News media coverage of direct-to-consumer pharmaceutical advertising: implications for countervailing powers theory
Heather Hartley and Cynthia-Lou Coleman
*Health (London)* 2008; 12; 107
DOI: 10.1177/1363459307083700

The online version of this article can be found at: http://hea.sagepub.com/cgi/content/abstract/12/1/107
News media coverage of direct-to-consumer pharmaceutical advertising: implications for countervailing powers theory

Heather Hartley & Cynthia-Lou Coleman
Portland State University, USA

Abstract  Since a 1997 regulatory shift on the part of the US Food and Drug Administration (FDA), there has been an explosion of televised direct-to-consumer (DTC) pharmaceutical advertising in the United States. The introduction and growth of this form of advertising, as well as other recent evolutions in the health care arena, have altered relationships among key countervailing powers in the health care system, suggesting the need to recast countervailing powers theory so as to account for these changes. Coming from the perspective that the news media play an important role in reflecting the balance of power among the various countervailing powers, the paper advances this theoretical framework through an empirical assessment of the relative prominence of those entities in print news media coverage of the DTC advertising phenomenon. The study finds that ‘corporate sellers’ (pharmaceutical industry) are accorded more prominence in news coverage than are providers, consumers, corporate purchasers, or state players and that DTC critics, in particular, have minimal representation. In addition, the findings point toward two modifications for countervailing powers theory: (1) an incorporation of the role of academic/research organizations, and (2) a consideration of the universe of possibilities with respect to each of the countervailing powers.

Keywords  countervailing powers; direct-to-consumer (DTC) advertising; news media; pharmaceutical industry

Address  Department of Sociology, Portland State University, P.O. Box 751, Portland, OR 97207, USA. [E-mail hartleyh@pdx.edu].

Acknowledgements  The authors gratefully acknowledge funding support from Portland State University for this study. We thank the following individuals for research assistance: Alyse Collins, J. Collin English, T. Russell Hanes, Lailah Hamblin, and Shaun Jackson. We thank Jeff Gersh, Daniel Sullivan and the anonymous reviewers for critical readings of various paper drafts.
Introduction

Since a 1997 regulatory shift on the part of the US Food and Drug Administration (FDA), there has been an explosion of direct-to-consumer (DTC) pharmaceutical advertising on television in the US. The introduction and growth of this form of advertising has altered relationships among key countervailing powers in the health care system – including state players, health care providers, industry (corporate sellers and purchasers), and consumer publics – suggesting the need to recast countervailing powers theory (see Hafferty and Light, 1995; Hartley, 2002; Light, 1993; Light, 2000), a framework that seeks to explain the evolving relationships among these health system stakeholders.

Coming from the perspective that the news media play an important role in reflecting the balance of power among the various countervailing powers, the article advances this theoretical framework through an empirical assessment of the relative prominence of those entities in print news media coverage of the DTC advertising phenomenon. The study, an analysis of coverage of this new advertising trend in eight major national newspapers, answers the following questions:

1. What is the relative prevalence of sources/countervailing powers in news coverage of DTC advertising?
2. What is the relative potency of those sources/countervailing powers, as measured by likelihood of being directly quoted, average number of words per quote, and likelihood of being first sources in the stories?
3. What is the relative prevalence of coverage of benefits and drawbacks associated with DTC advertising, and which sources/countervailing powers are critics, moderates or promoters of DTC advertising?

In answering these empirical questions, the results of the study are used to advance the countervailing powers framework (Hafferty and Light, 1995; Hartley, 2002; Light, 1993; Light, 2000). By assessing which players and what arguments are accorded prominence in the print news coverage of a major health-related policy evolution, we are able to comment on the relative balance of power among these countervailing powers. Our findings suggest that while countervailing powers theory has been most frequently utilized to model challenges to physician power, a new focus on the growing power of the pharmaceutical industry in particular will enable the framework to better account for the latest evolutions in the health care system. In addition, the findings indicate that the theory should better conceptualize the role of academic/research organizations within the system of countervailing powers and should better integrate a consideration of the universe of possibilities with respect to each of the countervailing powers.
Background

Prior to 1997, the FDA required DTC ads for prescription drugs to both disclose the drug’s major risks (i.e. the ‘major statement’), and make ‘adequate provision’ for disseminating the approved package labeling. Because televised advertisements cannot easily broadcast full labeling, this requirement limited the amount of DTC ads produced. However, in August 1997 the FDA issued Draft Guidelines for Industry: Consumer-Directed Broadcast Advertisements, which addressed the adequate provision clause by stipulating that television advertisements could satisfy the requirement through referral to an alternate source of information (e.g., toll-free telephone number, website, or print ad). This alternate source would, in turn, provide full disclosure of product label information and thus satisfy the provision. As a result of this regulatory shift, there has been a dramatic expansion of DTC advertising on television. While DTC ads in print media have been common since the 1980s, the widespread appearance of DTC ads on television is a much more recent phenomenon. In 1991, only one brand of prescription medication was advertised on television. By the end of 1997, twelve drugs were marketed this way, and by 2000, at least fifty were (Belkin, 2001). By the end of the 1990s, the amount of money spent each year by pharmaceutical companies on DTC advertising surpassed the amount spent on ads in professional medical journals (Terzian, 1999). The pharmaceutical industry spent $1.7 billion on TV advertising in 2000 – 50% more than in 1999 and more than double the 1998 amount (Belkin, 2001). By 2004, this figure had more than doubled yet again, up to $4.2 billion (Ives, 2005).

The increase in televised DTC advertisements takes place within a complex environment in which people are taking more prescriptions than ever before and per capita drug spending is at an all-time high (Wilkes et al., 2000). Notes the Kaiser Family Foundation, ‘National spending on prescription drugs is the fastest growing segment of health care spending, accounting for 20% of the estimated increase in such spending between 1999 and 2000’ (Kaiser Family Foundation, 2001). The amount spent on prescription drugs in the US grows each year, with the spending for drugs four times higher in 2002 than in 1990 (Kaiser Family Foundation, 2004). Importantly, the greatest cost increases are coming from those drugs most heavily advertised to consumers, particularly the newer, higher-priced drugs (Belkin, 2001; Kaiser Family Foundation, 2004).

