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Exploring the Role of Medical and Consumer Articles in the Diffusion of Information related to Medical Change

Abstract

Using content analysis, this study provides theoretical means for reconciling social network theory focusing on human influence in information use and behavior change, and current emphasis in medical fields on the principle role of published literature in guiding and changing clinical practice. Trust enhancing features within published articles are explored.

Résumé : En utilisant l'analyse de contenu, cette étude présente les moyens théoriques pour relier la théorie du réseau social en convergeant sur l'influence humaine de l'utilisation de l'information et sur le changement de comportement, de même que sur l'impact courant des domaines médicaux sur le rôle principal de la littérature publiée pour guider et modifier les pratiques cliniques. Les caractéristiques facilitant la confiance à propos des articles publiés sont explorées.

1.0 Introduction

The effective diffusion of information and *information use*, a field of study concerned with "understanding what information sources people choose and the ways in which people apply information" (Julien 2002, 1051), is receiving increased attention as professionals and lay individuals struggle to make sense of proliferating information, and seek to effectively utilize that information in day-to-day life. In medical fields, where the translation of research into daily clinical practice is of critical importance (Haines and Donald 1998), an understanding of factors influencing information diffusion and use can provide valuable insights into the process of medical change.

In this study, a stratified random sample of medical and consumer articles was analyzed using content analysis in order to explore both the role of published literature in diffusion of information, and articles as a communication channel between loosely connected medical groups or individuals, and between medical and consumer populations. An illustrative medical case study provided context for this investigation; Rogers' *Diffusion of Innovations* (Rogers 1995) and Granovetter's *Strength of Weak Ties* (SWT) theories (Granovetter 1973) provided the theoretical frameworks that informed the study. This paper seeks to provide theoretical means of reconciling research demonstrating that interpersonal relationships are primary factors influencing the effective transmission of information and subsequent behavior change (Granovetter 1973; Rogers 1995), and the current emphasis in medical fields on published literature as the principal means of guiding and changing clinical practice (Sackett et al. 2000).

2.0 Illustrative Case Study and Research Questions

In 1966 New York gynecologist, Robert Wilson, wrote a best selling book that promised every woman the option of remaining 'feminine forever.' Promoting the concept that menopause produced estrogen deficiency of such proportions that a woman's entire social, psychological, and physical well-being was doomed, Wilson promised the elimination of menopause, a return to youthful vigor, the indefinite postponement of the ravages of aging, and the final physical and mental emancipation of women. The fundamental concept that menopause was a "deficiency disease" (Bell 1987, 535), which required ongoing medical intervention in the form of hormone therapy (HT), became widespread and, by the late 1980s, menopause was explicitly or implicitly identified as a deficiency disease in both medical and consumer articles (Topo 1997). Despite the lack of credible evidence substantiating the safety and efficacy of long term HT, and despite studies indicating concerns about the use of HT for prevention of chronic disease (*cf*. Haskell, Richardson, and Horwitz 1997), articles that threw this therapy into question were criticized and "disregarded in lieu of the less credible evidence that fit the prevailing paradigm" (Herrington and Howard 2003, 519).

Belief in the benefits of long-term HT remained until July 2002 when the well-respected *Journal of the American Medical Association* (*JAMA*) dropped a bombshell which reverberated across medical and consumer publications and into doctor's offices and living rooms: the long anticipated Women's Health Initiative (WHI) study had been prematurely halted following determination that HT had more potential for harm than for good in healthy postmenopausal women taking a combination of estrogen and progesterone to prevent chronic disease (Rossouw et al. 2002). Although these findings appeared to come as a surprise to many physicians and women, HT as a long-term preventative therapy was a treatment innovation that emerged and developed over time. Prescribing doctors and HT users had incidentally or intentionally gathered information about HT and then applied that information in their professional and/or personal lives.

