Published in final edited form as:

J Fam Issues. 2012 October ; 33(10): 1299–1323. doi:10.1177/0192513X11430821.

A Typology of Communication Dynamics in Families Living a Slow-Motion Technological Disaster

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Abstract

With increasing numbers of communities harmed by exposures to toxic substances, greater understanding of the psychosocial consequences of these technological disasters is needed. One community living the consequences of a slow-motion technological disaster is Libby, Montana, where, for nearly 70 years, amphibole asbestos-contaminated vermiculite was mined and processed. Former mine employees and Libby area residents continue to cope with the health consequences of occupational and environmental asbestos exposure and with the psychosocial challenges accompanying chronic and often fatal asbestos-related diseases (ARD). Nine focus groups were conducted with Libby area residents. Transcripts were analyzed to explore patterns of family communication about ARD. The following five patterns emerged: Open/Supportive, Silent/Supportive, Open/Conflictual, Silent/Conflictual, and Silent/Denial. Open/Supportive communication included encouragement to be screened for ARD, information about ARD and related disaster topics, and emotional support for people with ARD. In contrast, communication patterns characterized by silence or conflict have the potential to hinder health-promoting communication and increase psychological distress.

Keywords

environmental hazard; technological disaster; family; communication; asbestos

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Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Modern industrial activity can place its neighboring communities at increased risk for adverse health consequences because of exposure to toxic substances. Exposures often are discovered after they have been ongoing for considerable time and can have long-term consequences for affected communities (Brown, 1997; Edelstein, 2004; Gibbs, 1998; Hastrup, Thomas, & Edelstein, 2007; Kroll-Smith & Couch, 1990). Community exposures to toxic substances have been described as technological disasters, that is, safety and health-threatening situations that arise from a failure to take adequate steps to safe-guard people from the risks of technological activity (Baum, Fleming, & Davidson, 1983; Berren, Santiago, Beigel, & Timmons, 1989). Recently, the term *slow-motion technological disaster* (Cline et al., 2010; Freudenburg, 1997; Hernandez & Sedler, 2003) has been applied to toxic exposures in which consequences emerge slowly, often are discovered long after the problem's inception, and persist over long periods of time rather than having a sudden onset and/or a short duration (in contrast to rapid-onset technological disasters, such as explosions or bridge collapses; Cline et al., 2010). In terms of scale, incalculability, uncontrollability, imperceptibility, and inmitigability, they have the qualities of the world risk society hazards discussed by Beck (1992, 1999).

The purpose of the present work was to identify patterns of communication about asbestos-related disease (ARD), the primary health treat from a slow-motion technological disaster unfolding in Libby, Montana, where residents experienced widespread asbestos exposure from a nearby vermiculite mining operation. These communication patterns may have implications for victims' health behavior and psychosocial well-being.

Families living in communities affected by slow-motion technological disasters live under perceived threat of illness and excess death and threats to psychological well-being (Edelstein, 2004; Hastrup et al., 2007; Palinkas, Petterson, Russell, & Downs, 1993). Much of the impact of the health threat on psychological well-being may be mediated through family life and family relationships (Unger, Wandersman, & Hallman, 1992). From well-known disasters involving exposure to toxic substances, we know that exposures often take place in the family home or through family activities. For example, at Love Canal in Niagara Falls, New York, toxic waste contaminated residents' yards and homes (Fletcher, 2002). In Woburn, Massachusetts, industrial waste contaminated residents' drinking water (Massachusetts Department of Environmental Quality and Engineering, 1979). Residents of areas of Belarus, Russia, and the Ukraine exposed to radioactive fall-out because of the Chernobyl nuclear accident were warned not to eat local products, garden, or collect food from the forests (Abbott, Wallace, & Beck, 2006). In addition, when the larger ecosystem is contaminated, family occupational and leisure activities (e.g., recreation, sports) also can put family members at risk.

The impact of technological disasters may be magnified for families because technological disasters that encroach on families and the family home may be experienced as particularly egregious violations of personal security and a desecration of a "sacred" part of American life (Fitchen, 1989). Furthermore, concern for children's welfare is a major, if not the most significant, source of concern and anxiety for parents and grandparents experiencing technological disasters (Abbott et al., 2006; Hastrup et al., 2007; Unger et al., 1992).

