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Health literacy, social support, and health: a research agenda

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Abstract

Amid increased concerns about the adverse consequences of low health literacy, it remains unclear how health literacy affects health status and health service utilization. Moreover, studies have shown significant variation in individual adaptation to health literacy problems. This article proposes research hypotheses to address two questions: (1) What are the causal pathways or intermediate steps that link low health literacy to poor health status and high utilization of expensive services such as hospitalization and emergency care? (2) What impact does social support have on the relationships between health literacy and health service utilization? Empirical studies of health literacy are reviewed to indicate the limitations of current literature and to highlight the importance of the proposed research agenda. In particular, we note the individualistic premise of current literature in which individuals are treated as isolated and passive actors. Thus, low health literacy is considered simply as an individual trait independent of support and resources in an individual's social environment. To remedy this, research needs to take into account social support that people can draw on when problems arise due to their health literacy limitations. Examination of the proposed agenda will make two main contributions. First, we will gain a better understanding of the causal effects of health literacy and identify missing links in the delivery of care for patients with low health literacy. Second, if social support buffers the adverse effects of low health literacy, more effective interventions can be designed to address differences in individuals' social support system in addition to individual differences in reading and comprehension. More targeted and more cost-efficient efforts could also be taken to identify and reach those who not only have low health literacy but also lack the resources and support to bridge the unmet literacy demands of their health conditions.

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Introduction

Over the past decade, increased interest in health literacy—defined as the capacity of individuals to obtain, process, and understand the basic health information and services needed to make appropriate health decisions (Selden, Zorn, Ratzan, & Parker, 2000)—has reinforced the movement to empower health care consumers, heightened the important link between literacy and health, and challenged the contemporary

practices of health education and communication (Nutbeam, 2000). Some observers suggest that advancing health literacy may become a global challenge for the 21st century (Nutbeam & Kickbusch, 2000).

In the United States, interest in health literacy arose from the unexpected findings of the 1992 National Adult Literacy Survey (NALS). According to the survey, 40–44 million of the 191 million American adults were functionally illiterate and another 53.5 million adults had marginally better functional literacy skills (Kirsch, Jungeblat, Jenkins, & Kolstad, 1993). The survey also found that self-reported educational attainment (i.e., years of schooling) did not necessarily translate into a corresponding level of reading or comprehension.

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Among those with a high school diploma, 16% tested at Level 1—the lowest of five literacy levels—and 36% tested at Level 2. More startling, 4% of those with college degrees tested at Level 1 and 11% at Level 2 (Smith, 1998). These findings raised concerns about the functionality of low literacy adults with regard to health care. Subsequently, the concept of “health literacy” was developed to refer specifically to functional literacy in the health care realm.

Conceivably, low health literacy may have adverse health effects by limiting patients’ ability to comprehend health information and follow written medical instructions, to communicate with physicians and other health care providers, and to negotiate the complexity of health care and obtain proper and timely care. Research that exists has in general related low health literacy to poor health status and unnecessary use of hospital care (e.g., Baker, Parker, Williams, Clark, & Nurss, 1997; Friedland, 1998; Gazmararian, Baker, Parker, & Blazer, 2000; Marwick, 1997; Roter, Rudd, & Comings, 1998; Rudd, Moeykens, & Colton, 2000). The relationship, furthermore, is independent of educational attainment (Baker et al., 1997; Kalichman, Ramachandran, & Catz, 1999; Nurss, 1998). However, establishing the causality is limited by the cross-sectional design of most studies and the lack of attention to mechanisms that link low health literacy to poor health status and increased hospitalization (Ad Hoc Committee on Health Literacy for the Council on Scientific Affairs, American Medical Association, 1999). Studies have also treated patients with low health literacy as passive actors and have failed to account for their use of social support and resources in dealing with health problems.

The main purpose of this article is to advance our understanding of the health impact of health literacy by pointing out useful research directions. Instead of providing a comprehensive review of existing research, we propose a research agenda built around two research questions: (1) What are the causal pathways or intermediate steps that link low health literacy to poor health status and high utilization of expensive services such as hospitalization and emergency care? (2) What is the impact of social support on the relationships of health literacy with health status and health service utilization? With regard to the second question, we suggest that social support may moderate the impact of low health literacy on health status and health service use. In other words, whether low health literacy leads to poor health status and excess use of expensive services may be a function of the amount of support and resources that individuals receive from their social networks.