This research study focused on the impact of the early publication of WHI results, and explored the role of published literature in the diffusion process of HT as a long-term preventative therapy (Genuis 2004b). The following research questions were addressed:

1. How did the published results of the WHI study influence medical and consumer literature and what role did the literature play in the innovation-decision process related to HT as a long-term preventative therapy for menopausal and postmenopausal women?
2. Given that published literature provides a conduit through which information flows within and between networks, how can SWT theory and the concept of 'weak trusted ties' contribute to a greater understanding of the role of the literature in information transmission?
3. How has the WHI study impacted the expression of the biomedical model vs. normal life transition model within the literature?
4. How was the medicalization of menopause expressed in the sample of medical and consumer articles?
5. Given the acknowledged impact of industry in medicine, how did industry influence articles in the sample?

This paper focuses on question #2 and explores the role of published articles as communication channels between health professionals, and between medical and consumer populations.

3.0 Literature Review

3.1 Diffusion of Innovations Theory

Diffusion of Innovations, a theory formalized by Rogers in 1962 and now elucidated by over 6200 diffusion studies (Rogers 2002), is essentially a process by which innovation is communicated through a variety of channels over time and among members of a social system (Rogers 1995). This theory focuses on the spread of information related to new ideas or technologies and on the application of that information as expressed by innovation adoption or rejection. Central to innovation diffusion, as elucidated by Rogers (1995), is the innovation-decision (I-D) process, a process which incorporates both information seeking and information use as individuals move through the following stages: knowledge acquisition, persuasion, decision, implementation, and confirmation.

While Rogers' (1995) theory provides a useful framework for exploring the diffusion of a wide variety of innovations (in Library and Information Science, this theory has been primarily used to investigate the diffusion of services or technology (*cf.* Ash 1999; Bennett and Bennett 2003; White 2001)), classic diffusion studies acknowledge the complexities of communication and suggest that future researchers explore questions related to the role of different communication sources (Valente and Rogers 1995). In fact, a recent shift "from considering innovation attributes and adopter characteristics to considering communication channels and the diffusion context" (Oldenburg, Hardcastle, and Kok 1997, 275), makes timely the questions explored in this study.

Communication channels are essential to diffusion: "every diffusion process is fundamentally based on the spread of information concerning the innovation among the members of a social system" (Kortelainen 1997, 556). Not only are communication channels the means by which information flows between individuals or groups, but the nature of the exchange influences the impact of the message (Rogers 1995). Ferrence (1996), for example, found that the more credible and respected the information source, the greater the likelihood of innovation adoption. Communication networks, "interconnected individuals who are linked by patterned flows of information" (Rogers 1995, 308), also play an important role in diffusion. These networks have a degree of structure and stability, thus allowing predictability related to information flow.

3.2 Strength of Weak Ties Theory

Strength of Weak Ties theory provides a framework for exploring different channels, or *ties*, that carry information and ideas between individuals, and between and within social networks (Granovetter 1973; Granovetter 1982). While it is through *strong ties* (STs), communication channels between people who know and interact extensively with one another, that influence is more likely to flow (Weimann 1983) and innovation adoption is more likely to be stimulated (Weenig 1993), this theory presents the counterintuitive argument that *weak ties* (WTs) are critical because of their unique capacity to act as information bridges that carry new information between loosely connected individuals and/or social networks. There is, therefore, an intricate interplay between weak and strong ties: WTs provide greater access to non-redundant ideas, whereas STs have a greater capacity to act as validators, which offer opinions on the value and usefulness of new information received from WTs (Baker and Pettigrew 1999).

Although it would appear that individuals tend to act on the basis of awareness-knowledge received from WTs and trusted input received from STs, SWT theory has been refined by researchers who explored the benefits of weak vs. strong ties and found that while STs have "a positive and statistically significant ($p = .006$) effect on the receipt of useful knowledge," the impact was positive because of the typical association of STs with trust (Levin and Cross 2004, 1483). When trust dimensions were controlled, the benefits of *trusted weak ties* were apparent and these ties "yielded the most useful knowledge of all" (Levin and Cross 2004, 1486). While it is evident that the diffusion of information may be enhanced by trusted information sources and particularly by trusted WTs, Levin, Cross and Abrams (2002) point out that organizations should also be aware of dangers associated with misplaced trust.

