versus low literacy. Although internal consistency was high, it was not clear that the scale measured all components of mental health literacy as defined by Jorm et al. (1997). Through exploratory and confirmatory factor analysis a five-factor pattern was discovered that assessed knowledge of disorders and treatment, attitudes toward help-seeking, and various aspect of stigma including personal, enacted, and social distance. Six knowledge

items failed to load on any factor, produced low communalities, and low corrected item-total correlations.

Upon removal of the weak items, an item analysis was conducted using item response theory through Samejima's Graded Response Model. Low *a-parameters* in conjunction with low flat item information functions, and flat overlapping category response functions revealed an additional nine items produced little to no information with poor ability to discriminate. The remaining 20 items measuring knowledge, help-seeking, and stigma toward mental illness produced well defined category response functions with narrow peaked curves and defined boundary locations, but only moderate ability to discriminate based on the value of the *a-parameter* and shape of the item information function. Potential for a ceiling effect was indicated by most respondents selecting high response categories. This is of concern in a college age sample that would be expected to score low on a measure of mental health literacy (Farrer et al., 2008; Jorm, 2012).

Despite many attempts, mental health literacy has proven to be a difficult concept to operationalize. Although the Mental Health Literacy Scale was developed with great care and input from mental health experts, the items do not load in a pattern in line with the theoretical definition and fail to produce item parameter estimates indicating strong ability to detect and discriminate among those with or without mental health literacy. Most of the items appearing to measure stigma produced moderate to strong parameters estimates, while nearly all items measuring knowledge of disorders and treatments need heavy revision. Given the potential for great benefit from increasing individual and

population level mental health literacy, it is vital to continue to refine the tools used to evaluate public health programming.

Although item response theory item parameter estimates are sample invariant, the property only holds when the data fit the model well, and the sample is drawn from the population of interest. A limitation of the current study is the use of a convenience sample from a university setting. Given the invariant properties of item response theory, the current findings are expected to hold across all samples of relatively educated college age individuals, but further testing is needed to determine if the parameter estimates vary in the general population. This would be of importance when considering a measurement tool for use in public health program evaluation at the population level.

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APPENDIX A: SURVEY ITEMS

Demographics

1. What is your age group?
2. Do you consider yourself Hispanic/Latino?
3. What is your gender identity?
4. Which of the following best describes your race? (more than one choice is acceptable)
5. Do you currently have a major or minor in Psychology?
6. Is this semester the first semester in which you have taken a psychology course?
7. Have you or a close loved one had experience with mental health professional (including social worker, psychologist, psychiatrist, counselor)?

Mental Health Literacy Scale

The purpose of these questions is to gain an understanding of your knowledge of various aspects to do with mental health. When responding, we are interested in your degree of knowledge.

1. If someone became extremely nervous or anxious in one or more situations with other people (e.g., a party) or performance situations (e.g., presenting at a meeting) in which they were afraid of being evaluated by others and that they would act in a way that was humiliating or feel embarrassed, then to what extent do you think it is likely they have **Social Phobia**

2. If someone experienced excessive worry about a number of events or activities where this level of concern was not warranted, had difficulty controlling this worry and had physical symptoms such as having tense muscles and feeling fatigued then to what extent do you think it is likely they have **Generalized Anxiety Disorder**

3. If someone experienced a low mood for two or more weeks, had a loss of pleasure or interest in their normal activities and experienced changes in their appetite and sleep then to what extent do you think it is likely they have **Major Depressive Disorder**

4. To what extent do you think it is likely that **Personality Disorders** are a category of mental illness

5. To what extent do you think it is likely that **Dysthymia** is a disorder

6. To what extent do you think it is likely that the diagnosis of **Agoraphobia** includes anxiety about situations where escape may be difficult or embarrassing

7. To what extent do you think it is likely that the diagnosis of **Bipolar Disorder** includes experiencing periods of elevated (i.e., high) and periods of depressed (i.e., low) mood

8. To what extent do you think it is likely that the diagnosis of **Drug Dependence** includes physical and psychological tolerance of the drug (i.e., require more of the drug to get the same effect)

9. To what extent do you think it is likely that in general in the United States, **women are MORE likely to experience a mental illness of any kind compared to men**

10. To what extent do you think it is likely that in general, in the United States**, men are MORE likely to experience an anxiety disorder compared to women**

11. To what extent do you think it would be helpful for someone to **improve their quality of sleep** if they were having difficulties managing their emotions (e.g., becoming very anxious or depressed)

12. To what extent do you think it would be helpful for someone to **avoid all activities or situations that made them feel anxious** if they were having difficulties managing their emotions

13. To what extent do you think it is likely that **Cognitive Behaviour Therapy (CBT)** is a therapy based on challenging negative thoughts and increasing helpful behaviours

14. Mental health professionals are bound by confidentiality; However, there are certain conditions under which this does not apply. To what extent do you think it is likely that the following is a condition that would allow a mental health professional to **break confidentiality**:
    If you are at immediate risk of harm to yourself or others

15. Mental health professionals are bound by confidentiality; However, there are certain conditions under which this does not apply. To what extent do you think it is likely that the following is a condition that would allow a mental health professional to **break confidentiality**:
    if your problem is not life-threatening and they want to assist others to better support you

    Please indicate to what extent you agree with the following statements:

16. I am confident that I know where to seek information about mental illness.

17. I am confident using the computer or telephone to seek information about mental illness

18. I am confident attending face to face appointments to seek information about mental illness (e.g., seeing the GP)

19. I am confident I have access to resources (e.g., GP, internet, friends) that I can use to seek information about mental illness

20. People with a mental illness could snap out if it if they wanted

21. A mental illness is a sign of personal weakness

22. A mental illness is not a real medical illness

23. People with a mental illness are dangerous

24. It is best to avoid people with a mental illness so that you don't develop this problem

25. If I had a mental illness I would not tell anyone

26. Seeing a mental health professional means you are not strong enough to manage your own difficulties

27. If I had a mental illness, I would not seek help from a mental health professional

28. I believe treatment for a mental illness, provided by a mental health professional, would not be effective

29. How willing would you be to move next door to someone with a mental illness

30. How willing would you be to spend and evening socializing with someone with a mental illness

31. How willing would you be to make friends with someone with a mental illness

32. How willing would you be to have someone with a mental illness start working closely with you on a job

33. How willing would you be to have someone with a mental illness marry into your family

34. How willing would you be to vote for a politician if you knew they had suffered a mental illness

35. How willing would you be to employ someone if you knew they had a mental illness

Decoy Validation Item

1. Those who are reading this select agree and keep going.
2. Select 3 (Applied to me very much or most of the time) if you are paying attention.
3. Select 0 (Did not apply to me) if you are reading this.
4. People who are paying attention will check strongly agree to this question.