The article is presented in four sections. The first section briefly reviews studies examining the relationships of health literacy with health status and utilization. The second section outlines a conceptual framework

explaining how health literacy affects health status and health service utilization. The third section describes the potential moderating effect of social support on the impact of health literacy on health status and utilization. We conclude by summarizing the implications of pursuing the two research questions.

Studies on the relationships between health literacy, health status, and utilization

One of the first and systematic studies on the consequences of low health literacy was conducted by Baker and associates. They investigated how health literacy affected patients’ disease knowledge, health status, and health service utilization (Baker et al., 1997; Baker, Parker, Williams, & Clark, 1998; Williams, Baker, Parker, & Nurss, 1998). The study employed a cross-sectional design and was conducted at two urban public hospitals in the United States. A total of 2669 patients from emergency care centers and walk-in clinics participated in the study. The measure of health literacy was based on the Test of Functional Health Literacy in Adults, a comprehension test of health literacy that consists of a reading comprehension (containing 50 items that measure a patient’s ability to read and fill in the missing word on selected passages about upper GI series, a Medicaid application, and a procedure consent form) and a numeracy section (containing 17 items that assess a patient’s ability to understand numbers such as those on prescription bottle labels, blood glucose results, and schedule times on appointment slips) (Parker, Baker, Williams, & Nurss, 1995).

Results of the study indicated that patients with low health literacy were more likely than patients with high health literacy to report their health as poor. Low health literacy also negatively affected hypertensive and diabetic patients’ knowledge of their chronic disease but had no relationship with disease outcome. In terms of health service utilization, the study found health literacy to be unrelated to regular source of care or physician visits. The relationship between health literacy and hospitalization was significant: lower health literacy was associated with a higher hospitalization rate in the previous year. However, the relationship varied by the research site and was statistically significant only among patients in one hospital.

These findings raised concerns about the specific health effects of low health literacy, and part of the results have been replicated in more recent research. Most consistently, other studies have confirmed the negative contribution of low health literacy to health status and disease knowledge. In studying Medicare enrollees of a managed care organization, Gazmararian et al. (1999) found that individuals who rated their health as “fair/poor” were twice as likely to have low

health literacy compared with individuals who rated their health as “good/excellent.” Furthermore, enrollees who had chronic illness had slightly higher rates of low health literacy than individuals without chronic conditions. Knight (1999), in a study of prostate cancer screening and disease management, showed that patients with lower health literacy were less knowledgeable about the importance and methods of early detection and treatment. Kalichman and associates found that controlling for years of schooling, HIV/AIDS patients with lower health literacy were less likely to know their CD4 cell count and viral load and were less likely to know the meaning of these disease indicators. Low health literacy was also related to misperceptions that anti-HIV treatments reduced risks for sexually transmitting HIV and that anti-HIV treatments could substitute for safe-sex practices (Kalichman et al., 2000).

In contrast, results on the relationship between health literacy and health service utilization have been inconsistent. A study based on data from 402 Medicaid beneficiaries did not find any significant difference in use of health services (based on cost differentials) by health literacy level (Weiss et al., 1994). Friedland (1998), on the other hand, found that those with lower health literacy tended to have fewer physician visits but substantially longer hospital stays. More recently, Scott and associates demonstrated a positive relationship between health literacy and preventive health care use among enrollees of a managed care organization’s Medicare plan (Scott, Gazmararian, Williams, & Baker, 2002).

Together, these findings raise several important questions. It is unclear whether low health literacy actually reduces individuals’ health status or persons with low health literacy tend to misinterpret physical discomfort and over-report health problems. Alternatively, a persons with lower health literacy may be less knowledgeable about diseases and their early symptoms, understand less about the need for preventive care and routine primary care visits, and therefore be more likely to suffer from chronic health problems and have poorer health status. If the latter explanation holds, we should expect greater and perhaps over-use of expensive hospital and emergency care services among those with lower health literacy. Current research, however, shows that the effects of low health literacy are more consistent and consequential for reported health status and disease knowledge but less so for utilization of health services. How do we account for the discrepancy? What would explain the variation in access to health care among persons with low health literacy? More broadly, how do individuals adapt to or overcome their health literacy problems?