Since SWT theory was first proposed, it has been used primarily within the social sciences as a framework for investigating social networks and interpersonal transmission of information. The ability to operationalize tie strength, however, allows this theory to be used in an interdisciplinary context to generate explanations for observed relationships. Schwartz (1994), for example, uniquely operationalized tie strength on the basis of the information-provider's role rather than the interrelationship between individuals, and other researchers have suggested that this theory provides a framework for examining the flow of health information (Baker and Pettigrew 1999). In the current study, published literature was viewed as a communication channel or tie. SWT theory was used to examine the role of published information as a bridging tie between loosely connected medical groups, and to analyze the function of consumer publications in bridging the gap between medical and consumer communities.

3.3 Medical Change and the Role of Published Literature

Diffusion and social network theory research suggests that most individuals do not rely on scientific studies for the evaluation of innovations; instead they rely on interpersonal communication channels and subjective evaluations. In other words, "people prefer to turn to other people rather than documents for information" (Levin, Cross, and Abrams 2002). Despite a significant emphasis in medical publications and medical education on research-based literature as the basis for clinical decision-making (Gonzales, Ringeisen, and Chambers 2002), the role of interpersonal communication is evident in medical fields: relationships between physicians (Borbas et al. 2000; Coleman, Katz, and Menzel 1966), and between physicians and their patients (Brown et al. 2002; Hunter, O'Dea, and Britten 1997) are primary factors influencing the adoption of clinical innovation. The importance of interpersonal relationships is further confirmed by studies demonstrating that the diffusion process is speeded up when medical innovations are introduced through opinion leaders (Farquahar et al. 1990; Lomas et al. 1991; Puska et al. 1986). Gabbay and le May's (2004) recent ethnographic investigation of general practitioners' decision-making and information use confirms these findings: clinicians were rarely informed by explicit research evidence; instead they relied on "their own and their colleagues' experience, their interactions with each other and with opinion leaders, patients, and pharmaceutical representatives, and other sources of largely tacit knowledge" (1013).

Despite the central role of interpersonal relationships in information diffusion and particularly in behavior change, the utilization of published information is a critical concern in medical fields. The translation of research based knowledge into clinical

practice is not only an expected part of maintaining standards of practice (Dobbins et al. 2002), it is also "an important and lifelong part of professional development" (Haines and Donald 1998, 74). Surveys assessing the contribution of information sources to knowledge suggest that physicians perceive published literature as a critical information source. Both general practitioners and specialists, for example, indicated that peer reviewed medical literature was one of the most important sources of knowledge related to the relationship between a given pathogen and disease (Fendrick, Hirth, and Chernew 1996); and in a survey of Canadian radiologists participants reported that journals and texts were the most extensively used resources in self-directed learning (Fox, Rankin, and Costie 1997). In addition, the principle that clinical practice should be based on the best available research evidence, a principle commonly understood to be the practice of evidence-based medicine (EBM) (Sackett et al. 2000), has been widely endorsed by medical societies and associations.

While interpersonal relationships play a significant role in consumer adoption of medical innovation (for instance, both qualitative and quantitative research suggests that the patient-doctor relationship has a critical impact on women's decisions to use HT (Marmoreo et al. 1998; Newton et al. 1998)), studies demonstrate that published literature also plays an important, though less formal role. A consumer mail-based survey, for example, found that the "number one source of information about menopause was women's magazines (76%)" (Clinkingbeard et al. 1999, 1097), and 44.5% of respondents to a telephone survey indicated that printed materials were an important source of information, with 59.6% of women 50-59 years of age citing the use of printed material (Newton et al. 1998). Qualitative studies also confirm that women commonly turn to the popular press and other printed materials for menopause information (Griffiths 1999; Jones 1999). While facts contained in consumer publications may have varying degrees of validity, it is important to note that patients and readers of medically oriented lay literature assume that views propagated by medical authorities are based on trustworthy research (Griffiths 1999; Lyons and Griffin 2003).

