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Clinical Correlates of Health Literacy in People with Serious Mental Illness

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Abstract

People with serious mental illness (SMI) experience health disparities (De Hert et al., 2011). Low health literacy could be an important factor for health outcomes in the SMI population (Krishan, von Esenwein, & Druss, 2012). The association between demographic and clinical variables was examined in people with SMI as possible predictors of health literacy. Participants were recruited via paper and electronic advertisements to assess health behaviors in adults with SMI and/or a diagnosis of type 2 diabetes. Participants completed a battery of tests including the Test of Functional Health Literacy in Adults (TOFHLA) to assess health literacy, the Positive and Negative Symptom Scale (PANSS) to assess positive and negative psychiatric symptoms, and the Dementia Rating Scale (DRS) to assess cognition. Data for adults with SMI only were analyzed using SPSS version 23. Participants (N = 56) were predominantly Caucasian (n = 48; 85.7 %), female (n = 34; 61.8 %), and lived alone (n = 26; 47.3%) or with someone else (n = 26; 47.3%). Overall, the sample had high total health literacy (M = 84.54; SD = 10.97). Total DRS scores correlated with total health literacy (r = .428; p = .001,), as did living situation (r = .270; p = .047). The PANSS positive scores weakly correlated with reading health literacy (r = -.262; p = .051). The results vary by TOFHLA subscale. Three multiple linear regression models were created using data- and theory-driven variables to determine the strongest predictor of health literacy in this population. Understanding the relationship between cognition and health literacy in people with SMI could help providers improve health disparities that this population experiences.

Clinical Correlates of Health Literacy in People with Serious Mental Illness

Serious mental illness (SMI) affects 9.8 million people in the United States and includes disorders such as depression, bipolar disorder, and schizophrenia (National Institute of Mental Health, 2015). Having SMI is seen as one of the greatest, most unrecognized sources of health care disparities (Bartels & DiMilia, 2017). Not only do people with SMI experience a greater morbidity and mortality than the general population, but they also have suboptimal health service use (Hert et al., 2011). Even when people with SMI do access care, they have worse adherence to chronic illness treatments (CDC, 2011). Clearly, health disparities need to be addressed in this unique population.

Health literacy may contribute to these health disparities. Health literacy is defined as "The degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (Parker, 2000, p. 278). Multiple tests are commonly used to measure health literacy such as the Test of Functional Health Literacy for Adults (TOFHLA; Parker, Baker, Williams, & Nurss, 1995), the Newest Vital Sign (NVS; Weiss et al., 2005), the Rapid Estimate of Adult Literacy in Medicine (REALM; Bass III, Wilson, & Griffith, 2003). Additionally, some studies do not use a validated measure, but rather assess health literacy via several short questions (Al Sayah, Majumdar, Egede, & Johnson, 2015). Both the NVS and the REALM can be completed in just a few minutes; the NVS is comprised of six questions about an ice cream container label (Weiss et al., 2005) and the REALM is comprised of a list of words to read (Bass III, Wilson, & Griffith, 2003). The TOFHLA takes a bit longer to complete, and has two sections assessing different aspects of health literacy. One section has people choose the word that fits best in the sentence

from a short list. Another section has people answer questions about pill labels and legal medical documents (Parker et al., 1995). Different measures of health literacy are used throughout the literature to assess health literacy in different populations.

In the United States, over one third of adults have low heath literacy (Kutner, 2006). People with low health literacy have been shown to have difficulty navigating the health care system, getting the medical treatment they need, and understanding that treatment (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011), in addition to experiencing worse health outcomes (Ferguson & Pawlak, 2011). These conclusions come from a review by Berkman et al. (2011) where health literacy literature results from 2003 to 2011 were assembled. Articles were taken from pertinent databases, and two researchers independently assessed the quality of the literature found. From almost one hundred articles about health literacy, the review provides a table of outcomes with the number of studies researching that outcome and the strength of evidence for these results as of 2011. For example, the review found eight studies agreeing that people with low health literacy were more likely to be depressed, but found few of those studies did well in controlling for other variables. Other outcomes included costs, knowledge, specific diseases, mammography, health status, and quality of life. The review also found low health literacy to be associated with increased risk of hospitalization, increased use of emergency care, poorer health status in older adults, and higher mortality (Berkman et al., 2011). Showing the number of studies for each outcome as of 2004 and 2011 highlights where more research needs done in the field of health literacy and displays the changes in consensus of the field.

