

Short title: SUICIDAL IDEATIONS IN YOUTHS AFTER A DISASTER

Full title: Factors Related to the Presence of Suicidal Ideations in Adolescents after a
Technological Disaster

Authors:

Eve Pouliot¹, Ph.D. (Eve.Pouliot@uqac.ca)

Danielle Maltais¹, Ph.D. (Danielle.Maltais@uqac.ca)

Anne-Lise Lansard¹, M.A. (Anne-Lise.Lansard1@uqac.ca)

Pascale Dubois¹, B.T.S., Student, Master of Social Work program (Pascale.Dubois1@uqac.ca)

Geneviève Fortin¹, M.A. (Genevieve.Fortin1@uqac.ca)

¹Université du Québec à Chicoutimi

Address for correspondence:

Eve Pouliot, Ph.D., Associate Professor

Université du Québec à Chicoutimi

Pavillon Alphonse-Desjardins

Department of Humanities and Social Sciences, Room H4-1140

555 Boulevard de l'Université

Chicoutimi (Quebec), Canada, G7H 2B1

Tel. (418) 545-5011, ext. 5089

Fax: 418 545-5012

Eve.Pouliot@uqac.ca

Abstract

Background. Three and a half years after a technological disaster, the train derailment in Lac-Mégantic (Quebec, Canada) in 2013, a study was conducted with adolescents to determine their mental health condition. **Method.** Data were collected from 538 young people using a self-administered questionnaire distributed at their secondary school. One question specifically concerned the presence or absence of suicidal ideations. This article compares the characteristics of high school students who had had suicidal ideations during the 12 months preceding the survey ($n = 172$), with other adolescents in the same age group who had not had such ideations ($n = 366$). **Results.** This study revealed that close to a third of respondents (32%) said that they had had suicidal ideations during the year preceding the data collection. They differed from the other respondents due to sociodemographic, psychological, educational, familial and social factors. The characteristics related to adolescents' mental health are mainly associated with the presence of suicidal ideations. **Conclusion.** Suicidal ideations in adolescents are a public health concern and may appear in non-negligible numbers after a disaster. This article indicates the importance after such an event of acting on all the social determinants of health in order to protect young people at risk of developing suicidal ideations and promote their recovery.

Keywords. Suicidal ideations, suicidal thoughts, youths, adolescents, disasters, technological disasters.

1. Background

All types of disasters can cause people to experience a variety of psychological problems, such as signs of post-traumatic stress, anxiety, depression, alcohol or drug abuse, and suicidal ideations (Bonanno et al., 2010). Although suicidal ideations are less documented in scientific publications on the impacts of disasters, several studies carried out after natural disasters have revealed the existence of suicidal thoughts in young people, in proportions ranging from 4.2% (Chou et al., 2007) to 35.6% (Chui et al., 2017; Ran et al., 2015).

Given the frequency of suicidal ideations in adolescents exposed to a disaster, studies have tried to identify the factors that seem to be associated. Some authors have found that suicidal ideations appear to be more common in young women after a disaster (Ran et al., 2015; Tang, Xu, et al., 2018; Ying et al., 2015), whereas others indicate that men have more suicidal thoughts (Vehid, Alyanak, & Eksi, 2006). Studies also note that suicidal ideations increase with age in young people and are particularly high in adolescents (Tang, Xu, et al., 2018; Tang, Zhao, et al., 2018). Regarding mental health, several authors indicate that suicidal ideations are positively associated with depression (Chui et al., 2017; Tang, Zhao, et al., 2018; Zuromski et al., 2018), anxiety (Tang, Xu, et al., 2018), signs of post-traumatic stress (Ran et al., 2015; Tang, Zhao, et al., 2018; Zuromski et al., 2018), sleep disorders (Tang, Xu, et al., 2018), and low self-esteem (Contis & Foley, 2015). Alcohol or drug abuse is also a factor likely to increase the risk of suicidal ideations in individuals after a disaster (Chou et al., 2007; Contis & Foley, 2015).