The effects of technological disasters also are mediated through family life because families often comprise one's closest and most influential network of social ties. People often turn to family members first and most often under adversity (Ell, 1996). How families respond to stressors may have a significant impact on family and individual adaptation. Edelstein (2004) found that living with the stresses of a contaminated water supply—health threats, loss of the value of the family home and inability to move, the burdens of trying to avoid exposure, and the burdens of activism—resulted in increased marital conflict. The pervasive loss of control experienced by victims of toxic waste contamination can engender anger or depression that can be detrimental to family relationships. Erikson (1976, 1998) observed that among survivors of the 1972 collapse of a coal-mining company's refuse pile dam and the Buffalo Creek flood, the magnitude of trauma exceeded victims' abilities to emotionally support one another; consequently many family and marital ties lost their emotional closeness. The loss of the physical community resulted in loss of the social community that validated and reinforced these ties and thereby exacerbated the crisis. Not surprisingly, children growing up in the midst of technological disasters are vulnerable to psychological distress (Edelstein, 2004).

Communication is a central aspect of family functioning (Burgess & Locke, 1953; Fitzpatrick & Caughlin, 2002; Koerner & Fitzpatrick, 2002). But little is known regarding family communication about the health consequences of slow-motion technological disasters. The present work explores communication about ARD¹ in families living in Libby, Montana, where residents experienced widespread and long-term occupational and environmental exposure to Libby amphibole asbestos from asbestos-contaminated vermiculite mined and processed near Libby.² The exposures have resulted in heightened incidence of ARD (McDonald, Harris, & Armstrong, 2004; Sullivan, 2007; Whitehouse, Black, Heppel, Ruckdeschel, & Levin, 2008). ARD includes asbestosis and pleural disease, which can result in years of worsening breathlessness, fatigue, and pain; and lung cancer and mesothelioma, which progress relatively quickly and are fatal in the majority of cases (National Cancer Institute, n.d.).

Although many might imagine that serious illness will evoke open and supportive communication with family members, research on family communication about serious illnesses such as HIV/AIDS and cancer indicates that this may not occur. Competing motives, values, and beliefs often take priority over being charitable toward, supportive of, and emotionally close to those who are ill. For example, people who are HIV positive may not disclose their status to a relative either because they anticipate rejection and blame or because they anticipate that telling the other person will cause worry and grief (Arnold, Rice, Flannery, & Rotheram-Borus, 2008). In families affected by cancer, silence or

¹The health consequences of asbestos exposure often are referred to collectively as "asbestos-related disease," with wide variability in the severity, symptoms, prognosis, and disease course (Roggli, 1990). Some diseases (e.g., lung cancer, mesothelioma) advance quickly; others (e.g., asbestosis, pleural plaques, fibrosis) cause progressive disability over many years. Like the scientific community, focus group participants referred to these diseases collectively. For example, sometimes the local lay term *asbestos* is used to refer to different illnesses and/or globally to asbestos-related health consequences.

²The vermiculite mined in Libby was naturally contaminated with a particularly toxic form of asbestos referred to as Libby amphibole asbestos (Whitehouse, 2004). Libby amphibole asbestos is made of transitional fiber, meaning that each fiber is made up of different kinds of fibers, and the exact chemical composition of a single fiber may differ from one end of the same fiber to the other (Meeker et al., 2003; Van Gosen et al., 2005). Unlike other forms of asbestos such as the more commonly known chrysotile asbestos used in shipbuilding and automotive brakes and also used as building insulation, Libby amphibole does not have commercial value.

avoiding talk about illness and dying to avoid emotionally distressing topics is common (Zhang & Siminoff, 2003) even between spouses (Boehmer & Clark, 2001). Cancer risk can evoke similar responses between family members. Kenen, Ardern-Jones, and Eeles (2004) interviewed female patients at a cancer genetics risk clinic about their communication with family members regarding family history of cancer and possible genetic risk. The women experienced open communication about cancer in some relationships but in other relationships encountered silence. They noted a variety of motivations for the silence: others' desire to avoid distressing topics, hostility, withdrawal, and self-censorship to avoid upsetting others. The context of a slow-motion technological disaster likely introduces a host of contextual conditions that hinder open supportive communication family about illness and the threat of illness that results from toxic exposures.

Researchers have labeled community dynamics in the unfolding of technological disasters as “nontherapeutic,” characterized by opposing victim clusters and emergent community conflict (Cuthbertson & Nigg, 1987). Technological disasters, especially those that unfold slowly, are characterized by ambiguity regarding the nature and extent of the threat, community conflict regarding how to best respond to the threat (Couch & Kroll-Smith, 1985; Kroll-Smith & Garula, 1985; Shriver & Kennedy, 2005), and disputes about locus of responsibility (Cuthbertson & Nigg, 1987; Shriver & Kennedy, 2005). Uncertainty about the health consequences of slowly emerging disasters is magnified because not all individuals in the community are similarly affected nor are they affected at the same time. This uncertainty results in the absence of a shared perception of victim legitimacy and identity, polarization on disaster-related issues, and the development of community factions and mistrust (Cline et al., 2010; Couch & Kroll-Smith, 1985; Cuthbertson & Nigg, 1987), especially when exposure risks are not acknowledged by authorities (Shriver, Cable, & Kennedy, 2008). Freudenburg (1997) noted similar dynamics in what he termed *corrosive communities*: disaster victims rather than its perpetrators are blamed, the community becomes polarized, and once-trusted authorities fail to take or enforce responsibility. In (often rural) communities where interdependence had been the norm, and network ties are central to one's identity, loss of support from family and neighbors is all the more psychologically devastating (Cline et al., 2010; Erikson, 1998).

