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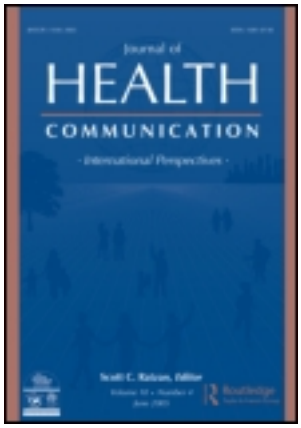

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Subjective Health Literacy and Older Adults' Assessment of Direct-to-Consumer Prescription Drug Ads

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Subjective Health Literacy and Older Adults' Assessment of Direct-to-Consumer Prescription Drug Ads

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Older adults are increasingly the intended target of direct-to-consumer (DTC) prescription drug ads, but limited evidence exists as to how they assess the educational value of DTC ads and, more importantly, whether their assessment depends on their level of health literacy. In-person interviews of 170 older adults revealed that those with low subjective health literacy evaluated the educational value of DTC ads significantly lower than did those with high subjective health literacy. The results prompt us to pay more scholarly attention to determining how effectively DTC ads convey useful medical information, particularly to those with limited health literacy.

The population of adults 65 years or older is rapidly expanding as the baby boomers reach retirement age, coupled with changes in technology, nutrition, and lifestyles. The U.S. Census Bureau (2005) predicts that this population will increase from 35 million in 2000 to 72 million in 2030, representing more than 20 percent of the U.S. population. Health care services and health information are of great interest to older adults. Given that they are heavy users of prescription drugs and medical services (Balazs, 2004), older adults are increasingly the intended audience of direct-to-consumer (DTC) advertising for prescription medications in the United States (Datti & Carter, 2006).

DTC ads are one of the fastest growing categories of consumer advertising (Bittar, 2004). Since the U.S. Food and Drug Administration (FDA) relaxed its restrictions on DTC ads in 1997, expenditure on this form of advertising has skyrocketed. The ubiquity of DTC ads has spurred a heated debate on the pros and cons of such ads. Although opponents argue that heavy DTC advertising has raised drug costs, as well as the number of unnecessary prescriptions (Elliott, 2003; Findlay, 2001), proponents often claim that DTC ads are educational and empower consumers (see Calfee, 2002). Amid the heated debate, the educational value of DTC

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ads toward those with inadequate health literacy has a direct bearing on the discussion about the public benefits of such ads.

Inadequate health literacy has often been linked to poor health outcomes in older adults. Older adults are disproportionately affected by inadequate health literacy due to their inability to navigate independently the health care environment, understand and process basic health information, or make appropriate health decisions (Baker et al., 2002; Levy & Royne, 2009). The increasing amount of health information, including DTC ads, means older adults face greater challenges than ever before in navigating, sorting, and making sense of such information (Centers for Disease Control and Prevention [CDC], 2009). Like other vulnerable populations, promoting health literacy in older adults is a public health imperative to reduce any health disparities (Speros, 2009). It is important to understand the magnitude and effects of health literacy in older adults.

How older adults, especially those with inadequate health literacy, assess the informational content of DTC ads will help address the societal value of DTC ads. Given that older adults with limited health literacy possess less health knowledge and poorer physical and mental health (Wolf, Gazmararian, & Baker, 2005), any educational value of DTC ads could represent their benefit to a segment of consumers who need to be empowered. Given the increasing visibility of DTC ads targeting older adults, how effectively DTC ads convey useful medical information and particularly how those with limited health literacy perceive the informational content of DTC ads warrant a thorough assessment.

Health Literacy and the Educational Value of DTC Ads

Health literacy is a key element in health promotion and protection, disease prevention and early screening, health care maintenance, and policy making (Ozdemir, Alper, Uncu, & Bilgel, 2010). In Healthy People 2010, the U.S. Department of Health and Human Services (2000) defines health literacy as "the degree to which individuals can obtain, process, and understand basic information and services needed to make appropriate healthy decisions." The World Health Organization (WHO) defines health literacy as the cognitive and social skills that determine the motivation of individuals to gain understanding and to use information in ways that promote and maintain health (Bodie & Dutta, 2008; Ozdemir et al., 2010; WHO, 1998).