* *Note*: Each item designed to blend in with the survey items in which it was embedded.

CHAPTER III: THE RELATIONSHIP BETWEEN MENTAL HEALTH LITERACY AND STIGMA TOWARD MENTAL ILLNESS

Mental illness is the leading cause of global disease burden for those age 18 to 29 and accounts for over 30% of years lived with disability and over 10% of years of life lost due to illness, disability, or death (Vigo et al., 2016; Wei et al., 2016). Specifically, depression is the leading cause of years lived with disability for women and the second leading cause for men, and accounts for 30% of disability adjusted life years (DALYs) attributed to mental illness (World Health Organization, 2014). In the United States, it is estimated that roughly one out of every five regardless of age experienced a diagnosable mental illness in the past twelve months. While one in twenty-five experienced a serious mental illness such as schizophrenia, bipolar disorder, or major depressive disorder (Kessler et al., 2007; Kessler et al., 2008) This translates to an estimated 43 million Americans being impacted by mental illness each year.

Mental illness is highly treatable and early recognition and intervention lead to increased odds of improved long-term outcome (Kelly et al., 2007). However, due to individual, societal, and structural reasons, a larger percentage of people with mental illness fail to seek treatment, and failure to seek treatment results in significant social, economic, and personal cost (Wei et al., 2016).

The individual burden of mental illness is high. Those with serious mental illness die an average of 25 years younger than the general population, due to modifiable risk factors and suicide (Parks et al., 2006). Suicide is a leading cause of death in all age

groups in the United States, approximates the death rate due to breast cancer, and is three times the national homicide rate (Insel, 2015). Compared to people without mental illness, those with mental illness are less likely to be employed, more likely to have low quality employment, interact with the criminal justice system, live in substandard housing, and at increased risk for all causes of early mortality (Corrigan, 2004; Kessler et al., 2008; Wei et al., 2016; World Health Organization, 2014). The economic burden of mental illness is equally troubling, and it is higher than the combined cost of cancer, diabetes, and respiratory illness (Insel, 2015; Kessler et al., 2008). When accounting for mental health care expenditure, combined with the cost of lost productivity and disability, it was estimated in 2012 that the financial cost of mental illness accounted for $467B in the United States (Insel, 2015).

Mental Health Literacy

There are long delays between the first presentation of symptoms of a mental illness and time to treatment. People often experience their first symptoms of mental illness at an age when their knowledge and skills are underdeveloped. Fifty percent of mental illness presents itself by the mid teenage years, while 75% of onset occurs by the mid 20's (Kessler et al., 2008). With projected lifetime risk of developing a mental health disorder as high as 69%, it is vital that focus be placed on mental health literacy (Jorm et al., 1997; Kessler et al., 2007).

Mental health literacy is defined as knowledge, attitudes, and behaviors pertaining to mental health that facilitate one's ability to prevent, recognize, and manage mental health related issues (Jorm, 2012). The components of mental health literacy include: the

ability to recognize mental illness; knowledge of how to seek information on risk factors, causes, symptoms, self-help and professional treatment options; and attitudes that promote recognition and help-seeking (Jorm et al., 1997). In the 1990's the focus of mental health literacy training was placed on expanding the ability of healthcare professionals to identify mental illness in their practice. This top-down approach to prevention places a high burden on health professionals and ignores the agency of the patient in health decision-making and behavior, which led to a shift in focus to improving population level knowledge of mental illness and treatment options in the 2000's (Jorm, 2012).

The first step to seeking help for a condition is the ability to recognize that a problem exists (Kelly et al., 2007). A major consequence of low mental health literacy is the delay in help-seeking that results in delayed treatment coupled with a reduced perception of the value of available treatment options (Kelly et al., 2007). Delays in help-seeking range from an average of 14 years for mood disorders, up to 18 years for substance abuse disorders, and 30 years for anxiety disorders (Jorm, 2012).

Those with reduced understanding of mental illness and treatment options have more negative views of psychiatric medications and tend to view psychiatric treatments on par with other non-evidence-based treatments (Jorm, 2012). Additionally, those with symptoms of depression who have a negative view of psychiatric medication are less likely to be prescribed medication, less likely to adhere to treatment once prescribed, and less likely to benefit from any treatment (Pyne et al., 2005). Failing to seek treatment or failing a treatment protocol has a direct effect on overall health and socio-economic

outcomes. To prevent delays in treatment, it is vital that one know how to recognize the signs and symptoms of mental illness, as well as have an attitude or belief system that would promote seeking information about and recognition of mental health issues.

Mental Illness Stigma

Mental health literacy impacts the proportion of those who seek treatment, and impacts the cultural influences that drive mental health policy and healthcare structure (Corrigan, 2004; Link & Phelan, 1995). Adults with reduced mental health literacy are less likely to be able to identify mental illness and more likely to attribute symptoms to weakness of personal character, which leads to inappropriate assumptions about the causes and treatment prospects for mental illness (Farrer et al., 2008). The general lack of knowledge surrounding mental illness results in a high burden of stigma associated with being diagnosed with a mental illness. People labeled as mentally ill are more harshly stigmatized than those with any other health condition regardless of level of disability (Corrigan, 2004).

Stigma has a profound and powerful influence on the life of a person with mental illness, and the consequences are dire (Wang & Lai, 2008). This is in part due to the internalized shame associated with self-stigma, but in larger part due the influence of enacted stigma intertwined in social structure (Corrigan, 2004). The pervasive stigma and discrimination embodied in social structure leads to mental illness often being neglected by policy makers, which affects healthcare structure and policy such that those with mental illness receive fewer medical services and health insurance benefits than

those without mental illness for similar physical health ailments (Corrigan, 2004; Henderson et al., 2014). Despite the enormous economic burden of mental illness in the United States, less than 10% of healthcare spending is dedicated to treating mental illness (Kessler et al., 2008).

