


# Seniors Who Experienced the Lac-Mégantic Train Derailment Tragedy: What Are the Consequences on Physical and Mental Health?

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## Abstract

**Introduction:** In July 2013, a train derailment caused the death of 47 people and destroyed the downtown area in the city of Lac-Mégantic (Quebec, Canada). This tragedy had several impacts on this small community. **Method:** Three years after this disaster, we used a representative population-based survey conducted among 800 adults (including 265 seniors aged 65 or above) to assess the physical and mental health of seniors. **Results:** Several differences were observed in seniors' physical and mental health based on their level of exposure to the tragedy. Nearly half of seniors highly exposed to the train derailment (41.7%) believe that their health has deteriorated in the past 3 years. The majority of seniors highly exposed to the train derailment (68.7%) also show symptoms of posttraumatic stress disorders. Seniors highly or moderately exposed to the tragedy were also more likely to have found positive changes in their personal and social life as compared with nonexposed seniors. **Discussion:** A technological disaster such as a train derailment still had negative impacts on seniors' physical and mental health 3 years later. **Conclusion:** Public health authorities must tailor prevention and promotion programs to restore health and well-being in this population.

## Keywords

seniors, posttraumatic stress, technological disaster, train derailment, postdisaster, psychological health

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## Introduction

On July 6, 2013, the population of Lac-Mégantic (Quebec, Canada) faced one of the worst railway disasters in Canadian history. In the night, a train carrying 72 tank cars filled with crude oil derailed. This caused explosions and a major fire in the downtown area of this community. Much of this downtown had been destroyed and 47 people (including four seniors) died. Several families had experienced damage to their property and had to be permanently relocated. Due to increased likelihood of technological and natural disasters worldwide and the impact of such events on communities and seniors, it is important to document the consequences of disasters on seniors' physical and mental health. The purpose of this article is to document this issue in the context of a technological disaster (i.e., the train derailment at Lac-Mégantic). Our study was conducted 3 years after this

disaster with a sample of 800 adults (including 265 citizens aged 65 or above).

## Literature Review

Any individual exposed to a traumatic event, regardless of age, is likely to develop health or social problems, to accentuate preexisting health issues, and to generate

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negative impacts in various aspects of personal, conjugal, family, or social life (Bei et al., 2013). Furthermore, scientific literature has shown that technological disasters are associated with more deleterious consequences than natural disasters for a similar amount of losses and damages (Morgan & Bhugra, 2010). This situation is partly due to the fact that in technological disaster, a human error is often responsible of the event and victims are more likely to seek a guilty party rather than to focus on their rehabilitation (Bromet, Havenaar, & Guey, 2011).

For seniors, the authors agree that exposure to a disaster affects them in many aspects of their lives (Brockie & Miller, 2017; Maltais, 2013), as they generally have an increased need for assistance (Kar, 2016). Disasters may be responsible of losing a loved one or one's home and substantially altering the meaning of their life (Bei et al., 2013). Older people are also more likely to face financial challenges and to deal with insufficient financial means (Henderson, Roberto, & Kamo, 2010). This financial insecurity may force them to change their lifestyle and create a significant source of stress (Maltais, 2013). Their religious and other beliefs may also change as well as their conjugal, family, and social life (Maltais & Gauthier, 2018). In terms of physical health, seniors are more likely to increase or develop physical disorders when they face disasters (Jia et al., 2010; Kar, 2016). These include a decrease in physical capacities, a more negative perception of one's state of health, the development of cardiovascular diseases, and increased fatigue (Maltais, 2016). In a longitudinal study on the consequences of a flood on seniors' physical and mental health, greater exposure to the disaster and lack of social support were found to predict poor physical health (Bei et al., 2013). An increased prevalence of psychological disorders such as depression or posttraumatic stress disorder (PTSD) have also been reported as a result of disasters among seniors (Pietrzak, Southwick, Tracy, Galea, & Norris, 2012).

