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Environmental Stigma: Resident Responses to Living in a Contaminated Area

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Abstract

This article examined the extent to which residents living in the Midland–Saginaw–Bay City area in Eastern Michigan felt stigmatized due to industrial contamination. Seventy in-depth interviews were conducted with local residents, focusing on the extent to which they experienced three aspects of stigma— affective, cognitive, and behavioral. Results indicated that although some participants were not concerned with living in a contaminated community, local residents largely perceived dioxin as a risk to individual health and the local environment. Concern, shock, and irritation were typical affective responses at the time participants learned of the contamination. Several participants indicated a feeling of embarrassment and fear of being rejected by others because of the stigma associated with industrial contamination. Instead of actively seeking information about dioxin contamination and remediation, participants often relied on information provided to them by government officials. Behaviorally, participants avoided eating locally caught fish and prepared fish more carefully in order to avoid exposure to contaminants. As a whole, this study provided insight to understand affective, cognitive, and behavioral responses to environmental stigma.

Keywords

environmental stigma; industrial contamination; dioxins; superfund sites; public risk perceptions

If human stigma responses are reduced to those where consumer spending drops to avoid Alar-suspect apples or buyers whose worries prompt when they think negatively about housing purchases, something of the complex interplay of psychological, social, and political forces that produces stigma is lost.

—Gregory, Flynn, and Slovic (1995, p. 222)

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Introduction

Stigma, in the classic work of Goffman (1963), is defined as a discrediting judgment about individuals who possess socially undesirable attributes. In the environmental context, stigma is the negative public perception of living in a community that has experienced a degraded quality of life. Environmental stigma may result from a variety of causes, such as air pollution, high crime rates, deteriorated public or private infrastructure including parks, community centers, sidewalks and streets, buildings, houses and land, and contamination from toxic chemicals such as the by-products of industrial processes. Environmental stigmatization is parallel to social stigma, involving “discrediting settings, places, objects, nonhuman lifeforms, and surroundings, as well as people associated with these environments” (Edelstein, 2001, p. 41). Environmental stigma typically occurs when the public perceives a risk or threat to human or environmental health, and subsequently people avoid contact with products and places that are perceived as threatening to human well-being (Gregory, Slovic, & Flynn, 1995).

One context in which environmental stigma is probable is in communities with extensive environmental contamination. The geographical area of focus in the present study, for example, is contaminated with dioxins and dioxin-like compounds. The term “dioxins” is often used to refer to a family of toxic chemicals that share a similar structure and induce harm through a similar cellular mechanism. According to World Health Organization (2014), high concentrations of dioxins are mainly the by-products of manufacturing processes like smelting and the production of chlorinated organic compounds, such as pesticides. Due to the chlorination of their basic chemical structure, dioxin and dioxin-like compounds are very persistent in the environment. Dioxins are toxic and have been linked to reproductive and developmental dysfunctions, interference with the immune and endocrine systems, and also linked to some cancers (World Health Organization, 2014).

In this study, we investigate how residents in a community contaminated with dioxins respond emotionally, cognitively, and behaviorally to environmental stigma. Understanding human responses to feeling stigmatized is an important step for the engaging communities in decision making about the future of their communities.

Context

Dioxin contamination has been an important environmental issue along the Tittabawassee, Saginaw, and Bay Rivers in the Midland–Saginaw–Bay City area in Michigan since the mid-1980s. Contamination by Dow Chemical Company, which is the community’s largest employer, has occurred since the early 1900s due to incineration and then water-borne discharge. Currently, the U.S. Environmental Protection Agency (EPA hereafter), Michigan Department of Environmental Quality (MDEQ), and Dow Chemical Company collaborate to assess dioxin levels in soil and water, remediate properties that are found to have dioxin levels exceeding the site-specific remediation criteria (250 parts per trillion for residential property), and involve and inform the public about their activities. The U.S. EPA proposed to implement the remediation by segment and by the time this study was conducted, 4-mile stretch of the Tittabawassee River downstream from the city of Midland was being

remediated and planning of remediation was being conducted for the downstream area which runs through Midland. Although scholarly and technical efforts are being made to mitigate the negative impacts of dioxins on the natural environment and human health in the affected area, it is also critical to understand how local contamination affects residents' psychological and behavioral responses to the environmental crisis. The literature on environmental stigma provides a useful theoretical framework for this objective.