The combined effects on health care, employment, and housing policy interacts with the increased prevalence of chronic disease among those with mental illness resulting in a dramatic decrease in life expectancy largely due to modifiable risk factors (Corrigan, 2004; Parks et al., 2006). Yet, the attitudes that lead to such discriminatory policies and behavior are notoriously hard to measure due to social desirability bias, defined as an individual's tendency to respond in line with social norms rather than reporting their true feelings (Michaels & Corrigan, 2013).

Purpose of Current Study

Given the high personal and societal burden of mental illness in the United States, and the demonstrated association between stigma, policy, and help-seeking, it is important to determine the public health impact of using mental health literacy programming to reduce the stigma associated burden of illness. Using the newly proposed Revised-Mental Health Literacy Scale, the current study builds on the work of Michaels and Corrigan (2013) by examining the extent to which stigmatizing attitudes toward mental illness can be predicted by mental health literacy while controlling for social desirability bias.

Methods

Participants

Upon approval of the Institutional Review Board, data were collected from 534 participants recruited from the psychology research pool of a Southeastern University. When asked about gender, 59.6% of participants identified as female, 25.3% male, and 15.2% chose not to respond. Most participants (95.7%) were age 18 to 24 years old, 3.4% were age 25 to 34, and less than 1.0% were age 35 or older. Regarding race and ethnicity, 65.0% were Caucasian, 21.5% were Black or African American, 6.8% were Asian, and 6.7% were Native Alaskan, Hawaiian, Indian, or "Other Not Listed", while 93.3% of participants indicated that they were not of Hispanic descent.

Most participants (78.0%) indicated that they did not hold a college major or minor in psychology, and 79.8% indicated that they were currently enrolled their first psychology course. Finally, 53.0% indicated that they or a close loved one had prior experience with a mental health professional such as a Social Worker, Psychologist, Psychiatrist, or Mental Health Counselor.

Materials

Demographics. Participants completed a demographics form requesting their age, gender, race, ethnicity, major, number of semesters enrolled in a psychology course, and experience with mental health professionals. Demographic questions can be seen in Appendix B.

Perceived Devaluation Discrimination Scale. The Perceived Devaluation Discrimination Scale [PDDS] (Link, 1982; Link, Wells, Phelan, & Yang, 2015) is a measure of the extent to which individuals believe most people will devalue or discriminate against those with a mental illness. Each of the 12 items were scored on a four-point scale from "Strongly disagree" (0) to "Strongly agree" (3), where higher scores indicate an increased perception of stigma toward mental illness. The scale is scored by reverse scoring six items and summing the scores. The PDDS has been widely used and has been demonstrated to have strong psychometric properties ($\alpha = .80$). Items and scoring pattern of the PDDS can be seen in Appendix B.

Knowledge Test of Mental Illness. The Knowledge Test of Mental Illness [KTMI] (Michaels & Corrigan, 2013) is a faux knowledge test that uses Error-Choice methodology to reduce socially desirable responding to assess stigmatizing attitudes towards mental illness. Error-Choice tests require participants to select from a set of response choices with no particular "correct" answer where the response set is distributed on a continuum of empirically based information (e.g. What percentage of people with serious mental illness is considered dangerous in their lifetime? "3%" or "15%") (Antonak & Livneh, 1995a, 1995b; Clarke & Crewe, 2000; Hammond, 1948). The KTMI is a 14-item scale that appears to measure knowledge of symptoms, etiology, prognosis, treatment, epidemiology, and interpersonal issues related to mental illness. The KTMI is scored by summing one point for each stigmatizing response and zero for each non-stigmatizing response, where higher scores indicate stronger attitudes of prejudice. The KTMI has been demonstrated to have strong construct validity, positive

intercorrelations with other measures of public stigma, acceptable internal consistency ranging from α = .58 to α = .70 depending on sample characteristics, and good test-retest reliability (*r* = .70). Items and scoring pattern of the KTMI can be seen in Appendix B.

Revised-Mental Health Literacy Scale. The Revised-Mental Health Literacy Scale (R-MHLS) (Bowman, Weatherby, Kim, Owusu, & Hamilton, 2017) is a measure of one's ability to recognize mental health disorders, knowledge of causes and risk factors, knowledge of help-seeking information, knowledge of self and professional treatments, and attitudes toward help-seeking and promoting mental health. The R-MHLS is a 20-item scale with items scored on a 4-point scale with a range of 20 to 80 where higher scores indicate increased mental health literacy. The R-MHLS has strong internal consistency (α = .84) and is scored by summing the responses after reverse scoring 8 items. Items and scoring pattern of the R-MHLS can be seen in Appendix B.

Procedure

All data were collected online using the online survey utility, Qualtrics (Qualtrics, 2005). Upon obtaining informed consent, each participant was asked to complete: demographic information, the Revised-Mental Health Literacy Scale, Perceived Devaluation and Discrimination Scale, and the Knowledge Test of Mental Illness. Four validity check items instructing the participant to select a specified response were randomly placed throughout the study to detect participant attentiveness.

Analysis Plan

Data cleaning. Data were cleaned and validated based on a priori criteria. Items were reverse scored as necessary and scale scores were tabulated as previously outlined for each scale. Items and scale scores were assessed for patterns of missingness, normality, homoscedasticity, and outliers.

Data analysis. To assess internal consistency, coefficient alpha was calculated for each scale (Cronbach, 1951). Scale scores were analyzed to determine the association between knowledge, attitudes, and demographics, as well the extent to which mental health literacy predicted prejudicial attitudes and beliefs.

Results

Scale Properties

The covert measure of public stigma, Knowledge Test of Mental Illness (KTMI), was found to have a mean of 5.78 (2.67), with internal consistency acceptable for research purposes α =.60. The overt measure of public stigma, Perceived Devaluation Discrimination Scale (PDDS) was found to have a mean of 20.51 (5.75), with excellent internal consistency α = .84. As expected there was a significant positive relationship between the KTMI and PDDS, r = .39, p = .009.

Tests of Assumptions

Prior to analysis, data were examined for patterns of valid responses and missingness. The data from participants who failed to correctly answer the four validity check items (n = 136) were not further analyzed. The results of Little's MCAR Test indicated that data were missing completely at random indicating that missing data could safely be handed by listwise deletion [χ^2 (90, n = 398) = 86.53, p = .584].