Researchers who conducted studies on the consequences of disaster exposure among seniors reported that they are more vulnerable than younger people because of personal, contextual, or social factors (e.g., physical condition due to aging process, social isolation, lower income, reduced mobility). Other factors include the presence of chronic problems and cognitive impairments (Inoue & Yamaoka, 2017). All these factors bring stress in the moments where coping skills gradually fade and contribute to the increase in vulnerability of seniors (Maltais, 2016). Some researchers believe that older people who experience a traumatic event are more likely than younger people to experience depression (Jia et al., 2010), lower quality of life (Wu et al., 2015), use sedatives and tranquilizers (Suzuki et al., 2011), and to show decreased immune response (Wu et al., 2015).

Other experts, however, suggest that seniors are better suited to cope as compared with younger adults (Karlin, Marrow, Weil, Baum, & Spencer, 2012) or that they are

equally affected (Nolen-Hoeksema & Aldao, 2011). They have shown that seniors are able to overcome stresses and challenges in aftermath of a disaster and to be resilient (Abramson et al., 2015). The resilience of seniors would come from their experience. Such researchers base their argument on the accumulation of seniors' life experiences and on the fact that, over the course of their lives, they have developed coping strategies enabling them to cope with stressful events. This position is based on two hypotheses (i.e., maturation, inoculation). For the proponents of the maturation hypothesis, seniors react less intensely than younger adults to stressful events. Proponents of the inoculation hypothesis consider that seniors, because of their previous exposure to traumatic situations, are less vulnerable to the adverse effects of disasters. From this perspective, experiences would enable seniors to mobilize resources needed to better cope with stress (Finnsdottir & Elklit, 2002).

Thus, there are diverging views on the coping abilities of seniors in the aftermath of a disaster. This article tries to shed light on this question using a representative population-based survey. Herein, we assess the physical and mental health of seniors exposed to a technological disaster.

## Method

### *Recruitment of Participants*

During October and November 2016, a professional polling firm recruited 800 adults from randomly generated phone numbers. Among these adults, there were 265 seniors (142 lived in Lac-Mégantic and 143 in communities of the area). Each senior was invited to a telephone survey lasting approximately 30 min.

### *Study Variables*

The survey consisted of various tests to measure the level of exposure to the train derailment and to capture physical and mental health of seniors as well as their use of alcohol, anxiolytics, antidepressants, and nonprescribed drugs. Based on various questions on losses and stress experienced during the derailment, it was possible to classify respondents into three levels of exposure to the tragedy (i.e., high exposure = 18.1%, moderate exposure = 55.1%, no exposure = 26.8%). Respondents with a high level of exposure experienced three types of losses (i.e., human loss, material loss, and subjective loss). Moderately exposed respondents experienced one or two types of losses and unexposed respondents reported no loss.

The physical health of seniors was assessed with two questions. The first concerned the perception of one's health (i.e., excellent, very good, good, fair, poor) and the second assessed whether perceived health remained stable or not (i.e., improved, deteriorated) in the past 3 years.

The original 15-item Horowitz's Impact of Events Scale (Horowitz, Wilner, & Alvarez, 1979) was used to identify the presence of intrusive events or avoidance following the train derailment in July 2013. This test is frequently used in American or Canadian research to assess the level of risk of developing PTSD after a post-traumatic event. It includes 15 items relating to intrusion or avoidance experiences in posttraumatic situations. For each item, the respondent should indicate the frequency of occurrence of these symptoms during the last week. In our previous studies, this test was the subject of a factorial study in the main components study with victims of a natural disaster; the results suggested the relevance of referring to a single factor (Maltais, Lachance, & Brassard, 2002). A composite score of 0 to 75 points was created. The higher the score, the more PTSD symptoms respondents show. A score above 25 indicates a moderate or high-level risk to present PTSD (Tichehurst, Webster, Carr, & Lewin, 1996). In this study, the alpha coefficient is .92 for the overall score.

The 6-item Kessler Psychological Distress Scale (Kessler, Andrews, Colpe, & Hiripi, 2002) was used to assess psychological distress. This scale, validated in various surveys and populations, deals with feelings of nervousness, hopelessness, agitation, depression, discouragement, and uselessness felt during the last month. Each item is evaluated on a 4-point scale, for a total score ranging from 0 to 24. The higher the score, the greater the psychological distress. According to the Institut de la statistique du Québec (Baulne & Courtemanche, 2016), people who score 7 or more are considered to be suffering from psychological distress. In this study, the alpha coefficient is .83.