Stigma and Its Environmental and Technological Aspects

As defined by Goffman (1963), stigma is a discrediting judgment about individuals who possess socially undesirable attributes. Although Goffman (1963) primarily focused on stigma arising from personal attributes (e.g., physical deformities), scholars have extended this conceptualization to include places of dwelling (Korpela, 1989; Satterfield, 2000) and argue that stigma stems from residences that are discredited by environmental and technological hazards (Edelstein, 1991). For example, Walker (2001) noted that stigma toward individuals can arise from the fact that they live near technological infrastructures or other environmentally or aesthetically hazardous surroundings. Moreover, individuals living in or near contaminated areas may also be perceived as dangerous, and their identities become associated with the environmental contamination (Walker, 2001; Wester-Herber, 2004).

Environmental stigmatization can involve both actual and imagined negative experiences associated with living in communities in which potentially damaging industries are located (B. Miller & Sinclair, 2012). Actual negative experiences related to environmental stigmatization typically include observation of abandoned homes, brownfields, and hollowed out downtowns; decreases in property market values (Jackson, 2005); and carryover effects for people living in affected areas where continuous negative human–environment interactions occur (Gregory & Satterfield, 2002; Twigger-Ross & Uzzell, 1996). Researchers argue that such interactions are important for the formation of self-identity (Hidaglo & Hernandez, 2001; Twigger-Ross & Uzzell, 1996); people are likely to suffer damage to their identity caused by public perceptions about the polluted nature of their living area and biased evaluations of their own identity (Wester-Herber, 2004). Experiencing stigma leads to various responses, ranging from diminished self-esteem to feeling empowered, from experiencing anger to feeling indifferent (Holmes & River, 1998; Whitley & Campbell, 2014). Since research examining the social aspects of environmental and technological stigmatization remains limited (B. Miller & Sinclair, 2012), this study aims to enrich this body of literature by investigating environmental stigma from three dimensions— affective, cognitive, and behavioral responses to environmental stigma, through in-depth interviews.

Affective Responses to Stigma

Previous research has indicated that chronic stress is a typical emotion reported by people living in contaminated areas (Cwikel, Abdelgani, Goldsmith, Quastel, & Yevelson, 1997; Fleming, O'Keefe, & Baum, 1991). Many factors have been found to contribute to the psychological stress such as fear of life-threatening diseases caused by toxic exposure (e.g., Matthies, Höger, & Guski, 2000), uncertainty about the invisible harm caused by exposure

to toxic contamination (Vyner, 1988), and perceptions of limited individual control of one's surroundings (Davidson, Baum, & Collins, 1982).

In addition to psychological stress, individuals subject to environmental stigma often experience anger (Loewenstein & Lerner, 2003). Adeola (2000), for example, reported that people living in the New Orleans metropolitan area expressed their anger and frustrations about government agencies' failure to provide solutions to health-threatening environmental conditions. Likewise, Gervich et al. (2015) reported that local residents of a small city in Louisiana expressed anger toward federal environmental regulators and representatives of a nearby industrial factory for polluting their community.

The stigma literature about traditionally stigmatized conditions (e.g., mental illness) suggests that stigmatized individuals are likely to experience other negative emotions, such as shame (Hasson-Ohayon et al., 2012) and embarrassment (Doherty & O'Doherty, 2010; Moses, 2010). Environmental stigma is likely to make people vulnerable to these emotions as well, especially when people living with contamination believe that their identities are negatively affected by the contamination and perceive outsiders to view them as dangerous (Gregory & Satterfield, 2002). Indeed, in stigmatized communities, in addition to direct outcomes (e.g., dread of health consequences) generated by the environmental hazard, residents' beliefs about how they are viewed by others can drive negative experiences (Satterfield, 1996). Building on this literature, we pose our first research question:

Research Question 1: What emotions do residents living along the Tittabawassee River feel when discussing dioxin contamination?

Cognitive Responses to Stigma

In addition to affective responses, stigmatized individuals also make cognitive and rational evaluations of environmental hazards. According to Edelstein (1988) and Eiser et al. (2012), these cognitions can include knowledge about hazards, risk perceptions of a given environmental hazard subject to avoidance, perceived importance of environmental safety to communities, attributions of responsibility for hazards, and perceived control over negative outcomes associated with environmental hazards. Existing research has shown that stigmatization tends to amplify risk perceptions; that is, when people perceive that they are stigmatized for living in a contaminated area, they tend to evaluate the hazards as riskier than if they do not experience stigma (Kasperson, Kasperson, Pidgeon, & Slovic, 2004; Peters, Burraston, & Mertz, 2004). Thus far, statistical correlations between stigma and risk perceptions have not been established; the existing research on cognitive responses to environmental stigma is anecdotal. Hence, rather than making predictions about the relationship between the experience of stigma and cognitive responses, we pose a research question to probe the cognitive factors associated with living in a contaminated area:

Research Question 2: What are the current risk perceptions among residents living along the Tittabawassee River in relation to dioxin contamination?