Some of these questions may arise from the use of a cross-sectional design in most current studies and the failure to discern the causal impact of low health literacy on health service utilization. For example, in contrast to

Baker and associates’ earlier research (Baker et al., 1997; Baker, Parker, Williams, & Clark, 1998), their recent study using prospective cohort design found a significantly higher rate of hospital admissions among elderly managed care enrollees with an inadequate level of health literacy (Baker et al., 2002). Another limitation is that most studies rely on self-reported information to assess health status and the use of health services (e.g., screening tests, routine physician visits, and hospitalization). Researchers have observed that patients with low health literacy have difficulties communicating with physicians and often cannot recall the diagnoses or medical procedures that they have received immediately after the physician visit (Baker, 1999; Ungar & Coyte, 1998). Thus, it is conceivable that measures of utilization and health behavior based on self-report may be unreliable, particularly among individuals with low health literacy. Moreover, research has investigated the consequences of low health literacy in a singular fashion and failed to consider the inter-relationships between outcomes such as disease knowledge, engagement in health risk behavior, use of preventive care, and routine physician visits. These research limitations, along with consistent findings of a strong relationship of low health literacy with poor health status and disease knowledge, call for improved and systematic research to map out the causal mechanisms or pathways of health literacy (Ad Hoc Committee on Health Literacy for the Council on Scientific Affairs, American Medical Association, 1999).

In addition, current research has failed to incorporate factors in individuals’ social environment as potential resources that may ameliorate the negative impact of low health literacy. Individuals therefore are treated as isolated and passive actors, and low health literacy becomes an individual attribute that determines or constrains individuals’ ability to obtain proper care for their health needs. Although such an individualistic model of health literacy has a seemingly simple, magic-bullet-like quality, allowing physicians and other health care providers to focus their attention on an important aspect of individual patients’ deficiency, it ignores individuals’ broader social systems of support. To the extent that social support is useful for coping with individual problems, health literacy takes on a social dimension, and the support and resources available in social environments should be considered as potentially important factors for alleviating the adverse effects of low health literacy on health outcomes.

Conceptual framework for understanding the connection of health literacy to health status and health service utilization

In this section, we propose a framework that links health literacy to health status and health service

utilization. The framework incorporates four inter-related intermediate factors including (1) disease knowledge and self-care, (2) health risk behavior, (3) preventive care and routine physician visits, and (4) compliance with medications. Specifically, the framework suggests that individuals with lower health literacy are likely to have poorer medical knowledge, worse health behavior, less regular preventive care and physician visits, and poorer compliance with routine clinical visits and medications. These factors, in turn, may delay seeking timely and appropriate care, produce poor health outcomes, and increase the use of emergency and hospital services (Fig. 1).

Note that the framework depicts the “net” effects of health literacy and the intermediate variables. In testing the framework, factors at the individual and community levels—such as socio-economic status (including educational attainment), age, gender, ethnicity, health insurance coverage, disease severity, income discrepancy, and ethnic composition of the community—are important confounders and would need to be controlled for. For the sake of simplicity, we do not show the inter-correlations among intermediate variables. This is not to downplay the inter-related nature of those factors. In fact, the strength of the model is its simultaneous consideration of those inter-related causal pathways. Failing to take that into account may bias the findings. Also omitted in the framework are the feedback loops from health status and emergency and hospital care use to the intermediate variables and health literacy. For example, a person with frequent hospital admissions,

possibly due to serious illness, may become a good user of medical information and thus have high health literacy. This suggests that greater use of health services may lead to higher health literacy. Consideration of such reversed effects is essential for discerning the causal relationships between health literacy and outcomes such as health status and health service utilizations. In the following, we provide justification for the specified pathways depicted in the framework.

Knowledge of disease and self-care

Existing research has consistently shown that individuals with lower health literacy are less knowledgeable about diseases and less capable of properly caring for themselves (Davis et al., 1996; Kalichman et al., 1999; Knight, 1999; Williams, Baker, Honig, Lee, & Nowlan, 1998a; Williams, Baker, Parker, & Nurss, 1998b). The pattern persists despite the area of medical knowledge and self-care concerned—diabetes, hypertension, asthma, HIV/AIDS, prostate cancer screening and management, or mammography screening.

