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The influence of coping strategies on quality of life in a community facing environmental and economic threats

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The influence of coping strategies on quality of life in a community facing environmental and economic threats

ABSTRACT

The study investigated the quality of life in a community facing a technological disaster causing environmental and economic damages. For years, the Italian city of Taranto has based its economy on a big steel plant. The industrial plant caused severe environmental pollution, negatively affecting the health of residents living in an area of the city. The steel mill is now under judicial investigation and may be closed in the future causing loss of job for many citizens. By means of a questionnaire, we investigated the influence of coping strategies on quality of life and place attachment and the effects of being under the environmental (i.e., living in the contaminated area) and the economic (working for the steel mill) threat on these variables. Results showed that living in the contaminated area negatively impact on quality of life directly and indirectly lowering place attachment and increasing avoidant coping. Working for the plant had a negative effect on the environmental dimension of quality of life.

Keywords: Quality of life; Coping; Technological disasters; Place attachment; Structural equation modelling.

1 Introduction

According to the World Health Organization (WHO) definition, health is not the simple absence of disease but a state of physical, mental, and social well-being. Subjective perception of well-being is very relevant and several studies have shown that subjective evaluations contribute to health and

longevity (Diener and Chan 2011). WHO defined quality of life as a multidimensional concept and developed a specific instrument assessing it in terms of four different evaluations: physical health, psychological status, social relationships, and environment (i.e., economic and general life conditions) (WHOQoL Group 1998). This scale was translated into many languages and was efficaciously applied in different countries (i.e., De Girolamo 2001; Lucas-Carrasco 2012).

Considering the multidimensionality of the concept, several studies have noted the role of different determinants of quality of life, ranging from the individual level to the social level (i.e., Dzuka 2012; Tartaglia, 2013). Among these determinants, coping strategies may help at the individual level to restore a higher quality of life when one is menaced by external threats (Ben-Zur 2009). Coping is the cognitive and behavioural effort to address stressful situations (Lazarus 1999). There are different ways to react to adverse situations. Lazarus and Folkman (1984) distinguished among problem-focused strategies (i.e., attempts aimed at actively changing the negative event creating stress) and emotion-focused coping (i.e., attempting to reduce negative emotions related to the stressful situation). Another way to face negative events is avoidant coping or distancing from the problem without trying to manage it (Skinner et al. 2003). Researchers have attempted to incorporate these coping models into the development of various strategies that may lead to positive effects when used by individuals facing negative events. Carver (1997) validated a scale measuring 14 coping strategies grouped in the literature in different numbers of second-order factors (Nahlen Bose et al., 2015).

At a larger level, the relationship with the environment (social and physical) affects quality of life in urban settlements. Studies have shown that place attachment (Rollero and De Piccoli 2010, Tartaglia 2013) and sense of community (Huang, Tan, & Liu, 2016; Kutek, Turnbull, & Fairweather-Schmidt, 2011) have positive effects on well-being. Negative events that damage the social and physical environment may deteriorate the relationships between people and their place of residence, which may also negatively affect quality of life.

2 Psychosocial effects of technological disaster

Natural and technological disasters are huge events that severely affect the life conditions of individuals and communities. Researchers in psychology and sociology have a long tradition of conducting studies on the aftermaths of disasters (Green, 1996; Tierney, 2007). Depression, anxiety, and posttraumatic stress disorder (PTSD) are the most common psychological consequences reported in the literature (Green and Lindy, 1994). The Conservation of Resources model (COR; Hobfoll, 1989) postulates that people are motivated to obtain, retain, and protect that which they value, and any event resulting in actual or perceived loss of resources will produce psychological stress. Scholars have used this theoretical framework to understand the effects of both natural and technological disasters, with differences emerging between these two types of events. The mental health consequences of natural disasters generally dissipate within few years (Green and Lindy, 1994), whereas technological disasters have chronic negative effects on both the individuals and communities affected by the disaster (Arata et al. 2000; Baum and Fleming, 1993; Gill et al., 2014; Picou, Gill, Dyer, & Curry, 1992). Technological disasters usually cause long-lasting pollution of the communities affected (i.e., Three Mile Island nuclear accident, Exxon Valdez oil spill, BP oil spill), leading to vulnerability due to the community's economic, social, and cultural dependence on damaged resources (Kroll-Smith and Couch, 1993; Ritchie and Gill 2010). Higher levels of vulnerability lead to higher levels of psychological stress (Gill et al. 2014). In addition to individual negative consequences, technological disasters have been found to lead to a pattern of social deterioration referred to as the corrosive community (Arata et al. 2000; Freudenburg, 1997; Picou, Marshall, & Gill, 2004). For residential settlements, some author considers place attachment to be a component of sense of community (Tartaglia, 2006). Other scholars do not agree with this point (Long & Perkins, 2003). In any case, when examined together, sense of community and place attachment were strongly correlated, indicating at least a partial overlap of the two concepts (Pretty, Chipuer, & Bramston, 2003). Natural disasters may lead to a strong place attachment as a response to the feeling of place fragility (Burley, Jenkins, Laska, & Davis, 2007), whereas technological