Specifically, functional health literacy means that individuals (a) can apply literacy skills to health-related material such as prescriptions, appointment cards, medicine labels, and directions for home health care (Parker, Baker, Williams, & Nurss, 1995); (b) have adequate background information and be able to advocate for oneself in the health system (Institute of Medicine [IOM], 2004); and (c) can confidently participate in dialogue and discussions, interpret charts, make decisions about participating in research studies, use medical tools for personal or family health care, calculate the timing or dosage of medicine, and vote on health and environmental issues (Ozdemir et al., 2010).

However, many older adults have limited abilities in reading and understanding basic health information necessary to function successfully as patients (e.g., Baker et al., 2002; Downey & Zun, 2008; Tang, Pang, Chan, Yeung, & Yeung, 2007). More than 5 million adults aged 70 and older in the United States have some form of cognitive impairment without dementia, leading to the conclusion that decreased

cognitive performance occurs with increasing age (Federman, Sano, Wolf, Siu, & Halm, 2009; Plassman et al., 2008). In a study among Medicare enrollees aged 65 and older in four U.S. cities, 34% had inadequate or marginal health literacy (Gazmararian et al., 1999).

The issue of health literacy in older adults becomes more critical considering their high demand for prescribed medication. As consumers of approximately 30% of all prescription medication (Gazmararian et al., 2006), older adults are frequently the intended target of DTC prescription ads (DeLorme, Huh, & Reid, 2007). Such DTC ads have the potential to effectively communicate health information and reduce health disparities among older consumers who have increased need for health care information but who might experience more difficulty in understanding and using that information. However, little is known about how older adults find and interpret key medical information provided in DTC ads (i.e., side effects, potential benefits, and directions for use), and whether those with inadequate health literacy perceive certain kinds of information as difficult to understand.

In fact, a content analysis study casts doubt on the educational value of DTC ads aimed toward those with inadequate health literacy (Kaphingst, Dejong, Rudd, & Daltroy, 2004). Results showed that more broadcast time was allocated for benefits than risks, and risk statements lacked important contextual information. The absence of contextual information appears to be quite problematic "for the significant proportion of consumers with limited literacy skills" (2004, p. 524). Furthermore, a majority of ads did not use consumer-friendly languages to explain medical ideas. Given that "individuals with limited literacy skills might have limited health-related vocabularies" (2004, p. 524), use of medical terminologies may obscure risk information. Bell, Wilkes, and Kravitz (2000) also pointed out that many DTC ads explained medical conditions and treatments rather superficially. Kaphingst and colleagues stated, "More emphasis is placed in these advertisements on the promotional purpose of selling prescription drugs than on the purported intent of educating consumers about medical conditions" (2004, p. 525). Considering that older adults with limited health literacy have difficulties even with day-to-day activities (Wolf et al., 2005), it remains unlikely that they fully understand the medical information provided in DTC ads.

Studies on the assessment of DTC ads by older adults, however, are limited. Older Australian adults, aged between 55 and 87, reported limited perceived benefits of DTC ads and expressed concerns that DTC ads may confuse consumers (Jones & Mullan, 2006). Other studies on the effects of DTC ads for older adults are mixed in terms of their findings (DeLorme & Huh, 2009). Older adults do not recognize the effect of DTC ads on themselves, while believing that others are influenced, confirming the third-person effect (DeLorme et al., 2006, 2007). Older adults also reveal their frustration toward individual DTC ads, despite positive perceptions toward the general idea of DTC ads (DeLorme et al., 2007).

Older adults are a diverse group with different needs and wants. When examining older adults' assessment of DTC ads, their level of health literacy should be considered as a useful determinant. The challenge that older adults typically face in interactions with doctors and other health care providers can be succinctly explained by this 91-year-old college graduate: "I never know what he says after I leave his office. It's like he's talking Russian. I try to follow what he's saying, but he talks too fast and uses words that mean nothing to me. I don't want him to think I'm stupid... I'm not stupid. I may be old and slow, but I'm not stupid" (Speros,

2009). Such a statement demonstrates that education cannot be used as a proxy for health literacy. A close look at the magnitude of health literacy in older adults and the effect that it has on their lives is called for.

