Potential Paradoxical Effects of Myth-Busting as a Nutrition Education Strategy for Older Adults

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ABSTRACT

Medical myth-busting is a common health education strategy during which a health educator highlights common misconceptions about health and then presents evidence to refute those misconceptions. Whereas this strategy can be an effective way to correct faulty health beliefs held by young adults, research from the field of cognitive psychology suggests that normal age-related changes in cognition may diminish the educational efficacy of medical myth-busting for older adults. In the coming years, health educators are going to have increasing numbers of older adult clients. Although health educators are often trained to understand how age-related disease processes affect older adult clients' ability to learn and remember, currently there is little emphasis placed on teaching health educators how normal aging impacts their clients' cognition. We hope that by detailing how normal cognitive aging can reduce the efficacy of a common patient education strategy, we motivate health educators to learn more about how their clients' normal age-related changes in cognition might demand modified educational approaches.

The older population, defined as individuals who are 65 or more years of age,[1] is increasing rapidly in the United States. Current census projections predict that by 2030 there will be 72 million older adults in the United States, more than double the number in 2000.[1] Although this demographic shift toward a "grayer" America in part reflects improved health care knowledge and delivery, it brings new challenges to the health care system.[2] Because older adults are disproportionately affected by chronic diseases that contribute to increased rates of disabilities, increased injuries, and decreased quality of life, the American health care system will be stressed in unprecedented ways.[2]

Yet, the Centers for Disease Control and Prevention (CDC) note that there are "critical knowledge gaps" in our ability to help older adults prevent and/or manage both acute and chronic health conditions.[3]

Because even normal aging results in significant physical, social, emotional and cognitive changes, it is imperative that health care workers understand the unique needs of their older adult clients. In response to this concern, the Partnership for Healthy Aging and the American Geriatric Society developed a set of core competencies for all health professionals who care for older adults.[4] These core competencies specify domains of health care in which age-related psychologi-cal and physical changes impact how health care workers can best deliver education and treatment to older adult clients. The present paper focuses on one of the themes addressed by these core competencies: the importance of developing communication strategies that are sensitive to age-related changes in cognition. Specifically, we review

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research from the field of cognitive psychology that describes how age-related changes in cognition could lead a common health education practice, medical myth-busting, to backfire.

Medical myth-busting is an educational practice during which the health educator provides an educational experience in which clients' misconceptions about health are identified and then refuted. In the present paper, we refer to research from the field of cognitive psychology to explain why older adults are more likely than young adults to hold medical misconceptions and how the technique of myth-busting typically works to correct misconceptions. We then describe some age-related changes in cognition, how those changes impact older adults' ability to learn and remember health information, and why those changes might negatively impact the efficacy of myth-busting as way to correct misconceptions. Finally, we conclude the paper with some suggestions about how health educators can apply the information presented here to their practice.

OLDER ADULTS' SUSCEPTIBILITY TO ADHERENCE TO HEALTH MYTHS

Because older adults are at increased risk for falling prey to quackery,[5-6] it is especially important that health educators find ways to identify and correct health misconceptions held by their older adult clients. For example, nutritionists need to be aware of the fact that their older adult clients' fear of aging may result in adherence to myths about products or nutrition regimens that falsely claim to delay the aging process.[7] The booming dietary supplement market is fertile ground for unsubstantiated health claims targeted at older adults. The 1994 Dietary Supplements Health and Education Act (DSHEA) defines dietary supplements, including vitamins, minerals, herbs and amino acids as "food," and as a result, the U.S. Food and Drug Administration (FDA) does not regulate them as food additives or drugs.[8] Supplement manufacturers can sell their products without FDA approval. The FDA evaluates and monitors supplement safety only after the product is on the market.

Thus, many unsafe, ineffective products are available on the market for a period of time before the FDA evaluates them. Because older adults regularly face issues related to physical decline and illness and because they tend to have a heightened awareness of mortality, the older adult population may be particularly vulnerable to sales pitches that promote ineffective or even dangerous dietary or supplement regimens. Supplement use among older individuals is common; studies have shown that 33% to 72% take nonprescription supplements.[9-10] Older persons are at a greater risk for toxicity of nutrients due changes in liver and kidney detoxification mechanisms and drug-nutrient interactions.[5] Ineffective remedies may result in lack of participation in effective, traditional treatment for serious health issues, compounding the problem. In addition, out-dated traditional ideas about nutrition or folklore persist. For example, some still believe a dangerously low protein diet may be effective to treat cancer.[11] Vitamin and mineral supplements or herbal remedies are often thought to be safer than pharmaceutical drugs because they are "natural," and yet can be ineffective or dangerous.[12] Friends and family, the media, the Internet, and misinformed health practitioners contribute to the medical misconceptions of older adults.[12] Legitimate health care providers must not only teach accurate information to their older adult clients, but must also find methods to identify and correct pre-existing misconceptions—medical myth-busting is one such method commonly used.