Community dynamics in Libby appear to be similar to those typical of rapid-onset technological disasters. Evidence indicates a marked absence of social support for victims, interpersonal conflict, and stigmatization of victims and advocates (Cline et al., 2010). If the dynamics found at the level of the community—uncertainty, conflict, mistrust, and stigmatization of those who are ill—also are found within families, family communication about ARD is likely to be profoundly affected.

Amphibole Asbestos Exposure in Libby, Montana: A Case of a Slow-Motion Technological Disaster

Between the early 1920s and 1990, vermiculite, contaminated with what is now called Libby amphibole asbestos, was mined 6 miles outside of Libby, Montana, a community of approximately 2,600, with a total of 10,000 people residing within a 4-mile radius of the

town center (U.S. Census Bureau, 2000). Libby is located in the northwest corner of Montana, in Lincoln County. Lincoln County is poor, with a median household income of approximately \$33,000 in 2008, \$10,000 below the state average and 20.1% living below the poverty line (U.S. Census Bureau, 2010), and high unemployment (15.6% in 2010; Montana Department of Labor and Industry Research and Analysis Bureau, 2010).

In addition to miners and processing plant workers who experienced occupational exposure, Libby area residents were exposed to amphibole asbestos by dust brought home on workers' clothes, ambient air, contaminated insulation and building materials, and the common practice of adding vermiculite to garden soil (Agency for Toxic Substances and Disease Registry, 2000). Additional occupational exposures included providing contracted services to the mine (e.g., vending machine, vehicle maintenance) and harvesting and milling timber in the Libby area (Hart, Ward, Spear, Crispin, & Zolnikov, 2007).

Asbestos exposure is associated with increased risk for mesothelioma, lung cancer, asbestosis, and pleural disease and may be associated with auto-immune disorders (Noonan, Pfau, Larson, & Spence, 2006; Pfau, Sentissi, Weller, & Putnam, 2005; Ward et al., 2006) and gastrointestinal cancers (Frumkin & Berlin, 1988). The incidence rate of asbestosis mortality in Libby is 40 to 80 times higher than in the rest of the United States, and the rate of lung cancer mortality is 30% higher than in the rest of Montana (Agency for Toxic Substances and Disease Registry, 2002). More than 30 cases of mesothelioma have been diagnosed in Libby (Whitehouse et al., 2008). Mesothelioma is an extremely rare cancer of the pleural lining of the lung (incidence rate of 10 cases per 1 million in the general population (U.S. Cancer Statistics Working Group, 2007) primarily attributable to asbestos exposure. In June 2009, the U.S. Environmental Protection Agency declared Libby and the nearby community of Troy a public health emergency; this is the first and only time that it has issued such a finding.

The goals of the present work were to (a) identify a typology of family communication patterns about ARD in the context of a slow-motion technological disaster and (b) explore possible implications of these patterns for health behavior and psychosocial well-being. This work contributes to the study of family communication in the context of serious illness and is especially relevant for illness that is stigmatized or where the legitimacy of illness is questioned. This research also contributes to the literature on psychosocial adaptation to toxic exposures, providing useful information on family dynamics to those engaged in disaster response, health promotion, health care, or social action within these communities.

Method

Overview

We conducted focus groups in Libby, Montana, with three types of participants: (a) individuals diagnosed with ARD (ARD), (b) individuals not diagnosed themselves but with one or more family members diagnosed with ARD (Family), and (c) individuals who had neither personal nor family experience with ARD (Non-ARD). The focus groups inquired into multiple facets of the psychosocial impact of the disaster. The present work is one of several analyses that have been or are being conducted employing these data. Published

work describes how the Libby slow-motion technological disaster has resulted in the deterioration of a previously supportive community rather than an outpouring of social support (Cline et al., 2010). The present analysis employed an exploratory, data-driven or bottom-up approach (Corbin & Strauss, 2008) to create a codebook that captured the analytic categories of interest. The codebook was implemented reliably by teams of independent coders to code the focus group transcripts.