The Inventory of Complicated Grief (Prigerson et al., 1995) was used to assess the presence or absence of complicated grief. This tool focuses on two elements: symptoms of separation distress (e.g., nostalgia) and traumatic distress (e.g., bitterness, avoidance). It includes 19 items, and respondents must indicate how often each feeling has been experienced since the death of a loved one. Answer ranges from *never* (0) to *always* (4). A score of 26 or higher corresponds to complicated grief (Prigerson et al., 1995). Complicated grief differs from normal grief by the persistence of different symptoms beyond 12 months after the loss (American Psychiatric Association, 2013). The alpha for this test is .91.

The Posttraumatic Growth Inventory (Tedeschi & Calhoun, 1996) documents the posttraumatic growth of respondents. This 21-item tool identifies the presence or absence of positive impacts to traumatic events in five domains: (a) relationship with others ( $\alpha = .91$ ), (b) new possibilities ( $\alpha = .88$ ), (c) personal strengths ( $\alpha = .86$ ), (d) spiritual changes ( $\alpha = .66$ ), and (e) appreciation of life ( $\alpha = .83$ ). This tool offers six answer choices ranging from 0 (*I never experienced this change*) to 5 (*I experienced this change very strongly*). Individuals who demonstrate positive effects from their exposure to a

traumatic event typically receive 23+ points for the sub-scale Relationship with others, 18 for New possibilities, 15 for Personal strengths, 5 for Spiritual change, and 11 for Appreciation of life (Tedeschi & Calhoun, 1996). The alpha for the overall score is .95.

The Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988) was used to assess social support. This tool measures three dimensions of social support (i.e., from family, from friends, and from significant people) with 12 questions and a total score ranging from 12 to 84. The higher the score, the higher the level of support the seniors have. Having 69 points or more means that respondents have a high level of social support, a score of 49 to 68 points corresponds to an average level of social support, whereas respondents getting 12 to 48 points would have access to a low level of social support. The alpha of this scale is .90.

Respondents' consumption patterns of alcohol and medication were identified with questions on the use of doctor-prescribed tranquilizers, sedatives, or antidepressants, and how often they drank five or more drinks on the same occasion in the past 12 months. According to the *Association pour la santé publique du Québec* (2015), this type of alcohol consumption is "abusive consumption." Respondents also had to estimate whether their frequency of alcohol consumption had remained stable, decreased, or increased over the past 3 years.

## Data Analysis

Cross checking data was performed to validate which characteristics can differ significantly between those exposed strongly, moderately, and those unexposed to train derailment. Chi-square was used for nominal or ordinal data. When significant differences were identified through these analyses, a posteriori comparative tests were conducted using the Bonferroni correction. The significance threshold was established at .05 for all the analyses.

## Results

### Sociodemographic Characteristics of Respondents and Stress Experienced During the Train Derailment

The majority of the respondents are aged between 65 and 74 years and own their homes. However, there is a significantly higher percentage of women among highly exposed seniors compared with the other two groups of respondents. In addition, a higher percentage of highly exposed seniors live alone compared with moderately exposed respondents (Table 1).

When the train derailed, 89.6% of highly exposed seniors feared for their own lives or that of a loved one, whereas this percentage was 52.7% for those who were