Health risk behavior

Although research has not examined the effect of health literacy on health risk behavior, it is conceivable that individuals with lower health literacy are more likely to engage in negative health behavior such as smoking, drinking, abuse of illegal substances, and living a sedentary lifestyle. This is in part because of

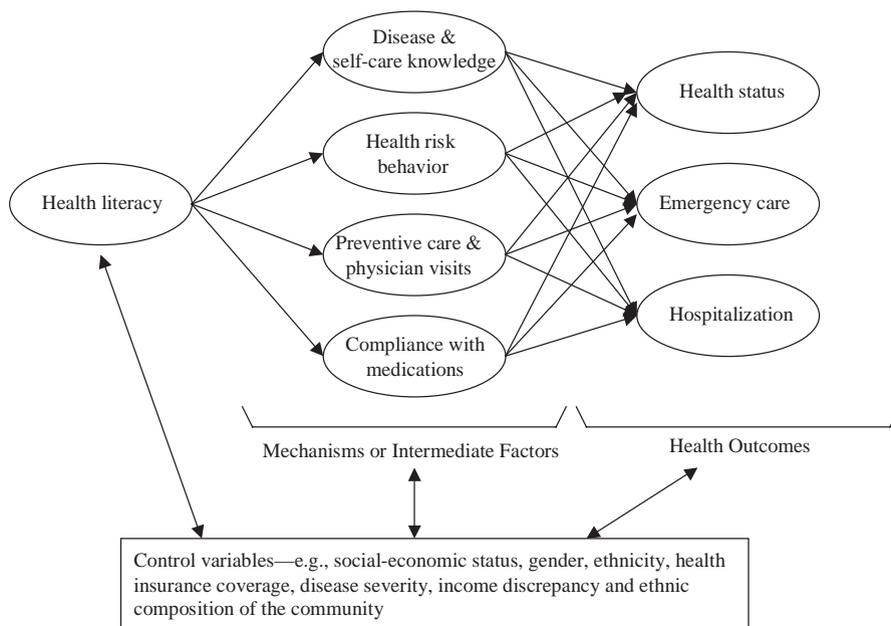


Fig. 1. A simplified model of mechanisms linking health literacy to health outcomes.

their limited access and ability to understand health and medical information. Individuals with lower health literacy may also be more skeptical of medical advice, which in turn reduces their positive health behavior.

Preventive care and physician visits

Increased skepticism, limited access and limited ability to comprehend information about the importance and methods of early disease detection and treatment, as well as less participation in shared decision making regarding medical care, may lead to a lower rate of preventive care utilization among people with lower health literacy. Having problems following physician instructions and understanding information on the appointment slip or the referral form (Williams et al., 1995) also may limit those individuals' access to preventive care and routine physician visits. Some empirical evidence supports these arguments. Scott, Gazmararian, Williams, and Baker (2002) demonstrated a positive relationship between health literacy and preventive health care use among enrollees of a managed care organization's Medicare plan. Friedland (1998) found a significant association between lower health literacy and fewer physician visits.

Compliance with medications

Lorenc and Branthwaite (1993) conducted a study to understand factors leading to better compliance with prescribed medicine. Of the seven factors identified, five were related to patients' health literacy level and their ability to communicate with physicians: accurate knowledge of regimen, belief in the importance of taking tablets exactly as prescribed, less fear of illness, ability to read the label on the bottle, and understanding what the doctor had said. Low health literacy was a significant predictor of two-day treatment adherence among HIV patients, after controlling for factors such as age, education, ethnicity, income, HIV symptoms, substance abuse, and emotional distress (Kalichman et al., 1999). In the same study, patients with lower health literacy were also more likely to miss medications and use medical care less frequently because of confusion, depression, and desire to purify their body.

Health status and use of emergency care and hospital services

Understandably, individuals with less knowledge of disease management, more health risk behaviors, lower use of preventive care and routine physician visits, and poorer compliance with medications are likely to have lower health status and suffer from more severe illnesses that in turn require intensive emergency and hospital care. Discerning the causality, however, is difficult because individuals with lower health status as well as

more severe illnesses may be more receptive to health information and interventions and be more compliant with medical instructions. Despite this problem, there is evidence to support the negative effects of poor health attitude and behavior on health status and use of emergency and hospital care. A study by Nakazono, Davidson, and Andersen (1997) showed that persons who placed lower value on preventive practices tended to have poorer self-rated health. Shapiro and Roos (1985) found that those elderly who had no physician visits in the past 2 years were at a greater risk of a hospitalization episode of 16 and more days than their counterparts who kept regular contact with physicians. Using data from Jerusalem's Hadassah University Hospital, Levy, Mermelstein, and Hemo (1982) identified noncompliance with drug therapy as the principal factor leading to hospitalization.