Research has begun to identify possible predictors of health literacy in the general population of adults. These predictors vary across countries and disease states. The most common predictors of health literacy include education, age (Armistead-Jehle, Cifu, Wetzel,

Carne, & Klanchar, 2010), minority status, income (Martin et al., 2009), and cognition (Dahlke, Curtis, Federman, & Wolf 2013). More specifically, low health literacy is associated with less education, older age (Armistead-Jehle et al., 2010), minority status, lower income (Martin et al., 2009), and lower cognition (Dahlke et al., 2013). Living situation could affect health literacy; another person at home may help someone understand prescription labels, medical documents, or discharge instructions. Few studies assess living situation as a predictor of health literacy. One study found that living situation did not moderate the effect of low health literacy on self-management abilities, meaning it was not a significant factor, but did find that low health literacy was associated with living alone (Geboers, de Winter, Spoorenberg, Wynia, & Reijneveld, 2016). Knowing predictors of health literacy may be a quick way to identify people who need more help understanding health information.

While health literacy has been studied in the general population of adults, few studies have been conducted looking at health literacy in adults with SMI. Some studies show a positive correlation between low health literacy and a psychotic disorder diagnosis (Lincoln et al., 2011), a diagnosis of schizophrenia (Clausen, Watanabe-Galloway, Baerentzen, & Britigan, 2015), or poor mental health status (Al Sayah et al., 2015; Geobers et al., 2016). In contrast, some literature shows no significant correlation between health literacy and SMI (Lincoln et al., 2008), or even that adults with SMI have higher health literacy (Galletly, Neaves, Burton, Liu, & Denson, 2012). Another study correlates low health literacy with increased odds of inpatient hospitalization in people with SMI (Krishan et al., 2012). A more thorough understanding of the relationship between health literacy and SMI, as well as the factors that contribute to health literacy in adults with SMI, may assist health care professionals in improving health disparities for this population.

Not only are there few studies about health literacy in the SMI population, but even fewer studies determine predictors of health literacy in this population. A study by Lincoln et al. (2008) found that the type of mental illness can predict health literacy where psychotic disorders predict lower health literacy, post-traumatic stress disorder and substance abuse predict higher health literacy, and no relationship was found with number of diagnoses (e.g. anxiety and depression). Clausen and colleagues (2016) conducted a study to find factors associated with low health literacy in people with SMI, including major depression, bipolar disorder, schizophrenia, schizoaffective disorder, and an other, non-specified category. Three health literacy measurement tools were used, and seventy-one participants were recruited from a day rehabilitation program in Nebraska. The researchers found disorders like schizophrenia or schizoaffective disorder were associated with the REALM-SF and the NVS, respectively, meaning people with schizophrenia scored lower on the REALM-SF and people with schizoaffective disorder scored lower on the NVS. In both of these findings, positive and negative symptoms of psychotic disorders could be a factor affecting health literacy scores. Older age was found to predict low health literacy, but Clausen et al. (2016) states that the NVS focuses more on measuring the numeric aspect of health literacy. Use of a more comprehensive health literacy measure, such as the TOFHLA, may provide a better understanding of predictors of health literacy in the SMI population.

In populations with high health literacy, other factors may be contributing to health disparities for people with SMI. One study shows that people with lower health literacy have abnormal cognition (Apolinario, Mansur, Carthery-Goulart, Brucki, & Nitrini, 2015); another states that cognitive tests can be used as predictors of health literacy (Dahlke et al., 2013). Both studies used a version of the TOFHLA for health literacy measurement and the MMSE for

cognitive assessment (Apolinario et al., 2015; Dahlke et al., 2013). The population and sample size varied greatly. In people with schizophrenia, one classic symptom is cognitive deficits (American Psychological Association, 2013). Because cognition is a hallmark symptom of psychotic disorders, it could help explain differences in health literacy in the SMI population.

Other symptoms of psychotic disorders include positive and negative symptoms. Positive symptoms include hallucinations and delusions; negative symptoms include decreased emotional expression and lack of motivation (American Psychological Association, 2013). One study looked at whether schizophrenia and everyday functioning was connected, finding negative symptoms predicted limitations in everyday functioning. Some measures of everyday functioning were the participant's abilities to handle matters in public offices and communicate with strangers (Viertio et al, 2012). Similarly, health literacy involves communicating with health care professionals and handling paperwork or processes when seeing a physician. The effect of psychotic symptoms on everyday functioning may translate into affecting health literacy in people with SMI.

