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Abstract

Poor health literacy reduces the efficacy of behavior change interventions, hampers management of health conditions, and attenuates understanding of the prevention and treatment of diseases. Poor health literacy has also been linked to fair/poor self-rated health in domiciled samples; however, there is a paucity of studies on the relation amongst homeless adults, who bear a disproportionate burden of disease and disability and require a high level of care and access to health services. Here, we examined the association between health literacy and self-rated health among a convenience sample of homeless adults. Participants were recruited from six homeless-serving agencies in Oklahoma City (*N* = 575; 63% men, Mage = 43.6+12.3). We used logistic regression to assess the association between health literacy (confidence completing medical forms: extremely/quite a bit versus somewhat/little bit/not at all) and self-rated health (poor/fair versus good/very good/excellent), controlling for age, subjective social status, education, race, sex, income, health insurance, employment, social security recipient status, diabetes diagnosis, high blood pressure diagnosis, and high cholesterol diagnosis. In the adjusted model, health literate homeless individuals had greater odds of endorsing good/very good/excellent self-rated health compared to those somewhat/a little bit/not at all confident completing medical forms (AOR = 2.02, [CI95% = 1.35-3.02]). Interventions targeted at adjusting reading level and comprehensibility of health information are needed for homeless individuals with poor/limited health literacy, which may ultimately impact their self-rated health. Shelters and homeless-serving agencies could host classes focused on practical skills for enhancing health literacy and/or provide navigation services.

Keywords

health literacy, self-rated health, homeless

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Abstract

Poor health literacy reduces the efficacy of behavior change interventions, hampers management of health conditions, and attenuates understanding of the prevention and treatment of diseases. Poor health literacy has also been linked to fair/poor self-rated health in domiciled samples; however, there is a paucity of studies on the relation amongst homeless adults, who bear a disproportionate burden of disease and disability and require a high level of care and access to health services. Here, we examined the association between health literacy and self-rated health among a convenience sample of homeless adults. Participants were recruited from six homeless-serving agencies in Oklahoma City (N = 575; 63% men, M_{age} = 43.6±12.3). We used logistic regression to assess the association between health literacy (confidence completing medical forms: extremely/quite a bit versus somewhat/little bit/not at all) and self-rated health (poor/fair versus good/very good/excellent), controlling for age, subjective social status, education, race, sex, income, health insurance, employment, social security recipient status, diabetes diagnosis, high blood pressure diagnosis, and high cholesterol diagnosis. In the adjusted model, health literate homeless individuals had greater odds of endorsing good/very good/excellent self-rated health compared to those somewhat/a little bit/not at all confident completing medical forms (AOR = 2.02, [$CI_{95\%}$ = 1.35-3.02]). Interventions targeted at adjusting reading level and comprehensibility of health information are needed for homeless individuals with poor/limited health literacy, which may ultimately impact their self-rated health. Shelters and homeless-serving agencies could host classes focused on practical skills for enhancing health literacy and/or provide navigation services.

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Health literacy is the degree to which individuals have the capacity to obtain, process, and understand health information and services, and apply that acquired information in health decision-making (Institute of Medicine (US) Committee on Health Literacy, 2004; Magnani et al., 2018). One of the approaches to measuring health literacy is based on an individual's self-rating of difficulty with understanding or reading medical or health information (Chew et al., 2008). Health literacy is considered a vital asset to the maintenance and promotion of good health. Hence, poor or limited health literacy can pose a barrier to disease prevention, access to health information, utilization of health care services (e.g., cancer screenings), and medication use (Magnani et al., 2018; Peterson et al., 2011). It is, therefore, not surprising that poor health literacy has been associated with limited knowledge of medications and health conditions, higher likelihood of morbidity and mortality, hospitalization, health expenditures, and poor health outcomes (Magnani et al., 2018; Peterson et al., 2011). When compared to those with high health literacy skills, individuals with poor health literacy not only tend to be less healthy, but are also

more likely to have difficulties reading and comprehending medical information on prescription labels and completing hospital forms (Rothman et al., 2009; van der Heide et al., 2013). Poor health literacy could also lead to the inability of individuals to develop the knowledge, skills, and confidence to make beneficial health decisions. Thus, poor health literacy is associated with reduced efficacy of behavior change interventions, impaired management of health conditions, and attenuated understanding of the prevention and treatment of diseases (Lee, 2017; Magnani et al., 2018).

