Factors associated with health-related quality of life (HRQOL) in students who survived the Sewol ferry disaster in South Korea

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ABSTRACT

Background: The purpose of this study was to analyze the mental health status of Danwon students who survived the Sewol ferry disaster. The study also evaluated the mental health effects of the disaster on the survivors.

Methods: Questionnaires were used to collect data from selected respondents. It was found that high family function and adolescent's strengths influence the quality of life of the survivors significantly.

Results: High scores on the Family Adaptability and Cohesion Evaluation Scales ($p < 0.001$) or the strengths domain of Strengths and Difficulties Questionnaire ($p = 0.027$) were significantly associated with higher KIDSCREEN-27 scores.

Limitation: It is difficult to explain the causal relationship and generalize due to cross-sectional study with small sample size.

Conclusions: Family function and adolescent's strengths had the significant relationship with higher quality of life of survivors. This finding offers important insight into understanding the effects of such accident, and suggest the importance the family and mental health to survivors of disasters.

1. Introduction

The Sewol ferry disaster occurred on April 16, 2014 in South Korea. A ferry named Sewol sank in the West Sea and only 181 of the 476 passengers who had boarded the ferry survived. There were 325 Danwon high school students on board for a school trip on that day. The disaster claimed the lives of 250 students.

The Sewol ferry disaster caused negative emotional reactions in the survivors, families, friends, and various individuals exposed to disaster situations (Woo et al., 2015). Previous studies conducted have demonstrated the negative consequences of disasters on indirectly exposed groups, such as volunteers, local residents, and unrelated individuals exposed to media (Kessler et al., 2008; Schlegel et al., 2002).

Studies of adults after the events of September 11 reported significant association with the number of hours of TV coverage of the attacks and the number of different kinds of potentially traumatic events (Schlegel et al., 2002). Studies of children after Oklahoma city bombing disaster found significant levels of psychological problems related to direct and indirect exposure and to TV (Pfefferbaum et al., 1999, 2001; Pfefferbaum et al., 2000). However, the biggest negative consequences were on direct disaster survivors (Goldfrank et al., 2003).

The effects of disasters on victims occur not only in physical form but also various mental forms such as post-traumatic stress disorder (PTSD) (Chermok et al., 2002; Kar and Bastia, 2006; Wnivesky et al., 2011), depression (Ginexi et al., 2000; Kar and Bastia, 2006; Wnivesky et al., 2011), and interpersonal difficulty (Davis et al., 2014; Wnivesky et al., 2011). The representative studies on mental effects of disasters include the World Trade Center Health Registry, which was established to track people exposed to the 9/11 terror attacks and 2011 shooting massacre on Utaya Island, Norway. Both studies emphasized the importance of initial treatment for post-traumatic care for survivors and mental illness care for disaster survivors (Stene and Dyb, 2015; Wnivesky et al., 2011). Another disaster in Korea, the Hebei Spirit oil spill in 2007 also showed high prevalence of depression, stress, and suicidal tendency on individuals who have experienced various disasters (Song et al., 2009). These studies show that experiencing disaster...

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affects the onset, course, and prognosis of future mental illnesses, and it is important to study the mental illness of disaster experienced persons.

The aim of this study was to analyze the mental health status of students who survived the Sewol ferry disaster in South Korea by objective scale questionnaires and to evaluate the factors associated with health-related quality of life (HRQoL) in students who experienced the tragedy.

2. Methods

This study was performed using Danwon high school students who survived the Sewol ferry disaster in South Korea. We initially distributed questionnaires to the 75 students and obtained responses from 57 students, after excluding 4 with incomplete questionnaires. This cross-sectional study was conducted in December 2015, 20 months after the Sewol ferry disaster.

For demographics factors, sex and age was included. Age was ranging from 17 to 19 years. For Psychological factors, participants also completed the Lifetime Incidence of Traumatic Events-Child (LITE-C), Family Adaptability and Cohesion Evaluation Scales (FACES-III), Peritraumatic Dissociation-Post-traumatic Negative Beliefs-Post-traumatic Social Support (PTD-PTNB-PTSS) scale, KIDSCREEN-27, and the Strengths and Difficulties Questionnaire (SDQ). The LITE-C is a checklist assessing trauma or losses that children have experienced and assesses the age, number of times, emotions at which the trauma occurred (Prigerson et al., 1995). The FACES-III is to assess two major dimensions on the circumflex model: adaptation and cohesion of the family (Olson et al., 1985). Family cohesion assesses the degree of separation or connection of family members to the family. The PTD-PTNB-PTSS is a validated Korean instrument to evaluate risk factors for post-traumatic stress disorder (PTSD) (Lee et al., 2011). The KIDSCREEN-27 instrument assesses the subjective health-related quality of life (HRQoL) of children and adolescents (Ravens-Sieberer et al., 2007). The tool was developed as a self-report measure applicable for healthy and chronically ill children and adolescents aged 8–18 years. The SDQ is a brief behavioral screening questionnaire for 3–16-year-olds (Goodman et al., 1998). This self-report version is suitable for young people aged 11–16 years, depending on their level of understanding and literacy. It examines 25 attributes, divided into 5 scale: 1 = emotional symptoms; 2 = conduct problems; 3 = hyperactivity/inattention; 4 = peer relationship problems; 5 = prosocial behavior. Scales 1–4 were combined to calculate the total score of adolescent's difficulties domain. The total score of scale 5 was considered as adolescent's strengths domain. A generalized linear model using a log link and Poisson distribution was performed. All statistical analysis was performed using Stata 14.1 (Stata Corp LP, College Station, TX, USA).