The role of published literature in information diffusion and change is ambiguous. Although behavior change is strongly influenced by interpersonal communication, published literature may be viewed as a critical communication channel which allows new information to flow between loosely connected individuals and groups. By viewing published literature as a WT in a multifactor communication network, a theoretical means of reconciling the apparent ambiguity between theories that highlight the role of interpersonal relationships in change and the current emphasis in medical fields on published literature as a basis for clinical change may be provided, and a more comprehensive understanding of the role of published literature can be achieved.

4.0 Methods

Content analysis, a "summarizing, quantitative analysis of messages" (Neuendorf 2002, 10) that can be used to make "valid inferences from text" (Weber 1990, 9) was used in this exploratory study. This method was chosen for the following reasons: 1) content analysis seeks "to generate generalizable conclusions . . . [rather than] focusing on a full and precise conclusion about a particular case" (Neuendorf 2002, 15); and 2) this research method allows consideration of both countable content, and also *latent* content, which consists of "unobserved concepts that cannot be measured directly but can be represented or measured by one or more indicators" (Neuendorf 2002, 23). The unit of

analysis for this study was medical and consumer articles. Texts were based on paper-published material, as web content is not static and many consumer publications use reprints from paper-published magazines in online articles.

4.1 Sampling

The sampling frame included articles published from January 1999 to October 2003, the most recently available issues at the time of sampling. This allowed analysis of articles published prior to initial publication of WHI results, and in the time that had passed since July 2002, thus facilitating analysis of change. Only publications that were available in English, for which there was database access and thus the ability to key word search, and that were accessible in full text were included in the study. The goal of the medical and consumer portions of the sample was to select a representative sample of articles from a variety of publications read respectively by Canadian physicians and women. This allowed an analysis of information that these two populations were commonly accessing and from which they were directly and/or indirectly learning about menopause and HT.

Because of the lack of a readily available source that compiled circulation figures for medical journals and because increasing access to online resources such as PubMed has decreased dependence on individual subscriptions, medical publications were selected based on Canadian origins and/or representation of major medical associations. Medical publications were selected using the following criteria: 1) *Publication Profiles* (Rogers Media Inc. 2003) verified Canadian origins and national scope, and publications were relevant to general practitioners and/or specialists in Obstetrics and Gynecology; and 2) primary journals published by the American Medical Association (*JAMA*) and British Medical Association (*BMJ*) were chosen for inclusion as they are prominent journals that are relevant to Canadian physicians.

Consumer publications were selected according to the following criteria: 1) the five publications with the highest average number of female readers per issue (as indicated by the 2002-2003 edition of *Media Digest* (Canadian Media Director's Council 2002-2003)), with a verified scope incorporating health issues, and with a target audience including women 40+ years of age, were selected; and 2) in order to include Canadian focused material from a comprehensive list of Canadian and international journals, magazines and newspapers, the sampling frame was supplemented by articles accessed through the database *CPI.Q* (*Canadian Periodicals Index*).[1]

Drawing from selected source publications, a combination of search terms representing HT and menopause and/or postmenopause was used to establish the sampling frame: 57 consumer articles (21 pre-WHI, 36 post-WHI) and 84 medical articles (46 pre-WHI, 38 post-WHI) were identified. A random numbers table was used to select the stratified, random sample, which was composed of one out of every three articles in the sampling frame. Seven pre-WHI and 13 post-WHI consumer articles, and 16 pre-WHI and 13 post-WHI medical articles were selected for analysis; the final sample consisted of 49 articles.

4.2 Variables and Data Analysis

Variables and values for content analysis were developed in accordance with the research questions (see section 2.0). A detailed list of operational definitions and content indicators for variables, as well as a data collection worksheet was developed, pilot tested, and adapted. Data analysis of values was accomplished using the Statistical Package for the Social Sciences (SPSS); frequencies were compiled, and chi-square and Cramer's V tests were performed on selected variables in order to determine the statistical significance of associations (significant at $p < .05$ unless otherwise stated). In a number of cases, variable values were collapsed at the data analysis phase. See appendix A for a list of variables, values, and variable definitions discussed in this paper.