Poor health literacy is a significant problem, especially among homeless individuals who already bear a disproportionate burden of disease and disability, and require a high level of care and access to health services (Baggett et al., 2013; Romaszko, Cymes, Dragańska, Kuchta, & Glińska-Lewczuk, 2017). A study by Sleath and colleagues (2006) exploring barriers to taking medication among homeless women found that homeless women with low health literacy were more likely to report barriers to giving their child needed medicine compared to those with high health literacy. Another study reported difficulty with navigating through a complex healthcare system, a potential manifestation of poor health literacy, as a barrier to accessing primary health care among homeless adults (Campbell, O'Neill, Gibson, & Thurston, 2015). Not surprisingly, homeless individuals have a life expectancy of about 18 years shorter than the general population (Romaszko et al., 2017).

Among domiciled samples, poor/limited health literacy has also been linked with poor/fair self-rated health (Furuya, Kondo, Yamagata, & Hashimoto, 2015; Marques, Escarce, & Lemos, 2018), defined as the subjective perception of one's own health status (Salomon, Nordhagen, Oza, & Murray, 2009). Self-rated health is an important indicator of an individual's health status and a critical indicator of morbidity, mortality, disability, and risk behaviors in domiciled samples (Salomon et al., 2009; van der Heide et al., 2013). Studies indicate that at least a quarter of homeless adults rate their health as fair/poor (Chang et al., 2015; Taylor, Kendzor, Reitzel, & Businelle, 2016). The fair/poor self-rated health reported by homeless adults could be partially influenced by poor health literacy, which can reduce the likelihood that individuals will successfully access and utilize health services (Lee, 2017). Apart from poor health outcomes, studies have shown poor/limited health literacy to be linked with education, income, and other sociodemographic measures (Joffer, Flacking, Bergström, Randell, & Jerdén, 2019). For example, compared to those with higher education levels, individuals with lower education were more likely to exhibit poor/limited health literacy (van der Heide et al., 2013). Further, education inequalities exist in self-rated health, whereby individuals with lower education were more likely to engage in health risk behaviors compared with individuals with higher education levels, resulting in poorer health outcomes (Bayati, Dehghan, Bonyadi, & Bazrafkan, 2018).

The current study examined the relation between health literacy and self-rated health among homeless adults. We hypothesized that health literacy would be positively associated with self-rated health among homeless adults. A better understanding of this relationship may initiate dialogues and interventions that support health literacy skills among adults seeking homelessness-related services.

Methods

Sample Recruitment

Data for the parent study were collected from July to August of 2016 as part of a larger study focused on health among a large, convenience sample of adults recruited from six homeless-serving agencies in Oklahoma City, OK (Maness et al., 2019). Recruitment was accomplished via flyers posted at the involved agencies. Eligibility criteria were ≥ 18 years of age and a ≥ 7th grade English literacy level (Arozullah et al., 2007). Eligible and interested individuals completed the informed consent process and data collection procedures. Participants were compensated with a $20 department store gift card. All procedures were approved by Institutional Review Boards of at the University of Oklahoma Health Sciences Center and the University of Houston.

Measures

Predictor. Health literacy was measured with a single item reading: "How confident are you filling out medical forms by yourself?," with five response options: 1 = Extremely; 2 = Quite a bit; 3 = Somewhat; 4 = A little bit; 5 = Not at all; later categorized as extremely/quite a bit versus somewhat/a little bit/not at all (Chew, Bradley, & Boyko, 2004). This single health literacy screening measure has been used in prior studies, is highly correlated with other widely used measures of health literacy, and has been linked to smoking, lower communication skills, and higher perceived stress in prior work (Chew et al., 2004; Stewart et al., 2015; Wynia & Osborn, 2010).