The introduction of televised DTC drug advertising has generated controversy. Proponents argue that the ads increase awareness of treatment options and thus function as a useful form of education, while critics challenge this claim, arguing that the ads promote demand for and use of unnecessary or inappropriate medication while contributing to rising health care costs (Angell, 2000a; Angell, 2000b; Angell, 2004; Bonaccorso and Sturchio, 2002; Hoffman and Wilkes, 1999; Hollon, 1999; Holmer, 1999;
Kaiser Family Foundation, 2004; Mintzes, 2002; Rosenthal et al., 2002; Wilkes et al., 2000). About half of respondents in a 1999 study believed that drug ads are prescreened and sanctioned by the FDA, and 43% believed that only ‘completely safe’ drugs are advertised to consumers (Bell et al., 1999). Neither of these assumptions is correct, and in fact the FDA has cited significant numbers of ads for violations (Belkin, 2001).

In 2005, the year after the well-publicized withdrawal of the much-advertised Vioxx brand pain reliever from the US market, the controversies surrounding DTC advertising inspired a variety of calls for evaluation or reform of current advertising practices. Notably, in July 2005, US Senate Majority leader Bill Frist called for curbs on DTC advertising in both print and televised media and requested that the Government Accountability Office study the issue to create a basis for potential imposition of federal restrictions on the practice (Kiely, 2005). Later that month, the Pharmaceutical Research and Manufacturers of America (PhRMA), the drug industry’s trade association, announced plans to adopt an industry-wide voluntary code governing DTC advertising, beginning in 2006 (Pressler, 2005). Some drug companies have decided to self-impose even more restrictions (e.g., in 2005, Bristol-Myers Squibb voluntarily banned DTC advertising of new drugs for the first year on the market). Some critics argue that these voluntary restrictions are inadequate and are mainly meant to stave off future government regulation (Pressler, 2005). In November 2005, the FDA held a two-day public hearing to review DTC advertising, indicating the potential for changes to the existing regulatory structures.

Theoretical motivations

Overview: Countervailing powers theory in context
The theoretical heart of the project is located in literature on the changing nature of physician power vis-à-vis state, industry, and consumer forces. Over the last several decades, the field of medical sociology has witnessed much development in its conceptualization of the interrelation of these forces (e.g., Freidson, 1970; Haug, 1988; Haug and Lavin, 1981; Larson, 1977; McKinlay and Arches, 1985; Starr, 1982; Wolinsky, 1988). Although the profession of medicine has historically dominated health care, changes brought by managed care, increasingly powerful consumer movements and other forces have resulted in declines in the power and hegemony of the medical profession, as documented by these and other medical sociologists.

From the 1990s into the present, the countervailing powers framework (Hafferty and Light, 1995; Hartley, 2002; Light, 1993; Light, 2000) has re-articulated the location of the medical profession within the field of other institutional and cultural forces. Hafferty and Light (1995) situate the profession of medicine within a collection of five countervailing forces, including the government, corporate purchasers of health care (e.g., insurance and managed care companies), corporate sellers (e.g., manufacturers of medical
products and pharmaceuticals), consumers, and other providers (e.g., chiropractors). At its most general level, the perspective holds that one party (such as the state or a profession) may gain dominance by subordinating other parties who, in time, countermobilize to redress imbalances produced by the dominance of one party.

One of the most significant changes over the last decade has been the ascendance of pharmaceutical industry economic and political power (see Angell, 2004; Conrad, 2005; Conrad and Leiter, 2004; Fishman, 2004), with this change altering the balance of power among the key countervailing powers. Thus far, countervailing powers theory has been most utilized to model challenges to physician power and has not yet adequately accounted for the ascendance of pharmaceutical industry power. Our aim is to extend the theoretical framework by re-examining the balance of power within the system of countervailing powers, explicitly taking into account the position of the pharmaceutical industry vis-à-vis the other parties.

**Scholarship on the media**

In making this contribution to countervailing powers theory, we draw on social science that has demonstrated that mass media provide the stage for competing power interests to define, articulate and publicize their respective agendas. According to this body of work, organizations gain access to media through a variety of methods, and those that are most successful owe their success, in part, to the resources they can muster to build an agenda that reflects their own interests that are then rearticulated via mass-mediated channels (Dearing and Rogers, 1996; Gamson and Modigliani, 1989; Gandy, 1982; Herman and Chomsky, 1988; Reese et al., 2001). However, reporting norms require ‘balanced’ pluralistic coverage to ensure that a multitude of voices is heard in the arenas of debate, particularly in the face of social controversy (Coleman, 1995; Gitlin, 1980; Tichenor et al., 1980). Thus powerful players with a stake in an issue such as pharmaceutical regulation or sales actively court mass media in order to have their respective agendas articulated, and reporters and their organizations, in turn, provide the stage upon which such agendas unfold.

Mass media clearly play a role in how information is shaped by what gets covered in the first place, by the way in which controversies are defined, by naming expert sources able to speak to the issues, by setting the parameters for debate, and by emphasizing some value systems over others (Gamson and Modigliani, 1989; Gans, 1979; Ericson et al., 1989; Lasorsa and Reese, 1990; Tankard, 2001). Such attributes of news gathering and reporting – from identification of expert sources to emphasis on certain values – comprise the theoretical construct ‘framing’. While framing has been articulated on intrapersonal and microsocial dimensions, our interest lies in the social construction of information (framing) as it results in the news product.

Media scholars such as DeFleur and Ball-Rokeach (1989) argue that media systems are much more than vehicles for conveying information,
contending that political, economic – and, by extension, health systems – are dependent on mass media systems, and that the dependency is both structural as well as informational. In a related vein, the political economy model advanced by Schiller (1973) claims that economic interests in mass media systems constrain the content of news and entertainment. Arguably, then, the news product reflects the economic dynamics within mass media systems, thus linking the macro-level systems relationships with the more micro-level framing of information.

Existing theory on the countervailing powers within the health care system seeks to explain the influences of the state, industry and consumers on the medical profession or on each other. Our project will provide an empirical window into the balance of power among those parties by assessing how they are framed by the news media. In so doing, our research also creates stronger links between mass media scholarship and the sociology of health and medicine. The bulk of scholarly activity in media studies and health has focused on the role of media in communicating health information to publics, often with an eye on behavioral change (see, for example, Wallack et al., 1993). Less is written, however, from a macrolevel perspective that also attends to competing structural powers.