**Table 1.** Sociodemographic Characteristics of Senior Citizens by Level of Exposure (%).

Variables	Average exposure level (n = 265)			$\chi^2$
	Highly exposed (n = 48)	Moderately exposed (n = 146)	Unexposed (n = 71)	
<b>Age (years)</b>				1.71
<b>65-74</b>	75.0 <sup>a</sup>	69.9 <sup>a</sup>	67.6 <sup>a</sup>	
<b>75-84</b>	22.9 <sup>a</sup>	25.3 <sup>a</sup>	29.6 <sup>a</sup>	
Above 85	2.1 <sup>a</sup>	4.8 <sup>a</sup>	2.8 <sup>a</sup>	
<b>Gender</b>				8.08*
<b>Man</b>	14.6 <sup>a</sup>	33.6 <sup>b</sup>	38.0 <sup>b</sup>	
<b>Woman</b>	85.4 <sup>a</sup>	66.4 <sup>b</sup>	62.0 <sup>b</sup>	
<b>Owner of his or her home</b>				3.918
<b>Yes</b>	75.0 <sup>a</sup>	76.7 <sup>a</sup>	87.3 <sup>a</sup>	
<b>No</b>	25.0 <sup>a</sup>	23.3 <sup>a</sup>	12.7 <sup>a</sup>	
<b>Lives alone</b>				6.33*
<b>Yes</b>	54.2 <sup>a</sup>	33.8 <sup>b</sup>	38.0 <sup>ab</sup>	
<b>No</b>	45.8 <sup>a</sup>	66.2 <sup>b</sup>	62.0 <sup>ab</sup>	
<b>Marital status</b>				17.5*
<b>Married/free union</b>	45.8 <sup>a</sup>	65.1 <sup>a</sup>	52.1 <sup>a</sup>	
<b>Single</b>	8.3 <sup>ab</sup>	6.8 <sup>b</sup>	21.1 <sup>a</sup>	
<b>Separated/divorced</b>	20.8 <sup>a</sup>	10.3 <sup>a</sup>	8.5 <sup>a</sup>	
<b>Widowed</b>	25.0 <sup>a</sup>	17.8 <sup>a</sup>	18.3 <sup>a</sup>	
<b>Highest education level completed</b>				7.15
<b>Less than secondary V</b>	25.0 <sup>a</sup>	28.1 <sup>a</sup>	29.6 <sup>a</sup>	
<b>Diploma of vocational studies</b>	4.2 <sup>a</sup>	4.1 <sup>a</sup>	7.0 <sup>a</sup>	
<b>High school</b>	37.5 <sup>a</sup>	32.2 <sup>a</sup>	28.2 <sup>a</sup>	
<b>College</b>	20.8 <sup>a</sup>	13.0 <sup>a</sup>	11.3 <sup>a</sup>	
<b>University</b>	8.3 <sup>a</sup>	19.2 <sup>a</sup>	18.3 <sup>a</sup>	
<b>Others</b>	4.2 <sup>a</sup>	3.4 <sup>a</sup>	5.6 <sup>a</sup>	5.75
<b>Annual household income (Can\$)</b>				
<b>Less than 30,000</b>	63.4 <sup>a</sup>	44.1 <sup>a</sup>	48.5 <sup>a</sup>	
<b>30,000-79,999</b>	34.1 <sup>a</sup>	51.5 <sup>a</sup>	50.0 <sup>a</sup>	
<b>80,000 or more</b>	2.4 <sup>a</sup>	4.4 <sup>a</sup>	1.5 <sup>a</sup>	

Note. Each superscript letter denotes a subset category whose proportions do not differ significantly at the .05 level.

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

moderately exposed ( $p < .001$ ). Highly exposed seniors were more likely to have feared for their own lives (65.1%) than those who were moderately exposed (15.6%,  $p < .001$ ). Nearly half of the seniors (41.7%) experienced the death of one of their loved ones, whereas nearly all highly exposed seniors (97.9%) were temporarily or permanently relocated. About half of the seniors (41.7%) also experienced damage to their home. For their part, 22.6% of moderately exposed respondents were relocated and only 4.1% experienced changes in their housing (loss or damage). Three years after the tragedy, the majority (81.3%) of highly exposed seniors were still daily exposed to the downtown area, whereas this percentage decreased to 47.3% for moderately exposed people ( $p < .001$ ).

### Physical Health

Regardless of their level of exposure to train derailment, the majority of seniors felt that their health was excellent or very good (Table 2). There is no difference between groups of respondents concerning the changes

noted (improvement, stabilization, or deterioration) in their physical health status over the past 3 years and in the consultation of family doctors or specialists. However, nearly half of the seniors highly exposed to the tragedy (41.7%) believe that their health has deteriorated in the past 3 years, whereas this percentage was 28.1% for moderately exposed seniors and 21.1% for the unexposed seniors. This study shows that the majority of respondents, regardless of their level of exposure, consulted their family doctor in the past year.