Model assumptions for linearity, normality, and homoscedasticity were tested. An examination of the scatterplot of mental health literacy scores and stigma scores revealed that a linear relationship existed between scores on the Revised-Mental Health Literacy Scale (R-MHLS) and the scores on Perceived Devaluation and Discrimination Scale (PDDS), as well as scores on the Knowledge Test of Mental Illness (KTMI).

For the PDDS, the normal P-P Plot of regression residual and the histogram of the frequency distribution of residuals appeared to be normally distributed, while the Kolmogorov-Smirnov (K-S) test revealed that the residuals were not normally distributed with slight skew and kurtosis. The scatterplot of the residual revealed that the residuals appeared to be randomly distributed, which in conjunction with a non-significant Levene's test for heterogeneity indicated that the assumption of homoscedasticity was met. The P-P Plot and scatterplot can be seen in Figures B1 and B2, while the results of the Levene's test, and the K-S test with associated skew and kurtosis can be seen in Table B1.

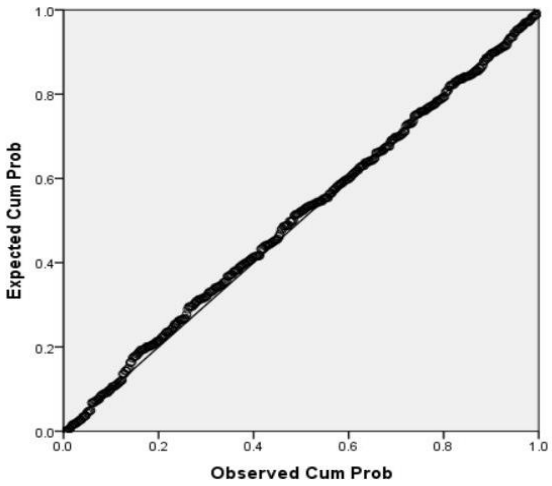

Figure B1. Normal probability plot of the difference between the observed and expected distribution of the residuals of the Perceived Devaluation and Discrimination Scale.

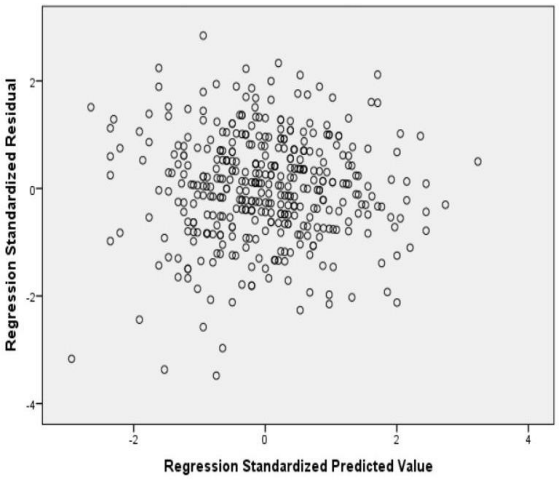

Figure B2. Scatterplot of the residuals of the Perceived Devaluation and Discrimination Scale

Table B1
Test of linear regression assumptions

Scale	Levene's	K-S	Skew (*SE*)	Kurtosis (*SE*)
KTMI	0.22 (p = .885)	0.11 (p < .001)	-0.09 (.12)	-.69 (.29)
PDDS	1.49 (p = .222)	0.07 (p < .001)	-0.41 (.12)	.75 (.24)

Note: PDDS = Perceived Devaluation Discrimination Scale, KTMI = Knowledge Test of Mental Illness, Levene's = Levene's Test of Homogeneity of Variance, K-S = Kolmogorov Smirnov Test, *SE* = standard error.

Likewise, for the KTMI, the normal P-P Plot of regression residual and the histogram of the frequency distribution of residuals appeared to be normally distributed, while the Kolmogorov-Smirnov (K-S) test revealed that the residuals were not normally distributed with slight skew and kurtosis. The scatterplot of the residual revealed that the residuals appeared to be randomly distributed, which in conjunction with a non-significant Levene's test for heterogeneity indicated that the assumption of homoscedasticity was met. The P-P Plot, histogram, and scatterplot can be seen in Figures B3 and B4, while the results of the Levene's test, and the K-S test with associated skew and kurtosis can be seen in Table B1.

Given the appearance and results of the plots and tests, the mild level of skewness and kurtosis, and that according to Tabachnick and Fidell (2013) the general linear model is robust to violations of normality, the assumptions of linearity, normality, and homoscedasticity were considered met.

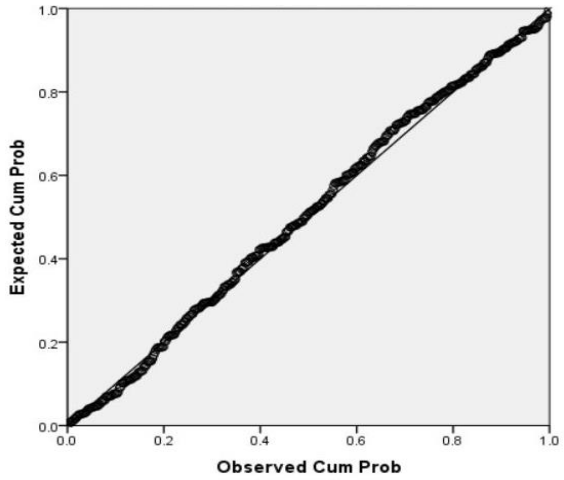

Figure B3. Normal probability plot of the difference between the observed and expected distribution of the residuals of the Knowledge Test of Mental Illness Scale.

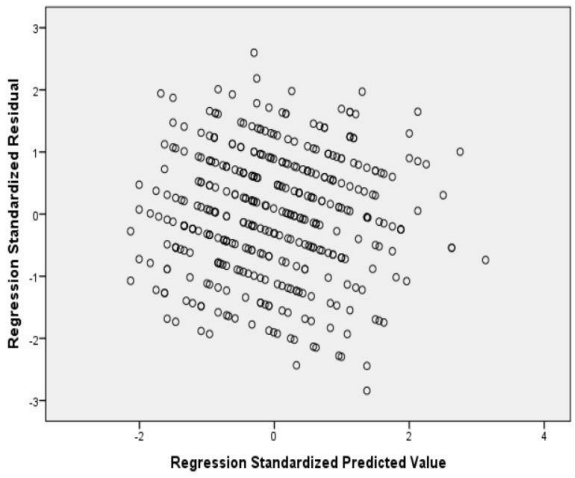

Figure B4. Scatterplot of the residuals of the Perceived Devaluation and Discrimination Scale

KTMI Results

A multiple linear regression was conducted between scores on the Knowledge Test of Mental Illness (KTMI) as a covert measure of public stigma, and the independent variables of prior experience with mental illness, gender, and scores on the Revised-Mental Health Literacy Scale. Table B2 displays the correlation between the continuous variables, the unstandardized (*B*) and standardized (β) regression coefficients, intercept, *R*, and R^2. The regression was significantly different from zero, F (3, 394) = 20.10, $p < .001$, with Adj. $R^2 = .13$ indicating that 13% of the variance in public stigma as measured by the KTMI was accounted for by the set of predictors. The direction of the coefficients suggests that stigma scores are highest among men with no prior experience with mental illness and low mental health literacy score. Results further indicate that mental health literacy had the strongest impact on the KTMI score.