**The countervailing powers and DTC advertising**

In this section, we show how the growth of televised DTC drug advertising has altered relationships among the countervailing powers (see Figure 1, which focuses on those countervailing powers already established by the theory). As discussed by Conrad and Leiter (2004), recent developments in the corporatized medical-industrial complex have created a ‘new set of relationships among corporate entities, insurers, physicians, and consumers’ (p. 171–2).

A change in FDA policy – to allow televised DTC drug marketing – was an important catalyst that reconfigured relationships among the countervailing powers, yet this change also reflects the influence of corporate sellers on the state, through the successful lobbying actions of the pharmaceutical industry (Angell, 2004). In turn, this particular linkage between the state and corporate sellers triggered changes in the relationships among the other parties.

The relationship between consumers and the pharmaceutical industry shifted as a result of the prevalence of DTC advertising. Within a competitive system of managed health care, increasing numbers of health plans are measuring ‘consumer satisfaction’ and compete with other plans to attract members, thus giving increased weight to the importance of consumer demand. In such a consumer-centric system, it becomes prudent for pharmaceutical companies to seek to influence consumer prescription-seeking behavior (through DTC ads) as well as physician-prescribing behavior (Wilkes et al., 2000). Evidence suggests that these ads do affect consumer behavior, leading to increases in office visits for heavily advertised conditions and
more requests for brand-name drugs (Hall, 2001). As a result, the balance of power between consumers and providers has been altered (Kaiser Family Foundation, 2001). Studies have determined, for example, that half to three-quarters of consumers asking for a medication by name were given a prescription for that drug (Bell et al., 1999; FDA, 2004; Wilkes et al., 2000). A provocative randomized controlled trial even showed that when researchers sent actors in good health to doctors’ offices to see if they could get prescriptions for the faked symptoms, over half of the patients making brand-specific requests were granted those prescriptions (Kravitz et al., 2005).

The trend of increased prescription drug spending has triggered various cost-savings strategies on the part of health plans, working to alter the arrangements between purchasers/payers and providers as well as purchasers/payers and consumers. Physicians are gatekeepers to prescription drugs. Insurers, health plans and managed care organizations (MCOs) have responded to increased consumer demands for advertised prescriptions by controlling physician-prescribing behavior, to some extent, through the implementation of various sets of rules and sanctions (such as formularies...
limiting what drugs physicians can prescribe). While purchasers have been containing cost by constraining physician behavior, now that behavior is increasingly being affected by industry (via DTC advertisements). The ads appear to increase consumer requests for nonformulary medications and put pressure on purchasers/payers to add drugs in high demand to their formularies (Penna, 2000). Purchasers also utilize the services of intermediary organizations, such as pharmacy benefit managers (PBMs), as part of their efforts to hold down their spending on prescription drugs.

The expansion of televised DTC drug advertising ultimately has an impact on the medical profession (and other healthcare providers authorized to prescribe medications) in complex (and perhaps contradictory) ways. For example, while physicians still maintain gatekeeping authority over prescription drugs, they are increasingly under constraints to satisfy two other countervailing powers: consumers (who might ask for prescriptions for drugs they have seen advertised) and corporate purchasers/payers (who might impose requirements to contain costs). In addition, to balance cost containment with efforts to meet consumer demand, many payers have implemented tiered co-payment schemes, which require consumers to pay higher co-payments for certain prescription drugs, oftentimes the newer and more expensive brand-name products (Penna, 2000).

The rise of televised DTC advertising has had an impact on each of these countervailing powers; each, therefore, has a vested interest in this new form of advertising. Through determining which perspectives are accorded the greatest attention, and which parties are able to have their platforms or viewpoints most frequently articulated by print news media, the study provides an assessment of the relative position of those countervailing powers.

Method

Data collection
The study is a content analysis of print news coverage of televised DTC advertisements and surrounding controversies in eight major newspapers that represent key elite press and key regionally based press within the US. We analysed the population of 145 stories published in these newspapers over the time period August 1997–July 2003 (a six-year span), beginning with the month that televised DTC advertising was legalized in the US. Eight newspapers were selected to represent newspapers of record in distinct regions of the United States: the New York Times, Boston Globe, Washington Post, Chicago Sun Times, Atlanta Journal and Constitution, San Francisco Chronicle and the San Diego Union-Tribune. In addition, USA Today was selected.

We collected the articles through the Lexis-Nexis database, using one of the database’s recognized search phrases – ‘direct to consumer drug marketing’
(the search was confined to this search phrase). The search identified 216 articles. We reviewed each story for content and, ultimately, 71 articles were excluded for the following reasons, presented in order of prevalence: the story was not about DTC advertising (e.g., was about political ads that favor adding a prescription drug benefit to Medicare); the story did not mention DTC advertising (e.g., was about an internet service for physicians to get info on drugs); the story made only a passing one- or two-line reference to DTC advertising; the story was about advertising but did not address the advertising of prescription drugs; the story was only about online drug promotion, print advertising or billboard advertising (if the article was generally about DTC advertising, it was kept, but if it focused only on one of these types, it was excluded, as we wanted to maintain focus on the broadcast forms of advertising addressed by the 1997 policy change).

The analysis included news stories, opinion-editorial pieces, and letters to the editor. Our justification for including opinion-editorial articles and letters to the editor is that we are examining social construction of the DTC issue (and specifically, which sources are afforded opportunities to speak on the topic), which is not limited to news articles (Bantimaroudis and Ban, 2001; Dickerson, 2001; Entman, 2004). Our principal reason for analyzing newspaper coverage as opposed to broadcast news is that print coverage is more likely to set the agenda for policymakers and opinion leaders (Best, 1989; Cook, 1998; Dearing and Rogers, 1996; Reese, 1990) and thus has the potential to create bridges between mass media systems theories and countervailing powers theory.

The greatest number of stories appeared in the New York Times with 57 stories (39%). The Washington Post had 25 stories (17%) and the Boston Globe had 23 stories (16%). The USA Today had 11 stories (8%), the Chicago Sun Times, 9 (6%), and the Atlanta Journal and Constitution, 9 (6%). The San Francisco Chronicle had 6 stories (4%) and the San Diego Union-Tribune, 5 (3%). More than half (62.8%) of all stories were hard news (from the financial/business section, science section, or general news section), 18.6% were features or specials (from the health section, lifestyle section, or magazine section), 9.7% were opinion-editorial pieces, with the remaining 9% letters to the editor. The word count in stories varied from 67 to 2769, with a mean of 744 words (s.d. = 542) and a median of 653 words.