In addition to these individual factors, some studies emphasize that a history of interpersonal violence is more closely related to suicidal ideations (Lai et al., 2020; Zuromski et al., 2018). Within the family, several events are associated with young people's suicidal ideations after a disaster, including interpersonal conflicts (Contis & Foley, 2015), physical or

psychological violence (Contis & Foley, 2015; Lai et al., 2020; Lau et al., 2010), and physical or emotional neglect (Tang, Zhao, et al., 2018). Although few studies have examined the influence of school-related factors on suicidal ideations after a disaster, Lau et al. (2010) observed that school absenteeism was associated with the presence of suicidal thoughts in adolescents after an earthquake in China.

Some factors are specifically related to the disaster itself. Thus, compared to peers who were not exposed to a disaster, some studies have shown that young people who were directly or indirectly exposed have more suicidal ideations (Adebäck, Schulman, & Nilsson, 2018; Lai et al., 2020; Tang, Xu, et al., 2018). However, few studies have considered the impact of the type of disaster experienced (natural or technological) on suicidal ideations in young people. Unlike natural disasters, a technological disaster is always human-caused. It is described as an event that occurs when a technological hazard is not mastered and a potentially dangerous situation arises therefrom or becomes a reality (Auger et al., 2003). For example, an oil spill or the explosion of a truck transporting hazardous materials or a plant producing them would be considered a technological disaster. Only the study by Contis and Foley (2015) documented the extent of suicidal thoughts and suicide attempts in adolescents following a technological disaster. Given that researchers have found that the consequences of technological disasters for mental health last longer than in the case of natural disasters (Bromet, Havenaar, & Guey, 2011; Chung & Kim, 2010), it therefore seems relevant to investigate suicidal thoughts in young people following a technological disaster.

This article specifically concerns adolescents experiencing suicidal ideations three years after a technological disaster: the train derailment in Lac-Mégantic (Quebec, Canada). On July 6, 2013, following the derailment of a freight train carrying crude oil, several explosions and fires

resulted in the destruction of the downtown area of this municipality of slightly more than 6,000 inhabitants. The consequences of this event were serious: the destruction of many commercial and residential buildings, contamination of the soil, temporary or permanent evacuation of hundreds of citizens, and the loss of numerous jobs. In addition to destroying the municipality's downtown area, this technological disaster affected citizens, and especially young people, both physically and psychologically. The 47 deaths caused by the disaster meant that 27 young people lost at least one parent. In this context, it is relevant to consider the factors that can affect the appearance of suicidal ideations in adolescents following a technological disaster.

2. Methodology

2.1 Participants and Data Collection Process

The data for this quantitative study were gathered in March 2017 at the only secondary school located on the territory of the municipality of Lac-Mégantic. A cross-sectional research design was applied to document the associations between different variables in a given period.

Participants were recruited through the secondary school, which they were attending at the time of data collection. The school management informed the teachers about the research project, and they were given a letter that briefly presented it. For students aged less than 14 years old, an information and consent form was sent to their parents or legal guardians. The questionnaire was administered in class to the youths who volunteered to take part in the study.

Out of 808 adolescents who could have taken part in the study, 538 (66.5%) responded to a self-administered questionnaire concerning, among other things, the presence or absence of suicidal ideations during the 12 months preceding the data collection. Thus, it is possible to describe the characteristics that distinguish youths who had experienced suicidal ideations at least

once during the 12 months preceding the survey ($n = 172$) from those who had not had such thoughts ($n = 366$).

This study was approved by the Comité de recherche de l'Université du Québec à Chicoutimi (approval no. #602.21.13).

2.2 Measurement Instruments

Suicidal ideations were assessed with the following closed-ended question: "During the last 12 months, have you ever thought about suicide?" Respondents could answer "never," "rarely," or "quite or very often." For purposes of analysis, the youths who said they had had such thoughts rarely ($n = 112$) or quite or very often ($n = 60$) were considered to be respondents who had had suicidal ideations.