Indeed, as An (2007) showed, perceived knowledge in health and medicine is a key factor determining consumers' utilization of DTC ads. Those with low perceived knowledge were somewhat hesitant to talk to their physicians about the advertised drug, although they held positive attitudes toward the ads. Assuming that increased involvement in health-decision making by less knowledgeable consumers can lead to true empowerment, how those with inadequate health literacy assess information in DTC ads will help us understand any health disparities that may result from the prevalent DTC ads (An, 2007).

Overall, the general public's views on the informational contents in DTC ads appear to be quite positive. Viewer assessments about the information provided in DTC ads (Brodie, 2001) revealed that 84% rated them as doing either an excellent or a good job of explaining the conditions that the medicine is designed to treat; 72% assessed DTC ads as excellent or good in terms of stating potential benefits; 66% found them doing either an excellent or good job in explaining who should take the medicine; 55% evaluated them as excellent or good in stating who should not take the medicine and questions to ask a doctor; 52% found them doing either an excellent or good job of telling people the potential side effects; and 47% assessed DTC ads' content on directions for use of the medicine as either excellent or good.

Compared to the positive views by the general public, how older adults view the contents of DTC ads remained to be examined. Furthermore, beyond the descriptive examination of older adults' assessment, the current study aims to see whether their assessment differs according to their subjective level of health literacy. As such, this exploratory study attempts to document the unique magnitude of health literacy in older adults.

Method

The operational definition of health literacy in the current study follows the definition by the U.S. Department of Health and Human Services (2000): "the degree to which individuals can obtain, process, and understand basic information and services needed to make appropriate healthy decisions." That said, among the many dimensions of health literacy, we focused on the aspect of functional health literacy. Two commonly used tests to measure functional health literacy are the Rapid Estimate of Adult Literacy in Medicine (REALM) (Davis et al., 1993) and the Test of Functional Health Literacy in Adults (TOFHLA) or the short form of TOFHLA (S-TOFHLA) (Baker et al., 2002; Parker et al., 1995). Studies on health literacy use these established measures to determine their subjects' level of reading, writing, speaking, listening, and math skills; cultural and conceptual knowledge components; and comprehension of health terms, using actual materials patients might encounter in a health care setting (e.g., Baker et al., 2002; Davis et al., 1993; Downey & Zun, 2008; Federman et al., 2009; Gallop, 1997; Gazmararian, Kripalani, & Miller, 2006; Kalichman, Ramachandran, & Catz, 1999; Morrow, Clark, Tu, Wu, & Murray, 2006; Ozdemir et al., 2010; Parker et al., 1995).

However, REALM and TOFHLA/S-TOFHLA are too long and can be overly intrusive to be routinely integrated into clinical care (see Parker et al., 1995; Brez & Taylor, 1997). For instance, the short form of TOFHLA consists of 36 items. To

develop a more practical method to identify patients with low health literacy, Chew, Bradley, and Boyko (2004) tested a brief version comprising 16 screening questions. They evaluated the brief version of S-TOFHLA and highlighted seven items that successfully identified those with inadequate health literacy. The current study uses the seven items to measure health literacy (Chew et al., 2004) in predicting older adults' assessment of DTC ads. Because those items evaluate how people perceive their confidence in understanding and using medical information, we call it subjective health literacy.

The sample consisted of 170 older adults, recruited from retirement centers, nursing homes, and churches in a Midwestern college town. The average age was 78.4, ranging from 66 to 95. Among the sample, 69% were female and 31% were male. Reflecting the college town characteristics, the sample was well educated, with 79% having a college degree or higher. Because the focus of the study was to examine the spectrum of health literacy levels, which should not be equated with education, this well-educated group of older adults enabled us to measure the health literacy skills demonstrated even by very educated seniors.

Among the sample, most were married (55%), while 15% were single and 30% were widowed. All of them were Caucasian. In terms of occupation, 95% labeled themselves as retired. About 22% declined to identify their income level. The income levels of the rest were as follows: \$14,999 or less (4%); \$15,000–\$34,999 (24%); \$35,000–\$54,999 (21%); \$55,000–\$74,999 (17%); and \$75,000 or more (12%). On average, the sample rated their overall health condition as 3.98—with a minimum of 2 and a maximum of 6—on a scale of 1 (unhealthy) to 7 (extremely healthy). Each interview took place in-person with a paper and pencil questionnaire.