Coverage was relatively consistent over the six-year period, ranging from 12–21 stories a year (for each full year in the study), with an exception being 2002, when 40 news stories were found. Several news-breaking events occurred in 2002, including the confirmation of a new head of the FDA, a report by the Government Accounting Office (GAO) on FDA oversight of DTC drugs, and release of a Kaiser Family Foundation study on DTC ads. Due to the relatively small number of stories collected from any one year, the analysis does not disaggregate data by year.
Coding

Manifest and latent content were recorded for each news story. The two lead authors developed a coding guide, and four graduate students coded the stories over an eight-week period in 2004. Coders met on four occasions to review coding decisions, discuss problems and refine decision rules.

‘Sources’ were considered those individuals selected by the reporter to discuss the issue at hand. For this study, sources were identified only if they were quoted directly or, if indirectly, that the attribution was clearly conferred to the source. For each story, coders noted which sources made remarks about issues surrounding the DTC advertising phenomenon. Sources were not counted if their identity was indeterminant, such as ‘scientists agree’ or ‘critics suggest’. Sources were typically affiliated with ‘organizations’ noted by the reporter. Coders noted each source by name, title and the organization as presented in the story. Once all organizations were noted, the two authors examined the list and created categories based on the organizations named.

Five of those organizational categories reflected the commonly recognized countervailing powers: (1) pharmaceutical industry (‘corporate sellers’); (2) the state, which we divided into two categories: (a) FDA sources and (b) other federal sources; (3) consumer advocacy organizations; (4) health care providers and provider organizations; (5) health care system representatives (a combination of insurers, HMOs, and hospitals, loosely reflecting ‘corporate purchasers’). In addition to these, we established four other categories based on patterns that emerged from the data: (1) academic/research organizations, primarily universities and research institutes; (2) consultants (primarily consultants to industry), which included advertising agencies, public relations organizations and the like; (3) mass media organizations; and (4) miscellaneous, which included groups such as banks, foreign organizations, and the remaining sources not falling into the other categories. The ‘sources’ for letters to the editor were considered to be those writing the letters, unless the authors referred to other sources in the letters. We decided against coding specifically for ‘opinion-editorial articles’ and/or ‘letters to the editor’ because we were most interested in source use, and these pieces came from a variety of source categories.

The team also coded the arguments and perspectives (frames) posed by the sources. In order to be measured, these claims needed to be in quotations, or, if not quoted, then clearly attributed as the views of the source. We categorized the sources’ arguments according to ‘news frame’. Prior to coding, we reviewed academic and popular literature, noting those claims that were most often presented: benefits and drawbacks, both social and economic, to individuals and organizations affected by DTC marketing; relationships among stakeholders, particularly doctors and patients; medical advancements arising from the pharmaceutical industry’s research and development efforts; and legal and ethical issues surrounding DTC advertising. Drawing from this review, we established eight a priori frames.
prior to coding: benefits; drawbacks (but not financial costs); costs (solely financial); power relationships (but not doctor–patient relationships); doctor–patient relationships; health, medicine, science and technology (discussion of ‘breakthroughs’ or challenges to the notion of ‘breakthroughs’); ethics; and law or policy. Each frame was counted independently, meaning one frame could not be counted as both benefit and power relationship. However, a source might make multiple claims and, in this case, coders could record more than one frame per source.

**Intercoder reliability**

To check coding reliability, 10% of the stories were selected at random by one of the authors (CC). For the first test, the four coders were divided into two teams and received one batch of duplicate stories. For the second test, coders were divided into new teams, with each receiving one new batch of duplicate stories. Following Krippendorff’s (1980) lead, we assessed reliability on the manifest content separately from the latent content. For the manifest content, we found agreement overall ranged from 92–100% on such coding decisions as newspaper, word count, story type, and source organization. Coder agreement on the frames was less than the manifest content: 74–100%, depending on the frame. Two more follow-up checks were conducted, both resulting in improvements in intercoder reliability. This article mainly uses data that were coded for manifest content (and that had a better overall agreement), which makes the lower rates of agreement on latent content less of a concern for this analysis. However, this article does examine two frames in particular (benefits and drawbacks). Due to the lower intercoder reliability for the frames, one of the authors (HH) double-checked the coding for these two frames, as well as the related cost frame.

**Operationalization**

We operationalized ‘power’ through four primary measurements, using the following rationales: (1) we assessed source prevalence, assuming that more representation translates into greater symbolic weight; (2) we evaluated the relative likelihood of different types of sources being quoted directly, working from an assumption that direct quotes lend legitimacy to a source; (3) we calculated the average number of words attributed to each source type (in direct quotes), again assuming that more representation translates into greater symbolic weight; (4) we determined the likelihood that the various types of sources are listed first in a story, drawing from the journalistic precept that the most essential elements of and sources in a story are included at the beginning.

**Analysis**

Data from the code sheets were analysed utilizing SPSS 12.0. The data were examined with (1) the story as the unit of analysis (N = 145), and with (2) the
source as the unit of analysis (N = 436). Analyses included: comparisons of frequency data to ascertain relative source and frame prevalence, means comparisons to assess relative lengths of quotes, two-by-two analysis to determine distribution of benefits and drawbacks among news stories, and Chi-square analysis to assess patterns pertinent to discussion of benefits and drawbacks of DTC advertising across source types.

Limitations
The methodological limitations of content analysis apply to our study. Specifically, content analysis relies upon subjective assessments of data. To minimize this subjectivity, we adhered to standard content analysis protocols, including creation of a rigorous coding manual, coder training, and establishing baseline levels of intercoder reliability. We are also limited by the accuracy of the archive from which we drew our sample. Because we are using an established, commonly relied upon database, the risk of inaccuracy is minimized. In addition, because the analysis included only eight major newspapers, the findings are not generalizable to all newspaper coverage.

Findings
Source prevalence
Overall prevalence. There were a total of 436 sources used in the 145 stories. The pharmaceutical industry is the most prevalent organizational type, comprising over 20% of all sources mentioned (Table 1). In the middle range (each comprising 10–20% of all sources) are sources from academic/research organizations, consulting groups, the FDA, and health care providers. The following organizations are least frequently represented, comprising fewer than 10% of all sources: consumer advocacy organizations, health care system representatives, non-FDA federal sources, and mass media organizations. With the exception of sources from academic/research organizations and consultants, those from the pharmaceutical industry outnumber all other types of sources by nearly or more than a 2:1 ratio.