To measure resilience, the Resilience Scale for Adolescents (READ) was used (Hjemdal, 2007; Hjemdal et al., 2006). This tool comprises 28 positive assertions, with a 5-point Likert-type scale, where 1 means "totally disagree" and 5 means "totally agree." Higher scores on the READ indicate greater resilience. The READ obtained a Cronbach's alpha of 0.95 in this study.

To assess the presence or absence of signs of post-traumatic stress, the Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979) was used. This tool comprises 15 items; for each one, the respondent must indicate the frequency of these symptoms during the last week. The score can range from 0 to 75 points. The higher the score, the more symptoms of post-traumatic stress the respondent shows. A score higher than 25 on this scale indicates a high level of manifestations of post-traumatic stress (Ticehurst et al., 1996). The scale's alpha coefficient in this study is 0.93.

The young people's self-esteem was documented using Rosenberg's (1965) Self-Esteem Scale, which is composed of 10 items. Respondents had to indicate their agreement on a scale ranging from "Strongly disagree" (0 points) to "Strongly agree" (4 points). The score was obtained by adding the points for each item, reversing the scores for five of them. A score of 31 or less corresponds to low self-esteem, while 34 or more represents high self-esteem. This instrument's alpha coefficient is 0.88.

Based on respondents' answers concerning stress or the various losses they experienced after the train derailment, the students were classified into three categories: students with strong, moderate or no exposure to the disaster. Students who were strongly exposed had experienced losses at the human (fears for their own life or that of a loved one, loss of a loved one, physical injuries) or material (evacuation or damage to their home) level. Moderately exposed students also suffered some human or material losses, while those who were not exposed had not experienced such losses.

Finally, the questionnaire included multiple-choice questions to describe the respondents' sociodemographic, familial, educational and social characteristics.

2.3 Statistical Analyses

This analysis was carried out in two parts. First, descriptive tables were prepared to compare the differences between two groups – students with suicidal ideations and those without – on the basis of chi-squared tests. The Bonferroni correction was applied to clarify the differences between categories. Given that numerous variables differed significantly between the two groups of respondents, preliminary regression analyses were done to determine which variables contributed the most to the existence of suicidal thoughts. After this step, 13 variables

were chosen and integrated into a final hierarchical logistic regression. Odds ratios were also calculated for each of the variables, using a 95% confidence interval.

3. Results

3.1 Sociodemographic Characteristics

Most of the youths questioned were living with both parents when the data were collected. Among sociodemographic characteristics, sex was the only factor differentiating young victims of the train derailment who had had suicidal ideations from those who had not. Indeed, although more than a third of all the girls questioned (37.2%) had experienced suicidal thoughts during the 12 months preceding the survey, 26.6 % of the boys were in that group ($p < 0.01$). As for age, no statistically significant difference was identified.

3.2 Exposure to the Disaster

Table 1 reveals that the adolescents who had suicidal ideations were more likely than those who did not to have been exposed to the disaster and to have been strongly exposed. Compared to the group who did not have suicidal thoughts, more of those who did had felt fears for their own life or that of a loved one, had gone without news of a loved one, had experienced the death of a relative or friend, or had experienced personal injuries or injuries to a loved one. At the material level, more of them had experienced damage to or loss of their home and had had to move temporarily or permanently following the disaster.

Table 1

Presence of Suicidal Ideations as a Function of Exposure to the Tragedy (%)