MEDICAL MYTH-BUSTING

It is well-documented that human beings of all ages selectively interpret new information in a manner that is consistent with one's existing beliefs. For example, information that is consistent with existing beliefs attracts one's attention more readily and is more easily remembered than information that is inconsistent with existing beliefs.[13] Thus, one reason individuals can maintain faulty beliefs is because they simply fail to notice and/or remember disconfirming evidence. Compounding this bias in information pro-

cessing is the metacognitive experience that misconceptions do not feel like erroneous beliefs because they are embedded in how that individual understands the world.[14] The combination of this confirmation bias and the characteristic stubbornness with which humans hold on to their own worldview makes the correction of erroneous beliefs quite difficult.[14-15]

These biases in thinking can be amplified when an individual is personally invested in a topic. For example, Brown and Park found that individuals who were already familiar with a disease were less likely to learn new information about that disease than about unfamiliar diseases.[16] The authors interpreted these findings as indicating that previous familiarity with a medical condition may lead clients to resist learning new information about the condition. Thus, if clients come to health care providers with mislaid confidence in their own knowledge about a familiar condition and a cognitive bias against learning new, correct information, how, in practice, do health educators attempt to correct clients' misconceptions?

Health educators often take on the role of medical myth-buster. This approach involves a direct challenge of misconceptions through the identification of common myths and the presentation of disconfirming information. A typical education strategy is to provide individuals with a list of common myths about medical information as a way to make salient wrongly-held ideas about health issues. For example, recently, NBC's *Today* show medical correspondent, Dr. Nancy Synderman published two such books, *Diet Myths that Keep Us Fat* and *Medical Myths that Can Kill You*.[17-18] The Alzheimer's Association web site has a page titled "Alzheimer Myths" that describes eight common misconceptions about Alzheimer's disease.[19] The National Institutes of Health provides a list of myths about kidney stones.[20] The AARP offers a fact sheet entitled *Myths about Medicaid and the People It Helps*.[21] In fact, this approach is so appealing that the Discovery Channel produces a hit television show, *Mythbusters*, in which the lead actors test the validity of popular urban myths. The purpose of

the myth-busting strategy is to cognitively engage individuals by challenging their existing knowledge base in an attempt to initiate conceptual change, rather than simple assimilation of information.[22]

EFFICACY OF MEDICAL MYTH-BUSTING

The technique of explicitly tagging misconceptions as myths and providing counter evidence to promote the correction of those misconceptions has much intuitive appeal and some theoretical and empirical support. The logic behind myth-busting as a means of correcting individuals' understanding has been tested most directly in science education.[23] Findings from this body of work demonstrate that teaching strategies that "offend the individuals' intuitive conception" and bring about "cognitive conflict" are most likely to bring about conceptual change.[23] One effective teaching technique that mirrors medical myth-busting involves providing students with information that refutes erroneous beliefs to make the misconceptions salient.[14,23] The refutation sets the stage for conceptual change. That is, highlighting the contradiction between the existing (mis)conceptualization of the phenomena and the correct understanding leads to an increased likelihood that the individual will be motivated to resolve the contradiction and to create a coherent understanding.[14,23-26] One recent work involving college history students validated this approach: students exposed to an instructional strategy that signaled false information and warned them against incorporating inaccurately depicted historical events from popular films into their understanding of those events were less likely to believe the movie-based misconceptions than were students not exposed to this technique.[27] Another work demonstrated that presenting misconceptions and their corresponding refutations successfully corrected misconceptions about psychology for students in an Introduction to Psychology course.[28] Based on this body of work, it is quite reasonable to assume that the myth-busting technique might work similarly well in the health care domain; however, research on cognitive aging provides reason

for health educators to be cautious about using medical myth-busting with their older adult clients.