4.3 Study Limitations

This study was limited by criteria used in selecting sampling frame articles: articles were selected by search terms representing both HT and menopause, therefore, articles not indexed as addressing HT were rejected. Although indexing generally noted HT when HT alternatives were being discussed, it is possible that the sample of articles was biased towards a medicalized approach to menopause. Indexing practices within databases could have also limited the reliability of results.

Analytic consistency could not be established because a single coder carried out content analysis. This limitation was addressed by the pilot study, which facilitated exploration of research methods and allowed evaluation of variable definitions. Consistency was further addressed by the development of detailed operational definitions for variables and values, and the prominent display of these definitions throughout the content analysis.

5.0 Results and Discussion

The association between tie strength and communication of new information provides a set of propositions that can be used within an interdisciplinary context to explore observed relationships and information flow. The overwhelming evidence presented by diffusion and SWT research demonstrates that strong interpersonal relationships primarily cause innovation adoption and concrete behaviour change; therefore, when conceptualizing STs and WTs within the context of a multifactor communication network, published literature must be regarded as a WT. A broader appreciation for the different ways that literature may function is gained from exploring the proposal that benefits derived from a WT's ability to provide non-redundant information is enhanced by the user's level of trust in the WT.

In order to investigate how SWT theory and the concept of 'weak trusted ties' contribute to a greater understanding of the role of the literature in information transmission, the following topics are discussed in light of findings from content analysis: 1) the impact of the WHI as demonstrated by direct or indirect reference to initial WHI results (Rossouw et al. 2002); 2) trust enhancing features within the published literature; and 3) potential for misplaced trust within the medical literature.

5.1 The Impact of the WHI

Despite the negligible impact of previous studies that raised concerns about the use of HT for disease prevention (results from the 1998 Heart Estrogen/progestin Replacement Study (Hulley et al. 1998), for example, were essentially ignored because they were not compatible with widespread belief that HT was cardioprotective), this exploratory study found that the premature cessation of the WHI's estrogen plus progestin trial had an appreciable impact on both medical and consumer articles. All post-WHI articles (published after July 17, 2002) in this random sample were impacted by WHI results and thus a significant relationship was found between WHI impact and pre-WHI vs. post-WHI articles ($\chi^2 = 45.152$, df = 1, $p < .001$). Articles were also identified according to their expression of characteristics of different I-D stages (articles with confirmation stage characteristics, for example, contained post-adoption information related to reinforcement of adoption decision, dissonance, and/or therapy discontinuance); a statistically significant relationship was found between confirmation stage and WHI impact ($\chi^2 = 20.417$, df = 1). Confirmation stage articles were impacted by WHI findings proportionally more than expected: 71.4% (n = 25) of these articles were impacted, whereas the WHI did not impact any non-confirmation stage articles.

Furthermore, the impact of the WHI was more than structural; it also impacted the context of subsequently published information (Genuis 2004a). A relationship was found between impact and the overall tone: articles impacted by the WHI study expressed a higher than expected overall negative or cautionary tone towards long-term preventative HT ($\chi^2 = 17.293$, df = 1, $p < .001$). In addition, a lower than expected proportion of post-WHI articles communicated the assumption that menopause is associated with undesirable symptoms and future disease, thus indicating a significant relationship between symptom/disease assumption and WHI impact ($\chi^2 = 5.553$, df = 1).

Although the diffusion of knowledge related to medical change has typically been slow and reluctant (Haines and Jones 1994), this content analysis suggests that widespread communication of information in medical and consumer publications does impact both the substance and context of subsequently published articles. The clear impact of WHI results on medical and consumer articles demonstrates that novel information flowed between connected medical groups and between medical and consumer populations. Since published papers are the elemental means by which the research results are communicated to the medical community (Evans 2000), and since consumers tend to trust research presented by medical authorities (Griffiths 1999; Lyons and Griffin 2003), published literature can be seen to play an important bridging role in communicating medical research to loosely connected physicians and consumers. This view is collaborated by others: Buist et al. (2004) found that the diffusion WHI trial results had "an immediate impact" on HT prescribing patterns (1042), and only one month after the initial release of WHI findings, a consumer survey found that 64% of respondents had heard of the WHI study and 13% had stopped taking HT as a result (Breslau et al. 2003).