Table B2
Multiple regression of R-MHLS score, gender, and prior mental illness experience on stigma score as measured by the KTMI

Variable	KTMI	*B*	β	*M*	*SD*	*R*	R^2
Intercept		14.28 (1.25)					
Prior Exp.	--	-0.44 (0.28)	-.08				
Gender	--	0.90 (0.29)*	-.15*				
R-MHLS	r =-.33*	-0.13 (0.02)*	-.33*	64.86	7.28		
KTMI	--	--	--	5.78	2.67		
						.37	.13

Note: KTMI = Knowledge Test of Mental Illness, R-MHLS = Revised-Mental Health Literacy Scale, Gender = coded 1 (man), 0 (woman), Prior Experience = coded 0 (no), 1 (yes). * = $p < .001$

PDDS Results

A multiple linear regression was conducted between scores on the Perceived Devaluation and Discrimination Scale as a measure of public stigma, and the independent variables of prior experience with mental illness, gender, and scores on the Revised-Mental Health Literacy Scale. Table B3 displays the correlation between the continuous variables, the unstandardized (*B*) and standardized (β) regression coefficients, intercept, *R*, and R^2. The regression was marginally significantly different from zero, with mental health literacy being the strongest predictor, F (3, 395) = 2.66, p = .054, Adj. R^2 = .01. Given marginal significance with a low R^2 value indicating that little variance was accounted for by the set of predictors, no further analyses were conducted with the PDDS,.

Table B3
Multiple regression of R-MHLS score, gender, and prior mental illness experience on stigma score as measured by the PDDS

Variable	PDDS	*B*	β	*M*	*SD*	*R*	R^2
Intercept		27.69 (2.86)					
Prior Exp.	--	-1.15 (0.63)	-.10				
Gender	--	0.08 (0.65)	.01				
R-MHLS	r =-.11*	-0.12 (0.05) *	-.15*	64.86	7.28		
PDDS	--	--	--	20.51	5.75		
						.14	.01

Note: PDDS = Perceived Devaluation Discrimination Scale, R-MHLS = Revised-Mental Health Literacy Scale, Gender = coded 1 (man), 0 (woman), Prior Experience = coded 0 (no), 1 (yes).
* = p < .05.

Discussion

In the United States, mental illness is a leading cause of disease burden with roughly 43 million Americans impacted by mental illness annually (Kessler et al., 2007; Vigo et al., 2016). Although mental illness is highly treatable less than 60% of those with diagnosable symptoms seek treatment resulting in a considerable personal, social, and economic burden (Insel, 2015; Kessler et al., 2008). The hefty burden of mental illness to person, family, and society necessitates identifying leverage points for intervention.

Cultural belief systems within the general population shape beliefs and behavior toward mental illness, which in turn influences widely held stereotypes that guide social and health policy (Link et al., 1999). The general lack of knowledge surrounding mental illness results in a high burden of stigma associated with being diagnosed with a mental illness, such that people labeled as mentally ill are more harshly stigmatized than those with any other health condition regardless of level of disability (Corrigan, 2004). Improving mental health literacy is one means of addressing stigma related gaps in help-seeking behavior. However, the nature of the relationship between mental health literacy and public stigma remained unclear in part due to the difficultly in circumventing social desirability bias in stigma measurement (Michaels & Corrigan, 2013).

The current study demonstrated that social desirability bias can be circumvented by use of covert instruments such as an error choice test like the Knowledge Test of Mental Illness. As expected, mental health literacy was not related to public stigma when stigma was overtly measured by the Perceived Devaluation Discrimination Scale (Brown et al., 2010; Corrigan, 2000, 2004; Link et al., 1999; Michaels & Corrigan, 2013). When

covertly measured, it was found that stigma decreased as mental health literacy increased when controlling for known predictors of stigma, namely prior experience with mental illness and gender. Based on the current findings, implementation of interventions to improve mental health literacy in public health programs is expected to lessen the burden of stigma against people with mental health issues.

Although the current study utilized a large sample representative of the college age population in the Southeastern United States, it is limited by use of self-reported data from a convenience sample. This study was also limited by the relative newness of the Revised-Mental Health Literacy Scale (R-MHLS), the small number of literacy items measuring knowledge of disorders and treatment options, and the lack of a validation study of the newly created scale. Further research is needed to validate the R-MHLS based on current mental health literacy theory and practices and to determine the nature of the relationship between stigma and literacy in a community setting.

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APPENDIX B: SURVEY ITEMS

Demographics

1. What is your age group?
2. Do you consider yourself Hispanic/Latino?
3. What is your gender identity?
4. Which of the following best describes your race? (more than one choice is acceptable)
5. Do you currently have a major or minor in Psychology?
6. Is this semester the first semester in which you have taken a psychology course?
7. Have you or a close loved one had experience with mental health professional (including social worker, psychologist, psychiatrist, counselor)?

Revised-Mental Health Literacy Scale

The purpose of these questions is to gain an understanding of your knowledge of various aspects to do with mental health. When responding, we are interested in your degree of knowledge.