disasters may have the opposite effect. The corrosive community phenomenon may imply distrust of the social and environmental dimensions of a place and, consequently, an impaired sense of community and place attachment. Moreover, the pollution caused by technological disasters may affect the environment for a long period of time, making it unsafe and therefore compromising economic activities. Based on the COR model, the loss of economic resources leads to stress, which then affects quality of life. In fact, Gill and colleagues (Gill et al. 2014) found that residents of communities not directly impacted by the oil exposure from the BP spill but that had lost income from the disaster had the same negative psychological health consequences experienced by residents who were directly oiled. Technological disasters may have several negative effects on the following quality of life dimensions: on physical health because of the exposure to toxic agents; on psychological status because of the stress caused by the loss of resources; on social relationships because of the corrosive community phenomenon; and on the environment because of damage caused by the disaster to the community and its economic resources. All these negative consequences may be relevant for years due to the long-lasting negative effects of pollution. Coping strategies may help people respond to these consequences reducing the negative effects of these consequences on quality of life and place attachment. The negative emotions produced by an environmental disaster may alter one's bonds towards a place, but coping strategies can foster the ability to manage these emotions and may help preserve a positive place attachment (Ruiz & Hernandez, 2014).

3. The context of the study

For years, the Italian city of Taranto has based its economy on the ILVA steel plant, the largest steel plant in the European Union according to the European Commission (2015). The industrial plant caused severe environmental pollution, negatively affecting the health of residents living in an area of the city. In 2012, a judicial examination proved that the ILVA plant emitted considerable

quantities of dangerous substances, and an epidemiological survey showed that exposure to the industrial emissions caused pathologies and higher mortality in the area (Biggeri et al. 2012). The judicial proceedings started recently and are still ongoing, but the controversy on the environmental impact of the steel plant began in the 1990s. Given the pollution and judicial proceedings, the steel mill may be closed in the future, causing the loss of jobs for many citizens and severe damage to the local economy. The plant accounted for about 75% of the entire city's GDP in 2008 (Tonelli et al. 2013).

Environmental pollution and economic uncertainty affect the quality of life of the residents and their relationship with the community. Pollution directly affects the residents living close to the steel plant, whereas economic uncertainty affects those working for the plant as well as those closely related to employees of the plant (i.e., a relative, the spouse). The present study investigated the influence of coping strategies on quality of life in this context, as well as the effects of being under the environmental and economic threats of these variables.

We expected the following: (a) coping strategies would influence quality of life (Ben-Zur 2009; Gattino, Rollero, & De Piccoli, 2015) and place attachment (Ruiz & Hernandez, 2014); (b) place attachment would positively influence quality of life (Tartaglia, 2013); (c) exposure to environmental pollution would negatively impact physical and psychological quality of life (Gill et al. 2012; Grattan et al. 2011) and the quality of one's tie with the place (Picou, Marshall, & Gill, 2004); and (d) the risk of loss of economic resources would negatively influence environmental quality of life (Gill et al., 2014).

4. Method

4.1 Participants

We collected the data via online self-reported questionnaire. Participation in the survey was voluntary, and anonymity of the participants was guaranteed. The research was conducted following the ethical principles of the Italian Society of Community Psychology. We promoted participation

among the residents of the city using online forums concerning different topics linked to the city of Taranto (e.g., photography, football), and grace to the contribution of several community associations (i.e., an apolitical local committee, a voluntary association for free information, the local association representing small- and medium-sized enterprises). The study involved 202 participants (49.5% female; average age 37.38 years, $SD = 17.35$ years). 33.7% were college graduates, 54.5 % high-school graduates, and 11.9 % had a lower educational level. Concerning employment position, 51.5 % of subjects were workers, 15.8 % were students, 5.6% retired, 18.9% unemployed, and 8.2% housewives. The 50% of the participants lived in the contaminated area of the city. The 27.2% worked (or were closely related to somebody working) for the steel mill. The 17.8% of the participants were at the same time living in the polluted area and economically affected by the plant crisis.