Behavioral Responses to Stigma

Individuals adopt a vast array of behaviors as coping strategies when experiencing environmental stigma. C. T. Miller and Kaiser (2001) provide a meaningful framework to assist in understanding behavioral responses to stigma, which can include both disengagement and engagement coping strategies.

Disengagement coping happens when stigmatized individuals withdraw from the stress resulting from stigma (Pinel, 1999). Two forms of disengagement coping have been studied extensively: (a) avoidance of interactions or comparisons with unstigmatized individuals and (b) denial or minimization of prejudice or discrimination. When people avoid interactions or comparisons with unstigmatized others, they can do so either physically or mentally. For example, HIV patients have described situations in which they needed to avoid interactions with “normal” others, including close family members and friends, in order to protect themselves from negative consequences (Varas-Díaz, Serrano-García, & Toro-Alfonso, 2005). When avoidance of interactions is not perceived as a possible outlet for stressful situations, stigmatized individuals tend to turn to more mental avoidance strategies like denying or minimizing others’ prejudice and discrimination (C. T. Miller & Kaiser, 2001).

On the other hand, engagement coping behaviors are characterized as behaviors that aim to assist the individual in “gaining control over the stressful event” (C. T. Miller & Kaiser, 2001, p. 81). In particular, there are two major types of control discussed in literature: primary and secondary control. Primary-control coping involves actions performed to change the stressful situation and gain personal control over the environment directly (C. T. Miller & Kaiser, 2001), such as problem solving, emotion regulation, and emotion expression. Problem solving may include behaviors such as collective action to improve devalued group status (Brewer & Brown, 1998), as well as behaving in a socially skillful and stereotype-disconfirming fashion (Kaiser & Miller, 2001). Emotion expression and regulation, on the other hand, involves controlling emotions that are thought to be detrimental to overcoming others’ prejudicial responses. This control then makes the stigmatized individuals better able to deal with others’ stereotypical beliefs about them (Steele & Aronson, 1995).

Secondary-control coping, in contrast, takes the form of individual passive adaptation to the stressful situation, through distraction, cognitive restructuring, and acceptance (C. T. Miller & Kaiser, 2001). Distraction involves engagement in both cognitions and behaviors to relocate attention elsewhere. Cognitive restructuring includes strategies of attributing poor outcomes to the unfairness of other people instead of stigmatized individuals themselves, as a way to protect self-esteem (Crocker & Major, 1989) and devaluating domains in which one’s group is stigmatized (Major & Schmader, 1998). Acceptance of stigmatized condition is another secondary-control stigma coping strategy.

The current study examines the engagement and disengagement coping strategies by asking the following question:

Research Question 3: What behaviors have residents living along Tittabawassee River adopted to cope with the environmental contamination?

Beyond coping behaviors, there is also a range of behaviors that directly address the risks posed by dioxin contamination. Humans are exposed to dioxins largely by consuming contaminated food, such as fish and wildlife (Perelló et al., 2015), and through contact with contaminated soil from the watershed or other outdoor areas (Wang, Huang, Zheng, Cheung, & Wong, 2013). Thus, to reduce exposure, local residents might engage in less consumption of contaminated food, more careful preparation of potentially contaminated food, and less frequent usage of outdoor recreational areas such as parks. The extent to which local residents perform these behaviors was addressed with the following question:

Research Question 4: To what extent do residents consume locally produced food (**Research Question 4a**) and engage in outdoor activities involving the contaminated watershed and soil (**Research Question 4b**)?

Method

Participant Identification and Recruitment

Seventy interviews were conducted with 72 interviewees (37 males and 35 females), including two interviews with couples. The average age was 51.08 years ($SD = 6.76$), with participants ranging from 19 to 85 years old. The vast majority of the participants were Caucasian/White ($n = 67$), with one African American and one Hispanic participant. Eleven participants had completed a graduate degree, 22 participants had completed a bachelor's degree, 28 participants had completed community college, and 10 participants had completed high school. At the point of interview, 29 participants were employed full-time, 9 were employed part-time, 27 were retired, and 3 were unemployed. The average length of time living in the area was 39.99 years ($SD = 21.68$). The median household income was \$50,000–\$74,999. Table 1 summarized demographics of participants.