Items to measure the key independent variable, subjective health literacy, were adapted from Chew and colleagues (2004). Respondents were asked to respond to seven items using a scale of 1 (always) to 5 (never):

1. How often are appointment slips written in a way that is easy to read and understand? ($M = 1.94$, $SD = .81$)
2. How often are medical forms difficult to understand and fill out? ($M = 2.8$, $SD = 1.06$)
3. How often do you have difficulty understanding written information your health care provider (like a doctor, nurse, or nurse practitioner) gives you? ($M = 2.93$, $SD = 1.11$)
4. How often do you have problems learning about your medical condition because of difficulty understanding written information? ($M = 3.0$, $SD = 1.41$)
5. How often do you have someone (like a family member, friend, hospital/clinic worker, or caregiver) help you read hospital materials? ($M = 3.61$, $SD = .85$)
6. How confident are you filling out medical forms by yourself? ($M = 3.17$, $SD = 1.35$)
7. How confident do you feel in following the instructions on the label of a medication bottle? ($M = 2.78$, $SD = 1.23$)

To create the subjective health literacy scale ($\alpha = .76$), the items (1), (6), and (7) were reverse-coded to have a consistent scale from low to high subjective health literacy.

The perceived educational value of DTC ads ($\alpha = .93$) was evaluated by seven items adapted from Brodie (2001), on a scale of 1 (poor) to 5 (excellent)

by asking: In general, how would you rate the job prescription drug ads do in telling you about

1. the condition that the medicine is designed to treat ($M = 2.76$, $SD = 1.44$),
2. potential benefits ($M = 2.8$, $SD = 1.40$),
3. who should take the medicine ($M = 2.52$, $SD = 1.34$),
4. who should not take the medicine ($M = 2.41$, $SD = 1.26$),
5. questions to ask a doctor about the medicine ($M = 2.4$, $SD = 1.39$),
6. potential side effects ($M = 2.56$, $SD = 1.49$), and
7. directions for use of the medicine ($M = 2.1$, $SD = 1.29$).

Their overall evaluation about the prescription drug ads was also asked, using a scale of 1 (very easy) to 5 (very difficult), by the question: Overall, how easy do you find prescription drug ads to understand?

Key control variables that might affect respondents' assessment of the information provided in DTC ads were measured: age, income, gender, education, overall health condition, and prescription drug use. Those are factors that previous studies controlled when examining consumers' opinion of ad utility or attitudes toward DTC ads (see Moorman & Matulich, 1993; Huh, Delorme, & Reid, 2004; Perri & Nelson, 1987). Because we used self-reported measures for health literacy and educational values of DTC ads, controlling for factors that could affect respondents' attitudes toward prescription drugs was necessary. In addition to basic demographic variables and drug usage, total media exposure was measured to control for their exposure to DTC ads by the questions: On average, how many hours per week do you spend listening to the radio?, reading newspapers?, reading magazines?, watching TV?, and using the Internet, besides using email? The total media exposure index was an average score of five items to estimate total possible exposure to DTC ads.

Results

Older Adults' Assessment of the Informational Content in DTC Ads

Overall, older adults found prescription drug ads relatively easy to understand, with an average score of 2.38 on a scale of 1 (very easy) to 5 (very difficult) based on the question: Overall, how easy do you find prescription drug ads to understand? Their assessment of the educational value of DTC ads was not that positive, however. All seven items hovered around 2.5, with a maximum of 2.8 (potential benefits) and a minimum of 2.1 (directions for use of the medicine), as shown in Table 1. Older adults felt that DTC ads are doing a better job of listing potential benefits ($M = 2.8$) than explaining directions for use ($M = 2.1$), questions to ask a doctor ($M = 2.4$), or who should not take the medicine ($M = 2.4$).

Also, based on the responses combining those who said either good or excellent (marking either 4 or 5), older adults' assessment does not appear to be positive on the informational content provided in DTC ads. Only 35% chose either good or excellent in terms of information about "the condition that the medicine is designed to treat"; 31% for "potential benefits"; and 30 percent for "potential side effects." Other items showed lower evaluations: 23% for "who should take the medicine"; 21% for "who should not take the medicine"; 19% for "questions to ask a doctor about the medicine"; and only 8% for "directions for use of the medicine." Overall, older adults believed that DTC ads were doing a better job in terms of promoting the

