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Overconfidence in Managing Health Concerns: The Dunning–Kruger Effect and Health Literacy

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Abstract
Health literacy is often low within the general population. The Dunning–Kruger effect (DKE) suggests that individuals may experience a cognitive bias in which they overestimate their own knowledge base. This study examines the DKE regarding health literacy and health behaviors. A community sample ($n=504$) completed questionnaires measuring objective health literacy, confidence in health knowledge, and health behaviors and medical conditions. Results support the presence of a DKE for health literacy; individuals with low health literacy reported equal or greater confidence in health knowledge than individuals with higher health literacy. Individuals with lower health literacy reported more problematic engagement in health behaviors. Low health literacy can impact engagement in health behavior and effect health outcomes, but individuals may not realize this deficit. Implications for clinical intervention include the need to address cognitive bias and enhance motivation to participate in health literacy interventions.

Keywords Health literacy · Dunning–Kruger effect · Cognitive bias · Health behavior

Health literacy is broadly defined as an individual's ability to read, comprehend, and use the information necessary to obtain adequate healthcare (Vahabi, 2007). Although health is consistently rated as one of the most valued principles in American culture and people tend to report motivation to learn about their health and potential risks, individuals are unrealistically optimistic about their health risks. Unrealistic optimism causes individuals to misread emotions regarding others' health and illnesses, and to become quite comfortable with self-diagnosis (Dunning et al., 2004). Because of the interesting incongruencies among reported health values and health behaviors, health literacy has been heavily researched within the past two decades with a variety of populations and related factors. The importance of health literacy on health outcomes is widely known. For instance, patients diagnosed with heart failure and who had adequate health literacy skills had more general knowledge about their condition and greater self-care confidence (Dennison et al., 2011). Despite the widespread importance of appropriate digestion of this information, health literacy is low within our larger population (Chervin et al., 2012).

Health literacy, comprised of scientific and scholarly knowledge, is generally moderate to poor within our culture (Benotsch et al., 2004), and predictably lower among individuals with poorer literacy abilities (Freedman et al., 2011). Despite this widespread occurrence, individuals continually perceive that they can appropriately digest health literacy and risk behaviors. Inadequate health literacy is consistently reported as a risk factor for smoking cessation success (Stewart et al., 2013), parental adherence to infant feeding schedules and physical activity behaviors (Yin et al., 2014), and mothers' knowledge to obtain child care subsidies (Pait et al., 2014). Older adults with associated low health literacy skills and lower cognitive functioning than their average counterparts have worse general physical fitness, greater BMI, and fewer natural teeth (Mottus et al., 2014) and often have non-familial caregivers with poor health literacy that results in less than adequate care (Stewart et al., 2013). Poor health literacy has detrimental impacts on health behaviors and overall wellness, including having less understanding of ones' illness, higher psychosocial distress, poorer self-reported health, worse health outcomes, higher rates of hospitalization, higher healthcare costs, and higher risk of death (Mazor et al., 2012).

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Although adult education classes (Chervin et al., 2012; Freedman et al., 2011) and transparent visual aids (Garcia-Retamero & Cokely, 2017) have improved health literacy among a wide breadth of diverse populations, lower general literacy abilities do not fully account for the widespread health literacy skills within our population. Individuals in a diverse urban setting have demonstrated their abilities to use their social resources to find appropriate healthcare, perceive their need for care, and form meaningful relationships with their providers, despite literacy ability (Samerski, 2019). Because of the lack of adequate health literacy among individuals with good literacy skills, researchers have proposed a comprehensive model of understanding and measuring health literacy that includes cognitive biases, academic skills, and health knowledge (Ownby et al., 2014).