Outcome. Self-rated health was assessed with a single item reading: "Would you say your health in general is…" with five response options: 1 = Excellent; 2 = Very good; 3 = Good; 4 = Fair; and 5 = Poor; which were later dichotomized into good/very good/excellent versus poor/fair (Idler & Angel, 1990; Salomon et al., 2009) for primary analyses based on restriction of range. This single item has been used in multiple national surveys, has established reliability and validity, is linked to morbidity and mortality, and has been commonly used to capture self-rated health in other work (Chang et al., 2015; Cuevas et al., 2013; Fisher et al., 2014; Jylhä, 2009; Savoy et al., 2014; Stewart et al., 2015).

Covariates. Continuous variables were self-reported and included age and subjective social status (community ladder from 1 to 10, where respondents rank their relative standing in their self-defined community with 1 = bottom of the ladder and 10 = top of the ladder; Adler & Stewart, 2007). Other covariates were categorical: education (< GED/high school degree; ≥ GED/high school degree), race (white; black; other), sex (male; female), yearly income (≤ $5,000; > $5,000), health insurance (uninsured; insured), employment (unemployed; employed), social security recipient (no; yes), diabetes diagnosis (no; yes), high blood pressure diagnosis (no; yes), and high cholesterol diagnosis (no; yes).

Data Analysis

Descriptive analyses were used to describe participants' characteristics. Before running regression models, we assessed multicollinearity using variance inflation factors, and all were within the acceptable limit of < 5. A binary logistic regression model was estimated for the outcome variable (self-rated health) to assess the main effect of the independent variable (health literacy), while controlling for covariates (age, subjective social status, education, race, sex, income, health insurance, employment, social security recipient, diabetes diagnosis, high blood pressure diagnosis, and high cholesterol diagnosis). A final, covariate-adjusted ordinal logistic regression was conducted, using the 5-level self-rated health variable, to ensure a consistent pattern with logistic regression results. All analyses used two-tailed tests of significance with a significance level set at $p \leq .05$, and were conducted using IBM SPSS Statistics for Windows, Version 25.0.

Results

Of the $N = 610$ individuals participating in the study, 35 (5.7%) were excluded from the analytic sample based on missing data. Percent of missing data for each variable independently was as follows: age (1.3%), subjective social status (0.16%), education (0.16%), race (0.83%), sex (0%), income (4.3%), health insurance (0.16%), employment (0.16%), social security recipient (0.16%), diabetes diagnosis (0.16%), high blood pressure diagnosis (0.16%), high cholesterol diagnosis (0.16%), health literacy (0.32%), and self-rated health (0.16%).

The majority of participants ($N = 575$; 86.6%) reported being homeless, with a mean length of lifetime homelessness of 3.2±5.1 years. About 74% reported spending the night at a shelter over the past three months, while 48% reported staying at the shelter where data were collected for three weeks or longer. Overall, 64% rated their health as good/very good/excellent, and 68.3% felt extremely/quite a bit confident filling out medical forms alone. Descriptive statistics are shown in Table 1.

In adjusted models, the odds of rating health as good/very good/excellent was lower for women (AOR = 0.62, [$CI_{95\%}$ = 0.42-0.92]), as was a diagnosis of diabetes (AOR = 0.54, [$CI_{95\%}$ = 0.30-0.96]); high cholesterol (AOR = 0.50, [$CI_{95\%}$= 0.30, 0.83]); and high blood pressure (AOR = 0.48, [$CI_{95\%}$= 0.31, 0.73]). In the adjusted model including these and other covariates, health literate homeless individuals had greater odds of endorsing good/very good/excellent self-rated health compared to those who felt somewhat/a little bit/not at all confident filling out medical forms alone ((AOR = 2.02, [$CI_{95\%}$= 1.35, 3.02]); Cox & Snell R square = 0.143; Table 2). A final covariate-adjusted analysis was conducted that treated self-rated health as a 5-level ordinal variable, yielding a consistent pattern of results (AOR = 1.49, [CI_{95}%= 1.30, 1.71]).