The Aging Mind and Its Interaction with Medical Contexts

Recently, there has been a call for health care providers to consider the impact of normal age-related cognitive decline when counseling older adult clients.[6,29] In general, aging leads to a decline in processing speed, working memory (i.e., processing involved in strategic thinking), and some types of long-term memory performance.[30] Of particular relevance to the present work is the additional finding that, in general and across many contexts, older adults tend to rely less on effortful processing than do young adults.[31,32] High effort processing involves a conscious strategic allocation of a large portion of available cognitive resources to complete a task, whereas low effort processing occurs beneath awareness and involves very little or no decrement in available cognitive resources. For example, practiced drivers expend very little cognitive effort retrieving and applying the requisite knowledge to drive, and under normal conditions can easily simultaneously complete other tasks, such as singing along with the radio. Novice drivers, on the other hand, find driving to be a complex and difficult task that requires all their conscious focus and cognitive energy. In the context of driving, low effort processing is preferred because it leaves available cognitive resources that can be deployed in case something unexpected occurs; but, the superiority of low effort processing varies with context. For example, when an individual explicitly attempts to remember a previously encountered piece of information (e.g., a medication name, a fact about drug side effects or proper dosage), using low effort processing could lead to unwarranted belief in the accuracy of a faulty memory.[33] Yet, in the context of this type of explicit memory retrieval task, older adults do just that. In memory retrieval tasks, older adults tend to rely on low effort processing that generates a sense of familiarity rather than on the more high effort strategy of recollection.[31,32] Essentially,

when judging the accuracy of their memory for some piece of information, older adults' reliance on familiarity as a proxy for accuracy results in a willingness to accept a vague sense of previously having being exposed to that piece of information as evidence of accurate remembering. In contrast, young adults' threshold for labeling an experience as accurately remembered requires the recollection of specific details that results from high effort processing. In addition to impacting memory retrieval, the level of processing brought to bear during learning has large implications for how successful learning is: more effortful processing leads to better learning.[34,35] Thus, older adults' reliance on low effort processing impairs both learning and remembering.

Older adults' predisposition to deploy low effort cognitive processing has important implications for the work of health educators. For example, research demonstrates that older adults retain less information from written material describing medical information than do younger adults, even when older adults have familiarity with the medical condition.[16,36] This outcome is likely attributable to the fact that the learning situation fails to elicit from older adults the level of cognitive engagement that leads to learning and remembering. Further exacerbating the problem for health educators is the older adults' tendency to overestimate their comprehension of and ability to remember medical information.[36] This overconfidence and resultant resistance to learning is magnified in situations in which older adults are familiar with a health condition. For example, Okun and Rice demonstrated that older adults with osteoarthritis, compared to those without the disease, were more likely to remember content from an informational pamphlet on osteoarthritis incorrectly and in a manner that was consistent with their prior misconceptions about the disease.[37-39] These findings held true even when the researchers signaled the misconceptions with verbiage such as "contrary to popular opinion."[37] These findings indicate that older adults routinely rely on low effort processing strategies and, perhaps even more concern-

ing, are unaware of the need (or are unable) to employ more demanding learning and retrieval strategies in medical contexts. These poor cognitive habits can diminish the efficacy of health education efforts, and perhaps especially when those efforts that include medical myth-busting.

The Impact of Medical Myth-Busting on the Aging Mind

The low effort processing that characterizes the aging mind impairs an individual's ability to create a single memory structure that integrates both the item to be remembered and the source of the information.[40-43] In other words, with aging it becomes more difficult to remember both *what* you heard and *where* you heard it from; older adults are less likely to form memories that include both content and context. To be successful, the myth-busting technique demands that the client remember and integrate (at least) two things: (1) the content of the myth statement, and (2) the context or the truth value of the statement. If the truth value of a statement is not encoded and/or not retrieved with the content, then there is real danger that a feeling of familiarity caused by underscoring the content of the myth could lead to strengthening of the belief in the misconception.

This paradoxical effect can be explained by the illusion of truth effect.[44] This effect describes the tendency to use message familiarity as an indicator of truth; that is, the more often an individual encounters a message, the more likely that the individual later will endorse the truthfulness of the message.[44] For example, marketers employ message repetition to engender positive attitudes toward their products and reduce consumer skepticism.[45] The illusion of truth effect is likely an outcome of the relative ease with which individuals can retrieve repeated messages from memory.[33,46,47] Moons et al. demonstrated that when individuals' processing style was relatively unengaged, repetition of message, not strength of a persuasive argument, determined level of agreement with the argument.[33] Individuals are most likely to rely on fluency of retrieval as a signal for judgments of truth when they

are relying on automatic, low effort processes to make those decisions.[33] That is, under the low effort processing circumstance that characterizes older adult cognition, fluency of retrieval (i.e., feeling of familiarity) acts a shortcut for making truth judgments. Thus, for older adults, repeated exposures to misconceptions about health have the potential to further entrench the faulty belief in the truth of the misconception.