Participants

We conducted nine focus groups ($N = 66$). Participants were a convenience sample of people with ARD, family members of people with ARD, and people who had no personal experience with ARD. The community research partner, the Center for Asbestos Related Disease (CARD), conducted all recruitment and screening activities. They advertised the opportunity to participate in the study via flyers, community media ads, and presentations at community organization meetings. In addition, some individuals were approached individually by personnel from the Center for Asbestos Related Disease. Participants were older than 21 years and had lived in Libby for 5 or more years. Additional information about recruiting and focus group assignment procedures can be found in Cline et al. (2010).

Table 1 contains information about the sample characteristics. Consistent with the aims of qualitative research (e.g., Patton, 2002), we did not attempt to recruit a representative sample. Rather we sought to exhaustively explore the range of experiences and beliefs of key groups in the Libby disaster. However, the characteristics of the sample tended to be relatively similar to those of the Libby population as a whole. According to U.S. Census data, in 2000, the Libby population was 95.5% White, it was 46.8% male, the median age was 43.2 years, 59.8% of men and 43.8% of women older than 15 years were married, and 10.2% reported having a 4-year college degree. The most marked differences between the study sample and the Libby population was that the study participants had more education (22.7% with college degrees or greater), were older (only 4.8% were younger than 40 years), were more likely to be married (66.2%), and were more likely to be female (50.0%). Because the focus of the larger investigation was not family communication, detailed information about participants' family ties was not collected. However, the majority of participants were married, and nearly all (96.9%) had had at least one child (many grown and living outside of the household). Because most participants had family ties, we would expect that if family communication dynamics about ARD were salient and important aspects of their experience of the disaster, these would emerge in the focus group discussions.

Participants were assigned to focus groups based on their experience with ARD. Four groups comprised participants who had been diagnosed with ARD (ARD; $n = 29$); two groups of participants had family members who had been diagnosed with ARD, but they themselves had not been diagnosed (Family; $n = 14$); and three groups of participants had neither been diagnosed with ARD nor had family members diagnosed with ARD (Non-ARD; $n = 23$).

Procedures

Focus groups were video- and audiorecorded. After the focus group discussions, participants were debriefed and received an honorarium (\$40 in “Libby Bucks,” currency useable at local businesses). All recordings were destroyed on completion of transcription, transcript validation, and deidentification of transcripts.

Moderator and discussion guide—The focus groups were moderated by a licensed clinical social worker who was an experienced focus group moderator. She was not from Montana and was unfamiliar with the Libby disaster. The moderator followed a discussion guide that covered the following topics: (a) Introductions and Opening Question (why agreed to participate), (b) Libby, Montana: Hometown Image (personal perceptions, what you would like others to know about Libby), (c) Experiencing the Asbestos Problem (costs and consequences for the community, families, individuals), (d) Social Support and the Asbestos Problem (social support in general and associated with asbestos issues), (e) Diffusion of the Problem and Process of Understanding it (risk perceptions and how they changed), (f) Beyond Libby (what others who may have been exposed to asbestos-contaminated vermiculite need to know), (g) Summary, and (h) Libby and the Future (hopes and dreams). Focus group discussions ranged in duration from approximately 2.5 to 3 hours.

Data preparation—Deidentified transcripts were unitized into thought units following rules developed by Auld and White (1956). Two research team members unitized a sample of 30 transcript pages and established 97.5% agreement; in turn, they completed, or reviewed and corrected, all remaining unitizing of transcripts. The final sample consisted of 15,782 thought units.

One researcher (HO) reviewed transcripts to identify thought units related to family. A coding system was developed and applied (see details below) in an attempt to capture themes that emerged in the family-related thought units. The present analysis is based on a subset of the “family” thought units that pertain specifically to family communication about ARD.

Coding System and Procedures

Development of the coding system—To develop the codebook, the first author examined approximately 40% of the family-related thought units to create a comprehensive list of concepts represented in the data. Thought units from each focus group transcript were examined during this process, as perspectives varied considerably by focus group. Examination of the thought units continued until new concepts no longer were being generated (i.e., saturation point; Corbin & Strauss, 2008). Approximately 40% of the thought units were examined. Concepts were identified, refined, collapsed, and organized into higher level categories (Charmaz, 2006; Corbin & Strauss, 2008). The coding system was fine-tuned, and additional rules and examples were added to the codebook during the process of training coders. The final codebook contained 46 individual codes organized within six higher level categories: (A) emotional reactions to having a family member with ARD, (B) impact of ARD on family structure, (C) family communication about ARD, (D)

family health promotion, (E) barriers to family health promotion, and (F) family exposures and affected relatives.

Coding—Three coders, including the first author, were trained to implement the family coding system. The codebook provided coding procedures, rules for coding; and explanations, descriptions, and examples of the codes. (The final codebook is available from the first author.) Practice coding continued until coders achieved an average intercoder reliability exceeding 80% agreement. Final coding was conducted by dyads comprising the first author and one research assistant. Mean percentage agreement for the transcripts was 77% (range = 72% to 85%). Differences were resolved by consensus.