### Mental Health

The majority of seniors highly exposed to the tragedy (68.7%) had PTSD symptoms (Table 2). This percentage is not significantly higher ( $p < .001$ ) than the moderately exposed individuals (52.1%) but significantly higher than the unexposed seniors (9.9%). Highly or moderately exposed individuals are also more likely than unexposed to have anxiety disorders ( $p < .01$ ). Psychological distress is also higher for seniors highly exposed to the derailment ( $p < .001$ ). Nearly half of the seniors highly

**Table 2.** Perceived Physical and Psychological Health of Senior Citizens by Level of Exposure (%).

Variables	Average exposure level (n = 265)			$\chi^2$
	Highly exposed (n = 48)	Moderately exposed (n = 146)	Unexposed (n = 71)	
<b>Perceived health status</b>				2.015
Excellent to very good	81.3 <sup>a</sup>	79.5 <sup>a</sup>	87.3 <sup>a</sup>	
Fair to poor	18.8 <sup>a</sup>	20.5 <sup>a</sup>	12.7 <sup>a</sup>	
<b>Changes in health level</b>				7.52
Improved	6.3 <sup>a</sup>	4.8 <sup>a</sup>	2.8 <sup>a</sup>	
Remained stable	52.1 <sup>a</sup>	67.1 <sup>ab</sup>	76.1 <sup>b</sup>	
Deteriorated	41.7 <sup>a</sup>	28.1 <sup>ab</sup>	21.1 <sup>b</sup>	
<b>Consulting a family doctor</b>				1.68
Yes	91.7 <sup>a</sup>	89.0 <sup>a</sup>	94.4 <sup>a</sup>	
No	8.3 <sup>a</sup>	11.0 <sup>a</sup>	5.6 <sup>a</sup>	
<b>Consulting a medical specialist</b>				5.69
Yes	41.7 <sup>a</sup>	58.9 <sup>a</sup>	46.5 <sup>a</sup>	
No	58.3 <sup>a</sup>	41.1 <sup>a</sup>	53.3 <sup>a</sup>	
<b>State of posttraumatic stress disorder</b>				49.41***
Yes (26 and above)	68.7 <sup>a</sup>	52.1 <sup>a</sup>	9.9 <sup>b</sup>	
No (25 and less)	31.3 <sup>a</sup>	47.9 <sup>a</sup>	90.1 <sup>b</sup>	
<b>Presence of a mood disorder</b>				3.86
Yes	14.6 <sup>a</sup>	10.3 <sup>a</sup>	4.2 <sup>a</sup>	
No	85.4 <sup>a</sup>	89.7 <sup>a</sup>	95.8 <sup>a</sup>	
<b>Presence of anxiety disorder</b>				13.30***
Yes	22.9 <sup>a</sup>	15.1 <sup>a</sup>	1.4 <sup>b</sup>	
No	77.1 <sup>a</sup>	84.9 <sup>a</sup>	98.6 <sup>b</sup>	
<b>Psychological distress</b>				20.37***
Yes	43.8 <sup>a</sup>	22.6 <sup>b</sup>	8.5 <sup>c</sup>	
No	56.3 <sup>a</sup>	77.4 <sup>b</sup>	91.5 <sup>c</sup>	
<b>Depressive episode</b>				4.12
Yes	37.5 <sup>a</sup>	31.5 <sup>a</sup>	21.1 <sup>a</sup>	
No	62.5 <sup>a</sup>	68.5 <sup>a</sup>	78.9 <sup>a</sup>	
<b>Complicated grief</b>				4.94*
Yes	45.0 <sup>a</sup>	19.2 <sup>b</sup>	N/A	
No	55.0 <sup>a</sup>	80.8 <sup>b</sup>	N/A	
<b>Consulting a psychologist</b>				5.34
Yes	8.3 <sup>a</sup>	4.8 <sup>ab</sup>	0.0 <sup>b</sup>	
No	91.7 <sup>a</sup>	95.2 <sup>ab</sup>	100.0 <sup>b</sup>	
<b>Consulting a social worker</b>				4.65
Yes	10.4 <sup>a</sup>	11.6 <sup>a</sup>	2.8 <sup>a</sup>	
No	89.6 <sup>a</sup>	88.4 <sup>a</sup>	97.2 <sup>a</sup>	

Note. Each superscript letter denotes a subset category whose proportions do not differ significantly at the .05 level.

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

exposed experienced complicated grief (45.0%), whereas this percentage is 19.2% among moderately exposed seniors ( $p < .05$ ). This means that these people have social functioning problems. Despite the fact that many seniors highly or moderately exposed to the train derailment have a number of psychological health issues, Table 2 shows that a minority of them have consulted a psychologist or social worker in the past year.