For older adults, medical myth-busting may serve to enhance familiarity with the erroneous content of the myths that can, in turn, lead to mistaken beliefs that the myths are true. Consider a situation in which an older adult has read myth-busting pamphlets and heard dietitians warn that a common myth about osteoarthritis is that "a diet that cleanses the body of toxins can treat the disease." At a later date the older adult encounters an advertisement hawking the fallacious benefits of a cleansing diet for the treatment of osteoarthritis. The older adult, relative to a young adult, may be more susceptible to the deceptive message because the content of the claim rather effortlessly triggers a feeling of familiarity; but, due to age-related changes in memory processing, the advertisement does not trigger the more effortful process of recollection that in turn leads to a failure to retrieve the specific truth value of the claim. The older adult, then, is likely to become a victim of the illusion of truth effect and find the advertisement persuasive. Exposure to the myths in the health educator's well-intentioned pamphlet combined with low effort cognitive processing increased the older adult's susceptibility to the fraudulent health claims.

In the above hypothetical example, there is a delay between when the older adult is exposed to the myth-busting material and when he/she encounters the advertisement. In a real-world setting, the length of the delay between exposure to a myth warning and the event that requires the application of the information from the warning is often substantial. Although the myth-busting approach can be an effective way to correct erroneous beliefs when those beliefs are tested shortly after exposure to the myths,

with time, corrected information fades and, in some cases, the original faulty beliefs are actually strengthened.[46,48] For example, Schwarz et al. reported just such findings from an unpublished experiment assessing college students' beliefs about the influenza vaccine.[46] In that study, one group of participants received a document that presented both the facts and myths about the flu shot while another group received a document that included only the facts and omitted the myths. A control group read no information about the flu vaccine. Immediately after reading the fact sheets, both groups (facts and facts plus myths) showed a more positive attitude toward the flu shot and reported that they were more likely to receive the flu shot than the control group. However, when participants responded to similar questions 30 minutes after reading the material, those who read the myth-busting version of the fact sheet actually indicated a less positive attitude toward the vaccine and reported being less likely to seek out the immunization than the control group; those who read only the facts (without the myths) maintained their positive view of the vaccination through the delay interval.

The impact of a time delay on memory accuracy further depends on age. Although Rahaal et al. demonstrated that older adults were no worse than younger adults at remembering whether a previously heard statement was delivered by a source labeled as truthful or deceitful, the source memory tests were given only ten minutes after having heard the statements.[49] When Skurnik et al. included a retrieval delay of three days, they found a much different result.[48] They asked older adult and college-aged participants to read 36 health statements, presented one at a time; each statement was labeled as "true" or "false." Some statements were repeated three times and others were displayed only once. The findings showed that when older adult participants read repeated sentences that were flagged as false, they often later remembered the statement (e.g., "Shark cartilage will help your arthritis"), but forgot that the statement was labeled as false; this finding held true even though

immediate testing showed that repetition of myths helped older adults remember both the content and the truthfulness of the statement. Younger adults, on the other hand, did not show an illusion of truth effect at either the immediate or delayed retrieval interval. Thus, older adults' memory for the statement, but not for the truthfulness, was maintained over the long-term. Instead of correcting older adults' misconceptions, the myth-busting technique apparently increased older adults' beliefs in fallacious statements about health.

More research is needed to determine the personal and situational circumstances under which myth-busting may be an effective tool for client education. For example, it is important for health care providers to understand the cognitive processing styles that characterize clients at different points during the lifespan so that they may develop client education strategies that are appropriately tailored to clients; myth-busting may refute or reinforce medical misconceptions differentially at different points in the lifecycle. The investigation of how the efficacy of myth-busting is moderated and/or mediated by individual differences among variables in addition to age, such as client familiarity with the health issue and working memory capacity is also warranted. Additional research on the impact of the mode of delivery of myth-busting and how that mode of delivery interacts with individual differences variables would also enhance understanding of this client education tool. For example, it is possible that oral delivery of myth-busting information may lead to a paradoxical increase in adherence to faulty beliefs for older adults because that mode of delivery taxes their often already compromised working memory system. On the other hand, myth-busting that is delivered with the use of external memory aids (e.g., images, written text) may indeed work well to help older adults correct medical misconceptions. Understanding the way older adults process and retrieve information, and determining the efficacy myth-busting as an educational approach will help health educators develop communication strategies that

will effectively correct older adults' mistaken beliefs about health.