Family communication about ARD—The present analysis concerns family communication about ARD (Category C). Thought units associated with six individual codes comprised this category: (a) families/individuals talking openly about ARD, (b) families/individuals giving emotional support to family members with ARD, (c) families/individuals giving/receiving informational support to family members regarding ARD, (d) families/individuals not talking openly about ARD, (e) family conflict associated with different views on ARD or the disaster, and (f) protection of family members from negative ARD information/negative emotions. We conducted further inductive analysis of the subset of thought units that comprised these six family communication topics/codes. We refined the codes (e.g., combining codes representing the same pattern, separating codes that reflected two patterns) to distinguish five orthogonal family interaction patterns with regard to communicating about ARD. These five patterns comprise our typology of non-overlapping family communication patterns.

The study procedures were approved by institutional review boards at Wayne State University and Karmanos Cancer Institute where the study's principal investigator (RJC) was employed during data collection and transcript preparation.

Results

Family Communication Patterns

Our analyses revealed five recurrent patterns in family members' communication about ARD. These patterns were primarily noted in the discussions by participants who had personal experience with ARD (ARD and Family). Non-ARD participants rarely discussed family communication about ARD.

Open/supportive—Some participants reported talking openly with family members about ARD. Open communication took the form of advice and, less often, providing information and emotional support. When participants talked about communicating about the disaster, they most commonly talked about encouraging family members to be screened for ARD. Parents encouraged children: "We talked two of our kids into getting tested, 'Go get tested. It doesn't cost you anything'" (ARD). One participant mentioned encouraging relatives who were no longer living in Libby to be screened: "and, uh, I also have relatives and friends that *used* to live here that have never been screened and I've been trying to get them here" (ARD). A few participants mentioned encouraging relatives to change health habits that

could affect their lung health, including advising them to quit smoking: “I told her, ‘Honey,’ I says, ‘Here’s what I’ll do. Let’s quit (smoking)’” (Family).

A few participants talked about their family networks functioning as a source of information or a *family-related grapevine* through which information spreads about the disaster controversy, community activities related to the disaster, and ARD: “My brother-in-law calls me at least once a day . . . he’s aware and he always, he’s tellin’ me what’s goin’ on and the rest of the family what’s goin’ on” (ARD). This person had learned about the opportunity to participate in the focus group from his brother-in-law. Another participant with ARD mentioned learning about the exposures and resultant health risks from an uncle who had worked at the mine and had died of ARD prior to the story breaking in the media.

Participants made few mentions of open, emotionally supportive communication about ARD. Although the moderator directly asked about instances of providing or receiving social support, only one person explicitly mentioned family interactions involving emotional support: “Of course, and my kids call me every day . . . ‘How you doin’, Dad?’ You know? I says, ‘Well, I’m still doin’ great,’ ya know. So, oh yeah, they check on me all the time, ya know” (ARD).

Silent/supportive—Some perceived that communicating openly about ARD would not be supportive. Rather, they were motivated to *avoid* talking about RD in order to be supportive. Not talking about ARD can be perceived as a way of protecting family members. People with ARD may not want to worry family members: “Do you want your daughter to worry about you? Do you tell them everything? I don’t tell my son nothing” (ARD). Caregivers may also avoid the topic to avoid showing their relatives with ARD that their quality of life is diminished or that they are under strain: “And *their* [caregivers’] life even goes down, but they [caregivers] don’t wanna *show* it to their loved one that’s dying” (ARD).

Open/conflictual—In some relationships, family members disagreed, argued, or fought about ARD. Participants in both the ARD and Family groups discussed family disagreements about the scope and seriousness of the health consequences of the asbestos exposure and the legitimacy of illness claims: “I had a brother-in-law that really bad-mouthed my wife, saying that she was fakin’ it” (ARD). One participant from a Family group mentioned that her husband, who has ARD, openly resisted her involvement in activities related to advocating for and promoting the health of people with ARD: “My husband is totally in denial. He’s *been* diagnosed, but he’s, he’s—even tonight, he was, um, negative. He was, ‘Why are you doing this?’ (Family). Participants from the Non-ARD groups did not mention this type of conflict, but one did mention arguing with his children about ARD risk: “My kids try to tell me the dust in my car is just dust, like you’ve got in [state]. I said, ‘No, no, no’” (Non-ARD).