Table 1. Assessment of information provided in DTC ads

	Mean/Median	SD
The condition that the medicine is designed to treat	2.76/3.0	1.44
Potential benefits	2.80/3.0	1.40
Who should take the medicine	2.52/3.0	1.34
Who should not take the medicine	2.40/2.0	1.26
Questions to ask a doctor about the medicine	2.40/3.0	1.39
Potential side effects	2.56/3.0	1.49
Directions for use of the medicine	2.10/2.0	1.29

Note: $N = 170$. All items were measured on a scale of 1 (poor) to 5 (excellent).

drug itself (treatment, the drug's benefits and side effects) than providing instructions and knowledge (who should take or not take it, questions to ask and directions for use). Compared with the findings of Brodie (2001), who surveyed the general population's views, older adults' assessment appears to be much more negative.

Older Adults' Subjective Health Literacy

The mean value of the subjective health literacy scale was 3.2, with a median of 3.14. Although the sample was a relatively educated group, their subjective health literacy was quite evenly spread out, skewed at .728 ($SD = .186$) and with the kurtosis of .531 ($SD = .370$). The subjective health literacy scale ranged from 2 (4.7%) to 5 (4.1%). The scores of 3 (10%) and 3.14 (17.1%) were the two largest segments. Table 2 shows descriptive statistics of each item used to measure subjective health literacy. A correlation test between the subjective health literacy scale and education was not significant, indicating that seniors who are highly educated did not necessarily have high subjective health literacy ($r = -.04$, $p = .54$).

To see how those with low subjective health literacy assess the educational value of DTC ads as opposed to those with high subjective health literacy, a median split of health literacy scale was created. Those whose subjective health literacy scores were below the median (3.14) were operationalized as having low subjective health literacy. There were 102 participants classified as those with low subjective health literacy, while the remaining 68 participants were classified as those with high subjective health literacy. Table 3 shows that there was no association between subjective health literacy and education levels ($\chi^2 = .798$, $df = 3$, $p = .850$). For example, among those with low health literacy, 58.8% held a graduate degree or higher, and among those with high health literacy, about the same percentage (57.4%) held a graduate degree or higher. Other basic demographic factors such as gender and income were also cross-tabulated, but there were no significant differences according to those variables.

The perceived educational value of DTC ads ($\alpha = .93$) based on the seven items was compared between two groups. Table 4 shows Levene's Test for Equality of Variances, which indicated unequal variances ($F = 27.8$, $p = .001$), leading to $t = -6.60$, $df = 168$, $p = .001$. Those with low subjective health literacy ($M = 2.1$, $SD = 1.17$) evaluated the educational value of DTC ads significantly lower than their counterparts ($M = 3.1$, $SD = .78$). In other words, those with low subjective health literacy were more critical about the informational content provided in DTC ads.

Table 2. Subjective health literacy of older adults

	Mean/Median	SD
1) How often are appointment slips written in a way that is easy to read and understand?	1.9/2.0	.81
2) How often are medical forms difficult to understand and fill out?	2.8/3.0	1.06
3) How often do you have difficulty understanding written information your health care provider (like a doctor, nurse, nurse practitioner) gives you?	2.93/3.0	1.11
4) How often do you have problems learning about your medical condition because of difficulty understanding written information?	3.0/3.0	1.4
5) How often do you have someone (like a family member, friend, hospital/clinic worker, or caregiver) help you read hospital materials?	3.61/3.0	.84
6) How confident are you filling out medical forms by yourself?	3.17/3.0	1.35
7) How confident do you feel you are able to follow the instructions on the label of a medication bottle?	2.78/3.0	1.23

Note: $N = 170$. Items have been adopted from Chew, Bradley, and Boyko (2004). All items were measured on a scale of 1 (always) to 5 (never). Items (1, 6, & 7) were reverse-coded to have a consistent scale from low to high subjective health literacy.

Each item comparison by a separate t-test also confirmed that those with low subjective health literacy levels were less enthusiastic in their assessment of DTC ads, with significant differences in all seven items. The group difference was the largest for the item "side effects" (mean difference between two groups = 1.24), followed by "who should not take the medicine" (mean difference between two groups = 1.18) and "who should take the medicine" (mean difference between two groups = 1.10). In terms of addressing side effects, the content of DTC ads was evaluated less favorably by those with low subjective health literacy, possibly suggesting their difficulty in understanding such information.