5.2 Trust Enhancing Features within the Published Literature

Levin and Cross (2004) note that in the context of information seeking, trust is a *relational* variable, which enhances learning, and tie strength is a *structural* variable where WTs represent channels that are most likely to carry non-redundant information. Thus, trusted WTs, which provide both relational and structural benefit, provide the most useful knowledge. In order to investigate the potential role of published literature as a trusted WT, it is necessary to consider features that may enhance trust in this medium.

Journal impact factors are commonly perceived as a comparative value measure, and it is assumed that information can be trusted if it is published in peer reviewed journals and research is of high methodological quality (Greenhalgh 1997). The fact that initial WHI results were communicated via a trusted channel, a respected peer review journal with a comparatively high impact factor, ensured that the information would receive considerable attention both in the medical and consumer press. This exploratory study highlighted other potentially trust enhancing features in consumer and medical articles.

A higher than expected proportion of articles in peer reviewed publications had authors who were identified ($\chi^2 = 24.837$, df = 2, Cramer's V = .712, $p < .001$). Breakdown of author identity demonstrates that those who were identified would be viewed as 'experts': 72.7% (n = 16) were physicians, professors and/or individuals with doctorate degrees; among the remaining 27.3% (n = 6), authors had qualifications that would likely identify them to readers as 'experts' (for example, 'women's health advocate,' and executive director of a national organization). 'Experts' were directly quoted in 49% (n = 24) of articles and a greater proportion of review articles than expected used expert quotes. A significant relationship was therefore found between articles quoting experts and article type ($\chi^2 = 18.065$, df = 2, Cramer's V = .607, $p < .001$). Because expertise strengthens perceived validity of communicated information (Nettleton 1995), and because people are likely to seek leadership from those with more formal education, higher socioeconomic status, and a greater degree of media exposure (Rogers 1995), it is likely that use of expert names and identities may serve to enhance trust, thus strengthening the role of the literature as a bridging WT.

Both Diffusion of Innovations and SWT theories contend that interpersonal relationships primarily impact innovation adoption. This study found a higher than expected use of personal voice (articles addressed reader using personal pronouns or were written in the first person) in consumer articles ($\chi^2 = 15.986$, df = 1). It was also found that consumer articles were over-represented in the early I-D stages (knowledge acquisition, persuasion, and decision) – thus raising questions about the use of personal voice as a tool for creating a more intimate tie with readers and influencing potential adopters.

While in medical fields research style articles are commonly accorded greater trust based on methodological "levels of evidence" (Centre for Evidence-Based Medicine 2001), review articles may also have trust enhancing features. In this study, the majority of articles with confirmation stage characteristics were review style articles (54.3%, n = 19); 20% (n = 7) were research oriented and 25.7% (n = 9) were editorial. While for the purposes of this analysis review articles included both formal and informal reviews of research results, it is worthwhile to note that the EBM movement has created a class of trusted WTs based on review articles: systematic reviews and other formal means of gathering research evidence into comprehensive, preappraised resources for physicians are being recommended as trustworthy resources upon which to base clinical decision-making (Guyatt et al. 2000). Review articles may thus be viewed as both bridging WTs, which brought news of WHI results to physicians and consumers, and also as a means of facilitating information use through the packaging of scientific knowledge for specific users. Content analysis also suggests that information presented in review and editorial articles may be brought to readers in a more personal manner: although only 18.4% (n = 9) of the random sample addressed readers using personal voice, all of these were review (66.7%, n = 6) or editorial (33.3%, n = 3) articles. This suggests that personal voice may contribute to establishing a personal tie with readers, thus enhancing trust.