Based on the aforementioned arguments and preliminary empirical evidence, we propose:

Proposition 1. *Other things being equal, individuals with lower health literacy will have poorer health status and greater utilization of hospital and emergency care services as mediated by their lower disease and self-care knowledge, worse health behavior, more limited use of preventive and physician care, and lower compliance with medication.*

Social support as a moderator for the relationship of health literacy with health status and health service use

Individuals are social actors, residing in social environments that contain various degrees of support and resources. While low health literacy may have adverse health effects, in order to evaluate precisely the extent of limitation that it places on individuals, we need to account for the social support and resources that people utilize when they encounter problems stemming from their health literacy deficiency. As an example, the NALS found that on average 9–12% of adults received “lots of help from family members or friends” with printed information and filling out complicated forms. A substantial proportion of respondents (23–25%) in the lowest level of literacy (Level 1) reported getting the same kind of assistance from others (Kirsch et al., 1993).

The concept of social support—defined as resources provided by a network of individuals and social groups (Lepore, Evans, & Schneider, 1991)—is far from new to social sciences researchers. More than two decades of research have proven that both seeking and receiving assistance from other people constitute major forms of coping behavior (Antonucci, 2001; Cohen, Teresi, & Holmes, 1985; Krause, 1997; Ren, Skinner, Lee, &

Kazis, 1999; Sherman, 2003; Turner & Lloyd, 1999). Although literature suggests that social support may have both direct effects (support improves health irrespective of literacy level) and moderating effects (support buffers the negative impact of literacy on health) on health status and health service utilization (Antonucci, Ajrouch, & Janevic, 2003; House, Landis, & Umberson, 1988; Lin, Dean, & Ensel, 1986; Penninx et al., 1997; Unger, Johnson, & Marks, 1997), for the purpose of this paper we focus on the latter. We suggest that the positive resources and support in individuals' social networks can improve their ability to acquire and understand medical information and to negotiate the health care system. Such social support and resources, when present, would be particularly important for those with low health literacy in facilitating the establishment of healthful attitude and behavior, increasing the use of preventive and routine physician visits, improving health status, and reducing the amount of costly, intensive emergency and hospital care. Conversely, poor support may amplify the adverse health situations of patients with lower health literacy because they are more vulnerable than those with higher health literacy.

Following a common distinction in the literature, we differentiate two aspects of social support—structural and functional (Lin, Ye, & Ensel, 1999; Martire, Schulz, Mittelmarmark, & Newsom, 1999; Sherbourne & Stewart, 1991). Below, we define these two dimensions of social support and explain the mechanisms of their moderating effects. The section ends with a discussion of several conceptual and methodological issues for empirical examination.

Structural social support as a moderator

The structural aspect refers to an individual's location in the social structure—e.g., participation in community organizations, maintenance of social contacts, and immersion in close social networks. Such structural positions may enhance the likelihood of accessing support and resources, which in turn provide the protective function against adverse life conditions (Aneshensel, 1992; Bloom, Stewart, Johnston, Banks, & Fobair, 2001; Boaz & Hu, 1997; Pearlin, 1989). One means by which structural positions can buffer the negative impact of low health literacy is information transmission, particularly through contact in an individual's close networks (Coleman, 1988; Holahan, Moos, & Bonin, 1997). Indeed, family, relatives, or friends are often the first source people whom we consult regarding health concerns. The Health in Detroit Study found that about half the time people responded to their health problems by talking with family, relatives, or friends (Verbrugge & Ascione, 1987). A study of Puerto Ricans in a small town also found that sick persons with

effective networks of kin received a great deal of concrete assistance in selecting and negotiating entry to institutional health resources (Schensul & Schensul, 1982). More direct evidence for such protective effects of structural support comes from a study on women's awareness of and attitudes towards hormone replacement therapy. Results of the study indicated that apart from doctors and the media, friends and relatives were important sources of information that promoted women's awareness of the therapy (Lydakis, Kerr, Hutchings, & Lip, 1998).

The moderating effect of structural support may also take place through altering the perception of low health literacy. Studies have shown that care-seeking behavior is constrained by an individual's socio-psychological circumstances (Alonzo & Reynolds, 1998; Mechanic & Volkart, 1960; Simmons et al., 1998). In the case of low health literacy, the stigma and shame associated with limited ability to read and write may prevent many patients from communicating their physical discomforts and obtaining timely, appropriate care (Nurss, 1998; Parikh, Parker, Nurss, Baker, & Williams, 1996). A sense of belonging and being supported originating from participation in social groups may enable an individual to face a stressful situation that would otherwise seem overwhelming (Holahan et al., 1997; Pearlin & Aneshensel, 1996), thereby bolstering efforts to cope with low health literacy. Although the person has not become more literate, the perception and belief may be modified so that he or she comes to feel less ashamed, is more willing to admit to the inability to read and write, and becomes more active in seeking advice from medical professionals.