The first three interviews were conducted by approaching participants at popular public locations (i.e., intercept interviews) to make sure the interview protocol was clear and concise. The first interview was conducted at a farmer's market. The second and third interviews were conducted at a common fishing hole on the Tittabawassee River. The questions were clearly understood by the interviewees and researchers did not make major changes to the interview protocol before proceeding to main interview data collection.

Residents living in properties along the part of the Tittabawassee River that were under remediation or where remediation was being planned were recruited to participate in the study by two interviewers who were blinded to the research questions, given that the two segments were being remediated or work was planned. After being introduced to the study, participants were consented and then interviewed. All but one participant agreed to be audio recorded, and the interviewers took detailed notes during all interviews. On average, interviews took approximately 20 minutes to complete, with a shortest interview completed in 9 minutes and a longest taking 78 minutes. On completion, participants were given a \$20 gift card to a local grocery store.

Interview Protocol Development

A structured interview protocol was developed focusing on five major topics, including (a) participants' knowledge about local contamination, (b) their concern about the contamination and the environment in general, (c) risk perceptions related to dioxin contamination, and (d) affective and (e) behavioral responses to local dioxin contamination. Most of the questions were closed-ended questions that required participants to either answer yes or no, or provide ratings using 10-point scales. Participants were also probed to elaborate on their answers or ratings.

Participants were first asked to list the top 10 issues in the area that concerned them, and were asked at a later point to evaluate how concerning dioxin contamination was to them in comparison with the issues listed at the beginning. The next section asked participants about their personal history in the area, as well as their perceptions about Dow Chemical Company. Participants were asked how long they had lived on and owned their property, whether they believed it was contaminated, if they had worked for Dow Chemical Company and to what extent they believed that Dow was a beneficial corporate member of the community (1 = *not valuable at all*, 10 = *extremely valuable*).

The third section asked questions specifically related to dioxin contamination. These included their initial feelings about dioxin contamination at the time when they first found out the area was contaminated, personal importance of the contamination in terms of health or environment, and what they had heard of Dow's involvement. Participants were asked to rate on 10-point scales the extent to which they were concerned that dioxin contamination would affect their health, the natural environment, and property market values (1 = *not concerned at all*, 10 = *extremely concerned*). Further questions asked if they had been approached by any national, state, or local organizations (e.g., EPA, MDEQ, Community Advisory Group) about the contamination and, if approached, how they felt about and processed the information they received from these groups.

The last section focused on participants' communication with others about dioxin contamination. These questions asked participants if they had told others that they lived in a contaminated area, whether they felt embarrassed about their community due to the contamination, and if they had experienced negative reactions from others when others learned that the participant lived in a contaminated area. Two additional questions were asked to probe if and how they had searched for information about dioxins and their perceptions of local people involved in the cleanup process.

Immediately following the interview, participants were also asked to fill out a 17-item survey about present their diet and food preparation behaviors (e.g., whether they "cut off fat from local fish before cooking") and use of outdoor recreational areas (e.g., whether they "reduce kids' outdoor activities as a result of dioxin"). Participants were then asked to fill out a set of demographic items, covering age, sex, ethnicity, education, employment, income, political preferences, and whether they have family members or friends suffering from diseases that they suspect may be caused by dioxin exposure.

Data Analysis

All audio-recorded interviews were transcribed by two transcribers who were blinded to the research questions, and the first author also randomly reviewed 10% of the transcriptions to check for accuracy. After transcription was completed, the authors organized participants' responses using Excel. Means and standard deviations of participants' ratings to closed-ended questions were computed and reported. A grounded approach to theme identification (Strauss & Corbin, 1997) was used to generate themes of participants' elaboration on some questions (e.g., "Why did you share the information about contamination in this area with others?").

Results

Preliminary Analysis

When asked to list issues in the area that concerned them the most, participants mentioned a variety of concerns. Thirty-six out of 70 interviewees mentioned environment-related concerns, including dioxin contamination ($n = 27$), flooding ($n = 12$), concerns about fishing and hunting ($n = 13$), water pollution ($n = 8$), and riverbank and property cleanup ($n = 8$). In addition to these environmental issues, participants also mentioned concerns about the economic condition in the area ($n = 12$), the decline in property values ($n = 6$), and bad road conditions ($n = 6$). Several other social issues were also mentioned, including crime ($n = 4$), drugs ($n = 4$), and teenage pregnancy ($n = 2$).