When considering ways in which published literature assumes trusted WT qualities, it is interesting to note that Granovetter's (1973) presupposition that ties are "positive and symmetric" (1361) is supported by this exploratory study. Ties created by published literature demonstrated a reciprocal element: a higher number of consumer articles than expected focused thematically on 'symptom relief' ($\chi^2 = 9.549$, $df = 1$), while a higher proportion of medical articles thematically focused on 'HT as risk' ($\chi^2 = 3.837$, $df = 1$). The relationship between theme and audience suggests a symmetric relationship between articles and the interests and concerns of readers: women demonstrate more interest and more favorable attitudes towards HT as a means of symptom relief than towards HT for disease prevention (Hemminki and Topo 1997; Hunter, O'Dea, and Britten 1997), while physicians, who are trained within a biomedical model, tend to focus on evaluating and quantifying risk vs. benefit.

5.3 Misplaced Trust

Content analysis demonstrated that, despite the widespread adoption of long-term preventative HT, there were important implementation stage questions prior to the release of WHI results (questions about how HT was used, how it worked in practice, operational problems, and how these problems might be solved). A higher than expected number of articles with implementation stage characteristics was found in the peer-reviewed literature ($\chi^2 = 6.829$, df = 2, Cramer's V = .373); there was a greater than expected proportion of research articles with implementation stage characteristics ($\chi^2 = 9.98$, df = 2, Cramer's V = .451); and, greater number of implementation stage articles than expected focused thematically on 'HT as risk' ($\chi^2 = 4.306$, $df = 1$). These relationships, which indicate that noteworthy concerns were being discussed in the literature despite the widespread adoption of long-term HT in clinical practice, are collaborated by Herrington and Howard's (2003) observation that the medical community largely disregarded pre-WHI articles that raised questions about the safety and efficacy of long-term HT. Given the central role of the literature within the ubiquitously promoted EBM paradigm and yet the apparent disregard for HT related concerns expressed in published articles, it is valuable to consider potential for *misplaced trust* in the published literature (Levin, Cross, and Abrams 2002).

Commercial companies have a long history of involvement in the development and promotion of HT as a treatment for menopausal and postmenopausal women (Oudshoorn 1990), and by the late 1990s and early 2000s, postmenopausal HT was one of the most heavily promoted pharmacological interventions (Majumdar, Almasi, and Stafford 2004). While the pharmaceutical industry's significant expenditures for drug promotion have been recognized, details of its pervasive influence are only beginning to be explored in the medical literature. In addition to fostering STs between individual physicians and pharmaceutical sales representatives (Moynihan 2003; Wazana 2000), recent investigations indicate that industry profoundly impacts WTs within the medical community through its considerable influence on academia and research: industry influences research questions that are chosen for study, methodology, data analysis, and diffusion of findings (Bekelman, Li, and Gross 2003; Bodenheimer 2000; Davidoff et al. 2001; Lexchin et al. 2003). In addition, industry funded research has been associated with publication of statistically significant pro-industry findings (Bhandari et al. 2004), and there is increasing evidence that negative or inconclusive research results are commonly withheld from publication (*cf*. Kondro and Sibbald 2004; McCarthy 2000; Nathan and

Weatherall 1999), a practice which compromises the accuracy of subsequent meta-analyses and endangers public health (Lexchin 2005). Furthermore, extensive relationships between industry and authors of clinical practice guidelines, documents which are deemed trustworthy and which are written with the specific goal of changing or influencing the practice of a large number of physicians, have been found (Choudhry, Stelfox, and Detsky 2002). Given on-going and significant concern about the influence of pharmaceutical companies on researchers, published medical information, and, ultimately, on clinical practice, it is valuable to recognize both the contrasting goals of industry and the medical profession, and the potential for misplaced trust in industry influenced material. WTs, particularly trusted WTs, play an important role in the diffusion of information and information use; therefore, evaluating potential sources for misplaced trust must be a priority when exploring the role of published literature in medical change.

6.0 Conclusion

The view of published literature as a WT, which may be enhanced by trust, provides a theoretical means of reconciling social network theories that focus on human influence in information use and change, and the current emphasis in medical fields on the principle role of the literature in behavior change. SWT theory contributes to understanding of both the potential role of published literature, and information use. While this exploratory study introduces the concept of published literature as a WT within the context of changing practices related to hormone therapy for menopausal and postmenopausal women, future research should investigate diverse information sources and a variety of medical innovations or changes in order to more fully explore WT features that influence the on-going evolution of medical practice. Future research should also incorporate qualitative study of how real people access, use, and interpret published literature related to controversial or changing areas of medical practice.