Finally, structural support may compensate for the negative impact of low health literacy by forcing individuals to behave in accordance with the health norms and standards of a social group. Frequently people acquire healthful behavior from others, with or without being aware of where they learned the behavior (Ali, 2002; Tucker, 2002). Furthermore, people in close networks—family, relatives, and friends—may serve as the surrogate decision makers for an individual (Levine & Zuckerman, 1999), assuming the primary responsibility and forcing the individual to seek health care.

To be sure, the very social structure that shields may also increase the exposure to stress and health risks. Besides the positive buffering effects mentioned above, it is important to note that certain positions or locations in social structure may expose individuals to negative and restrictive circumstances (Albrecht & Adelman, 1987; Antonucci, Akiyama, & Lansford, 1998; Ingersoll-Dayton, Morgan, & Antonucci, 1997; Lin, Woelfel, & Dumin, 1986; Rook, 1997). Of central concern is that support from certain groups may exacerbate health problems or reinforce negative behavior (Kaplan &

Toshima, 1990; Swann & Brown, 1990). For example, a person's social groups may engage in unhealthful behavior, such as smoking or heavy drinking. In such circumstances, pressures to conform to group standards may produce adverse health effects. Moreover, individuals tend to affiliate with people like themselves (Engels, Knibbe, Drop, & de Haan, 1997; Kandel, 1985). For individuals with low health literacy and risky health behavior, embedding in a low-education network may further limit adaptability by normalizing or reinforcing illiteracy and poor health practices. Research needs to examine the possibility of such negative moderating effects of social structure.

Based on these arguments, we suggest an interaction between health literacy and structural social support. We expect that positive (or high) structural support buffers (or protects) individuals from health literacy problems and such buffering effects are particularly pronounced among individuals with lower rather than higher health literacy. Conversely, negative (or low) structural support is more likely to amplify adverse health consequences in lower health literacy individuals than in those with higher literacy, because lower health literacy individuals are more vulnerable to constraints in their social environment.

Proposition 2. *Other things being equal, the adverse effects of low health literacy on health status and utilization of hospital and emergency care services will be greater among people with less structural social support compared with those who have greater structural social support. Furthermore, such interactive effects are mediated through disease and self-care knowledge, health risk behavior, use of preventive and routine physician care, and compliance with medications.*

Functional social support as a moderator

The functional aspect of social support includes communication and transaction activities that serve a variety of emotional, informational, and tangible needs, all of which link to notions of information, uncertainty reduction, and personal control (Albrecht & Adelman, 1987; Lin et al., 1999; Sherbourne & Stewart, 1991). Emotional support promotes feelings of self-esteem and self-confidence that enable one to accept and effectively cope with individual limitations (such as low health literacy) and their adverse consequences (Holahan et al., 1997; McAvay, Seeman, & Rodin, 1996). Evidence supporting this argument can be found in studies of disease situations. Studying a group of adolescents with diabetes, La Greca et al. (1995) found that emotional support from family and friends improved patients' adaptation to diabetes (La Greca et al., 1995). Informational support may assist people, especially those with

low health literacy, in accessing and comprehending medical conditions. The person's literate ability may not be altered by informational support. However, such support is potentially powerful in lessening the negative impact of low health literacy. Useful information also helps to reduce uncertainty, thus providing a personal sense of control or mastery over individual literacy problems (Antonucci, 2001; Lang, Featherman, & Nesselroade, 1997).

Tangible support from social networks may help those with low health literacy by reducing the stress of dealing with the health care system (Mechanic, 1962; Kawachi & Berkman, 2001). For individuals with low health literacy, difficulties in communicating with health professionals may prevent them from accessing primary care, leading to poor health status and increased use of unnecessary services such as emergency care and preventable hospitalizations. Tangible support, such as having someone urge or take the person to the doctor, may overcome certain limitations of low health literacy (Gotay & Wilson, 1998; Rickwood & Braithwaite, 1994).