Silent/conflictual—Rather than engaging in open conflict about the legitimacy of the health threat, some relatives avoided the topic in order to avoid arguing:

But just we try not to, you know, get into discussions about it because there's usually an argument . . . my husband thinks it's *overblown*, you know, that they have blown it out of proportion. And my brother, he doesn't. (Family)

The lack of discussion about ARD, even with those who are sick, reduces the amount of emotional and tangible support that people diagnosed with ARD receive from family members: "I don't have anybody I can really talk to about it. You know, not even *really* my *family*. My kids don't acknowledge it" (ARD). In some instances people with ARD experienced rejection from other family members: "the entire family got together, and, uh, if was kinda [pushing away motion] when the topic came up, it was standoffish. Ya know, we don't talk about this . . . they were turnin' her away because she has it . . ." (Family).

Silent/denial—Some participants talked about relatives with ARD who resisted communicating about the disease: "And he [speaker's father who had ARD] just didn't want anyone to help him anymore. He didn't even wanna talk about it" (ARD). Some explicitly identified this as denial: "He don't even wanna talk about it. But he's in denial. Guaranteed, he's in denial" (ARD). One participant who had not been diagnosed but was at risk for ARD similarly reported avoiding communicating about ARD. He talked about how he and his wife could not talk seriously about the risk they faced because although their home was contaminated with vermiculite, they could not afford to have it removed: "Um, the way it affected us, the way we handled it was we made jokes about it. You know, we, we, we hid it. We didn't, we weren't able to have any serious, um, uh, acknowledgment of it" (Non-ARD).

Discussion About ARD in Non-ARD Groups

With the noted exceptions, the five communication patterns emerged primarily among family dynamics reported by ARD and Family participants but not among Non-ARD participants. In one Non-ARD group, no mention of family communication about ARD occurred at all. In the other two groups, limited discussion addressed risk and screening. When asked directly by the moderator if families talk about ARD, several Non-ARD participants said, "No." For example, one said, "And I'm—but one grandson lives with me and, ya know, Um, but we don't really talk about it at home and stuff, so" (Non-ARD).

Discussion

Our analysis of focus groups conducted with Libby, Montana, residents identified five patterns in family communication about the health consequences of a slow-motion technological disaster (i.e., ARD): (a) Open/Supportive, (b) Silent/Supportive, (c) Open/Conflictual, (d) Silent/Conflictual, and (e) Silent/Denial. These patterns emerged primarily in the family relationships of participants diagnosed with ARD or those with a family member diagnosed with ARD. In contrast, participants from the Non-ARD focus groups made little mention of family communication about ARD.

Results reveal a number of motivations for avoiding discussion about ARD. Those findings are consistent with results of previous research regarding family communication about other serious illnesses. Similar to families' responses to cancer (Zhang & Siminoff, 2003) and HIV/AIDs (Arnold et al., 2008), some people with ARD and family members of people with

ARD reported avoiding discussion about the illness in order to avoid provoking distressing thoughts (e.g., worry) in their family members.

Patients and their family members also refrained from talking about ARD with other family members if they expected angry or rejecting responses. People with HIV/AIDs have similarly reported reluctance to disclose their disease status to close others because they anticipated angry and, or rejecting responses. Such expectations are realistic for both people with HIV (e.g., Emlet, 2007; Smith, Rossetto, & Peterson, 2008) and ARD. In Libby, the commonplace questioning of the legitimacy of illness claims and offering competing alternative explanations for the illnesses (ARD) including smoking, “hard living,” and not taking precautions to prevent exposure may lead people to expect rejecting responses. Some participants with ARD also were reluctant to discuss their illness if they anticipated that family members would be unsupportive and unwilling to talk about their illness with them. Previous research found a similar pattern among cancer patients (Cordova, Cunningham, Carlson, & Andrykowski, 2001). Although Silent/Conflictual and Open/Conflictual patterns obviously occur in other contexts, some characteristics of slow-motion technological disasters may specifically nurture these patterns.

ARD silence, motivated by desires to avoid distressing others, desires to avoid conflict and rejection, or unresponsiveness, suggests that people often are compelled to pursue relational goals over instrumental health goals (promoting their health by, e.g., obtaining or seeking health advice, information, or social support; Cline, 2011). This finding is consistent with previous research indicating that one of the most important reasons for topic avoidance in close relationships is relationship protection and maintenance (Afifi & Guerrero, 2000).

The second important motivation for topic avoidance is identity management (Afifi & Guerrero, 2000; Cline, 2003). Illness can be highly threatening to personal and social identity (e.g., self-perceptions and perceptions of how one is perceived by others, such as beliefs about being capable, strong, or reliable; Charmaz, 1991). Within the Silent/Denial pattern we found situations in which identity goals appeared to take priority over instrumental health goals. Some people with ARD or at risk for ARD avoided thinking and talking about ARD and, in the extreme, some people who had become sick with ARD isolated themselves from others as the disease progressed. This self-imposed isolation may be an attempt to avoid identity-threatening feedback that contradicts self-perceptions.