Cognitive Bias

Cognitive biases are systemic and predictable errors in judgment that result from reliance heuristics (Blumenthal-Barby & Kriger, 2015). Most persons believe that they rely on inductive reasoning for decision making purposes, but often rely on heuristics or "good enough" decisions. Cognitive researchers propose a dual process theory to explain cognitive biases that includes two systems. System one heavily relies on heuristics and cognitive biases and involves mostly unconscious, quick, and effortless thinking that is influenced by our past experiences, emotions, and memories. System two is deliberate, analytic, and cognitive resource-intensive, operating with much effort and control that is influenced by rational thinking, intention, logics, facts, and evidence. Although system two is much more accurate, it is often too slow for our fast-paced lives, especially within the world of healthcare (Smith, 2017).

Commonly known cognitive biases both inside and outside of healthcare include the anchoring bias, ascertainment bias, availability bias, confirmation bias, ordering effect, outcome bias, optimistic bias, and overconfidence bias (Elstein, 1999; Smith, 2017; Vahabi, 2007). Commonly utilized cognitive biases among both patients and medical providers (Fawyer et al., 2020; Braverman & Blumenthal, 2012; Hershberger et al., 1997) include the sunk-cost principle, the loss/gain framing bias, and the omission bias. These commonly used cognitive biases negatively affect both probability estimation of health-related risk behaviors and synthesis of health information. Cognitive biases and heuristics are relevant to both patients and medical providers through informed consent, physician–patient communication, patient adherence, and physician accuracy in diagnosis and treatment (Blumenthal-Barby & Krieger, 2015).

Further, blind spot bias suggests that people report that cognitive biases are more prevalent among their peers compared to themselves (West et al., 2012). Individuals with higher blind spot bias were more likely to have poor health literacy, make less than adequate medical choices, and fail to critically evaluate health information obtained from providers, advertisements, and the internet (West et al., 2012). Due to emerging research addressing the nuances of health literacy, Martensson and Hensing (2012) have proposed a second, more comprehensive approach to understanding this construct that encompasses the importance of utilizing critical thinking skills to accurately digest health information that translates into health behaviors. This model includes acknowledging an individual's social and cultural constructs that can cause fluctuation in their health literacy skills based on the identified situation (Martensson & Hensing, 2012). Although there is pre-existing literature regarding the role of various cognitive biases in poor health literacy, important components of this framework remain unclear, including the tendency to overestimate ones' abilities for a task in which they routinely do not perform well. One possible proposed missing factor is the Dunning–Kruger Effect.

Dunning–Kruger Effect

The Dunning–Kruger Effect (DKE) is a cognitive bias in which individuals overestimate their abilities (Dunning et al., 2004). The DKE encompasses individuals' inability to recognize their lack of ability, which leads to less than optimal decision making. Within the last decade, peer-reviewed research has addressed the various mechanisms driving the DKE. Examples of these mechanisms include the Better than Average Effect, that includes both motivational and perceptual-cognitive components, which suggests that individuals overestimate their self-ratings when being compared to their peers (Guenther & Alicke, 2010); metacognitive monitoring failure in evaluative situations (Kurdi et al., 2018), and metacognitive calibration sensitivity in relation to the task at hand (McIntosh et al., 2019); and, unrealistic optimism observed in individuals with poor health literacy and who are unable to adequately digest health information presented to them (Simons, 2013). Initially, DKE was proposed to be a metacognitive process, that is, individuals do not possess the metacognition to recognize their lack of ability related to certain tasks. Kreuger and Mueller (2002) argue that rather than relying solely on a metacognitive process, errors in the predictions of one's own performance can be explained by the regression of these predictions to the overall inflated mean, which has since been studied more extensively to understand the statistical artifacts of DKE. Another key mechanism driving the DKE is the false consensus effect, such that people overestimate how much others are like themselves, which can be explained through selective exposure, availability, resolution of ambiguity, or motivation (Bunker & Varnum, 2021). The DKE has been assessed and identified across a variety of cultures and populations (Coutinho et al., 2020). The inability to recognize lack of ability has been identified as a cognitive bias that fuels "intuitive thinking" that is easily accessible and requires less mental energy.