TRANSLATION TO HEALTH EDUCATION PRACTICE

The research reviewed in the present work suggests that medical myth-busting may have counterintuitive and counterproductive effects for the education of older adults. Myth-busting may, at best, be an ineffective way to correct older adults' misconceptions about health and, at worst, may in the long-term, serve to reinforce faulty beliefs. Because the potential negative impact of medical myth-busting on older adults applies across the spectrum of health care and community settings, all health care educators need to be aware of the limitations of myth-busting as a teaching strategy.

Health educators who do choose to employ myth-busting as a strategy for client education should be careful about assuming that immediate decreases in clients' endorsements of common myths indicate permanent corrections in clients' knowledge. We suggest that, at the least, these health educators identify pre-existing, relevant beliefs held by their older adult clients at an initial assessment and then continue to monitor those beliefs over the course of education and treatment. At different time intervals throughout the educational experience, older adult clients could complete a variety of knowledge tests to determine if they have learned and retained accurate information. For example, immediately after the initial educational experience, clients could complete an opinion survey to indicate their level of belief in relevant facts and myths. A few weeks after the initial instruction, the health educator could ask his/her clients to generate a list of the "top five" facts they know about the relevant medical topic. After each assessment, the health educator could then review the clients' responses, give feedback, and provide additional education, if warranted. This continuous assessment of client knowledge would allow educators not only to determine whether medical myth-busting leads to a rebound in older adults' adherence to faulty beliefs, but might also help

educators identify particularly intractable misconceptions and/or other types of difficulties. A program of repeated assessment would provide health educators information regarding the overall efficacy of their client education endeavors.

Despite the benefits of repeated assessments, both health educators and clients may find the significant time and effort requirements of this sort of intensive assessment program burdensome. However, because of the concerns that myth-busting may actually reinforce misconceptions, repeated knowledge assessment is a necessary component of using myth-busting as an effective health education strategy for older adult clients. Thus, health educators may find using medical myth-busting with older adult clients impractical. If so, health educators who work with older adults might consider avoiding myth-busting entirely and instead opt to adopt educational strategies that focus accurate information about relevant medical topics.

When developing educational approaches for older adults, health educators need to retain the high level of client cognitive engagement that myth-busting provides while avoiding the possible paradoxical effect of myth-busting that might result from the illusion of truth effect. Effective learning experiences will be those that demand effortful processing from older adult clients. A recent publication suggests that embedding difficulties, such as presenting written material in font that is slightly difficult to read, into the learning context requires high effort processing and, as such, leads to improved memory.[50] Other high-effort learning situations involve techniques that produce connections between correct medical information and the client's existing knowledge.[34] Educational exercises that help older adults note the personal relevance of the information is one way to produce such connections.[51] Another high effort technique that can increase retention of accurate information is to require the older adult learner to reflect on the accurate medical information and then to "teach" that information to either the health educator or, in the case

of a group learning setting, to others in the group. The key to ensuring accurate and sustained memories in older adult clients is to devise techniques that prevent them from engaging low effort processing strategies.

CONCLUSION

To persuade health educators who work with older adults to seek out continuing education about normal cognitive aging, we presented evidence regarding the potential negative impact of age-related changes in cognition on the effectiveness of medical myth-busting. The research we reviewed describes just one example of how cognitive aging might impact the practice of patient education with older adult clients. Although those working with older adults often learn about how diseases processes, like Mild Cognitive Impairment and Alzheimer's Disease, impact learning and memory, little training has focused on normal age-related changes to cognition. Surprisingly, health care providers themselves, when surveyed, failed to mention needing to know about how normal cognitive aging may impact efforts at patient education.[52] We are encouraged to see that the new core competencies developed and endorsed by 21 health-related professional organizations acknowledge the importance of understanding normal cognitive aging.[4] We hope that the present work increases the readers' awareness of the importance of using developmentally-appropriate health education strategies and motivates increased interdisciplinary health education endeavors.

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