Table 3. Subjective health literacy and education

	Those with low subjective health literacy	Those with high subjective health literacy	Total
Completed high school	15.7% (16)	20.6% (14)	30
Some college	2.9% (3)	2.9% (2)	5
Completed college	22.5% (23)	19.1% (13)	36
Graduate degree or more	58.8% (60)	57.4% (39)	99
Total	102	68	170

Note: $N = 170$. $\chi^2 = .798$, $df = 3$, $p = .850$.

Table 4. Informational value of DTC ads according to subjective health literacy

	Levene's test for equality of variances			*t*-test for equality of means	
	F	Sig	t	df	Sig.
Equal variances assumed	27.8	.001	−6.1	168	.001
Equal variances not assumed			−6.6	168	.001
	Those with low subjective health literacy ($N = 102$)			$M = 2.1$ ($SD = 1.17$)	
	Those with high subjective health literacy ($N = 68$)			$M = 3.1$ ($SD = .78$)	

Note: $N = 170$.

Older Adults' Assessment According to Subjective Health Literacy

Finally, to see whether older adults' assessment of the content of DTC ads depends on the level of subjective health literacy, a hierarchical regression was run after controlling for the following basic demographic, health, and media usage variables: age, income, education, gender, their overall healthiness, prescription medicine use, and total media exposure. The first block included basic demographic variables: age, income, education, and gender, which explained about 3% of the total variance. The second block added overall health condition and prescription drug use, which marginally increased R^2 to .036. The third block included total media exposure, increasing R^2 to .037. After controlling for those factors, subjective health literacy was finally added to the equation to see how subjective health literacy can predict older adults' assessment of the information content provided in DTC ads.

Table 5 shows that among the covariates, age and overall health condition were significant factors. Variables such as income ($\beta = .02$, $p > .05$), education ($\beta = -.01$,

Table 5. Regression on perceived informational value of DTC ads

Predictor variables	β	t	R^2
Age	−.15	−2.3*	
Income	.02	.23	
Education	−.01	−.15	
Gender	.04	.62	.030
Overall health condition	−.19	−2.67**	
Prescription drug use	.09	1.34	.036
Total media exposure	−.02	−.35	.037
Subjective health literacy	.61	8.5***	.336

Notes: $N = 169$. β values are standardized coefficients. Prescription drug use was measured by the question: "In the past six months, have you taken a prescription drug? (1) Yes (2) No." Overall health condition was measured by the question: "How would you rate your overall health condition on a scale of 1 (unhealthy) to 5 (extremely healthy)?"

*$p < .05$; **$p < .01$; ***$p < .001$.

$p > .05$), gender ($\beta = .04$, $p > .05$), prescription drug use ($\beta = .09$, $p > .05$), and total media exposure ($\beta = -.02$, $p > .05$) did not turn out to be statistically significant. However, those who were younger tended to evaluate the educational value of DTC ads more highly ($\beta = -.15$, $p < .05$). Also, those in poor health tended to rate the informational content of DTC ads more positively ($\beta = -.19$, $p < .01$). After controlling for the above factors, subjective health literacy turned out to be the strongest factor predicting older adults' views on the information provided in DTC ads ($\beta = .61$, $p < .001$). The subjective health literacy variable significantly increased R^2 from .037 to .336. Those with high subjective health literacy were more likely to assess the educational value of DTC ads positively as opposed to those with low subjective health literacy. The significant R^2 increase highlights the important role of subjective health literacy in predicting older adults' assessment of DTC ad contents.

Discussion

This exploratory study sought to document the magnitude of subjective health literacy in older adults and its effect in evaluating the informational content of DTC ads. The results showed that their assessment of the educational value of DTC ads depended on their level of subjective health literacy. Older adult consumers with low subjective health literacy found the communication contents of DTC ads less effective in terms of addressing key medical information.

The results of the current study underscore the important role of subjective health literacy in determining older adults' evaluation of DTC ad contents. In accordance with extant literature on health literacy, the level of subjective health literacy was significantly associated with older adults' self-reported understanding of medical information presented in DTC ads. It should be noted that the same content was evaluated less favorably by one group. The finding that the less favorable view was observed by those with low subjective health literacy alerts us to the inadequate informational values of DTC ads for consumers who truly need such information in order to be more educated and empowered.