Similar to the structural aspect of social support, these functional elements of support may interact with health literacy in determining an individual's health knowledge, health behavior, health status, and use of health services. We expect that the protective effect of functional social support will be particularly prominent among low health literacy individuals but small or nonsignificant among individuals with high health literacy.

Proposition 3. *Other things being equal, the adverse effects of low health literacy on health status and utilization of hospital and emergency care services will be greater among people with less functional social support compared with those who have greater functional social support. Furthermore, such interactive effects are mediated through disease and self-care knowledge, health risk behavior, use of preventive and routine physician care, and compliance with medications.*

Conceptual and methodological issues

To the best of our knowledge, no study has investigated whether or how social support moderates the effects of health literacy on health and health service use. Although empirical investigation of the above propositions (Propositions 1–3) may prove useful in extending our understanding of the social context of health literacy problems, several conceptual and methodological issues are worth noting.

First, following a common classification, we distinguish between the structural and functional aspects of social support. These two dimensions are distinct but related. Structural social support is often seen as a

“secondary” moderator, with its effects exercised through functional social support, the “primary” moderator (Kawachi & Berkman, 2001; Lin et al., 1999). Thus, having friends with similar disease experience or participation in a self-help group (structural) may help an individual with low health literacy to acquire and use medical information (functional). Family members in the same household or living nearby (structural) may be a good source of emotional and tangible support (functional). Examination of such hierarchical structure will help us understand both the processes and sources of social support and facilitate the design of intervention programs.

Second, the moderating effect of social support may vary depending on the specific dimension under consideration. Thus, sweeping generalizations concerning the moderating effects of social support may be inappropriate (Antonucci, 2001; Antonucci & Akiyama, 1997; Pinquart & Sorensen, 2000; Thoits, 1982). Greater specificity can be achieved by accurately and empirically documenting how individuals with low health literacy adjust to their health problems in different social groups and with different types of support.

Finally, embedded in our discussion above is the inference that the moderating effects of social support against low health literacy could be not only positive but also negative. To address this issue in future research, it will be useful to consider the distinction between the content (e.g., aid, affect, affirmation) and quality (e.g., satisfaction or dissatisfaction with the support received) of social support made by Antonucci (2001), Antonucci and Akiyama (1997), and Antonucci et al. (1998).

Conclusion

Research has consistently linked low health literacy to poor health status. Inadequate reading and writing skills may lead to poor care quality and excess medical services and costs (Ad Hoc Committee on Health Literacy for the Council on Scientific Affairs, AMA, 1999). A recent estimate based on data from the 1993 Survey of Income and Program Participation showed that the cost of inadequate health literacy ranged from \$30 billion to \$73 billion in 1998 US dollars, or about 3.2–7.6% of personal health care expenditures in the United States (Friedland, 1998). Due to its potentially large scale of impact, the issue of low health literacy has attracted broad attention and increased research has been conducted in local as well as international settings (e.g., D'Alessandro, Kingsley, & Johnson-West, 2001; Kickbusch, 2001; Nutbeam, 2000; Nutbeam & Kickbusch, 2000; Wang, 2000; Weiss, 2001). Thus, future

studies based on the research questions and hypotheses proposed in this paper are likely to produce significant policy implications at local, national, and international levels.

First, improving our understanding of the causal pathways of health literacy would greatly enhance the ability of policy-makers and health care providers to improve the delivery of care for patients with low health literacy, particularly in poor and underserved communities where the effects of low health literacy are most conspicuous. For example, if poor compliance with clinic appointments and medications accounts for the impact of low health literacy on excess hospitalizations, interventions involving close monitoring of patients' routine physician visits and use of prescribed medicine may be particularly effective in reducing hospitalization rates. Alternatively, if research indicates that patients' medical knowledge and health behavior are the main determinants of health status and health service utilization among low health literacy patients, policy-makers and health care providers can focus on developing multimedia, culturally sensitive educational materials, and increasing the staffing of health educators in clinical settings.