Currently, there is a lack of research of clinical variables as predictors of health literacy in the SMI population. The purpose of this study was to test whether cognition might also predict health literacy in people with SMI while accounting for other variables such as sociodemographic variables, depressive symptom severity, and positive and negative symptom severity. Based on previous literature, we hypothesize our sample will have low health literacy, and that health literacy will be associated with age, education, minority status, positive and negative symptoms, and cognition. Knowing this information in the SMI population may affect how health care professionals provide care and present health information appropriately, in turn affecting health outcomes. Assessing health literacy and cognition in people with serious mental

illness may reveal factors contributing to health disparities and help providers improve those disparities.

Methods

Participants were recruited for this study through paper and electronic advertisements distributed to community mental health centers in Wyoming and Colorado. Participants also came from provider referrals. Individuals with the following characteristics were included in the study: (a) Age eighteen years or older, (b) a chart diagnosis of a serious mental illness (i.e. schizophrenia, schizoaffective disorder, bipolar disorder, major depressive disorder), (c) taking antipsychotic, mood stabilizing, or antidepressant medication, (d) ability to complete the assessment battery, and (e) ability to provide informed consent. People with a diagnosis of dementia were excluded from the study.

Measures

Sociodemographic characteristics. Participants completed a sociodemographic questionnaire that included questions on age, gender, race/ethnicity, education level, veteran status, handedness, height, weight, marital status, and living situation.

Health literacy. Health literacy was measured using the Test of Functional Health Literacy Assessment (TOFHLA; Parker et al, 1995), a 67-item tool used to assess health literacy via a semi-structured interview administered by a trained rater where verbal and written responses are scored. The TOFHLA assesses two domains of health literacy, including numeracy and reading. A continuous total score and a categorical functional score can be calculated. The reading section has participants choose the correct word from a list of four to fit in the blank space of a sentence that describes patient rights and responsibilities, informed consent, or

preparation instructions for a procedure. The numeracy section uses samples of prescription vials and hospital forms to test comprehension of directions in the participant. This numeracy score out of seventeen is multiplied by 2.941 to create the weighted numeracy score out of fifty. Higher scores show higher health literacy on each subscale. For this study, the total, reading comprehension and raw numeracy scores were used in analysis. The TOFHLA has been used in studies assessing health literacy in people with movement disorders (Armistead-Jehle et al., 2010), older adults (Geboers et al., 2016), and people with SMI (Clausen et al., 2016). The TOFHLA has good reliability and validity. The researchers assessed reliability and validity by comparing the TOFHLA to the REALM and the WAT-R, two other health literacy assessment tools (Parker et al., 1995).

Psychiatric symptom severity. The Positive and Negative Syndrome Scale (PANSS; Kay, Fiszbein, & Opler, 1987), a 30-item tool, was used to measure psychiatric symptom severity in people with SMI. A trained rater records responses from a semi-structured interview based on a person's verbal and behavioral responses in three subscales including severity of positive, negative, and general psychiatric symptoms. Examples of symptoms from each domain include delusions, blunted affect, and anxiety, respectively. Symptoms are rated on a Likert-type scale of 1 ("Mild") – 7 ("Extreme") for each subscale. Scores are recorded by adding up ratings in each section (positive, negative, and general), and the total score is the addition of the sub-scores together. All subscales were used in this study. The PANSS has been used to study the effect of antipsychotic medication and the clinical utility of medications (Reddy et al., 2013). The PANSS was found to have high validity and reliability with scores that correlated to the Scale for Assessment of Positive Symptoms and Scale for the Assessment of Negative Symptoms scores developed by Andreasen (Kay, Opler, and Lindenmayer, 1988).