It is evident through previous research that our cognitive biases impact the ways in which we incorporate health literacy information into our existing beliefs. To date, there is limited research assessing the impact of DKE on health outcomes. Of particular interest is the relationship between DKE and beliefs about Autism Spectrum Disorder and anti-vaccination stances. In a large sample, researchers found that more than a third of the respondents thought that they knew as much or more than the physicians and scientists about the causes of Autism. Interestingly, overconfidence in Autism beliefs was highest among respondents with low levels of knowledge about the causes of Autism and those with high levels of misinformation endorsement (Motta et. al., 2018). Despite widespread public debunking of the link between vaccination and Autism, there are still many people who elect anti-vaccination stances for such purposes. Respondents in a study examining DKE, information sourcing, and endorsement of vaccination policy who endorsed being not in favor of vaccinations were found to be more confident in their knowledge, and were evenly distributed among their trust in physician versus internet sources for procuring information (Reed, 2021). Generally, the less people know about Autism the more they believe in the non-existent vaccination–autism link and the more they perceive themselves to be as knowledgeable about these issues as the trained experts (Franz, 2022). Thus, the DKE is understood to be an important factor in understanding the link between anti-vaccination and Autism fallacies.

A timely topic is the issue of COVID-19 public health advisories to help reduce the spread of the virus, including social distancing, masking, and vaccination. In the United States, there has been much uproar and passionate debate about the accuracy of such recommendations supported by science. Many American citizens rebelled against safety recommendations, acting as if they are more confident in their personal understanding of public health than that of physicians and scientists. In a study of over 2400 members of the public, those who knew less about COVID-19 were more likely to have sourced their information from mass media and social networks (Isaacs, 2022). Those who discredit COVID-19 safety precautions are not convinced through repeated presentation of evidence-based rationale; the DKE is cited as a reason for relevant anti-vaccination discreditation of medical evidence (Pullman & Dey, 2021). Generally, people reject scientific evidence about the safety of vaccines because they fail to grasp evidence about their own ignorance about vaccination (Franz, 2022).

To date, there is limited published research assessing the impact of DKE on health literacy, mostly dedicated to anti-vaccination fallacies. While this subset of research is important, the current authors chose to assess the possible broader impacts of DKE and health literacy. Due to the established research addressing the role of various cognitive biases in health literacy, it is plausible that the DKE subsequently impacts digestion of health information. It is important to understand factors contributing to health literacy, because low health literacy has been associated with mortality (Smith et al., 2018), and caregiver burden and caregiver poorer physical health (Hahn et al., 2020), among other effects. Acquiring accurate health literacy and critically evaluating presented information is a necessary foundational step for engaging in health-promoting behaviors that mitigate risk factors. Consistent with DKE, we hypothesize that individuals with lower levels of health literacy will express high confidence in their own knowledge of health as compared to individuals with objectively higher levels of health literacy. Further, we expect that individuals with low health literacy will also report poorer health behaviors and health outcomes than those with higher health literacy.

Method

Participants

Participants ($n = 504$) comprised a community sample recruited via Amazon Mechanical Turk. The mean age for the sample was 35.58 (SD = 11.75), with participants ranging in age from 18 to 72. The majority identified as female ($n = 293$, 58.0%), while 40.2% ($n = 203$) identified as male, 1.4% ($n = 7$) as "other," one participant identified as transgender, and one participant did not respond. Most participants were highly educated, with 66.0% having completed at least a bachelor's degree. Participants identified largely as white (59.8%, $n = 302$), with 22.2% ($n = 112$) identifying as Asian or Pacific Islander, 9.1% ($n = 46$) as African American or Black, 4.2% ($n = 21$) as multiracial, 2.8% ($n = 14$) as "other," 1.8% ($n = 9$) as Native American or Alaskan Native, and 0.2% ($n = 1$) did not report race. Of this sample, 16.0% ($n = 81$) identified as Hispanic. A large minority of participants (45.5%, $n = 230$) reported that they were married, with 31.9% ($n = 161$) describing themselves as single, 10.1% ($n = 51$) as cohabiting, 7.3% ($n = 37$) as dating, 4.2% ($n = 21$) as divorced, and 1.0% ($n = 5$) as widowed.