Variables	Presence of suicidal ideations (<i>n</i> = 172)	Absence of suicidal ideations (<i>n</i> = 366)	Significance
Exposure to the disaster			0.000***
Yes	79.4	59.1	
No	20.6	40.9	
Level of exposure			0.000***
Strongly exposed	12.9	5.6	
Moderately exposed	66.5	53.5	
Not exposed	20.6	40.9	
Fear for respondent's own life or life of a loved one			0.000***
Yes	69.6	48.8	
No	30.4	51.2	
Injury of respondent or a loved one			0.001**
Yes	17.6	7.8	
No	82.4	92.2	
Death of a loved one			0.000***
Yes	38.5	22.6	
No	61.5	77.4	
Damage to or loss of home			0.000***
Yes	9.6	2.0	
No	90.4	98.0	
Temporary or permanent move			0.001**
Yes	19.8	9.0	
No	80.2	91.0	

p* < 0.01, *p* < 0.001

3.3 Mental Health

Table 2 shows that significant differences in mental health exist between young people who had had suicidal ideations and those who had not. Fewer youths who had had suicidal ideations had high self-esteem and their mean score on the READ was lower. In addition, post-traumatic stress manifestations were significantly greater in this group.

Significantly more of the adolescents who said they had had suicidal thoughts during the year preceding the survey said that problems related to stress and anxiety and to grief and depression had harmed their family and school life.

Finally, significantly more respondents who had had suicidal thoughts reported having had psychological problems due to drug or alcohol consumption during the previous year. More of them also considered that their alcohol or drug consumption had impaired their relations with their family and their functioning at school.

Table 2

Presence of Suicidal Ideations as a Function of Respondents' Mental Health (%)

Variables	Presence of suicidal ideations (n = 172)	Absence of suicidal ideations (n = 366)	Significance
Self-esteem			0.000***
Low and very low	3.1	1.9	
Moderate	8.6	1.1	
High	88.3	96.9	
Resilience Scale for Adolescents (READ)			
Mean	2.61	3.08	0.000***
Median	2.61	3.11	
Presence of signs of post-traumatic stress (PTS)			0.000***
Yes (moderate/high)	17.8	6.6	
No	82.2	93.4	
Risk of PTS			0.000***
Low	82.2	93.4	
Moderate	10.1	5.7	
High	7.7	0.9	
Stress/anxiety impairing home life			0.000***
Yes	88.6	47.5	
No	11.4	52.5	
Stress/anxiety impairing school life			0.000***
Yes	82.1	48.8	
No	17.9	51.2	
Grief/depression impairing home life			0.000***
Yes	88.4	42.0	
No	11.6	58.0	

Grief/depression impairing school life			0.000***
Yes	81.3	34.3	
No	18.7	65.8	
Psychological problems related to drug/alcohol consumption			0.000***
Yes	21.4	4.7	
No	78.6	95.3	
Family problems related to drug/alcohol consumption			0.000***
Yes	11.1	1.9	
No	88.9	98.1	
School problems related to drug/alcohol consumption			0.000***
Yes	8.8	1.7	
No	91.2	98.3	

*** $p < 0.001$

3.4 Education-Related Characteristics

Youths who had had suicidal ideations in the 12 months preceding the survey differed from the others due to certain characteristics related to education (Table 3). Thus, significantly more of them had thought seriously about dropping out of school and disliked their school. They felt more overwhelmed and lost in their studies and more tense about the approach of exams and they had more difficulties focusing on their schoolwork. Similarly, fewer of them were motivated to do their homework and prepare for their exams. In addition, twice as many students who had had suicidal ideations had missed at least one class period without a valid reason in the six months preceding the data collection. These students were also significantly more likely than the others to have fallen asleep in class and not to have done their homework due to fatigue during this period.

On the other hand, more students who had had suicidal ideations said that they had shared their feelings and experiences with their teachers and felt respected by them.