Present findings also have implications for the literature on social support. The results provide additional evidence that serious illness does not necessarily evoke supportive responses from family members (Bolger, Foster, Vinokur, & Ng, 1996; Dakof & Taylor, 1990; Wortman & Dunkel-Schetter, 1979). Participant comments revealed interpersonal processes through which this lack of support emerges. On one hand, family members may respond to illness disclosures with anger, rejection, or a lack of emotional warmth and support. In turn, these responses likely establish negative expectations and reluctance to further discuss the topic on the part of ill family members and their caregivers. On the other hand, patients who may want to protect family members from worry and grief may limit discussion about their illness and, thereby, limit opportunities for family members to provide support.

Implications for Health and Well-Being

Participant comments reflecting an Open/Supportive family communication pattern indicate the potential for family communication to increase awareness of screening opportunities, encourage screening and health behavior change, provide social support for people affected by ARD, and disseminate information related to the disease and other disaster issues. Elsewhere, family communication has been shown to promote screening and healthy life-style changes (Korhonen, Uutela, Korhonen, & Puska, 1998; McCann et al., 2009). Although most instances of Open/Supportive communication about ARD likely have the potential to be beneficial, lay interpersonal health communication *can* be risk promoting (Cline, 2003). For example, a participant who expressed a belief that medications do more harm than good had encouraged his brother, who has ARD, to stop taking some of his medication: “get rid of some of those pills” (Family). Although the potential consequences for this particular person are unknown, medication generally is an important component of ARD management (American Thoracic Society, 2004).

In summary, silence and conflict related to ARD also have numerous potential negative implications for physical health and psychological well-being. These patterns reduce availability of social support, opportunities for disclosure, and access to information and advocacy. They limit opportunities for encouraging family members to be screened for ARD, and encouraging family members to engage in self-care or prevention behaviors, not only for people with ARD but also for their family members who also may be at risk for ARD (cf. Cline & McKenzie, 1996; Zhang & Siminoff, 2003).

Patterns of conflict may have negative consequences for interpersonal relationships and psychosocial well-being. ARD participants reported that disclosures about ARD sometimes were met with anger, rejection, or a lack of empathy on the part of relatives. Not surprisingly, these responses were an additional source of distress for people with ARD and sometimes resulted in suspending or limiting interactions with family members. Similarly, patterns of silence may have negative consequences for interpersonal relationships. Our findings regarding the consequences of silence are consistent with previous research demonstrating that avoidant communication is associated with reduced relational satisfaction, particularly when avoidance is attributed to an unresponsive partner or lack of emotional closeness with the partner (Caughlin & Afifi, 2004). Further research is needed to understand the extent, and conditions under which, silence that is motivated by a desire to protect relatives from worry and distress may be harmful or helpful.

Silence motivated by a desire to protect family members may be benign from a relationship standpoint. For example, Caughlin and Afifi (2004) found that silence was not associated with reduced relational satisfaction if people perceived that it was motivated by the other person’s attempt to protect the relationship. However, it is also possible that ARD silence, even if motivated by a desire to protect close others, could have negative effects on psychosocial well-being. In the context of serious illness, family communication and physical and mental well-being are reciprocally related (Gotcher, 1995; Mallinger, Griggs, & Shields, 2006). Avoiding illness-related topics frequently may be motivated by a desire to avoid distress-provoking thoughts and interactions (Zhang & Siminoff, 2003). However, a

fairly robust positive association exists between amount and openness of communication and adjustment among patients/survivors and their family members (e.g., Gotcher, 1995; Mallinger et al., 2006). Future research ought to extend the study of family communication about ARD in order to understanding the implication of family communication patterns for psychological adjustment to ARD.

Finally, the patterns of communication may differentially affect the Libby community's capacity for collective action. As evident in the family that functioned as a "grapevine" for disaster and ARD-related information, family communication *can*, when characterized by openness and supportiveness, promote activism. However, intrafamily and intracommunity conflict about the very legitimacy of an ongoing disaster and its consequences, whether open or silent in nature, impedes both family and community potential for unanimity, a shared vision for outcomes, and effective collective action to achieve such goals (Couch & Kroll-Smith, 1985; Kroll-Smith & Garula, 1985; Shriver & Kennedy, 2005). If disaster-related stress is exacerbated by family communication patterns this may, in turn, affect likelihood of engaging in collective action. In some instances, becoming an advocate may increase people's perceptions of control over the situation and their own and their family's health and well-being, possibly reducing stress (Edelstein, 2004). However, if people respond with avoidance strategies, stress may be a barrier to participating in these efforts.