Results also indicated that participants were quite knowledgeable about Dow Chemical. All but two interviewees were familiar with the company. Nine participants were working or had worked for Dow Chemical directly, or for contractors hired by Dow Chemical at the time of the interview. Participants in 42 interviews indicated that they had friends or relatives who worked for Dow Chemical. Participants considered Dow Chemical to be very valuable to the community ($M = 8.60$, $SD = 1.03$). When asked to elaborate on the reason for their ratings, the vast majority of the participants ($n = 65$) mentioned the economic contributions that Dow Chemical has made to the community by providing jobs and paying taxes. In addition, many participants ($n = 43$) valued Dow Chemical because of its public involvement, such as building recreational areas and sponsoring community events. When asked this question, two participants specifically mentioned that Dow Chemical was the source of dioxin contamination in this area, but in the same response, they also commended the company on its efforts to face the issue and remedy the problem.

Participants in all but 3 interviews were aware of the contamination occurring in their residential area, and in 57 interviews, the participants identified dioxin as the chemical contaminant, and Dow Chemical as the source of the contamination.

Research Question 1: Emotions Experienced When Discussing Dioxin Contamination

The first research question asked about respondents' emotions when discussing dioxin contamination. This question was addressed by asking participants who knew that the area was contaminated to elaborate on how they felt about the contamination when they first heard about it. Participants in 35 interviews mentioned the exact time when they first heard

about dioxin contamination in the area. Among them, participants in 24 interviews said that they first found out about dioxin contamination more than 15 years ago, and participants in 6 interviews said that they knew about it for almost all their life. Participants in 5 interviews said that they first heard about it less than 5 years ago and that was when they first moved into the area. Concern and worry ($n = 23$), shock and surprise ($n = 9$), and irritation ($n = 6$) were the main initial emotions reported by the participants. For example, one participant said:

Yeah, I am concerned about the dioxin and the long term effects, I guess. Since my kids grew up here, they're in their 20s now. You know, just and they've been down to the river, they fish and they've even been in the water, even though I tell them, told them not to. (Interview 24)

Another participant said:

Because I live here and drink the water and yeah, raised my children here. Didn't let them go down there.... My health, my kids' health, it is quite important to me that uh, that things get taken care of. However, if it doesn't, what I do with my kids, I say, okay, if you go down there, you're cleaning yourself up when you come back. You're washing your shoes off. You're washing your hands. You're getting everything clean. Just in case. (Interview 17)

Some participants were shocked or surprised when they first found out that their living area was contaminated. For example, one participant said:

[I was] shocked. We know about it 20 years ago, and it is getting worse. It just took our dreams away. It took our life away.... We, it really, knocked us down to think that it was poisonous and that we were exposing our grandchild and, you know, just probably could never sell the property and blah, blah, blah, blah, blah. It was a very frightening time. It upset us deeply. Still, still am upset. (Interview 59)

Irritation was another emotional response experienced by six participants at the time when they first learned of dioxin contamination in the area. One participant said:

I was irritated.... They took a natural resource and ended up taking it away from, you know, its use. I mean, its natural use. You can't eat the fish really out of the river and all that. (Interview 16)

On the other hand, participants in 21 interviews explicitly said that at present, they were not concerned or worried about the contamination. Some participants were indifferent to the contamination since they believed that the levels of dioxins were not significant enough to cause health risks ($n = 7$). One participant said:

I don't think the levels of the contamination are significant enough to cause any harmful effects. (Interview 57)

Other participants were not bothered by the contamination because they believed that dioxins existed naturally in the environment ($n = 4$), other things were more concerning to them ($n = 4$), or they noted that they could avoid exposure to dioxins by not engaging in certain activities ($n = 3$). For instance, participants said:

I certainly don't think we should be putting these things in the environment but it is there. They, no, no one knew that this was being added and of course, I am sure you know about the chemistry of fire and dioxin is a byproduct of fire, as well as chemical production. So there is dioxin in a lot of areas. (Interview 1)

I don't think it's that bad where it's, you know, as long as you stay out of it. (Interview 7)

You could avoid it. I mean, you just don't swim in the water, don't eat the fish. The only reason you would get contaminated is if you did things to make yourself susceptible to that. (Interview 55)

In addition to experiencing concern, surprise, and irritation, participants were asked whether the contamination made them feel embarrassed about the community's reputation. Participants in 14 interviews indicated that they have felt somewhat embarrassed or afraid of being rejected. For example, one participant said:

You know, growing up, we always joked about it. You know, different kids, we'd always laugh about having a third eye or the third arm, you know, and you often worried about when we were kids, how we played down in the river and fished. We never ate the fish but we'd always fish. We were always near the river. But I look at it as, you know, I'd still do it all over again. I love Midland. I love everything about it. I feel that Dow is trying to put their best foot forward, hopefully to make it a better place and clean up the mistakes they've had in the past. (Interview 70)

Another participant said:

yes, sometimes. I think there is a label for us out there of being contaminated by dioxins. (Interview 45)

Research Question 2: Cognitive Responses—Risk Perceptions About Dioxin

The second research question asked about the extent to which local residents perceived dioxin to be a health and environmental risk. Participants in 53 interviews thought dioxin was a health and environmental risk. One participant said:

Just because it's, I mean, it's in everything. I mean, the uh, river floods and like you're playing in your yard or your kids are playing in the yard, your animals are playing in the yard, gardens around here, it's all, all ends up on your table eventually. (Interview 61)

Another participant said:

Oh, it's one of the most studied substances on the planet. It's been tested and retested and proven to be a danger to human health and animal health. We can't eat wildlife from the watershed because they are thought to be too contaminated. Don't eat the fish. Don't eat the deer. Don't, don't touch them. You know, they're dying. This is a population unsafe for wildlife, why would it not be for the people? (Interview 47)

Another participant said:

I think it causes a lot of different diseases. Not necessarily just cancer that you hear about but other things in the dust and air, creates problems. (Interview 69)

On the other hand, participants in 12 interviews indicated that they did not believe dioxins were a health or environmental risk. For example, one participant said:

No, honestly, I don't. I don't think it's a risk. They just blow it up. You don't see any, they've done studies, I think, on cancer and all that other stuff and I don't think there's any spike in any of that stuff. The main problem is if you stir the thing up. You know, most of this is below the top level because of the sediment, every time you flood over and all these flood plains, they almost always flowed, flood over every spring. So you're getting another layer, they're getting deeper and deeper. The only time you're gonna have a problem is you start messing with it. People are eating a lot of fish out of the Saginaw River now. Where do you think all this dioxin goes? Gotta go right down that river. So ... I haven't heard of anybody getting sick and got a lot of walleye fish fries around here. (Interview 4)

Participants in three interviews said that they used to think dioxin was a health and environmental risk, but it was no longer a concern because of the remediation. For example, one participant said:

I think that it used to be but I think they're trying to clean things up. I think.
(Interview 31)

On the quantitative ratings, participants indicated a moderate level of concern of dioxin contamination to their personal and family health ($M = 5.82$, $SD = 1.87$), and a lower level of concern for negative effects of dioxins on natural environment ($M = 4.67$, $SD = 1.45$). In addition, participants also showed concerns that contamination would negatively affect the market values of local properties ($M = 6.14$, $SD = 1.03$).

Research Question 3: Coping Behaviors Related to Dioxin Contamination

To investigate coping behaviors, participants were asked whether they sought out information relevant to dioxin contamination and remediation, whether they had shared any information with people in their networks, and whether they had initiated conversations related to dioxin contamination and remediation with others. The majority of the participants (42 interviewees) did not actively seek information relevant to contamination and remediation. Among these participants, over half had been approached by the EPA, MDEQ, or Dow Chemical and given information about dioxin contamination and remediation. When receiving information, participants indicated that they had read carefully and understood the information provided. Participants in 24 interviews mentioned that they had actively searched for information about dioxin contamination and remediation online, by discussing this issue with government officials and Dow Chemical representatives, or by participating in public meetings held by the EPA.

In 17 interviews, the participants said that they had initiated conversations about dioxin contamination and remediation with their families and friends, although a majority of the interviewees reported that they never had such discussions. Multiple reasons contributed to why people initiated the conversations, such as wanting to have families know about their

situation ($n = 7$), being asked by others ($n = 5$), and discussing it because it was perceived as a heated issue in the community ($n = 3$). For participants who did not conduct conversations about contamination and remediation with others, many participants said this was not a topic that ever came up ($n = 18$). Participants in 8 interviews disclosed concerns about missing the opportunities to meet family and friends if they became aware of the contamination. For example, one participant said:

I like my friends and my family and I'd like them to still come on by. (Interview 49)

In addition, four participants indicated that they were concerned that their self-image would be damaged if they disclosed information about contamination in this area. One participant said:

They'll think something like I can't take care of myself. Doesn't look good. (Interview 70)

Research Question 4: Change in Food Preparation and Outdoor Activities

Participants were fairly aware of the risk posed by consuming locally caught fish, as participants in 61 interviews indicated that they would avoid eating fish caught locally or fatty fish. Among participants who indicated that they would eat locally caught fish, participants in 6 interviews indicated that they would space out fish meals or avoid soft “green” stuff in fish. Forty-two participants indicated that they grew vegetables in their yards, participants in 49 interviews indicated that they would consume locally grown vegetables, participants in 15 interviews revealed that they consumed locally produced eggs, and participants in 51 interviews said they consumed locally produced fat-free dairy products.