Cognitive functioning. The Mattis' Dementia Rating Scale-2 (DRS-2; Jurica, Leitten, & Mattis, 2001), a 36-item assessment tool, measures cognitive functioning. It assesses five cognitive domains including attention, initiation/perseveration, conceptualization, memory, and construction. Higher cognitive function is shown by higher scores. The total score comes from the addition of the five categories; each categorical score and the total score were used in analysis. The DRS has been used to assess cognition (Chappel and Riley-Doucet, 2013) and health literacy (Dahlke et al., 2013) in older adults, and cognition in people who visit the hospital (Apolinario et al., 2015). A study by Marson et al. (1997) found the subscales of the DRS to be valid measures of their constructs, and a study by Gardner Jr. and colleagues (1981) found the DRS has high internal reliability.

Depressive symptom severity. Depressive symptom severity was measured using the Hamilton Depression Rating Scale (HAM-D). This 28-item semi-structured interview is administered and scored by a trained rater. The measure has participants rate a specific symptom on a Likert-type scale of zero to two, three, or four where four represents greater severity. Some of those symptoms include agitation, insomnia, and depressed mood. The first seventeen items are added where a higher score means more severe depressive symptoms. The HAM-D has been widely used in studies of adults with SMI (Carneiro, Fernandes, & Moreno, 2015). The HAM-D has been shown to have good validity and reliability according to Kobak et al. (1999).

Procedure

Participants were recruited by electronic and paper advertisements for studies assessing health behaviors in adults with SMI and/or a diagnosis of type-2 diabetes or intervening to improve health outcomes in this population. Advertisements were made available at community mental health centers, group homes, and day programs in Wyoming and Colorado. Presentations

were also made to providers at these centers, and providers were given the opportunity to inform their clients about the study, obtain releases of information, and to directly refer clients to the research team. Once the research team was contacted, the study was further explained, and if the potential participant continued to display interest, an appointment to screen the potential participant was obtained. At the screening visit, informed consent and screening was obtained, and the individual was asked to sign a release of information to access diagnosis and medication components of the medical record. Following determination of study qualification, a second meeting was scheduled with a trained interviewer. Participants who provided informed consent were then asked to complete a 2.5 hour assessment comprising of measures of psychiatric symptom severity, cognitive functioning, and health literacy. Additional measures were collected as part of a larger study. All participants were compensated $10 for each screening and assessment visit.

Data Analysis

Data analysis was performed using SPSS, version 23. All data were screened for assumptions of multiple linear regression. Living situation was categorized (i.e. living alone, living with someone else, and assisted living). First, Pearson and Spearman correlations were used to examine associations between the TOFHLA sub scores and the demographic variables, DRS sub scale scores, PANSS positive, negative, general and total scores, and the HAM-D total scores. Both data- and theory-driven methods were used to identify predictors of interest. A multiple linear regression model was used to examine the relationship among clinical variables (i.e. cognitive functioning, positive and negative symptoms) and TOFHLA total, reading, and numeracy scores while controlling for possible covariates (i.e. living situation). Three separate multiple linear regression models were created, with TOFHLA total, reading, and numeracy

scores as the dependent variables in each test, respectively. In the first step of each regression analysis, living situation and gender were entered as covariates. The second step of each regression analysis included the clinical variables (i.e. DRS total score, PANSS positive score, and PANSS negative score) as predictors of each health literacy domain as assessed by the TOFHLA.

Results

Participants

The study participants included 56 adults with SMI. As shown in Table 1, the majority of people were Caucasian (*n* = 48; 85.7%) females (*n* = 34; 61.8%) where about half lived alone (*n* = 26; 47.3%) and about half lived with someone else (*n* = 26; 47.3%). The average age of participants was 49.5 (*SD* = 8.5), but data was missing for almost half the sample (*n* = 26). Most people had a high education level, completing high school (*n* = 15; 26.8%) or some amount of higher education (*n* = 32; 57.2%) with the average total years of education being 13.5 (*SD* = 2.667). See Table 1.

Health Literacy Scores

Most participants had high total health literacy (*M* = 84.54, *SD* = 10.973) and fell in the adequate functional health literacy category (*n* = 48; 85.7%). Total health literacy scores ranged from 52 to 99. Participants also scored high in the raw numeracy health literacy section (*M* = 13.96, *SD* = 2.30) and the reading comprehension health literacy section (*M* = 42.63, *SD* = 6.797). In the numeracy section, one complex question was missed the most with 25 participants answering incorrectly (44.6%). On other questions in the numeracy section, only three people

chose the wrong answer (5.4%). In the reading section, the most-missed question had 39 incorrect answers (69.6%); all participants answered another reading question correctly (100%).