Measures

Demographics

Participants responded to several demographic questions, including questions about age, gender, race, ethnicity, education, and relationship status. Participants were also asked about the field in which they were or had been employed, as well as health problems they may have experienced.

Health Literacy

The Medical Term Recognition Test (METER; Rawson et al., 2010) is a 40-item measure in which participants select actual medical terms from a list including distractor items. Score is calculated based on the number of medical terms correctly identified, with higher scores indicating greater health literacy. Scores from 0 to 20 are associated with low health literacy, 21–34 with marginal health literacy, and 35–40 with functional health literacy. The METER has demonstrated good reliability, concurrent validity, and predictive validity (Rawson et al., 2010).

Perceived Knowledge of Health

A series of three questions developed for the purpose of this study was utilized to examine participants' confidence in their own degree of health literacy and perceived ability to manage their health. Specifically, participants were asked "As compared with other people in general, how would you rate your knowledge about" health, medical care, and health behaviors. Participants used a sliding scale from 0 to 100 to indicate their perceived knowledge in each of these areas, with an anchor for zero indicating "others know more than me" and an anchor for 100 indicating "I know more than others." For analytic purposes, each question will be treated separately rather than combining data into a single scale.

Engagement in Healthcare and Health Behaviors

Participants were presented with several questions developed for the purpose of this study regarding participation in the healthcare system, use of medications and supplements, and frequency of engagement in a variety of health behaviors including alcohol use, tobacco use, consumption of fruits and vegetables, exercise, and tanning.

Procedure

This study was approved by the Institutional Review Board of Marshall University (IRB #1495879–1). Participants were recruited via Amazon Mechanical Turk. Interested individuals were routed to the survey hosted on Qualtrics. After reading an IRB-approved consent document describing the study and relevant related information, participants could choose to navigate to the study, during which they completed a series of questionnaires. At the conclusion of the study, participants were reimbursed $0.10 for participation.

Data Analysis Plan

To ensure quality of data collected via Amazon Mechanical Turk, data were first inspected to determine that participants appeared to put forth effort. Response patterns reflecting excessive missing data or lack of variability in response choices were removed. In the cases of small amounts of missing data, it was determined given the measures utilized that imputation of missing data was not viable, so listwise deletion occurred within the context of individual analyses. A total of 570 individuals participated in the study; 64 were removed due to concerns about the validity of the data provided, leaving a sample of 506 participants. Following data cleaning, descriptive statistics were calculated for all demographic variables.

To assess the hypothesis regarding the presence of a DKE, participants were first categorized as "low," "marginal," or "functional" health literacy based on standardized cutoffs on the METER. Analysis of variance (ANOVA) was used to examine differences among these groups in each of the "perceived knowledge of health" questions, with post hoc analyses examining between-group differences using Tukey's HSD. Additionally, ANOVA was utilized to assess the impact of education level on overall health literacy scores, and a t-test examined for overall differences in scores between healthcare and non-healthcare workers to consider possible impacts of health education on overall results.

For the second hypothesis regarding impact of health literacy on health behaviors and outcomes, ANOVA was utilized to examine group differences between among the three health literacy groups for each health behavior and outcome measured. Further, frequencies were calculated regarding tobacco use to determine if differences occurred in the number of those using tobacco among the groups.

Results

Health Literacy and Healthcare Experience

The current sample overall had relatively high rates of health literacy, as is consistent with the high level of education among participants ($F(7, 497) = 5.341$, $p < 0.001$). The mean health literacy score was 29.46 (SD = 13.74). The majority of participants ($n = 314$) achieved health literacy scores consistent with functional health literacy (FHL), while smaller groups received scores indicating marginal (MHL; $n = 75$) or low (LHL; $n = 116$) health literacy. Further, 12.9% ($n = 65$) of the sample was comprised of individuals who reported working in healthcare or related fields. Health literacy scores were not significantly different among healthcare ($m = 32.38$, SD = 12.93) and non-healthcare workers ($m = 29.03$, SD = 13.82; $t = 1.934$, $p = 0.056$).