With regard to outdoor activities, participants in 37 interviews indicated that they were still using the river for recreational purposes. However, some participants said that they had reduced outdoor activities ($n = 9$) and their children's outdoor activities ($n = 8$) as a result of the contamination (see Table 2 for summary).

Discussion

Living in contaminated areas such as dioxin contamination can be a devastating experience emotionally and relationally (Weber, Scholz, Bühlmann, & Grasmück, 2001). When first discovered, dioxins were portrayed as “a highly toxic chemical” (Shipp, 1986). Places found to be contaminated by dioxins (e.g., the Times Beach in Missouri) have been given labels such as “ghost town” (Shipp, 1986) or “toxic town” because these places were considered as “unsalvageable” and residents relocated (Schmidt, 1990). For people residing in these areas and attached to the places, they are likely to feel stigmatized. Research on environmental stigma, however, has largely been focused on the economic decline in property values and amplified risk perceptions as a result of environmental stigma. The psychological aspects of environmental stigma have received little scholarly attention.

With this in mind, the present investigation aimed to enrich understanding of the affective, cognitive, and behavioral manifestations of environmental stigma by studying residents living in Michigan, where dioxins were first found to be exceedingly high in the mid-1980s. Data were gathered from 70 in-depth interviews with local residents living along the Tittabawassee River in Michigan, contaminated many years ago by industrial pollution. Results provide insight into how residents feel about living in their community.

Stigmatization often results in a wide range of psychological stressors such as fear, anger, and anxiety among stigma targets (Crocker, Major, & Steele, 1998). In the geographic area we studied, concern about the health risks posed by dioxin was the most prominent affective state that individuals mentioned when discussing contamination. Many participants were concerned about the negative effects of dioxin exposure on family health. Previous research has identified these prevalent emotions among individuals living in environmentally contaminated areas (e.g., Cwikel et al., 1997; Loewenstein & Lerner, 2003). Embarrassment and fear of being rejected, although frequently reported in research of disease stigma (e.g., HIV, mental illness; Jefferies et al., 2015; van der Sanden, Bos, Stutterhelm, Pryor, & Kok, 2015), have been largely neglected in the literature on environmental stigma. A majority of the participants in this study did not feel embarrassed about the contamination; however, some participants expressed a feeling of embarrassment about the community reputation or concern about being rejected by others when they were asked why they did not share information about the contamination with others.

While a majority of interviewees perceived that dioxins were an environmental and health risk, some individuals were indifferent. Instead of actively seeking information about dioxin contamination and remediation, many participants merely relied on the information provided by government officials and Dow Chemical representatives. Many participants indicated that they had not initiated conversations about dioxin contamination and remediation with others. Several reasons could be contributing to this lack of engagement in the community. First, dioxin contamination has been in the area for decades and cleanups are currently undergoing to redeem the situation. For many participants, they grew up with the knowledge that this area is contaminated and have been living with the condition for an extended period of time. Being used to the situation and knowing that the contaminant was being remediated may have led residents to not feel stigmatized or actively seek relevant information. Second, the community in general had not experienced obvious adverse health effects that were proved to be caused by exposure to dioxin. This normalizing condition likely reduced residents' levels of perceived risk. Last, Dow Chemical is perceived as valuable and beneficial to the community by providing job opportunities and community welfare. Provided with resources such as economic security and education, stigmatized individuals feel empowered and as a result are less likely to identify themselves with the stigmatized situation (Meyer, 2003).

Many participants were aware of ways to reduce their exposure to dioxin, such as by avoiding locally caught fatty fish and preparing fish more carefully. Few participants reported taking actions to limit their use of the river for recreational purposes or reducing or stopping consumption of locally grown vegetables and eggs. These results suggest that participants believed that they had relatively adequate knowledge about minimizing dioxin

exposure via consuming locally caught fish, but may need further education of other ways to avoid dioxin, suggesting future educational efforts are needed about these exposure routes.