Strengths, Limitations, and Future Directions

The present work is the first systematic analysis of family communication in the context of a slow-motion technological disaster with serious health consequences. Our findings contribute to understanding the effects of technological disasters on family dynamics and to the breadth of literature on family communication about illness and illness risk. They alert us that family communication patterns may function as potentially significant inhibitors of healthy behavior, social support, relational satisfaction, and psychological well-being. Our results echo previous findings regarding the pervasiveness of disease silence, particularly in the literature on communication in families coping with cancer and HIV/AIDS. This study also reveals how, in a context characterized by community-wide ambiguity and conflict about the legitimacy of illness claims that may be typical of slow-motion technological disasters, these dynamics leach into families and become yet another challenge to open and supportive communication about illness. In turn, family dynamics become an additional challenge to the psychosocial well-being of people whose health already has been compromised by the disaster.

Our results should be interpreted in light of several caveats. First, our study was exploratory. We employed a convenience sample, and our data-driven approach was aimed at hypothesis generation rather than hypothesis testing. Our results may not be generalizable regarding Libby area residents or people living in other communities affected by technological disasters. However, the results do provide a framework grounded in the experiences of people living a slow-motion technological disaster that can be used to investigate family communication patterns in larger samples. Second, our typology was not intended to classify entire families or to depict family communication patterns as static over time. We found that, within families, communication in some relationships could be characterized as

conflictual, whereas in others it was supportive. Furthermore, some participants reported that their family communication patterns shifted over time, typically becoming less conflictual as more family members were diagnosed with ARD. Third, the data were not collected with the intention of studying family communication dynamics (see Method section for focus group discussion topics), limiting the quantity of data relevant to the topic of family communication and the breadth of data relevant to the topic. Although family communication spontaneously emerged as a salient topic for many participants, the focus group moderator did not expressly probe for more information on the topic, resulting in limited data regarding the motivations and consequences of the family communication dynamics discussed. Thus, we have attempted to draw on communication theory and previous empirical research to speculate on the motivations underlying the observed communication dynamics. Fourth, our results are based on a case study of a slow-motion technological disaster. In slow-motion disasters, awareness of the environmental hazard and health threats often emerges slowly, and exposures take place over a long period of time. These characteristics exacerbate uncertainty about the possible health consequences of the disaster and likely engender community conflict regarding how to ameliorate the situation. The present findings may not apply to rapid-onset technological disasters caused by a clear and consensual event, such as a chemical or oil spill or bridge collapse.

The present study provides information on the diversity of communication patterns that emerge in families coping with a technological disaster, as well as an analytical framework for future population-based research. Priorities for future research include inquiry into the distribution of the family communication patterns in representative samples, systematic attempts to identify the motivations for these patterns, and whether there are moderating influences on these patterns, such as familial relationship (e.g., sibling vs. adult child). Finally, as mentioned previously, future work should examine the possible psychosocial effects of ARD silence and conflict on people with ARD and their family members, including caregivers. Family conflict about ARD, even if not overt, *could* adversely affect the health of both patients and caregivers. Negative family interaction can increase stress responses and lower immune functioning (Kiecolt-Glaser & Newton, 2001), result in endocrine changes (Kiecolt-Glaser, Glaser, Cacioppo, & MacCallum, 1997), and increase susceptibility to illness (Cohen et al., 1998; Mayer & Haggerty, 1962). No existing research has investigated whether psychosocial distress, such as that caused by family conflict, could directly affect family members' health or whether it could impair their health indirectly by impeding self-care behavior (Fisher, 2006). Finally, our results suggest that family communication networks may be used to promote screening and dissemination of accurate information about ARD warrants further investigation.

Acknowledgments

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article:

This research was conducted as part of a larger Communication and Outreach Project (Rebecca J. W. Cline, project principal investigator) by the National Center for Vermiculite and Asbestos-Related Cancers (NCVAC) at the Barbara Ann Karmanos Cancer Institute (KCI), Detroit, Michigan. NCVAC funding came from the Centers for

Disease Control and Prevention, H75/CCH524709-0, John C. Ruckdeschel (principal investigator). The KCI Behavioral and Field Research Core, which facilitated data collection, was supported in part by NIH Cancer Center Support Grant P30CA022453.

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Table 1

Sample Characteristics

Characteristic	N(%)
Female	33 (50.0)
White	61 (92.4)
Age (years)	
31-39	3 (4.8)
40-65	38 (57.1)
66-85	25 (38.1)
Education	
<High school	7 (10.6)
High school	22 (33.3)
Some college	22 (33.3)
College	15 (22.7)
Married	44 (66.2)
One child	62 (93.9)
ARD status	
Diagnosed with ARD	29 (43.9)
Family diagnosed with ARD	14 (21.2)
Neither self nor family diagnosed with ARD	23 (34.8)
Years lived in Libby	
10 years	11 (16.7)
11-30 years	21 (31.8)
31 years	34 (51.5)

Note: ARD = asbestos-related diseases.