The results also showed older adults' relatively negative views on the informational content provided in DTC ads. Compared with the national sample in Brodie's (2001) survey, older adults assessed the educational value of DTC ads significantly lower. Older adults believed that DTC ads are doing a better job of listing potential benefits than explaining the directions for use, questions to ask a doctor, or who should not take the medicine. These results echo the concerns raised by other scholars (Kaphingst et al., 2004), who have noted that the informational content of DTC ads lack educational quality, with more emphasis on promoting the drug itself.

Consistent with the previous studies (Baker Johnson, Velli, & Wiley, 1996; Morrow et al., 2006), higher education was not necessarily linked to high subjective health literacy. Nor did education turn out to be a significant factor in determining the older adults' evaluation of the educational value of DTC ads. Despite the characteristic of the study sample—a highly educated group of seniors—a wide range of subjective health literacy was observed, distinguishing subjective health literacy from education. The results revealed that subjective health literacy was the strongest factor in predicting their assessment of information in DTC ads, while education was not. The finding points to the unique challenge that older adults face as they age, regardless of educational level.

Unlike education, the respondents' ages were significantly associated with their evaluation of the educational value of DTC ads: the younger they were, the higher they evaluated the informational content provided in DTC ads. The age of the current sample ranged from 66 to 95. This implies that within the group of older adults, age could make a difference in terms of self-reported health literacy and using medical information in DTC ads. This finding is also in line with previous studies that have demonstrated increasing age to be significantly associated with lower health literacy (Downey & Zun, 2008) and with cognitive impairment that is attributed to low functional health literacy (Plassman et al., 2008). The significant role of health status was also consistent with previous studies wherein older adults in poor health evaluated DTC ads more positively compared with those in better health. Similarly, Williams and Hensel (1995) reported that older adults with poorer health status have a positive attitude toward DTC ads.

The current study prompts us to pay more attention to how those with low subjective health literacy understand DTC ad contents. The results suggest the need to systematically review DTC ad contents to better understand the informational benefits of DTC ads toward those with low health literacy. By knowing that DTC ads were doing a poor job of explaining specific medical information to those with low subjective health literacy, particular components of DTC ads, such as side effects and potential benefits, should be systematically evaluated. Also, further studies can employ a qualitative approach to delve into respondents' feelings and thoughts about the content of DTC ads. More importantly, future studies should measure any possible health disparities as a consequence of different views and utilization of DTC ads. The results of the study also indicate that an understanding of the specific mechanisms underlying the role of health literacy is important in order to effectively craft messages for better interventions.

Limitations of the study should be acknowledged. The sample was a well-educated group of seniors, reflecting the characteristics of the college town studied. Also, all the participants were Caucasian. Such homogenous characteristics limit the generalizability of the results to the entire senior population in the United States. Results of the study should be interpreted with caution, and future studies should include a more diverse senior population in order to better understand the relationship between health literacy and the educational value of DTC ads.

Although a balanced sample will present more representative results, the wide range of subjective health literacy levels observed in the sample clearly indicates the need to consider factors beyond older adults' education levels. It is important to note that the significant link between subjective health literacy and the assessment of DTC ads among highly educated groups of seniors confirms the aforementioned confession made by the college-educated senior citizen: "I may be old and slow, but I'm not stupid" (Speros, 2009).

Furthermore, the limitations resulting from the measurement should be noted as well. Instead of objective measures, health literacy and educational values are self-reported measures. Objective tests of the participants' health literacy levels would increase the validity of these results. Also, future studies should measure the actual comprehension of medical information in DTC ads among older adults. Although statistical controls have been employed to minimize any confounding effects in the current study, it is possible that perceived educational values may be confounded with feelings about prescription drugs, experiences with side effects, or doubt about pharmaceutical companies in general. Given the results of the study,

a systematic examination of a large-scale national sample of senior citizens in terms of their comprehension of DTC information and objective tests of their health literacy is warranted.

In conclusion, the findings discussed in this study raise concerns about the usefulness of DTC advertising as a way of educating and empowering consumer groups, especially those who truly need such benefits. This study did not uncover a strong educational effect on older adults with low subjective health literacy from the ads. This population segment has the highest need for health information but has limited access to mass media and other health information sources. Their lower functional health literacy also limits their understanding of health information gathered from the media, including DTC advertising. The results of this study indicate that DTC ads do not appear to empower them, as proponents often claim.

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