3. Results

Table 1 summarizes the demographic and psychological characteristics of the study participants. The sex ratios were nearly equal (male = 50.88%), and most of the participants were aged 17 years (17.19 ± 0.44). The average score for psychological scales were calculated as follows: 92.04 ± 19.32 (KIDSCREEN-27; higher score reflects better HRQoL), 66.51 ± 16.54 (FACES-III; higher score reflects better adaptation and cohesion of the family), 22.72 ± 7.75 (PTD-PTNB-PTSS; higher score reflects higher PTSD risks), 11.39 ± 5.70 (difficulties domain of SDQ; higher score reflects increase in the risk of developing a mental health disorder), 6.63 ± 1.93 (Strengths domain of SDQ; higher score reflects decrease in the risk of developing a mental health disorder).

Table 2 summarizes the result from generalized linear models evaluating the impact of demographic and psychological factors on KIDSCREEN-27. After adjusting for demographic covariates, higher scores on the FACES-III (coef = 0.005, 95% CI, 0.002 to 0.007) and strengths domain of SDQ (coef = 0.027, p = 0.016, 95% CI, 0.005 to 0.049) were significantly associated with higher KIDSCREEN-27 scores. However, participants those who female (coef = –0.123, p = 0.001, 95% CI, –0.194 to –0.052) compared to male and who aged 17 years (coef = –0.194, p < 0.001, 95% CI, –0.282 to –0.106) compared to 19 years were significantly associated with lower KIDSCREEN-27 scores.

4. Discussion

This study was to analyze the mental health status of survived Danwon students by questionnaires, and to evaluate the mental health effects of disaster survivors.

As a result, this study found that family function and adolescent's strengths had the significant relationship with higher quality of life of survivors. In children exposed to disasters, home environment and parental functions perform an intervening role in the correlation with psychological and behavioral symptoms (Slone and Mann, 2016), and reduce the intensity of mental problems (Laor et al., 1997; Zahr, 1996). Previous studies have described that negative parenting changes such as increased tensions and anxiety were associated with children's mental illness (DeVoe et al., 2011). Therefore, it is necessary to provide an environment which offers mental health services for both children and parents in addition to emphasizing the importance of parents' role.

The effect of SDQ Strengths, measuring adolescent's strengths, on the subjective quality of children's life was consistent with previous studies. Adolescent's strengths are reported to influence life satisfaction directly and show a higher path of influence (Caprara and Steca, 2005).

This is related to the fact that adolescent's strengths produce a lot of benefit for development, both in counteracting negative outcomes and in promoting better adjustment over the course of life. In addition, increased level of adolescent's strengths are less inclined to show externalizing behaviors (Bandura et al., 1996; Eccles and Barber, 1999; Youniss et al., 1999). Therefore, family function and adolescent's strengths after disasters is important to the quality of life of the children. A comprehensive and multidimensional approach is needed for better intervention of disaster relief programs and mental illness interventions.

There are limitations of this study. First, it is difficult to explain the causal relationship between the factors due to the cross-sectional study. Second, attention should be paid to generalization as much as the bias on the sample can occur, since only a few of the students who survive for the first time have participated in the study. Third, confounding effect of socioeconomic factor such as income level of student's parents is not adequately controlled due to this study included only students. However, it might be expected that there is no significant disparity in socioeconomic level among study participants in considering that study was conducted in single public school and most of students were live in adjacent district. Finally, this study didn't consider socioeconomic factors due to the limitation of date. Socioeconomic status is associated with psychological impact in adolescents (Twenge, 2002). There is an identified need for further studies considering socioeconomic status.
among the survivors of the disaster in further.

Quality of life consists of satisfaction and happiness of various areas in personal life such as physical, psychological, and social status. This study provides important information in identifying preventive, intervention programs and social policies that can identify health problems or those in need, and help them to adapt better. This study found that high family function and adolescent’s strengths are crucial to quality of life among the survivors of the disaster. Therefore, this finding offers important insights into understanding such disasters and suggest the importance of family and mental health after suffering a disaster.

Conflict of Interest

All other authors declare that they have no conflicts of interest. Contributors

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