### Posttraumatic Growth in Respondents

Significantly higher percentages of highly or moderately exposed seniors found positive changes in three out of

the five subscales of the Posttraumatic Growth Inventory (i.e., relationships with others, spiritual changes, appreciation of life). Again, there are significantly more highly exposed people than unexposed people who have discovered new personal strengths ( $p < .05$ ) and identified new opportunities in their lives ( $p < .01$ ). Table 3 shows that exposed seniors are more likely than unexposed ones to have noticed positive changes in their relationships with those around them and realized that their loved ones are great people or that they can count on their help when needed. They also found new opportunities, such as developing new interests and possibilities, or being more inclined to make changes where necessary, and they

**Table 3.** Posttraumatic Growth and Consumption Patterns of Senior Citizens by Level of Exposure (%).

Variables	Average exposure level (n = 265)			$\chi^2$
	Highly exposed (n = 48)	Moderately exposed (n = 146)	Unexposed (n = 71)	
<b>Posttraumatic growth</b>				
Relationship with others				25.45***
Yes	39.6 <sup>a</sup>	45.9 <sup>a</sup>	11.3 <sup>b</sup>	
No	60.4 <sup>a</sup>	54.1 <sup>a</sup>	88.7 <sup>b</sup>	
New possibilities				11.06**
Yes	25.0 <sup>a</sup>	13.0 <sup>ab</sup>	4.2 <sup>b</sup>	
No	75.0 <sup>a</sup>	87.0 <sup>ab</sup>	95.8 <sup>b</sup>	
Personal strengths				6.50*
Yes	18.8 <sup>a</sup>	13.7 <sup>ab</sup>	4.2 <sup>b</sup>	
No	81.3 <sup>a</sup>	86.3 <sup>ab</sup>	95.8 <sup>b</sup>	
Spiritual change				16.00***
Yes	58.3 <sup>a</sup>	50.0 <sup>a</sup>	25.4 <sup>b</sup>	
No	41.7 <sup>a</sup>	50.0 <sup>a</sup>	74.6 <sup>b</sup>	
Appreciating life				20.66***
Yes	41.7 <sup>a</sup>	30.1 <sup>a</sup>	7.0 <sup>b</sup>	
No	58.3 <sup>a</sup>	69.9 <sup>a</sup>	93.0 <sup>b</sup>	
<b>Consumption patterns</b>				
Alcohol abuse at least once a week				0.67
Yes	4.2 <sup>a</sup>	4.8 <sup>a</sup>	7.1 <sup>a</sup>	
No	95.8 <sup>a</sup>	95.2 <sup>a</sup>	92.9 <sup>a</sup>	
Increase in alcohol consumption				5.82
Has increased	4.2 <sup>a</sup>	2.7 <sup>a</sup>	0.0 <sup>a</sup>	
Remained stable	89.6 <sup>a</sup>	82.2 <sup>a</sup>	81.7 <sup>a</sup>	
Has decreased	6.3 <sup>a</sup>	15.1 <sup>a</sup>	18.3 <sup>a</sup>	
Use of anxiolytics				
Yes	22.9 <sup>a</sup>	23.9 <sup>a</sup>	20.0 <sup>a</sup>	
No	77.1 <sup>a</sup>	76.1 <sup>a</sup>	80.0 <sup>a</sup>	0.48
Use of antidepressants				2.92
Yes	16.7 <sup>a</sup>	13.8 <sup>a</sup>	7.0 <sup>a</sup>	
No	83.3 <sup>a</sup>	86.2 <sup>a</sup>	93.0 <sup>a</sup>	
Increase in consumption of nonprescription medication				14.99**
Yes	18.8 <sup>a</sup>	4.1 <sup>b</sup>	2.8 <sup>b</sup>	
No	81.2 <sup>a</sup>	95.9 <sup>b</sup>	97.2 <sup>b</sup>	

Note. Each superscript letter denotes a subset category whose proportions do not differ significantly at the .05 level.  
\*  $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

appreciate more about their own lives and the value of each day. Finally, they see changes in their spiritual values, as well as a better understanding of their spirituality and a deepening of their religious beliefs.