1. If someone experienced excessive worry about a number of events or activities where this level of concern was not warranted, had difficulty controlling this worry and had physical symptoms such as having tense muscles and feeling fatigued then to what extent do you think it is likely they have **Generalized Anxiety Disorder**

2. To what extent do you think it is likely that the diagnosis of **Bipolar Disorder** includes experiencing periods of elevated (i.e., high) and periods of depressed (i.e., low) mood

   *Mental health professionals are bound by confidentiality; However, there are certain conditions under which this does not apply. To what extent do you think it is likely that the following is a condition that would allow a mental health professional to **break confidentiality**:*

3. If you are at immediate risk of harm to yourself or others

4. If your problem is not life-threatening and they want to assist others to better support you [R]

   Please indicate to what extent you agree with the following statements:

5. I am confident using the computer or telephone to seek information about mental illness

6. I am confident attending face to face appointments to seek information about mental illness (e.g., seeing the GP)

7. People with a mental illness could snap out if it if they wanted [R]

8. A mental illness is a sign of personal weakness [R]

9. A mental illness is not a real medical illness [R]

10. People with a mental illness are dangerous [R]

11. It is best to avoid people with a mental illness so that you don't develop this problem [R]

12. If I had a mental illness I would not tell anyone [R]

13. If I had a mental illness, I would not seek help from a mental health professional [R]

14. How willing would you be to move next door to someone with a mental illness

15. How willing would you be to spend and evening socializing with someone with a mental illness?

16. How willing would you be to make friends with someone with a mental illness

17. How willing would you be to have someone with a mental illness start working closely with you on a job

18. How willing would you be to have someone with a mental illness marry into your family

19. How willing would you be to vote for a politician if you knew they had suffered a mental illness

20. How willing would you be to employ someone if you knew they had a mental illness

Knowledge Test of Mental Illness

1. One type of psychotherapy, cognitive-behavioral therapy, has been shown to reduce the psychotic symptoms of schizophrenia. T/**F**
2. Considering people with schizophrenia, what is the average number of separate hospitalizations for their mental illness over a one-year period of time? **4 or more**/2 or less
3. People with severe mental illness cannot maintain private residences. **T**/F
4. People with schizophrenia should be allowed to use an online dating service. T/**F**
5. People with schizophrenia make up what percent of the homeless population? 5%/**25%**
6. Adolescents with schizophrenia are frequently truant from school. **T**/F
7. People with severe mental illness are capable of establishing an intimate long-term relationship of a sexual nature. T/**F**
8. People with schizophrenia benefit the least from services like psychotherapy. **T**/F
9. People with schizophrenia are likely to steal from their family members. **T**/F
10. Based on the capabilities of people with schizophrenia, school counselors should recommend beginning a job-training program rather than continuing in the regular curriculum. **T**/F
11. For those with serious mental illness, what percent of treatment should be dedicated to medication compliance? **>80%**/<50%
12. Neglectful parenting is somewhat responsible for the beginning of a serious mental illness. T/**F**
13. A person with schizophrenia is capable of being a physician or medical doctor. T/**F**
14. The divorce rate among the general population is about 50%. What is the divorce rate among people who experience mental illness? **>70%**/<50%

Scoring: Sum number of stigmatizing responses indicated by bold and underlined.

Perceived Devaluation Discrimination Scale

1. Most people would accept a person who has had a serious mental illness as a friend. [R]
2. Most people believe that a person who has been hospitalized for a serious mental illness is just as intelligent as the average person. [R]
3. Most people believe that a person who has been hospitalized for mental illness is just as trustworthy as the average citizen. [R]
4. Most people would accept a person who has fully recovered from mental illness as a teacher of young children in a public school. [R]
5. Most people believe that entering a mental hospital is a sign of personal failure.
6. Most people will not hire a person who has been hospitalized for serious mental illness to take care of their children, even if he or she had been well for some time.
7. Most people think less of a person after he/she has been hospitalized for a mental illness.
8. Most employers will hire a person who has been hospitalized for mental illness if he or she is qualified for the job. [R]
9. Most employers will pass over the application of someone who has had a serious mental illness in favor of another applicant.
10. Most people in my community would treat a person who has been hospitalized for mental illness just as they would treat anyone. [R]
11. Most young women would be reluctant to date a man who has been hospitalized for a serious mental illness.
12. Once they know a person was in a mental hospital for a serious mental illness, most people will take his or her opinions less seriously.

R = reverse coded.
Scoring = strongly agree (3), agree (2), disagree (1), or strongly, disagree (0)

Decoy Validation Item

1. Those who are reading this select agree and keep going.
2. Select 3 (Applied to me very much or most of the time) if you are paying attention.
3. Select 0 (Did not apply to me) if you are reading this.
4. People who are paying attention will check strongly agree to this question.

* *Note*: Each item designed to blend in with the survey items in which it was embedded.

CHAPTER IV: PROJECT CONCLUSION

In the United States mental illness accounts for a massive loss of production capital and carries with it an enormous societal burden (Farrer et al., 2008; Kessler et al., 2008). Mental illness is highly treatable, and early recognition and intervention lead to increased odds of improved long-term outcome, yet over 60% of people with a mental illness fail to seek treatment leading to substantial personal and societal burden (Kessler et al., 2007; Wei et al., 2016). There are long delays between the first presentation of symptoms and time to treatment, with 50% of mental illness presenting itself by the mid teenage years, and 75% by the mid 20's (Kessler et al., 2008).

Although health literacy is recognized as a stronger predictor of health status than income, employment status, level of education, and race or ethnicity (World Health Organization, 2014), with the high burden of mental illness it is equally vital that focus be placed on mental health literacy (Jorm et al., 1997; Kessler et al., 2007). Mental health literacy is comprised of a range of knowledge and beliefs related to the ability to recognize signs and symptoms of mental health issues and seek appropriate self or professional help (Jorm, 2012). One major consequence of low mental health literacy is a long delay in help-seeking that results in delayed treatment coupled with a reduced perception of the value of available treatment options (Kelly et al., 2007). To prevent delays in treatment it is vital that individuals know how to recognize the signs and symptoms of mental illness, as well as to have an attitude or belief system that would promote seeking information about and recognition of mental health issues.

Adults with reduced mental health literacy are less likely to be able to identify mental illness and more likely to attribute symptoms to weakness of personal character, which leads to inappropriate assumptions about the causes and treatment prospects for mental illness (Farrer et al., 2008). The resulting stigma has a profound and powerful influence on the life of a person with mental illness and the consequences are dire, this is in part due to the internalized shame associated with self-stigma, but in larger part due the influence of enacted public stigma intertwined in social structure (Corrigan, 2004; Wei et al., 2016). Yet, the attitudes leading to prejudice and discrimination are notoriously hard to measure and the public health impact of stigma reduction interventions difficult to discern (Michaels & Corrigan, 2013).