Discussion

This study investigated the association between health literacy and self-rated health among homeless individuals. As hypothesized, individuals who were health literate reported better self-rated health compared to those who were only somewhat/a little bit/not at all confident completing medical forms by themselves. Results are consistent with previous studies conducted amongst domiciled samples linking health literacy with self-rated health (Fernandez, Larson, & Zikmund-Fisher, 2016; Marques et al., 2018) and extend these findings to a group with a

Table 1

Participant Characteristics (N = 575)

Variable	*N* (%) / *M* [*SD*]
Age	
18 to 99 years old	43.6 [12.3]
Subjective social status	
Scale of 1 to 10	4.85 [2.57]
Education	
< GED/high school degree	143 (24.9)
≥ GED/high school degree	432 (75.1)
Race	
White	329 (57.2)
Black	115 (20.0)
Other	131 (22.8)
Sex	
Male	361 (62.8)
Female	214 (37.2)
Income (past year)	
≤ $5,000	395 (68.7)
> $5,000	180 (31.3)
Health insurance	
Uninsured	389 (67.7)
Insured	186 (32.3)
Employment status	
Unemployed	507 (88.2)
Employed	68 (11.8)
Social security recipient	
No	456 (79.3)
Yes	119 (20.7)
Diabetes	
No	500 (87.0)
Yes	75 (13.0)
High cholesterol	
No	460 (80.0)
Yes	115 (20.0)
High blood pressure	
No	330 (57.4)
Yes	245 (42.6)
Health literacy	
Somewhat/a little bit/not at all	182 (31.7)
Extremely/quite a bit	393 (68.3)
Self-rated health	
Poor/fair	210 (36.5)
Good/very good/excellent	365 (63.5)

Table 2

Adjusted Logistic Regression Results of Association between Health Literacy and Self-rated Health (N = 575)

	OR **Self-rated health**	**95% CI**	***p***
Health literacy			
Somewhat/A little bit/not at all	1.00	Referent	.001
Extremely/quite a bit	2.02	1.35-3.02	
Age			
18-99 years old	0.99	0.97-1.01	.276
Subjective social status			
Scale of 1 to 10	1.08	1.00-1.16	.066
Education			
< GED/high school degree	1.00	Referent	
≥ GED/high school degree	1.25	0.82-1.93	.304
Race			
White	1.00	Referent	
Black	1.60	0.97-2.66	.099
Other	1.49	0.93-2.37	.118
Sex			
Male	1.00	Referent	
Female	0.62	0.42-0.92	.018
Income			
≤ $5,000	1.00	Referent	
> $5,000	1.12	0.73-1.71	.600
Health insurance			
Uninsured	1.00	Referent	
Insured	1.02	0.59-1.75	.952
Employment status			
Unemployed	1.00	Referent	
Employed	1.36	0.76-2.42	.304
Social security recipient			
No	1.00	Referent	
Yes	1.20	0.62-2.30	.588
Diabetes			
No	1.00	Referent	
Yes	0.54	0.30-0.96	.036
High cholesterol			
No	1.00	Referent	
Yes	0.50	0.30-0.83	.008
High blood pressure			
No	1.00	Referent	.001
Yes	0.48	0.31-0.73	
Intercept	1.25		

Note. Model statement: Odds of good/very good/excellent self-rated health = 1.25 + 2.02*Health Literacy + 0.99*Age + 1.08*Subjective Social Status+ 1.25*Education + 1.61*Race_Black + 1.49*Race_Other + 0.62*Sex + 1.12*Income + 1.02*Health Insurance + 1.36*Employment Status + 1.20*Social Security Recipient + 0.54*Diabetes + 0.50*High Cholesterol diagnosis + 0.78*High Blood Pressure diagnosis
-2 Log Likelihood for Intercept only model: 1719.491; -2 Log Likelihood for Final model: 1564.004; $p < 0.001$

significant burden of disease (Baggett, Liauw, & Hwang, 2018; Chang et al., 2015; Roncarati et al., 2018). Based on our current results, we propose that special attention and intervention is needed among homeless individuals with poor health literacy levels to improve their ability to understand and process health information, which may ultimately impact their self-rated health. To accomplish this, shelters and homeless-serving agencies could focus on developing intervention materials with lower reading levels that are engaging, host classes focused on practical skills for enhancing health literacy for homeless individuals, and/or offer navigators to assist adults with limited health literacy to obtain healthcare. Additionally, increasing educational attainment among homeless individuals could also mitigate poor health literacy, as supported by research conducted among domiciled adults (Bayati et al., 2018).