### *Use of Alcohol, Anxiolytics, and Antidepressants*

No significant differences were found between seniors with respect to alcohol abuse or anxiolytics and antidepressants use in the past year. In the past 3 years preceding this survey, seniors who were highly exposed to the tragedy were slightly more likely than others to have noticed an increase in their alcohol consumption (Table 3). Finally, highly exposed seniors are more likely than others to report an increase in the use of nonprescription drugs ( $p < .01$ ).

## **Discussion**

This study shows that 3 years after the Lac-Mégantic train derailment, nearly half of the seniors highly exposed to the train derailment lost a loved one and present a more precarious physical and mental health than moderately or unexposed seniors. These findings are consistent with other studies on impacts of natural or technological disasters on health in general (Warsini, Buettner, Mills, West, & Usher, 2014) and on seniors (Inoue & Yamaoka, 2017). These studies mention that the level of exposure to traumatic events positively correlated with the frequency and intensity of the psychological problems that can be encountered. However, highly exposed seniors do not feel that their physical health status is worse, although a higher percentage of them consider that their physical health has deteriorated.

Despite the presence of psychological problems in a significant number of respondents exposed to the tragedy (including PTSD, psychological distress, depression, anxiety, complicated grief), few consulted a psychologist or a social worker in the year before the survey. The proportion of senior people who consulted these professionals is lower than that of younger adults. In this context, it would have been interesting to know whether these professionals were consulted in the 2 years following the tragedy, as well as the reasons for consulting or not this type of professional. Some studies of risk factors related to the presence of both physical and mental health in the aftermath of a disaster among elderly indicate that they are generally more reluctant to seek help than younger people (Johnson, Ling, & McBee, 2015). They tend to complain less, underutilize formal support services, and generally seek less support from family, friends, and public and community organizations (Karlin et al., 2012). Thus, seniors made very little use of formal support services after the train derailment. Could this phenomenon be explained by the fact that they wish to avoid being labeled as “people suffering from mental health issues,” by not turning to a psychologist or social worker services, subsequently feeling pressure from those around them to leave their homes? In the years following the tragedy, have senior people been less attentive to psychological and social assistance services offered within the Lac-Mégantic community? Did the services provided by psychologists and social workers meet the expectations and needs of seniors and were they accessible to these people? It would be interesting to obtain answers to these questions. It is also recognized that seniors tend to feel that their situation is less critical than that of other members of their community, thus hesitating to ask for support even when experiencing serious physical and psychological health issues or social functioning problems (Meyer, 2017).

The Lac-Mégantic train derailment has not only had a negative impact on the health of seniors but a significant number of highly exposed seniors also reported positive impacts 3.5 years after. These seniors feel that they have better relationships with those around them, see new opportunities, enjoy life even more, and have deepened their spiritual lives. Similar findings have also been noted in other studies of consequences of disasters on personal, family, and social lives of seniors (Labra, Maltais, & Gingras-Lacroix, 2018). In this regard, the fact that very few seniors discovered new strengths can be explained by the fact that their life experiences have led to a stronger confidence in themselves, a self-confidence gained before the disaster, allowing them to believe in their abilities to master difficulties. Seniors may also have been less attentive than younger adults to the skills or strengths developed in the years subsequent to the tragedy. In fact, it is important to note that the majority of seniors highly or moderately exposed to the disaster believe that they have been able to manage the

effects of the train derailment. They feel they have been able to meet the needs of their family members and reassure them, resume a normal lifestyle, cope with their emotions and other stressful events, maintain good morale, and negotiate with the government.

## Conclusion

In light of the results, it is important for a disaster-affected community to pay special attention to psychological health of seniors and encourage them to listen to their needs. Greater emphasis should be placed on consulting health and social service professionals who can help them. Thus, because seniors tend to ask for less support than younger people, they may be ignored by public authorities and may be less likely to benefit from recovery opportunities. Despite the fact that some seniors are more vulnerable in the aftermath of a disaster, there is relatively little research on the impact of disasters on biopsychosocial health of seniors compared with studies on younger adults, children, or teenagers. We must, therefore, maintain researchers' interest in this population and identify what is specific to senior people, to implement preventive and curative interventions corresponding to their reality.

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## Ethical Considerations

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