Given the high stakes involved in using a funded public health approach to reduce the mental illness related disease burden, valid and reliable instruments to assess mental health literacy are necessary to develop the evidence base for mental health literacy programming. Yet, most instruments designed to measure elements of mental health literacy have failed to produce sufficient evidence of reliability and validity of measurement, and failed to provide sufficient detail about sample characteristics and/or development of the tool (O'Connor et al., 2014). The lack of information and diverse scoring methodology across studies have made it difficult to compare findings across studies or to generalize across setting and populations.

The main objective of this project was the examine the psychometric properties of the Mental Health Literacy Scale, and to determine the extent to which literacy is related to stigmatizing attributes against those exhibiting signs and symptoms of a mental illness.

The purpose of the first study of this project was to examine the extent to which the Mental Health Literacy Scale conforms to the theoretical definition of mental health literacy by examining the extent to which the items measure the latent trait of mental health literacy and discriminate between those who are literate about mental health issues and those who are not. A secondary goal was to develop a revised instrument based on the overall findings of the psychometric analyses. It was found that 15 of the original 35 items performed poorly and were candidates for removal from the scale, and a 20-item Revised-Mental Health Literacy Scale with a new scoring pattern was developed.

The purpose of the second study was to examine the extent to which stigmatizing attitudes toward mental illness could be predicted by scores on the newly developed Revised-Mental Health Literacy Scale while accounting for social desirability bias that may cause inhibition to respond honestly to endorsements of discriminatory attitudes. As hypothesized, it was found that the higher the score on mental health literacy, the lower the reported stigmatizing beliefs against mental illness when measured using a covert stigma instrument. It was also found that when measured directly using an overt stigma instrument, mental health literacy was not predictive of discriminatory attitudes, which was expected based on prior literature (Corrigan, 2000; Michaels & Corrigan, 2013).

Future Directions

The product and contribution of the current project is the development of the Revised-Mental Health Literacy Scale with a suggested new scoring pattern. Also, when utilizing the new scale, the hypothesized relationship between literacy and stigma was realized. These findings are in line with prior research that has shown improvements in

knowledge through education and contact with persons who have a mental illness, which results in reduction of discrimination against mental illness in general (Corrigan, 2004; Jorm, 2012; Link et al., 1999; World Health Organization, 2014).

In summary, true prevention requires a mental health literate society that promotes early intervention, self-help, and the support of others. Implementation of the Revised-Mental Health Literacy Scale in public health programs, along with interventions that improve literacy, will help health educators lessen the burden of stigma against people with mental health problems. Further research using public health programming is needed to examine the extent to which stigma reduction through improved mental health literacy translates into increased help-seeking and positive long-term outcomes.

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APPENDICES

APPENDIX C: RESEARCH MATERIALS

IRBF004IC Version 1.2 Revision Date 07.26.2016

IRB
INSTITUTIONAL REVIEW BOARD
Office of Research Compliance,
010A Sam Ingram Building,
2269 Middle Tennessee Blvd, Murfreesboro, TN 37129

INFORMED CONSENT – RESEARCHERS' DISCLOSURES

(Part A – Participant's Copy)

Study Title	*Mental Health Literacy and Stigma*	Office Use
Principal Investigator	**Angela Bowman**	*IRB ID: 17-1100*
Faculty Advisor	Andrew Owusu	Approval Date: 11/11/16
Contact Information	asb5c@mtmail.mtsu.edu OR andrew.owusu@mtsu.edu	Expiration Date: N/A

Dear Participant,

On behalf of the research team, the Middle Tennessee State University (MTSU) would like to thank you for considering to take part in this research study. You have been contacted by the above identified researcher(s) to enroll as a participant in this study because you met its eligibility criteria.

This consent document describes the research study for the purpose of helping you to make an informed decision on whether to participate in this study or not. It provides important information related to this study, possible interventions by the researcher(s) and proposed activities by you. This research has been reviewed by MTSU's internal oversight entity - Institutional Review Board (IRB) - for ethical practices in research (visit www.mtsu.edu/irb for more information).

As a participant, you have the following rights:

- You should read and understand the information in this document before agreeing to enroll
- Your participation is absolutely voluntary and the researchers cannot force you to participate
- If you refuse to participate or to withdraw midway during this study, no penalty or loss of benefits will happen
- The investigator MUST NOT collect identifiable information from you, such as, name, SSN, and phone number
- The researcher(s) can only ask you to complete an interview or a survey or similar activities and you must not be asked to perform physical activities or offer medical/psychological intervention
- Any potential risk or discomforts from this study would be lower than what you would face in your daily life

After you read the following disclosures, you can agree to participate in this study by completing "Part B" of this informed consent document. You do not have to do anything further if you decide not to participate.

1. What is the purpose of this study?

The purpose of this study is to examine the knowledge of various aspects of mental health and attitudes toward mental illness.

2. What will I be asked to do in this study?

You will be asked to complete a series of surveys using a computer.

3. How many times should I participate or for how long?

You should only participate once and expect participation to last 45 minutes to an hour.

4. What are the risks and benefits if I participate?

The risks involved are no more than you would experience in everyday life while having a conversation or using a computer. The benefit to you is gaining knowledge of the research process and contributing the understanding of mental health literacy.

5. What will happen to the information I provide in this study?

All responses to this study will be kept confidential. No information to identify you will be collected.

6. What will happen if I refuse to participate and can I withdraw if I change my mind in the middle? Participation is voluntary and you may withdraw from participation at any time without penalty.

7. Whom can I contact to report issues and share my concerns?

You can contact the researcher(s) by email or telephone (**asb5c@mtmail.mtsu.edu OR andrew.owusu@mtsu.edu**). You can also contact the MTSU's Office of Research Compliance by email – irb_information@mtsu.edu. Report compliance breaches and adverse events by dialing 615 898 2400 or by emailing compliance@mtsu.edu.

_____
INVESTIGATOR SIGNATURE FACULTY ADVISOR SIGNATURE DATE

NON-IDENTIFIABLE PARTICIPANT ID# _____

Confidentiality Statement:
All efforts, within reason, will be made to keep the personal information in your research record private but total privacy cannot be promised, for example, your information may be shared with the MTSU IRB. In the event of questions or difficulties of any kind during or following participation, you may contact the Principal Investigator as indicated above. For additional information about giving consent or your rights as a participant in this study, please feel free to contact our Office of Compliance at (615) 898 2400.