Confidence in Health Literacy

Confidence in their own health literacy among participants with functional, marginal, or low health literacy was generally similar across groups (see Table 1). While there were no differences among the groups regarding confidence in their knowledge about health overall ($F(2, 504) = 0.841$, $p = 0.432$) or their knowledge regarding health behaviors ($F(2, 502) = 2.321$, $p = 0.099$), participants reported differences in confidence in knowledge regarding medical care ($F(2, 504) = 4.324$, $p = 0.014$). However, where differences did emerge, participants with low health literacy rated their confidence in their own knowledge as greater than did individuals with marginal or functional health literacy. The overall pattern of results supports a Dunning–Kruger effect in that individuals with lower health literacy express similar or greater confidence in their health literacy than do individuals with higher levels of health literacy.

Health Literacy, Health Behavior, and Health Outcomes

Level of health literacy was associated with a number of health behaviors (see Table 2) including frequency of attending medical appointments ($F(2, 502) = 42.002$, $p < 0.001$), use of medications ($F(2, 423) = 27.225$, $p < 0.001$) and supplements ($F(2, 482) = 12.338$, $p < 0.001$), frequency of use of tobacco products among current tobacco users ($F(2, 191) = 19.672$, $p < 0.001$, frequency of exercise ($F(2, 501) = 3.649$, $p = 0.027$), and frequency of tanning ($F(2, 500) = 156.866$, $p < 0.001$). Examination of mean differences in these variables indicates that individuals with lower health literacy reported more frequent health appointments, use of more prescription medications, use of fewer supplements, less frequent engagement in exercise, and more frequent tanning. The exception to this pattern of poorer health behaviors among those with lower health literacy appears to be tobacco use, with tobacco users in the functional health literacy group reporting higher frequency of use than users in the low or marginal health literacy groups. Further review indicates, however, that while use was high among current tobacco users, the percentage of the sample who reported engaging in tobacco use was lower among those with functional health literacy (29%, or 90 participants from the overall group of $n = 312$), than those with marginal (45%, or 33 participants from the overall group of $n = 74$) or low health literacy (62%, or 71 participants from the overall group of $n = 115$). Health literacy was not associated with frequency of alcohol use ($F(2, 501) = 1.493$, $p = 0.226$) or consumption of fruits and vegetables ($F(2, 499) = 1.308$, $p = 0.271$), nor did differences in the number of reported health problems emerge among the groups ($F(2, 502) = 2.313$, $p = 0.100$).

Discussion

In this community sample, participants with low measured health literacy expressed equal or greater confidence in their knowledge about health-related factors than did participants with higher levels of health literacy. This supports the presence of a Dunning–Kruger effect; overconfidence was observed specifically in the low health literacy group relative to those with higher health literacy. Further, this translated to poorer health behaviors and outcomes for those with low health literacy. While the number of endorsed medical problems did not vary by group, perhaps associated with

Table 1 Confidence in health-related knowledge among individuals with functional, marginal, and low health literacy

	Mean (SD)	Mean difference from LHL	Mean difference from MHL	Mean difference from FHL
General health				
Low literacy (LHL)	65.40 (21.93)	–	0.86	2.82
Marginal literacy (MHL)	64.53 (20.62)	−0.86	–	1.97
Functional literacy (FHL)	62.59 (21.44)	−2.82	− 1.97	–
Medical care				
LHL	62.99 (20.67)	–	7.81*	6.61*
MHL	54.93 (21.16)	−7.81*	–	− 1.20
FHL	56.21 (23.12)	−6.61*	1.20	–
Health behaviors				
LHL	66.55 (21.36)	–	5.85	4.76
MHL	60.66 (21.85)	−5.85	–	−1.10
FHL	61.76 (22.45)	−4.76	1.10	–

*$p < 0.05$

Table 2 Reported health behaviors among individuals with low, marginal, or functional health literacy