Correlations

Table 2 shows bivariate correlations between the TOFHLA subscale scores and all other demographic and clinical variables. Total TOFHLA scores were significantly correlated with living situation (r = .270, p = .047), race (r = -.269, p = .045), DRS initiation and perseveration (r = .398, p = .002), DRS memory (r = .470, p = .000), and DRS total score (r = .428, p = .001). TOFHLA Numeracy raw scores significantly correlated with living situation (r = .309, p = .022), DRS memory (r = .316, p = .018) and DRS total scores (r = .272, p = .042). TOFHLA reading scores correlated with DRS initiation and perseveration (r = .377, p = .004), DRS memory (r = .430, p = .001), and DRS total scores (r = .407, p = .002) while being weakly correlated with PANSS positive scores (r =-.262, p = .051). Functional TOFHLA scores correlated with race (r = -.288, p = .031), DRS initiation and perseveration (r = .277, p = .039), DRS memory (r = .380, p = .004), and DRS total scores (r = .302, p = .024). The other PANSS scores were not significantly correlated with the other TOFHLA subscales, and the HAM-D did not significantly correlate with any TOFHLA scores (See Table 2). Age, gender, marital status, highest level of education, years of education, veterans status, or handedness were not significantly correlated with any TOFHLA scores (See Table 2).

Predictors of Health Literacy

Multiple linear regression models were used to determine predictors of health literacy. All models were run in a step-wise fashion with demographic variables included in the first step and clinical variables included in the second step. The first step included gender and living

situation in every model, and the second step included the DRS total score, the PANSS positive score, and the PANSS negative score. In the first model which included total TOFHLA scores, the first step was not significant with living situation and gender accounting for only 8.9% of the variance in total TOFHLA scores. The second step was significant where living situation and total DRS scores were significant predictors of the variance in total health literacy scores (See table 3).

The second model showed similar results where the first step was not significant, and the second step was significant, but total DRS scores were the only significant predictor of reading comprehension scores in this model. Total DRS scores accounted for 10.3% of the variance in reading comprehension health literacy scores (See table 4).

The third model included raw numeracy health literacy scores. Both steps in the model were significant where gender, living situation, and total DRS scores were significant predictors of raw numeracy health literacy scores. Again, total DRS accounted for more variance than the other two significant predictors, accounting for 40.4% of the variance in raw numeracy health literacy scores (See table 5).

Discussion

With cognition as a predictor of health literacy in the general population, the purpose of this study was to determine whether cognition predicted health literacy in a population with SMI, and whether other clinical variables predicted health literacy. To our knowledge, this study was the first to show cognition as a predictor of multiple health literacy domains in a population with SMI, and the first to show living situation as a predictor of total TOFHLA scores and raw numeracy TOFHLA scores. In contrast to previous literature, health literacy scores in this sample did not correlate with age, education, or positive and negative symptoms. Also differing from

most literature, the sample, overall, had high health literacy, rejecting the first hypothesis. The third hypothesis was correct in that cognition was a significant predictor of total health literacy and of the health literacy sub-scores, but living situation and gender were also found to be significant predictors of total and raw numeracy health literacy scores and raw numeracy health literacy scores, respectively. Living situation as a predictor of health literacy shows how people with SMI may get help understand health materials from people at home. Research shows that people with SMI with larger support networks and higher satisfaction with those networks report better recovery from serious mental illness (Corrigan & Phelan, 2004). Having that social support and help understanding health materials could contribute to improvement of one's experience with SMI. Surprisingly, positive and negative symptoms did not correlate significantly with any TOFHLA scores, and were not significant predictors of any health literacy scores. Controlling for positive and negative symptoms shows how cognition is still a significant predictor, even after taking those factors into account.

The study should be interpreted within the context of its limitations. Having a small sample size could explain why the sample had high health literacy; the sample lacked variability based on small numbers of participants. This could also explain why other sociodemographic variables did not correlate with health literacy scores. As the sample size was small, the study may have been underpowered to detect significant relationships among variables of interest. Furthermore, the study sample included individuals who were interested in research on health behaviors and therefore, they may have been more motivated to participate and had higher health literacy than other individuals with SMI. The population was also moderately symptomatic, and results may not generalize to populations with greater symptom severity. This study was also part of a larger study comparing people with SMI only, people with type 2 diabetes only, and

people with both type 2 diabetes and SMI; therefore, results may differ depending on health status.