Table 3

Presence of Suicidal Ideations According to Respondents' Education-Based Characteristics (%)

Variables	Presence of suicidal ideations (<i>n</i> = 172)	Absence of suicidal ideations (<i>n</i> = 366)	Significance
Thought seriously about dropping out of school			0.000***
Yes	25.3	9.6	
No	74.7	90.4	
Likes school			0.022*
Yes	59.3	69.3	
No	40.7	30.7	
Overwhelmed and lost due to complexity of lessons			0.000***
Not at all	27.3	39.3	
A bit	44.8	50.8	
A lot/completely	27.9	9.8	
Tense about approach of exams			0.000***
Not at all	27.3	43.4	
A bit	39.5	40.7	
A lot/completely	33.1	15.8	
Difficulty focusing on schoolwork			0.000***
Not at all	27.5	38.3	
A bit	32.7	44.0	
A lot/completely	39.8	17.7	
Motivated to do homework			0.000***
Not at all	43.6	31.6	
A bit	37.2	29.4	
A lot/completely	19.2	39.0	
Motivated to prepare for exams			0.011*
Not at all	24.6	18.5	
A bit	40.4	32.7	
A lot/completely	35.1	48.8	
Missed class periods without a valid reason			0.000***
6 times or more	6.4	2.5	
2 to 5 times	16.4	8.7	
Once	17.5	10.1	
Never	59.6	78.7	
Falls asleep in class			0.001**
Yes	43.6	28.6	
No	56.4	71.4	
Does not do homework due to fatigue			0.000***
Yes	71.3	47.4	

No	28.7	52.6	
Finds it difficult to get on well with teachers			0.207
Not at all/not really	72.1	79.0	
Neutral	13.4	10.1	
A bit/a lot	14.5	10.9	
Sometimes shares feelings and experiences with teachers			0.000***
Not at all/not really	61.6	77.4	
Neutral	14.0	6.3	
A bit/a lot	24.4	16.3	
Feels respected by teachers			0.001**
Not at all/not really	61.0	76.2	
Neutral	18.6	11.5	
A bit/a lot	19.2	12.3	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

3.5 Social and Familial Characteristics

Although significantly more of the young people who had had suicidal ideations belonged to a peer group, Table 4 shows that these groups were more likely to be made up of friends who had dropped out of school, were thinking of doing so or thought that education was not important.

At the family level, significantly more youths who had had suicidal thoughts did not have a close relationship with their parents. Likewise, more of these adolescents also considered that, in the last six months, their parents never listened to their ideas and opinions, never said that they appreciated them, never resolved a problem with them when they disagreed, and often or always got angry and shouted at them. Finally, significantly more of the respondents with suicidal thoughts said that their parents never kept track of their misconduct and often or always seemed too busy to spend as much time with them as they would have wished.

Regarding discussions of the disaster in the family setting, there was no significant difference between the adolescents who had had suicidal ideations and the other respondents.

Thus, most of the youths who took part in this study said that they had never or rarely discussed this subject with their parents or heard their parents talk about the train derailment between themselves during the three months preceding the survey. On the other hand, significantly more of the respondents who had experienced suicidal thoughts during the last year, compared to those who had not, had never talked about the train derailment with a friend during the three months before the study.

Table 4

Presence of Suicidal Ideations According to Respondents' Social and Familial Characteristics (%)

Variables	Presence of suicidal ideations (<i>n</i> = 172)	Absence of suicidal ideations (<i>n</i> = 366)	Significance
The respondent belongs to a group			0.003*
Yes	75.9	62.6	
No	24.1	37.4	
Some of his/her best friends have dropped out			0.001***
Yes	19.0	8.8	
No	81.0	91.2	
Some of his/her best friends are thinking of dropping out			0.000***
Yes	28.0	14.6	
No	72.0	85.4	
Some of his/her best friends think that education is not important			0.000***
Yes	33.1	15.2	
No	66.9	84.8	
The respondent's parents let him/her go out any evening of the week			0.142
Never	43.3	40.2	
Sometimes	20.5	28.4	
Often or always	36.3	31.4	
The parents listen to his/her ideas and opinions			0.000***
Never	22.5	6.9	
Sometimes	29.0	15.5	
Often or always	48.5	77.6	
The parents resolve problems with him/her when they disagree			0.000***