As a whole, interviews conducted in this study did not suggest obvious stigmatized feelings among these Michigan residents. With Dow Chemical contributing many resources to the community, from high-paying jobs to building parks and the underwriting of civic events, paired with the unobtrusive nature of dioxin on human health, and active remediation efforts by the corporation, participants did not feel stigmatized. It would be useful for future research to compare residents in Midland with other communities in Michigan that have different environmental pollution such as lead water pollution in Flint, Michigan. Such comparisons will enable us to obtain a better understanding about the dynamics of stigma in communities.

Limitations, Implications, and Conclusion

This study has several limitations. First, given the qualitative nature of our data, we were not able to assess quantitative relationships among participants' emotions, risk perceptions, and coping behaviors. Second, as indicated by many scholars (e.g., Satterfield, Slovic, Gregory, Flynn, & Mertz, 2001), places that are chemically contaminated often have other socioeconomic issues that greatly affect residents, such as racial tension and economic difficulties. This study was not able to disentangle how these issues contributed to the environmental stigma caused by contamination. Third, this study explored the experiences of stigmatized individuals, but did not include another critical group, the stigmatizers, and investigate stigmatizers' perceptions of dioxin contamination and people living in areas affected by it. However, these limitations seemed not to change the conclusion of the present study. Future research is desired to further explore the complexity of environmental stigma.

The current study does provide data about how environmental stigma is manifested among people in a contaminated area. A number of respondents reported feeling concerned, shocked, irritated, and embarrassed when they first heard of the fact 20 years ago that their community was polluted, and that thought conditions continued to improve. The study sets the stage for future investigations of the interactions between stigmatizers and stigmatized individuals in the context of environmental contamination and of the ways in which the interactions influence stigmatized individuals' physical and psychological well-being.

Taken together, the current study demonstrates how scholars can understand how people living in polluted areas respond to environmental pollution cognitively, affectively, and behaviorally, and also indicates that people living in affected areas have multiple factors modify stigmatizing factors, such as an environmental contaminant. Another important factor influencing stigmatization to be studied in the future is how mass media portrays environmental contamination and the people living in those areas in order to better comprehend how environmental stigma is formed, developed, and spread.

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Table 1

Demographics.

<i>Education</i>	<i>n (%)</i>	<i>Employment</i>	<i>n (%)</i>	<i>Length of residence, years, M (SD)</i>	<i>39.09 (21.68)</i>
High school	10 (14.1%)	Unemployed	3 (4.2%)		
Community college	28 (39.4%)	Part-time	9 (12.7%)		
Four-year college	22 (31.0%)	Full-time	29 (40.8%)	<i>Property size, acres, M (SD)</i>	8.32 (16.22)
Graduate school	11 (15.5%)	Retired	27 (38.0%)		
<i>Ethnicity</i>	<i>n (%)</i>	<i>Marital status</i>	<i>n (%)</i>		
Non-Hispanic White	68 (95.8%)	Single	21 (29.6%)	<i>Income, Mdn</i>	\$50,000–\$74,999
Hispanic	1 (1.4%)	Married	43 (60.6%)		
Multiracial	1 (1.4%)	Widowed	3 (4.2%)		

Table 2

Food Consumption Behaviors and Use of the Tittabawassee River.

<i>Raising, preparing, and consuming local produce and livestock</i>			
Grow vegetables	<i>n</i> = 28 (39.4%)	Consume lean meat	<i>n</i> = 54 (77.2%)
Consume local vegetables	<i>n</i> = 49 (69.0%)	Consume local fat-free dairy	<i>n</i> = 54 (77.2%)
Consume local eggs	<i>n</i> = 15 (21.3%)	Clean vegetables	<i>n</i> = 68 (97.1%)
<i>Preparing and consuming locally caught fish</i>			
Avoid fatty fish	<i>n</i> = 5 (7.1%)	Cut fat off fish	<i>n</i> = 6 (8.6%)
Space out fish meals	<i>n</i> = 6 (8.6%)	Consume smaller fish	<i>n</i> = 5 (7.1%)
Avoid soft "green stuff"	<i>n</i> = 5 (7.1%)		
<i>Use of the Tittabawassee River</i>			
Use for recreation	<i>n</i> = 37 (52.8%)	Follow news about river remediation	<i>n</i> = 46 (65.7%)
Have reduced outdoor activities	<i>n</i> = 9 (12.8%)	Are involved in community decisions about river	<i>n</i> = 6 (8.6%)
Have reduced children's outdoor activities	<i>n</i> = 8 (11.4%)		