Knowing cognition can predict health literacy in people with SMI could help physicians and practitioners provide better care. Current literature shows people with SMI have suboptimal health service use (Hert et al., 2011) and have worse adherence to chronic illness treatments (CDC, 2011), and additional research on factors that impact health service use and treatment adherence is needed. Having lower health literacy could discourage people with SMI to use health services because they won't understand the information being provided. Further research needs conducted to determine whether health literacy in people with SMI directly affects these health disparities. Additionally, further research could be conducted to understand how specific cognitive components such as memory and initiation and perseveration are important for health literacy. This study can help health care practitioners use cognition as a predictor of health literacy to provide better, well-explained care to people with SMI.

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Appendix A

Table 1. *Demographic, Literacy, Health, and Symptomatic Characteristics of Participants*

Instrument	*n*	%	*M*	*SD*	Range	Low	High
Demographic							
Race/Ethnicity	56	100					
White	48	85.7					
Non-White	8	14.3					
Gender	56	100					
Male	21	37.5					
Female	34	60.7					
Other	1	1.8					
Living Situation	56	100					
Alone	26	46.4					
With Someone	26	46.4					
Other	3	5.4					
Missing	1	1.8					
Marital Status	56	100					
Married/Cohabitating	11	19.6					
Not Current Married	29	51.8					
Single, Never Married	15	26.8					
Missing	1	1.8					
Highest Education Level	57	100					
<9th Grade	4	7.1					
9th-12th (no diploma)	4	7.1					
GED	1	1.8					
H. S. Graduate	15	26.8					
Some College	22	39.3					
Associate Degree	1	1.8					
Bachelor Degree	7	12.5					
Graduate/Prof Degree	2	3.6					
Health Literacy							
TOFHLA Raw Numeracy	56	--	13.96	2.304	10	7	17
TOFHLA Weighted Numeracy	56	--	41.71	6.760	29	21	50
TOFHLA Reading Comprehension	56	--	42.63	6.797	28	22	50
TOFHLA Total Score	56	--	84.54	10.973	47	52	99
TOFHLA Functional Level	56	100					
Inadequate	3	5.4					
Marginal	5	8.9					
Adequate	48	85.7					
Psychiatric Symptoms							
PANSS Positive Scale	56	--	14.00	5.092	18	7	25
PANSS Negative Scale	56	--	13.34	6.512	24	7	31
PANSS General Scale	56	--	30.23	9.881	38	17	55
PANSS Total Score	56	--	57.39	18.95	70	31	101

Cognitive Functioning							
DRS Attention Subscale	56	--	36.02	1.104	5	32	37
DRS Initiation/Perseveration Subscale	56	--	32.57	5.846	20	17	37
DRS Construction Subscale	56	--	5.80	0.483	2	4	6
DRS Conceptualization Subscale	56	--	34.82	3.795	16	23	39
DRS Memory Subscale	56	--	22.29	2.410	9	17	26
DRS Total Score	56	--	131.45	10.775	47	97	144
Depressive Symptoms							
HAM-D Total Score	56	--	18.46	11.256	55	0	55

Includes the following measures: Test of Functional Health Literacy in Adults (TOFHLA), Positive and Negative Syndrome Scale (PANSS), Mattis Dementia Rating Scale (DRS), Hamilton Depression Rating Scale (HAM-D).