Never	33.9	15.7	
Sometimes	21.6	23.1	
Often or always	44.4	61.3	
The parents get angry and shout at him/her			0.000***
Never	40.4	65.6	
Sometimes	32.2	24.8	
Often or always	27.5	9.6	
The parents make a point of saying they appreciate him/her			0.000***
Never	28.1	8.5	
Sometimes	22.2	18.1	
Often or always	49.7	73.4	
The parents keep informed of his/her misconduct			0.001**
Never	34.5	19.2	
Sometimes	15.5	20.9	
Often or always	50.0	59.9	
The parents seem too busy to spend as much time with him/her as he/she would like			0.000***
Never	47.1	63.2	
Sometimes	21.8	22.3	
Often or always	31.2	14.6	
In the last 3 months, the parents have talked about the derailment with each other			0.057
Never	38.6	51.3	
Rarely	32.7	26.8	
Sometimes	25.7	19.7	
Always	2.9	2.3	
In the last 3 months, the parents have talked about the derailment with him/her			0.099
Never	57.3	65.2	
Rarely	28.7	22.2	
Sometimes	14.0	11.2	
Always	0.0	1.4	
In the last 3 months, the respondent has talked about the derailment with a friend			0.002**
Never	48.5	62.8	
Rarely	31.6	27.6	
Sometimes	18.7	8.5	
Always	1.2	1.1	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

3.6 Regression Analyses on Suicidal Ideations

Thirteen variables were retained and selected in a hierarchical stepwise logistic regression analysis, and six were highlighted as being more related to the presence of suicidal ideations in adolescents (Table 5). The regression had a Nagelkerke’s R^2 of 0.47. Of the 13 variables selected, only one was related to exposure to the disaster: the respondent’s home being damaged or completely destroyed during or after the train derailment ($p < 0.001$). These respondents were at more risk of experiencing suicidal ideations than their peers who were not in this situation. Among the variables related to mental health, the fact that adolescents considered that stress ($p < 0.01$) and depressive manifestations impaired their functioning at home ($p < 0.01$) was also associated with suicidal ideations. Moreover, the fact that adolescents considered their grief and depression to impair their learning at school or their relations with a teacher increased their risk of presenting suicidal ideations ($p < 0.01$). Youths’ resilience was another variable related to the appearance of suicidal ideations. Indeed, adolescents with higher scores on the READ are less likely to present suicidal ideations ($p < 0.01$). Finally, parents not keeping informed of their adolescent’s misconduct was also significant in our analysis ($p < 0.05$).

Table 5

<i>Analysis of Hierarchical Logistic Regressions on Suicidal Thoughts in Adolescents</i>				
Variables	<i>B</i>	<i>p</i>	Suicidal Ideations Exp(B) (95% CI)	R^2
Exposure to the disaster				0.062
Damage or loss of home	1.936	0.002**	6.929 (2.029–23.662)	
Mental health				0.433
Stress/anxiety impairing home life	0.933	0.006**	2.542 (1.307–4.941)	
Grief/depression impairing home life	1.097	0.005**	2.995 (1.404–6.387)	
Grief/depression impairing school life	1.151	0.001**	3.160 (1.584–6.304)	
Resilience Scale for Adolescents	–0.025	0.002**		

(READ)			0.975 (0.960–0.991)	
Education-based characteristics				
The parents do not keep informed of his/her misconduct	0.584	0.043*	1.793 (1.018–3.157)	0.466

* $p < 0.05$ ** $p < 0.01$

4. Discussion

More than three years after the train derailment, almost one-third of the adolescents surveyed in this study (32%) said that they had experienced suicidal ideations during the year preceding the survey. This proportion is higher than the rates reported in certain studies conducted after a natural disaster, which observed a prevalence of suicidal thoughts ranging from 8.8% (Stratta et al., 2014) to 35.6% (Ran et al., 2015) in adolescents aged 13 and over. However, similar prevalences have been found in other studies that showed that it is not uncommon for adolescents to develop suicidal ideations after a natural disaster (Ran et al., 2015; Tang, Xu, et al., 2018). Moreover, the high proportion of adolescents who experienced suicidal thoughts over the longer term after the train derailment may be explained by the hypothesis that these thoughts increased over time, as was the case in a study of adolescents three years after an earthquake (Chou et al., 2007). The high rates of suicidal thoughts reported in this study, three years after a technological disaster, also support the hypothesis that the consequences of technological disasters for mental health are more persistent than those of natural disasters (Bromet et al., 2011; Chung et al., 2010). It is also possible that other factors that had arisen between the disaster and the data collection period may have contributed to the development of suicidal ideations in the young people in this study.