Prevalence as first sources. Although the pharmaceutical industry has the highest overall prevalence, the pattern differs for first sources. The sources from academic/research organizations are the most prevalent first sources in the 145 stories, comprising over 18% of mentions (Table 1). In the middle range (each comprising over 10% of sources) are sources from consulting groups, the FDA, the pharmaceutical industry, and health care providers. Paralleling the overall patterns noted above, the following organizations are least frequently represented, comprising fewer than 10% of all sources: consumer advocacy organizations, health care system representatives, non-FDA federal sources, and mass media organizations.\(^4\)
Source potency
Likelihood of being directly quoted. The same pattern of prevalence emerges when analyzing the 280 sources that were directly quoted (see Table 2, Columns 1–2). As Table 2 (Column 3) shows, sources from the pharmaceutical industry, academic/research organizations, and consumer organizations are most likely to be directly quoted when they are included in an article, with approximately 70% of sources from these categories receiving direct quotes. Consultants, health system representatives, and non-FDA federal sources fall into the 60–70% range. On the low end, fewer than 60% of FDA sources, health care providers, and mass media sources are directly quoted.

Mean quote lengths. Before calculating the mean word counts by source type, we examined the data for outliers. We identified a word count data point as an outlier if it was three or more standard deviations away from the mean. Using this protocol, we identified two data points as outliers, both of which were from an FDA source. Due to the biasing nature of these outliers, they were not included in the means analysis.

Table 2 (Column 4) displays the mean word count in quoted material by organizational type. The overall mean was 35.7 words. Several organizational types averaged over 40 words per quote: mass media sources (44.0), non-FDA federal sources (41.5), academic/research sources (40.7), and the miscellaneous sources (40.8). Pharmaceutical industry quotes are on average the shortest, with an average word length of less than 30 words (29.3), even though these sources are the most prevalent of all organizational types. As shown in Table 2, the mean quote length for the pharmaceutical industry is significantly shorter than that for academic/research organization sources (mean difference of 11.4 words, SE = 5.26, p = .03).
The most commonly occurring of the eight \textit{a priori} frames was the drawbacks frame with at least one mention in 52\% of the stories. The benefits frame was a close second, occurring in 49\% of the stories. Other frames occurred as follows: power relationships (38\% of stories); health-medicine-science-technology (23\%); doctor–patient relationship (20\%); law/policy (18\%); cost (18\%); and ethics (8\%). This article restricts its analysis to the two most prevalent frames (benefits and drawbacks), with brief consideration of the related cost frame. In this section, we begin by discussing the relative prevalence of benefits and drawbacks in the stories, briefly characterize the content of these frames, and then move to an assessment of the sources most likely to note benefits and drawbacks. For in-depth analysis of all the frames as well as frame content, see Coleman et al. (2006).

**Benefits and drawbacks of DTC advertising**

The most commonly occurring of the eight \textit{a priori} frames was the drawbacks frame with at least one mention in 52\% of the stories. The benefits frame was a close second, occurring in 49\% of the stories. Other frames occurred as follows: power relationships (38\% of stories); health-medicine-science-technology (23\%); doctor–patient relationship (20\%); law/policy (18\%); cost (18\%); and ethics (8\%). This article restricts its analysis to the two most prevalent frames (benefits and drawbacks), with brief consideration of the related cost frame. In this section, we begin by discussing the relative prevalence of benefits and drawbacks in the stories, briefly characterize the content of these frames, and then move to an assessment of the sources most likely to note benefits and drawbacks. For in-depth analysis of all the frames as well as frame content, see Coleman et al. (2006).

**Benefits and drawbacks:** Relative prevalence. About equal numbers of articles mentioned benefits and drawbacks. As noted above, slightly more than half (52\%) mention at least one drawback associated with DTC advertising, while slightly under half (49\%) mention at least one benefit associated with DTC advertising. Stories tended to either mention both benefits and drawbacks (44 stories) or neither benefits nor drawbacks (42 stories) (p = .03, Fisher’s Exact Test). Overall, this accounts for 86 stories, while the remaining 59 stories mentioned either benefits but no drawbacks (27 stories) or drawbacks but no benefits (32 stories). Of those articles mentioning drawbacks, 34 cite more than one (with these articles mentioning 2–7 benefits each). Of those articles mentioning benefits, 34 discuss more than one (again, with these articles mentioning 2–7 benefits each). Overall, 146 drawbacks and 147 benefits were noted in the population of stories.

120
Themes: Benefits. Because the intent of this article is not to present a content analysis of the benefits and drawbacks of DTC advertising as discussed in news coverage, here we suggest only the general themes in coverage. Approximately half of the benefits noted (74 out of 147) relate to a central theme: the educational benefits of DTC ads. In general, this theme was expressed through assertions regarding the benefits to consumers of having more information about drugs, discussions of the ways in which consumers might be empowered by this information, and how the information would facilitate recognition of undiagnosed conditions and ultimately lead to better doctor–patient discussions. The next most prominent trend concerned the financial benefits of DTC advertising, with about 15% of the benefits (21 out of 147) clustered around this theme. The most discussed financial benefits include: the reduction in hospital costs associated with stimulation of better disease diagnosis and associated drug treatment regimens, the benefits to the stock market, and financial benefits for the pharmaceutical industry. Another seven benefits (less than 10% of the population) clustered around a minor third theme, that of the positive role of FDA oversight of the DTC advertising process. The remaining 45 benefits that were discussed (about one-third of the total) did not cluster around a central theme. Some of these other benefits include references to the benefits of particular drugs and the utility of specific ad techniques.

Themes: Drawbacks. Over 30% of the drawbacks noted (46 out of 146) relate to problems associated with the quality of the information in DTC ads, including references to ads providing biased and/or misleading information and ads obscuring drug side effects. Another 30 of the referenced drawbacks (approximately 20%) pertain to the problematic influence of the ads on consumer demand for prescription drugs (especially brand-name products), the potential for the ads to encourage drug treatment over alternatives, and the possible association with drug misuse/overuse. Another 14 drawbacks (less than 10% of the population) cluster around a third theme pertaining to the weak power of the FDA. Falling into this category are statements about the need for a stronger FDA to regulate DTC ads. The remaining 49 benefits (about one-third of the total) did not cluster around a central theme. Some of these other drawbacks include concerns about oversimplification of complex health conditions and general distress about the prevalence of the ads.