Table 2. *Correlations among Variables of Interest*

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	.17	.18	19.	20.	21.
1. Race/Ethnicity	--																				
2. Gender	.112	--																			
3. Living Situation	-.044	-.044	--																		
4. Marital Status	-.038	.197	.239	--																	
5. Highest Education Level	-.059	.062	.152	-.046	--																
6. PANSS Positive	.172	-.040	.172	-.104	-.185	--															
7. PANSS Negative	.152	.006	.021	-.145	-.244	.416[b]	--														
8. PANSS General	.157	.057	.084	-.108	-.287[a]	.535[b]	.806[b]	--													
9. PANSS Overall	.184	.033	.092	-.121	-.285[a]	.695[b]	.881[b]	.953[b]	--												
10. DRS Attention	-.053	-.135	.038	.170	-.123	-.133	-.315[b]	-.167	-.231	--											
11. DRS Initiation/Perseveration	-.199	-.069	-.026	-.037	.131	-.210	-.575[b]	-.414[b]	-.471[b]	.413[b]	--										
12. DRS Construction	.061	.014	-.454[b]	.011	.029	-.421[b]	-.360[b]	-.325[a]	-.410[b]	.177	.253	--									
13. DRS Conceptualization	-.076	-.083	-.060	.051	.099	-.355[b]	-.466[b]	-.346[b]	-.431[b]	.339[a]	.509[b]	.318[a]	--								
14. DRS Memory	-.113	-.091	.065	.078	.264[a]	-.228	-.318[a]	-.292[a]	-.322[a]	.306[b]	.473[b]	.283[a]	.544[b]	--							
15. DRS Total	-.160	-.097	-.040	.040	.153	-.310[a]	-.604[b]	-.446[b]	-.525[b]	.528[b]	.889[b]	.377[b]	.800[b]	.715[b]	--						
16.	.084	.158	.033	.071	-.370[b]	.336[a]	.584[b]	.758[b]	.689[b]	-.131	-.302[a]	-.368[b]	-.368[b]	-.240	-.367[b]	--					
17. TOFHLA Numeracy	-.172	.264	.309[a]	.066	.038	-.045	-.092	-.135	-.123	.143	.246	-.006	.153	.316[a]	.272[a]	-.100	--				
18. TOFHLA Weighted Numeracy	-.173	.261	.321[a]	.061	.040	-.044	-.091	-.139	-.124	.154	.245	.005	.141	.322[a]	.270[a]	-.107	.997[b]	--			
19. TOFHLA Reading	-.250	-.031	.101	.103	.025	-.262	-.192	-.124	-.207	.125	.377[b]	.110	.248	.430[b]	.407[b]	-.066	.394[b]	.393[b]	--		
20. TOFHLA Functional	-.269[a]	.118	.270[a]	.104	.045	-.189	-.185	-.179	-.217	.172	.398[b]	.079	.241	.470[b]	.428[b]	.115	.835[b]	.836[b]	.819[b]	--	
21.TOFHLA Total Score	-.288[a]	.192	.244	.035	-.042	-.069	-.071	.002	-.046	.070	.277[a]	-.012	.176	.380[b]	.302[a]	-.066	.663[b]	.667[b]	.684[b]	.807[b]	--

Note. Correlations represent Pearson, point-biserial, Spearmans' rho.
[a] $p < .05$
[b] $p < .001$

Table 3. *Two-step hierarchical linear regression analysis predicting total TOFHLA health literacy scores.*

Step/Variables	*β*	R^2	ΔR^2	*F*	*df*	*t*	*p*
Step 1		.089		2.498	2,51		.092
Gender	.120					.897	.374
Living Situation	.276					2.065	.044
Step 2		.321	.232	5.466	3,48		.002
Gender	.169					1.409	.165
PANSS Positive Scores	-.149					-1.111	.272
PANSS Negative Scores	.187					1.191	.240
Living Situation	.317					2.615	.012
DRS Total Scores	.519					3.423	<.001

Table 4. *Two-step hierarchical linear regression analysis predicting reading comprehension TOFHLA health literacy scores.*

Step/Variables	*β*	R^2	ΔR^2	*F*	*df*	*t*	*p*
Step 1		.014		.364	2,51		.697
Gender	-.036					-.260	.796
Living Situation	.112					.807	.423
Step 2		.219	.205	2.693	5,48		.032
Gender	.001					.009	.993
Living Situation	.163					1.257	.215
PANSS Positive Scores	-.222					-1.545	.129
PANSS Negative Scores	-.162					.960	.342
DRS Total Scores	.103					2.542	.011

Table 5. *Two-step hierarchical linear regression analysis predicting raw numeracy TOFHLA health literacy scores.*

Step/Variables	*β*	R^2	ΔR^2	*F*	*df*	*t*	*p*
Step 1		.171		5.243	2,51		.008
Gender	.271					2.127	.038
Living Situation	.317					2.483	.016
Step 2		.284	.113	3.804	5,48		.006
PANSS Positive Scores	-.026					-.186	.853
PANSS Negative Scores	.157					.973	.335
Gender	.313					2.510	.015
Living Situation	.332					2.707	.010
DRS Total Scores	.404					2.602	.013