The results of this study also confirm that being a woman (Tang, Xu et al., 2018; Ying et al., 2015), having low self-esteem (Contis & Foley, 2015) or signs of post-traumatic stress (Tang, Zhao, et al., 2018; Ying et al., 2015; Zuromski et al., 2018), or engaging in abusive consumption

of alcohol or drugs (Chou et al., 2007; Contis & Foley, 2015) increase the risk for adolescents of having suicidal ideations after a disaster. Contrary to the study by Stratta et al. (2014), this study shows that a lower level of resilience also constitutes a factor associated with suicidal ideations in secondary school students. Resilience was also negatively correlated with the presence of suicidal ideations, according to our analyses.

In addition, the results show that a high degree of exposure to the train derailment was positively associated with the existence of suicidal ideations, as were the associated stressors. Like other studies of this issue, this study appears to show the existence of a link between suicidality in adolescents and major losses, such as the death of a loved one (Adebäck et al., 2018; Tanaka et al., 2016), injuries to the adolescent or a family member (Tanaka et al., 2016; Tang, Xu, et al., 2018), or damage to the adolescent's home (Vehid et al., 2006). Our study showed that experiencing material damage to their home could be an important predictor of suicidal ideations in young people.

Moreover, this study emphasizes that young people who had suicidal ideations following the train derailment were also experiencing more problems related to stress, anxiety and grief in various areas of their lives, particularly at home and at school. Indeed, factors related to the adolescent's mental health are the most important predictors in this study. Thus, the adolescents questioned in this study who had had suicidal ideations differed from the others due to the cumulative negative perceptions related to various aspects of their psychosocial functioning. In addition, the scope of school-related problems associated with this issue leads us to believe that school would be an ideal environment not only for intervention but also for prevention, by identifying and assessing young people who need psychosocial assistance after a disaster. In this regard, other studies mention that, when students are reassured by their teachers, this helps

to increase their feeling of security and reduce their suicidal ideations (Lau et al., 2010; Yu et al., 2010).

In addition, the relationships young people have with family and friends and the parents' educational style appear to play a role in the appearance of suicidal ideations in adolescents who are victims of a disaster. Indeed, school absenteeism, association with peers who are having problems at school, and a lack of parental involvement in their life appear to increase the risk that such youths will develop suicidal ideations. Furthermore, the lack of opportunity to discuss the disaster, whether with friends or parents, is a factor related to the presence of suicidal thoughts. Thus, some studies highlight the fact that good social, familial and educational support can protect young people from suicidal thoughts after a disaster (Lau et al., 2010; Tang et al., 2010). Moreover, after such an event, it is important for young people's recovery to encourage them to express themselves about their experience and their feelings related to the tragedy, rather than using the adaptive strategy of avoidance, which consists in not mentioning the topic (Rheault & Maltais, 2005).

5. Conclusion

Although it is well known that suicidal ideations are related to other psychological problems, it is important to remember that young people who are at risk of having suicidal thoughts, and thus more likely to attempt suicide thereafter, have problems in various domains of their life, including the personal, educational, social and family spheres. Thus, it is important to act on the various social determinants of health to prevent and reduce the risk of suicide for adolescents who are victims of a technological disaster, such as the train derailment in Lac-Mégantic.

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All authors share responsibility for the final version of the submitted work and confirm that they had full access to all study data and take responsibility for the integrity of the study data and analysis.

The authors declare that they have no competing or potential conflicts of interest.

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