	Mean (SD)	Mean difference from LHL	Mean difference from MHL	Mean difference from FHL
Medical appt frequency[a]				
Low literacy (LHL)	3.57 (1.88)	–	−1.66***	−1.80***
Marginal literacy (MHL)	5.23 (2.13)	1.66***	–	−0.15
Functional literacy (FHL)	5.37 (1.74)	1.80***	0.15	–
Number of medications				
LHL	2.44 (2.17)	–	1.35***	1.47***
MHL	1.09 (1.50)	−1.35***	–	0.12
FHL	0.97 (1.28)	−1.47***	−0.12	–
Number of supplements				
LHL	0.36 (1.49)	–	−0.16	−0.75***
MHL	0.51 (0.92)	0.16	–	−0.59**
FHL	1.11 (1.59)	0.75***	0.59**	–
Frequency of alcohol use				
LHL	3.00 (1.72)	–	−0.11	−0.35
MHL	3.11 (1.99)	0.11	–	−0.24
FHL	3.35 (2.03)	0.35	0.24	–
Frequency of tobacco use				
LHL	3.37 (1.74)	–	−1.18*	−2.13***
MHL	4.55 (2.59)	1.18*	–	−0.95
FHL	5.49 (2.38)	2.13***	0.95	–
Frequency of fruit/veg consumption				
LHL	5.21 (2.21)	–	−0.52	−0.14
MHL	5.73 (2.15)	0.52	–	0.38
FHL	5.35 (2.21)	0.14	−0.38	–
Frequency of exercise				
LHL	5.01 (2.27)	–	−.10	−0.56*
MHL	5.11 (2.17)	0.10	–	−0.46
FHL	5.56 (2.01)	0.56*	0.46	–
Frequency of tanning				
LHL	3.05 (1.79)	–	1.61***	1.94***
MHL	1.45 (1.00)	−1.61***	–	0.34*
FHL	1.11 (0.49)	−1.94***	−0.34*	–

[a]Higher scores are associated with lower frequency of appointments, with scores ranging from 1–9

*$p < .05$

**$p < .01$

***$p < .001$

the relative youth of the sample which may have impacted overall likelihood of the presence of many chronic diseases which occur more frequently among older individuals, several other health behaviors and health outcomes were worse among individuals with lower levels of health literacy.

As noted above, consideration of patterns of responses related to confidence in health knowledge among those with different levels of health literacy is generally consistent with DKE. This warrants examination of consideration in the context of the underlying mechanisms driving DKE. Specifically, the finding that individuals with low health literacy rate their overall knowledge of medical care as greater than those with higher levels of health literacy initially appears suggestive of the Better than Average effect. However, consideration of broader patterns including ratings of general health knowledge and knowledge of health behaviors indicates this may be more reflective of regression to the mean, as ratings for all groups did not statistically differ, and indeed concentrated in the same small range slightly above the midpoint of the scale provided. Therefore, this is likely to be consistent with the perspective of metacognitive failure initially proposed by Dunning and Kruger; those with low health literacy may not have developed the knowledge and skill necessary to accurately evaluate their own health knowledge relative to others, so they overestimate their ability in line with the perceived group mean, which is likely more accurate for those with higher levels of health literacy.

Beyond the DKE, these findings regarding health behaviors and outcomes coincide with the existing literature documenting the negative impact of low health literacy on health behavior and management of medical conditions. While the present sample overall demonstrated higher levels of health literacy than is often found in the literature, with the majority of participants being classified as achieving functional health literacy, level of health literacy clearly affected key health behaviors and outcomes. Similar to prior studies indicating negative effects of low health literacy on variables such as tobacco cessation (e.g., Stewart et al., 2013), exercise (e.g., Yin et al., 2014), and higher medical utilization (e.g., Mazor et al., 2012), participants with lower health literacy engaged in more health compromising behaviors (tobacco use, tanning), fewer protective health behaviors (exercise, use of nutritional supplements such as vitamins), and required more healthcare (more frequent medical appointments, more prescription medications) than did those with higher health literacy.