Sex was identified as a significant covariate in the relation between health literacy and self-rated health. Women in our sample were less likely to report good/very good/excellent self-rated health compared to men. Research among domiciled adults has found stronger links between self-rated health and premature morbidity/mortality among women than men (Khang & Kim, 2010). While these results are not generalizable to homeless adults, results may suggest a critical need for targeted intervention efforts oriented toward homeless women to promote their health (Khang & Kim, 2010). These interventions might include attention to enhancing health literacy (Khang & Kim, 2010). Qualitative research with homeless women may reveal strategies to enhance both their health and health literacy.

Limitations include the cross-sectional nature of the study, whereby causality and temporality cannot be inferred. Longitudinal studies are needed to elucidate the relationship between health literacy and self-rated health among homeless individuals. Additionally, individuals with low reading literacy were excluded, which may have restricted the range for health literacy in this sample. However, significant results with even a restricted range on this construct suggest the veracity of associations. In addition, our results may not extend to homeless individuals who received services from one of the agencies but chose not to participate. However, a snapshot count of homeless individuals in Oklahoma City was reported to be 1,393 (excludes unaccompanied youths) in January 2016. Based on this number, it can be argued that our sample size of 610 included about 44% of the homeless adults in the area at the time (Oklahoma City Planning Department, 2016). Also, the health literacy and self-rated health responses were categorized based on restriction of range; however, associations were also tested using the ordinal form of self-rated health in an ordinal regression approach and results remained consistent. Results may not be generalizable to samples from other cities or states and therefore require replication – especially with more comprehensive measures of health literacy. Moreover, the reliability of the health literacy item over time is unknown; however, it would not be expected to change absent intervention or additional education. While we attempted to adjust for variables in the association between health literacy and self-rated health, we may not have accounted for all relevant factors (e.g., marital status). Finally, although self-rated health can encompass general health conditions, it is indistinct as to which areas of health individuals refer to when they rate their health (e.g., physical and/or mental). Despite these limitations, our study has notable strengths, which include recruitment from multiple sites (six homeless-serving agencies), coupled with a large sample size. Our study is also the first to assess the relationship between health literacy and self-rated health among homeless adults. Further, the current work supports the need to promote health literacy skills among homeless individuals or individuals utilizing shelter services. Future research could benefit from assessing the differences in health behaviors for individuals reporting high literacy versus low literacy.

Implications for Health Behavior Theory

As shown in our results, health literacy is associated with self-rated health among homeless individuals utilizing shelter services. Health literacy translates into skills to guide disease prevention, access to health information, utilization of health care services, and medication use (Magnani et al., 2018; Marques et al., 2018; Peterson et al., 2011). Therefore, being health literate is not only the responsibility of the affected individual, but extends to action of health care systems, homeless-serving agencies including shelters, and all involved with the provision of care and service to homeless individuals (Magnani et al., 2018). Theoretical underpinnings for health literacy exist in multiple theories, all of which address rationales for individual, social, community, provider, organizational, and system-level behavior practices (Magnani et al., 2018; Paasche-Orlow & Wolf, 2007). The social ecological model, informed by these health behavior theories, can help in understanding the relationship between health literacy and self-rated health and informing intervention approaches. For example, the social ecological model posits individual, organizational, and system-level factors that influence initiation and maintenance of healthy behaviors (McCormack, Thomas, Lewis, & Rudd, 2017). Beyond educational provision at the individual level, homeless-serving agencies and healthcare providers should ensure simplification, suitability, and accessibility of information used for homeless individuals or individuals utilizing shelter services. Effective communication and interaction is also a necessary skill for individuals who work with homeless stakeholders, which will in turn enable individuals receiving services to better make informed decisions about their health. Given the strong association between health literacy and self-rated health, these single-item measures could be incorporated into shelter and healthcare provider screening forms to identify individuals with poor/limited literacy for an enhanced level of service provision to navigate healthcare systems and their recommendations (Stewart et al., 2015).

Discussion Question:

1. Our findings show an association between limited health literacy and poor/fair self-rated health among homeless adults. What are efficient and effective ways health care providers, shelters, and homeless-serving agencies can improve health literacy among homeless individuals?

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