Second, drawing on the literature of social support, we suggest that positive resources and support in one's social networks might buffer and alleviate the adverse health consequences of low health literacy. If research supports our expectation, interventions should not only target patients but also their family, relatives, or friends—in particular, their primary caregivers. Researchers have observed that interventions focusing on low health literacy patients produce limited results and that literacy problems remain after patients attend health education classes (Baker, 1999; Davis, Berkel, Arnold, Nandy, & Jackson, 1998). An effective alternative may be to educate patients' proxies or direct caregivers. Indeed, preliminary findings have shown that intervention programs that enhance social support for hypertensive patients through educating family members to assist the patient with medication, appointment keeping, and diet and weight control significantly reduce the variability of diastolic blood pressure (Morisky, DeMuth, Field-Fass, Green, & Levine, 1985). Similarly, medical staff could encourage the companionship of family and friends during clinic visits and hospital stays, particularly among patients with difficulty reading and understanding medical information. Patients and their family usually respond to such suggestions positively, and the presence of family members at clinical visits increases significantly (Schilling & Stygar, 1994). Furthermore, research has shown that the time a physician spends with a patient tends to be longer when family members are present, and that physicians in general provide more information when a patient is

accompanied by family (Blanchard, Ruckdeschel, & Blanchard, 1991).

Third, it may be useful to design intervention programs based on individual differences in reading and comprehension ability as well as differences in social support and resources. A recent study examining the variation of women's responses to breast cancer interventions found that educational programs had greater benefits on the physical functioning of women with stronger social support and more resources. Programs that enhanced social support through peer discussion, on the other hand, were helpful for women who lacked support from their partners but harmful for women who had high levels of partner support (Helgeson, Cohen, Schulz, & Yasko, 2000).

Fourth, in addition to fulfilling the individual needs of patients, attending to the interaction of health literacy and social support has a significant cost implication. If certain types of social support display protective effects, more targeted (and more cost-efficient) efforts could be taken to identify and reach those who not only have low health literacy but lack the resources and support to bridge the unmet literacy demands of their health conditions. It is these populations—persons who lack the wherewithal to resolve their personal limitations and whose living environment consists of dysfunctional networks—that are particularly in need of the attention and assistance of professional helpers. Health professionals can counsel patients, especially those with low health literacy, on the informal support in their social networks (e.g., family assessment), including, perhaps, direct communication with family members early in the disease process. Indeed, a survey of patients' perceptions of the family practitioner's role found that 41% of patients strongly believed that physicians should discuss social support systems with patients (Price, Desmond, & Losh, 1991).

Finally and more importantly, while medical professionals assume an important role in combating the burden of low health literacy on our health care system, intervention efforts need to go beyond the individualistic medical model and the "bricks and mortar" wall of medical facilities. In this regard, community resources or organized community intervention programs have been of great benefit (Kawachi, 1999). A contemporary example is the Kentucky Mountain Scout Program, which trains women residing in the local community to act as "community health advisors" by providing information to their peers and encouraging them to participate in cancer screening, education, and treatment programs. The program has taken place in three counties and existing evidence indicates that two of the three counties where the interventions have been adequately implemented have obtained satisfactory results and have experienced a significant increase in cancer prevention activities (Friedell, 1999). Collabora-

tive efforts between local health care providers and community organizations such as churches may also be useful in reducing the negative consequences of low health literacy and improving the health status of the community (Samuel & Sanders, 1991; Smith, Merritt, & Patel, 1997; Thomas, Quinn, Billingsley, & Caldwell, 1994).

In response to recent research findings that 90 million adult Americans with low health literacy struggle to understand even basic health information, suggestions have been made to focus research on literacy screening and designing more reader-friendly media with simple illustrations and culturally sensitive examples as possible ways to improve patient-clinician interactions and patient outcomes (Ad Hoc Committee on Health Literacy for the Council on Scientific Affairs, American Medical Association, 1999; Davis et al., 1998; Lee, 1999; Ley, 1998; Mayeaux et al., 1996; Roter & Stableford, 1999). The Joint Commission on Accreditation of Healthcare Organizations now requires medical instructions to be given on a level understandable to patients. Researchers have also suggested that to enhance patients' understanding, physicians and other health professionals should communicate in simpler language, repeat their instructions, demonstrate key points, and avoid too many directions (Mayeaux et al., 1996). In addition, more health classes are now being offered to educate patients about their diseases, diagnosis, treatment, and self-care skills (Murphy et al., 1996; Wallerstein, 1992). These are all worthwhile efforts and an essential step toward making health and medical information more accessible to patients, improving their compliance, and ensuring that the care they receive is appropriate and of high quality. However, we believe there is more that can be done. Yet to accomplish more requires better and more detailed knowledge of how health literacy affects health status and use of health services. In order to identify factors that can facilitate or confine individuals' adjustment to their literacy limitations, we need to transcend treating health literacy as an individual issue and explore the social supports individual use to overcome health illiteracy.

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