Based on these results, it appears that the DKE may help explain the observed association between low health literacy and poorer health behaviors and outcomes. Those with low health literacy in the present study expressed the belief that they knew as much or more about health and related factors than those with objectively higher health literacy. This would suggest that individuals with low health literacy may not recognize their own need for more information, consistent with the metacognitive theory underpinning the DKE. Extrapolating to clinical situations, individuals with low health literacy may feel less of a need to seek additional information or ask clarifying questions, instead trusting in their inherent ability to manage their own health. Further, it is possible that in addition to having more difficulty understanding information provided by health professionals, those with lower health literacy may see this information as less necessary or valuable. Taken together, this combination of lack of understanding of health-related information reflected in low health literacy and a lower perceived need for or interest in information about managing health could result in the consistent association in the literature of low health literacy with negative health outcomes.

Due to the prevalence of low health literacy in the broader population (Chervin et al., 2012), clinicians working in medical settings are likely to encounter the combined challenge of low health literacy paired with the DKE. Low health literacy alone could be addressed over time through provision of appropriately-targeted information. Indeed, a recent systematic review concluded that interventions designed to increase health literacy are largely successful in doing so, and that these gains are also associated with positive changes in health behaviors (Walters et al., 2020). Addressing the underlying metacognitive challenges suggested by the DKE could prove to be more challenging, where individuals do not perceive a need to seek additional information or implement change, the likelihood of doing so is low. Conceptualized from the transtheoretical model (Prochaska et al., 1992), individuals with low health literacy may be precontemplative regarding increasing health knowledge, due to the lack of recognition for need to change. Therefore, addressing cognitive bias directly and working to enhance motivation to consume high-quality health-related information could create greater opportunities to improve both health literacy and health outcomes.

Limitations

While the implications of the present study warrant consideration, limitations must also be considered. First, the sample utilized was a community sample recruited via an online service. Results may not generalize to other populations, particularly as this sample was relatively young and highly educated, and some demographic groups were underrepresented in the sample (for example, individuals identifying as African American, transgender, or without high school degrees). The present sample does appear to be congruent with MTurk samples more broadly on these factors, and this does also relate to differences in health behaviors and outcomes from the broader US population (e.g., Walters et al., 2018). Of note, however, is that underrepresentation of commonly disadvantaged groups who may have less access to good health information and have lower health literacy may actually underestimate the strength of the present findings. Future research should attempt to better include individuals from varying backgrounds. An additional limitation is that, to allow for assessment of a wide range of health behaviors as succinctly as possible, study-designed measures of health behavior engagement and confidence in health knowledge were utilized for which reliability and validity have not been established. Further, the present study does not directly consider the path by which DKE impacts health literacy and health outcomes. While in the above discussion, we consider the DKE to impact health literacy, it is possible it may instead mediate the relationship between health literacy and outcomes. Future studies could further examine the mechanisms by which this effect occurs.

Conclusions and Future Directions

The need to identify and address cognitive bias in a number of areas in which it negatively impacts decision making has become increasingly clear in recent years. Perhaps, nowhere is this more starkly illustrated than in the management of health. Poor health literacy constitutes a well-established risk factor for negative health outcomes; the present study indicates that this is further complicated by an associated cognitive bias in the form of the Dunning–Kruger Effect in which individuals with low health literacy fail to recognize their own lack of knowledge or ability in this area. Careful consideration of this combined risk is warranted in future research as well as in clinical settings to increase the likelihood that individuals will develop functional health literacy that translates to better health outcomes and quality of life.

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Data Availability Not applicable.

Code Availability Not applicable.

Declarations

Conflict of interest Brittany E. Canady and Mikayla Larzo declare that they have no relevant financial or non-financial interest to disclose.

Ethical Approval This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Marshall University IRB (#1495879–1).

Human and Animal Rights This article does not contain any studies with human or animal subjects performed by any of the authors.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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