Compensation:
Unless otherwise informed to you by the researcher(s), there is no compensation for participating in this study. The investigator must disclose if the participant would be compensated in the benefits section.

Study-related Injuries:
MTSU will not compensate for study-related injuries.

Exemption Criteria:
This study was submitted to the MTSU IRB – an internal oversight entity to oversee research involving human subjects. The IRB has determined that this investigation consists of lower than minimal risk and it is exempt from further IRB processes based on the criteria: *"Category 2 - Educational Tests."*

Note to the Participant

You do not have to do anything if you decide not to participant in this study. But if wish to enroll as a participant, please complete "Part B" of this informed consent form and return it to the researcher. Please retain the signed copy of "Part A" for your future reference.

IRB

INSTITUTIONAL REVIEW BOARD
Office of Research Compliance,
010A Sam Ingram Building,
2269 Middle Tennessee Blvd, Murfreesboro, TN 37129

INFORMED CONSENT

(Part B – Researcher's Copy)

Study Title	*Mental Health Literacy and Stigma*	Approval Information
Principal Investigator	**Angela Bowman**	IRB ID: *17-1100*
Faculty Advisor	Andrew Owusu	Approval Date: 11/11/16
Contact Information	asb5c@mtmail.mtsu.edu OR andrew.owusu@mtsu.edu	Expiration Date: N/A

You have been contacted by the investigator(s) because the researchers believe you meet the eligibility criteria to participate in the above referenced research study. Be aware that you must NOT be asked by the investigator(s) to do anything that would pose risk to your health or welfare, such as:

- Identifiable information – name, phone number, SSN, address, College ID, social media credentials (Facebook page, twitter, etc.), email, identifiable information of closest relatives and etc.
- Physical activities – like exercise studies
- Medical intervention – testing drugs, collection of blood/tissue samples or psychological questions
- Nothing risky – any proposed activity that would expose you to more risk than what you would face on a day to day basis is not approved by the IRB

However, you can do the following:

- Withdraw from the study at any time without consequences
- Withdraw the information you have provided to the investigators before the study is complete
- Ask questions so the researcher must explain the procedures used in the research verbally.

The investigators must give you enough time to ask any questions. Once you have had a chance to read "Part A" (Participant's Copy), indicate your acceptance by checking the appropriate boxes:

	NO	YES
O I have read investigator(s)' disclosure (Part A) for the above identified research	☐	☐
O The researcher(s) explained the procedures to be conducted verbally	☐	☐
O I understand each part of the interventions and all my questions are answered	☐	☐
O The researcher(s) gave me a signed copy of the disclosure page (Part A)	☐	☐

By initialing below, I give my consent to participate in this study. I understand that I can withdraw from the study at any time without facing any consequences.

X

----------NON-IDENTIFIABLE PARTICIPANT ID# _____

Participant initial **Date**

Initial this copy and return it to the researcher and retain Part A for your reference in case you have questions or you wish to get in touch with the researcher or with the MTSU IRB

APPENDIX D: IRB APPROVAL

IRB
INSTITUTIONAL REVIEW BOARD
Office of Research Compliance,
010A Sam Ingram Building,
2269 Middle Tennessee Blvd
Murfreesboro, TN 37129

IRBN007 – EXEMPTION DETERMINATION NOTICE

Friday, November 11, 2016

Investigator(s): Angela Bowman (PI), and Andrew Owusu (FA)
Investigator(s') Email(s): asb5c@mtmail.mtsu.edu
Department: Health and Human Performance
Study Title: Mental Health Literacy and Stigma
Protocol ID: **17-1100**

Dear Investigator(s),

The above identified research proposal has been reviewed by the MTSU Institutional Review Board (IRB) through the **EXEMPT** review mechanism under 45 CFR 46.101(b)(2) within the research category *(2) Educational Tests* A summary of the IRB action and other particulars in regard to this protocol application is tabulated as shown below:

IRB Action	EXEMPT from further IRB review***	
Date of expiration	**NOT APPLICABLE**	
Participant Size	1000 [ONE THOUSAND]	
Participant Pool	MTSU Psychology research pool	
Mandatory Restrictions	All participants need to consent.	
Additional Restrictions	**Adults (18 years of age or older)**	
Comments	None at this time	
Amendments	**Date**	**Post-Approval Amendments** None at this time

***This exemption determination only allows above defined protocol from further IRB review such as continuing review. However, the following post-approval requirements still apply:

- Addition/removal of subject population should not be implemented without IRB approval

- Change in investigators must be notified and approved
- Modifications to procedures must be clearly articulated in an addendum request and the proposed changes must not be incorporated without an approval
- Be advised that the proposed change must comply within the requirements for exemption
- Changes to the research location must be approved – appropriate permission letter(s) from external institutions must accompany the addendum request form
- Changes to funding source must be notified via email (irb_submissions@mtsu.edu)
- The exemption does not expire as long as the protocol is in good standing
- Project completion must be reported via email (irb_submissions@mtsu.edu)
- Research-related injuries to the participants and other events must be reported within 48 hours of such events to compliance@mtsu.edu

The current MTSU IRB policies allow the investigators to make the following types of changes to this protocol without the need to report to the Office of Compliance, as long as the proposed changes do not result in the cancellation of the protocols eligibility for exemption:

- Editorial and minor administrative revisions to the consent form or other study documents
- Increasing/decreasing the participant size

The investigator(s) indicated in this notification should read and abide by all applicable post approval conditions imposed with this approval. Refer to the post-approval guidelines posted in the MTSU IRB's website. Any unanticipated harms to participants or adverse events must be reported to the Office of Compliance at (615) 494-8918 within 48 hours of the incident.

All of the research-related records, which include signed consent forms, current & past investigator information, training certificates, survey instruments and other documents related to the study, must be retained by the PI or the faculty advisor (if the PI is a student) at the secure location mentioned in the protocol application. The data storage must be maintained for at least three (3) years after study completion. Subsequently, the researcher may destroy the data in a manner that maintains confidentiality and anonymity. IRB reserves the right to modify, change or cancel the terms of this letter without prior notice. Be advised that IRB also reserves the right to inspect or audit your records if needed.

Sincerely,

Institutional Review Board
Middle Tennessee State University

Quick Links: Click here for a detailed list of the post-approval responsibilities. More information on exempt procedures can be found here.