Critics, promoters, and moderates. Based on patterns in the data, we grouped the source types to fall into three categories vis-à-vis their reported stances on DTC advertising: (1) critics, (2) promoters, and (3) moderates (Table 3). A source type was categorized as a ‘critic’ when over 40% of the sources from that group mentioned drawbacks associated with DTC advertising while less than 25% noted benefits. A source type was categorized as a ‘promoter’ when over 40% of sources of that type mentioned benefits associated with DTC advertising while less than 25% noted
drawbacks. ‘Moderates’ fell in the middle range, with 25–40% of sources of those types mentioning drawbacks and benefits. If a source type fell into a ‘low’ category for benefits (less than 25%) but a ‘medium’ category for drawbacks, it was considered to be a ‘moderate-critic’. It is important to note that this categorization is based only on the sources’ stances as reported in the news stories; we cannot know, for example, whether sources discussed other points/perspectives with reporters that did not make it into the news stories. While the terminology might appear biasing in that it has loaded meanings, our intent in utilizing it is to categorize the perspectives of various groups so that we can then establish whether groups with different stances are more or less likely to receive coverage in the news stories about DTC advertising.

Of the ten source types, reporters represent two as ‘promoters’: the pharmaceutical industry and consulting sources. When included in the stories, these sources were the most likely to cite benefits of DTC advertising (with 46% and 57% of these sources, respectively, doing so) and the least likely to identify drawbacks (each under 25%). Three source types fit the category of ‘moderates’: the FDA sources, mass media sources, and the miscellaneous sources. Sources from academic/research organizations and other (non-FDA) federal sources fall into the ‘moderate-critic’ source category. Three source types – health system representatives, sources from consumer advocacy organizations, and providers – are ‘critics.’ As Table 3 shows, there are significant differences in the likelihood that different source types will cite drawbacks (Pearson’s Chi-Square 43.08, df = 9, p < .001) and benefits (Pearson’s Chi-Square 40.07, df = 9, p < .001).

First sources only. Because news stories are written so that the most essential elements of a story are included at the beginning, whether a

---

**Table 3** Discussion of benefits and drawbacks, by organizational type

<table>
<thead>
<tr>
<th>Source type</th>
<th>% discussing benefits (N)</th>
<th>% discussing drawbacks (N)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmaceutical industry</td>
<td>46.1 (41)</td>
<td>12.4 (11)</td>
<td>Promoter</td>
</tr>
<tr>
<td>Consultants</td>
<td>57.0 (33)</td>
<td>22.4 (13)</td>
<td>Promoter</td>
</tr>
<tr>
<td>FDA</td>
<td>29.8 (14)</td>
<td>34.0 (16)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Mass media organizations</td>
<td>37.5 (9)</td>
<td>37.5 (9)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>25.0 (6)</td>
<td>29.2 (7)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Academic/research orgs.</td>
<td>22.7 (15)</td>
<td>31.8 (21)</td>
<td>Moderate-Critic</td>
</tr>
<tr>
<td>Non-FDA federal</td>
<td>15.0 (3)</td>
<td>30.0 (6)</td>
<td>Moderate-Critic</td>
</tr>
<tr>
<td>Health care providers</td>
<td>16.3 (7)</td>
<td>44.2 (19)</td>
<td>Critic</td>
</tr>
<tr>
<td>Consumer advocacy orgs.</td>
<td>13.5 (5)</td>
<td>62.2 (23)</td>
<td>Critic</td>
</tr>
<tr>
<td>Health care system reps.</td>
<td>21.4 (6)</td>
<td>46.4 (13)</td>
<td>Critic</td>
</tr>
<tr>
<td>Pearson’s Chi-Square</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>df = 9, p &lt; .001</td>
<td>df = 9, p &lt; .001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
reporter uses a first source that discusses a drawback or a benefit of DTC advertising can be of significant importance. Our analysis indicates that the first sources (N = 145) used by reporters are as equally likely to point out drawbacks associated with DTC advertising (32%) as benefits of it (also 32%), indicating no overall bias. However, just as the analysis of all sources indicated, differences emerge across source types.

When we conducted a Chi-Square analysis using all categories, 30% of the cells had counts less than 5. In order to lend strength to the analysis, we consolidated source types that had similar percentages and that ‘matched’ at a theoretical level. For this analysis, we collapsed the ten categories into the following five: (1) pharmaceutical industry and consultant sources; (2) FDA and non-FDA federal sources; (3) health care system representatives, health care providers and representatives from consumer advocacy organizations; (4) mass media and miscellaneous sources; and (5) academic/research organizations (not grouped with any others). The results of the analysis that used the consolidated categories did not differ substantively from that (not shown) using the 10 categories; however, with the consolidated categories, no cells had low counts (i.e., less than 5) in Chi-Square analysis.

As Table 4 shows, the results of the analysis of the first sources parallels that for all sources. First sources from the pharmaceutical industry and consulting groups are still the only DTC ‘promoters’. In fact, when a reporter started a story with the benefits of DTC advertising, over half of the first sources they used were from this group. Health care system representatives, providers and representatives from consumer advocacy organizations still qualify as ‘critics’. Although sources from academic/research organizations are, overall, ‘moderate-critics’, as first sources they are more aptly categorized as ‘moderates’. In other words, when a reporter leads a story with an academic/research source, it is more likely that the source is used to point out a benefit as compared to when the source is placed at other positions in a story.