Notes

[1] The following medical publications were included in the sampling frame: *BMJ, Canadian Family Physician, Canadian Medical Association Journal, JAMA, The Journal of Obstetrics and Gyneacology Canada*, and *The Medical Post*. The sampling frame included the following consumer publications: *A Friend Indeed*, *Business Week*, *Canadian Living, Chatelaine*, *Consumer Reports on Health*, *Fortune*, *Globe & Mail*, *Herizons*, *Homemaker's Magazine*, *Maclean's*, *Newsweek*, *Prevention*, *Reader's Digest*, *Time Canada*, and *U.S. News & World Report*.

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Appendix A: Variables and Values

Audience

1. Consumer article
2. Medical article

Pre/Post WHI

1. Pre-WHI (Article published prior to July 8, 2002 when the WHI was prematurely halted.)
2. Post-WHI (Article published after July 8, 2002.)

Impact of WHI study

1. Not cited/mentioned (Results of WHI study not cited or mentioned in article.)
2. Cited/mentioned (WHI results cited /directly identified, or referred to indirectly.)

Publication Type

1. Medical, peer reviewed (Article is intended for a medical audience and is published in a peer-reviewed medical journal.)
2. Medical, not peer reviewed (Article is intended for a medical audience and is published in a medical publication that is not peer-reviewed.)
3. Consumer (Article is intended for a lay audience.)

Article Type

1. Research (Article reports formal research and includes elements of research reports including evidence of research method.)
2. Review (Reviews findings of previously published research; may be formal review article or informal review of research results.)
3. Editorial (Editorial style. Either titled or identified by database indexing as an editorial, or it is in a clearly editorial or opinion style.)

Innovation-Decision Process (Abbreviated variable definitions provided below; supplemental pages, based on Rogers (1995, 161-203) provided expanded variable definitions for analysis.)

Knowledge Acquisition (Article facilitates awareness knowledge, how-to-knowledge, or principle knowledge.)

1. Yes
2. No

Persuasion (Persuades by presenting innov-evaluation info; innovation attributes frequently positively highlighted at this stage.)

1. Yes
2. No

Decision (Article presents information that will facilitate adoption or rejection of HT. Trialability of innovation may be emphasized.)

1. Yes
2. No

Implementation ***(Innovation-decision process moves from mental activity to reality.***

1. Yes
2. No

Confirmation (Article will include information related to reinforcement of adoption decision, dissonance, and discontinuance.)

1. Yes
2. No

Projected Tone Regarding HT (Articles with overall neutral tone or balanced presentation were excluded. Incidental disclaimers not graded as neutral.)

1. Positive (Article expresses an overall positive view of HT as a long-term, preventative therapy for menopausal women.)
2. Negative/cautious (Article expresses an overall negative or cautious view of HT as a long-term preventative treatment for menopausal women.)

Voice of Article

1. Personal (Reader addressed in personal manner (e.g. 'you'), or author uses first person.)
2. Impersonal (Article used impersonal voice; author uses the 3rd person.)

Author Role

1. Identified (Author credentials are given. This was associated with 'expert' status.)
2. Undetermined (Author credentials not given.)

Quoted Expert (Quoted individual is a physician, professor, researcher or has been identified as 'Dr. X.')

1. Yes
2. No

Symptom/disease assumption

1. Yes (Article explicitly or implicitly presents the assumption the menopause or postmenopause is associated with undesirable symptoms/chronic disease.)
2. No (Article does not present the assumption that menopause is associated necessarily with undesirable symptoms/disease.)

Major Theme of Article

HT for symptoms relief (Article focuses on HT as a means for symptom (e.g. hot flashes, night sweats, insomnia etc) relief or control.)

1. Yes
2. No

HT as Risk (HT is discussed or presented as a real or potential risk to health)

1. Yes
2. No