<table>
<thead>
<tr>
<th>Source Type</th>
<th>% discussing benefits (N)</th>
<th>% discussing drawbacks (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharm. industry and Consultants</td>
<td>68.6 (24)</td>
<td>11.4 (4)</td>
</tr>
<tr>
<td>FDA and non-FDA federal sources</td>
<td>16.7 (4)</td>
<td>37.5 (9)</td>
</tr>
<tr>
<td>Health system reps., providers and consumer orgs.</td>
<td>17.6 (6)</td>
<td>47.1 (16)</td>
</tr>
<tr>
<td>Mass media and Miscellaneous</td>
<td>20.0 (5)</td>
<td>40.0 (10)</td>
</tr>
<tr>
<td>Academic/research orgs.</td>
<td>25.9 (7)</td>
<td>25.9 (7)</td>
</tr>
<tr>
<td>Pearson’s Chi-Square</td>
<td>29.57</td>
<td>11.93</td>
</tr>
</tbody>
</table>

Pearson’s Chi-Square: 29.57, df = 4, p < .001

Pearson’s Chi-Square: 11.93, df = 4, p < .02
**Discussion**

The findings indicate that while the print news media might appear to be meeting their mission of ‘balanced coverage’ (i.e., both benefits and drawbacks are mentioned in equal amounts), they are actually giving disproportionate coverage to certain countervailing powers over others. However, these patterns in coverage are complex, depending on what measure is considered (e.g., overall prevalence, likelihood of being quoted, length of quotes). Taking these various measures into account, the two groups accorded particular positions of prominence are sources from the pharmaceutical industry and those from academic/research organizations.

**The pharmaceutical industry**

As shown in the findings section, the pharmaceutical industry is the most prevalent organizational type, comprising over 20% of all sources mentioned. With the exception of sources from academic/research organizations and consulting groups, sources from this industry outnumber all other types of sources by nearly or more than a 2:1 ratio. Arguably, the consultant sources could be added to the pharmaceutical industry total, as the consultants were generally consultants to that industry (e.g., advertising agencies with pharmaceutical industry contracts) and shared that industry’s ideological position on DTC advertising (i.e., both groups were the only ‘promoters’). Together, these two organizational types comprise a third (33.7%) of all sources, outnumbering academic/research sources by a 2:1 ratio and outnumbering all other types by at least a 3:1 ratio.

The pharmaceutical industry sources are also among those most likely to be directly quoted when included in news coverage. However, when a story includes a direct quote from an industry source, those quotes are, on average, the shortest of all ten source types included in the analysis, with the difference relative to sources from academic/research organizations being of statistical significance. Although these data cannot be used to assess why quotes from the pharmaceutical industry are especially short, we can speculate as to a plausible explanation: Reporters use sources from the pharmaceutical industry most often to note only the benefits of DTC advertising, resulting in shorter statements being selected to appear in the stories. Alternately, although we cannot establish this in our data, the industry’s shorter quotes might be illustrating the efforts of company public relations (PR) professionals to give succinct ‘canned’ sound bites. Similarly, the prevalence of the industry in coverage might also reflect the efforts of that industry’s teams of professional PR representatives who are eager to provide news material and copy to reporters.

**Sources from academic/research organizations**

These sources are also accorded positions of consequence in the news stories. Sources from academic/research organizations are the second most
prevalent overall, are the most prevalent first sources, are the most likely to be directly quoted when included as sources in a story, and also have relatively longer quotes when they are quoted. The prevalence and prominence of academic/research organizations suggests that countervailing powers theory should be re-conceptualized so as to account for their important role within the system of countervailing powers.

It appears that journalists seek to lead their stories with ‘expert sources’ from this category. In contrast, pharmaceutical industry sources are the most prevalent for all source positions other than first source. Reporters might use ‘expert sources’ from research institutions and universities to provide a sense of ‘balance’ to the start of a story, perhaps believing they are most likely to be (or be perceived as) unbiased and neutral. That sources from academic/research organizations are the most likely to be directly quoted and have relatively long quotes when quoted also seems to reflect the legitimacy they are accorded in news coverage.

Overall, sources from academic/research organizations are ‘moderate-critics’, somewhat more likely to note drawbacks of DTC advertising as compared to benefits, yet when a reporter leads a story with an academic/research source, it is more likely that the source is used to point out a benefit as compared to when the source is placed at other positions in a story. It seems, then, that the more moderate-critical role of the academic/research sources is downplayed when they are used as first sources. It is important to point out that it was beyond the scope of our analysis to determine whether or not the sources from academic/research organizations were in fact ‘neutral’. Because growing numbers of university researchers have financial and other ties to the pharmaceutical industry (Angell, 2004; Bodenheimer, 2000; Fishman, 2004; Wazana, 2000), it is likely that many of these seemingly unaligned ‘experts’ are in fact explicitly linked to that industry.

The ‘missing’ critics
The results also reveal what entities are largely excluded from coverage, most notably being the three key countervailing powers that are the strongest critics of DTC advertising: health care providers, consumers and health care system representatives. Of the three ideological types – promoters, moderates and critics – the critics are least represented, both in terms of sheer prevalence and in terms of potency. This analysis shows that ‘balanced’ coverage is largely a misnomer, that DTC critics literally have less voice in print news coverage.

Arguably, health care providers are the most prominent ‘critic’ group, with overall representation nearly equivalent to the FDA sources. However, health care providers are among the least likely to be quoted and have relatively few words attributed to them. Consumer advocacy organizations are relatively likely to be directly quoted when they are included in stories but their quotes are only of moderate length; in addition, they have low prevalence, representing less than 10% of sources (both overall and as first
sources). Health care system representatives have the lowest prevalence of the three critic groups (under 7%), fall between providers and consumer groups in likelihood of being quoted, and have moderate quote lengths.

**Conclusion**

Following from scholarship showing that the mass media provide the stage for competing power interests to define, articulate and publicize their respective agendas, and that those entities most successful in this enterprise owe their success, in part, to the resources they can muster to build an agenda (Dearing and Rogers, 1996; Gamson and Modigliani, 1989; Gandy, 1982; Herman and Chomsky, 1988), we consider prevalence and potency in news media coverage to be one proxy measure for organizational power. The print news media we examined may on the surface provide ‘balanced coverage’ of the DTC advertising phenomenon; yet, by giving disproportionate coverage to certain countervailing powers over others, the news media reveal an important facet of the balance of power among these various entities. Taken as a group, the sources from the pharmaceutical industry and academic/research organizations held multiple distinctions in regards to prevalence and potency (i.e., industry sources were the most prevalent overall; academic/research sources were second most prevalent overall, were most prevalent first sources, and were most likely to be quoted). In addition, the overall prevalence of industry sources is even greater if the consultant sources are added in, as these two groups together comprise *one-third* of all sources, outnumbering academic/research sources by a 2:1 ratio and all others by at least a 3:1 ratio. And even though benefits and drawbacks of DTC advertising are discussed in equal measure, those groups most likely to be DTC critics are least represented, both in terms of sheer prevalence and in terms of potency.

Of all conventionally recognized countervailing powers, the ‘corporate sellers’ (pharmaceutical industry, and by extension, the consultants) – those most likely to benefit directly from DTC advertising – are accorded the most symbolic weight in the news coverage, which can be taken as an indication of their relative power vis-à-vis the other countervailing powers (i.e., providers, consumers, corporate purchasers, and state players). In contrast, physicians and other health care providers, along with other groups most critical of DTC advertising (i.e., consumers and health system representatives), are among those least likely to have their perspectives represented in the news coverage. It may well be the case that the *system* of countervailing powers is not well represented in a news culture that promotes dichotomous thinking (providing balance to stories by representing ‘both sides’).

Our results have strong implications for countervailing powers theory, providing empirical support for our contention that countervailing powers theory should be recast so as to respond to the ascendance of pharmaceutical industry power. In addition, the findings indicate that the theory should
be modified so as to better conceptualize the role of academic/research organizations within the system of countervailing powers and integrate consideration of the universe of possibilities with respect to each of the countervailing powers.

While countervailing powers theory has been most utilized to model challenges to physician power (see Hartley, 2002 for a recent example), our work indicates that the growing power of the pharmaceutical industry should be a new focus. To this end, the study’s results are consistent with and lend support to Conrad and Leiter’s (2004) call to medicalization researchers to attend to the growing significance of pharmaceutical industry power. In addition, our results suggest that a countervailing powers model that explicitly contends with the escalating power of the pharmaceutical industry must also acknowledge the important position of the ‘expert sources’ from academic/research organizations. Certainly, these entities factored prominently in our study, as they were revealed to be very prevalent and potent sources on a health policy topic of great significance. But even more broadly, a growing body of research is examining the ways in which academic researchers/experts explicitly facilitate the consolidation and continued growth of pharmaceutical industry economic power (e.g., Angell, 2000a; Angell, 2004; Fishman, 2004; Wazana, 2000). A clear incorporation of insights from this body of work into countervailing powers theory will position the model to be a robust one able to account for the newest evolutions in the health care system.

We believe that the prominent placement of sources from academic/research organizations in particular raises a question with strong theoretical implications: Who ‘speaks for’ the various countervailing powers? One consideration is ease of access; getting information, quotes and perspectives from one group/countervailing power can be significantly easier that getting such things from another group. For example, to whom does a reporter approach for the ‘consumer’ perspective? Perhaps the reporter turns to a civic group or to the government (as the ‘people’s representative’), or perhaps the reporter turns to academia. Due to their high status and relative ease of identification, it may be the case that academia-based sources are being called on to serve as ‘proxy voices’ for other, less-identifiable groups.

A related question concerns what ‘constitutes’ a countervailing power. Even in the case of a countervailing power such as the drug industry, which often pays for PR and media support services, the ‘universe’ of players who might speak for the industry is expansive, including entities such as the companies themselves, trade groups, lobbying groups, etc. While our data cannot speak to this issue, one implication of our results is that theory could better integrate a consideration of the universe of possibilities with respect to each of the countervailing powers.

Future research can be directed to answering additional questions raised by our findings, some of the most important being those related to motive that cannot be addressed by our data: Why are individual journalists not
doing a better job of considering/integrating sources that represent the various countervailing powers invested in this issue? Is the answer one of access – that industry has the ability to pay public relations representatives to be accessible to the media? Is the answer more related to topic – that the pharmaceutical industry is more heavily represented simply because the stories are about changes that have an impact on them more directly than some other sources? Other potentially productive lines of future research could include: (1) an examination of news coverage on other related health subjects to determine whether the balance of power revealed by our study persists across substantive topics; and/or (2) an expansion of the study to include other newspapers with an eye to discerning any differences by newspaper and/or geographic region.

Finally, our results raise questions about the potential to incorporate mass media systems explicitly within the countervailing powers model. Drawing from the recognition that the mass media are harnessed by claims makers to convey and legitimize their respective agendas and are also essential elements in the political and economic systems that govern the countervailing powers model, a fruitful line of inquiry might examine the extent to which mass media systems are overlooked as actual stakeholders in the countervailing powers model. In a related vein, research directed at assessing the ways in which the news media might not just reflect but also shape the balance of power among the countervailing powers (e.g., media reception studies focused on the topic of DTC advertising) would usefully build upon the findings presented here.

**Notes**

1. Initially, we selected the *Los Angeles Times* to represent the southwest region. However, because that paper was not accessible via Lexis-Nexis for the full timeframe of the study, we replaced that paper with the *San Diego Union-Tribune*. In addition, some prominent newspapers, such as the *Wall Street Journal*, were not selected for this study if other newspapers from that geographic area were already included.

2. The category ‘mass media organizations’ was twofold, representing (a) sources from publishing houses or magazines (e.g., representative of *Prevention* magazine) and (b) the newspaper itself in the case of an editorial written on behalf of the newspaper.

3. Of the 14 editorials, 6 were written on behalf of the newspaper itself, with the remaining 8 coming from 4 other source categories. The 13 letters to the editor were written by sources from 5 different categories.

4. More than half of the mass media sources are first sources (13 of the 21 mass media sources were first sources). Some of that high rate of representation as first sources is a result of a coding decision – the newspaper itself was considered the ‘first source’ in the case of an editorial from that newspaper. Still, only 6 of the 13 mass media first sources fall into this category, less than half of all mass media first sources.
References


**Author biographies**

**Heather Hartley** is an Associate Professor of Sociology at Portland State University in Portland, Oregon. She teaches courses on health, gender, and sexuality. Hartley’s main line of research examines the drug industry as an increasingly important ‘engine of medicalization’. Within this area of research, besides examining...
direct-to-consumer advertising, she has also written extensively on the drug industry search for a ‘female Viagra’, with this work appearing in Sexualities, Advances in Gender Research, Women’s Studies Quarterly, and other journals.

CYNTHIA-LOU COLEMAN is an Associate Professor who teaches mass communication theory and research at Portland State University in Portland, Oregon. Coleman has written about direct-to-consumer advertising and risk communication for such journals as Communication Research, Risk Analysis and Health Communication. She earned graduate degrees at Cornell and the University of Wisconsin-Madison.