4.2 Measures

The questionnaire included different sets of indicators. The indicators used in our analyses were as follows:

1. The Italian version of the WHO Quality of Life Brief Scale (WHOQoL Group 1998; De Girolamo 2001), including 24 items belonging to four subscales measuring physical health (e.g., “To what extent do you feel that physical pain prevents you from doing what you need to do?”; Cronbach’s $\alpha = .78$), psychological status (e.g., “Are you able to accept your bodily appearance?”; $\alpha = .76$), social relationships (e.g., “How satisfied are you with your personal relationships?”; $\alpha = .64$), and environment (e.g., “To what extent do you have the opportunity for leisure activities?”; $\alpha = .76$). Items were scored on a five-point scale ranging from 1 (not at all) to 5 (an extreme amount). Higher scores corresponded to better quality of life.
2. The brief COPE Inventory (Carver, 1997) originally investigated 14 coping strategies, including 28 items rated on a 5-point Likert-type scale ranging from 1 (never) to 5 (very

often). We grouped the strategies using the 4-factor structure (Nahlen Bose et al., 2015), measuring problem-focused coping (active coping and planning; $\alpha = .73$), avoidant coping (behavioural disengagement and denial; $\alpha = .73$), socially supported coping (emotional support, instrumental support, and venting; $\alpha = .80$), and emotion-focused coping (positive reframing, acceptance, and humour; $\alpha = .78$).

3. The brief Neighborhood Attachment Scale (Fornara, Bonaiuto, & Bonnes, 2010), which includes 4 items (e.g., “For me, leaving my neighbourhood would be really hard”) rated on a 7-point Likert-type scale ranging from 1 (totally disagree) to 7 (totally agree). ($\alpha = .87$).
4. A brief list of socio-demographic items (gender, age, education, employment position, area of residence within the city, and working relations with ILVA).

4.3 Analyses

After performing preliminary analyses, we tested a structural equation model, assuming the aforementioned hypothesized relationships. Testing the model we performed bootstrap to investigate the mediated relationships.

5. Results

5.1 Preliminary analyses

We described the scales' scores calculating the mean and the standard deviation for each dimension. We calculated them separately for four groups of participants. Table 1 shows the comparison between residents in the contaminated area of the city and residents in the rest of the city. Table 2 shows the comparison between participants working (or who were closely related to an employee working) for the steel plant and other participants. We tested the differences between means using the T-test. The residents of the contaminated area had a lower subjective perception of physical health and used more avoidant and socially supported coping compared to other participants. The residents of the contaminated area also had lower place attachment. The participants working (or

who were closely related to an employee working) for the steel plant reported lower scores on three out of four subscales of WHOQoL (i.e., physical health, psychological status, and environment) compared to other participants. Table 3 shows the correlations between the scales. Concerning the relationship between coping strategies and quality of life, problem-focused coping and emotion-focused coping were positively correlated with three out of four subscales of the WHOQoL; avoidant coping was negatively correlated with three out of four subscales; and socially supported coping was not correlated with quality of life dimensions. Place attachment was correlated only with emotion-focused coping.

We explored the relationships among WHOQoL and socio-demographic features that may affect health-related quality of life, i.e., gender, age, and education. Testing gender differences by means of T-tests, we found that women had lower physical health (male mean = 3.73, female mean = 3.41; $T = 3.34, p < .01$), psychological status (male mean = 3.50, female mean = 3.20; $T = 3.13, p < .01$), and environmental quality of life (male mean = 3.72, female mean = 2.54; $T = 2.10, p < .05$). Age was not correlated with WHOQoL dimensions. Finally, we tested differences between participants who had graduated and those with lower education levels using T-tests, which yielded no significant differences.

5.2 Testing the model

Based on the abovementioned literature and preliminary analyses, we tested a structural equation model assuming the following relationships: (a) coping strategies influence quality of life and place attachment; (b) place attachment has a positive influence on the environmental dimension of quality of life; (c) residing in the contaminated area of the city negatively influences physical and psychological quality of life and place attachment; (d) residing in the contaminated area of the city increases the use of avoidant and socially supported coping; and (e) working (or being closely related to an employee working) for the steel plant negatively influences environmental quality of life. Based on the preliminary analyses, we included gender in the model to control for their effects

on quality of life. Due to the number of variables in the model, which may have led to a significant reduction of fit, we used a partial disaggregating approach (Bagozzi, 1993; Bagozzi and Edwards, 1998). We randomly aggregated the items of the WHOQoL and place attachment, reducing the number of indicators for each latent variable while still allowing for an estimation of the measurement error. As indicators of the four factors of coping, we used the original strategies of the Brief Cope. As recommended (Hu and Bentler, 1998), we tested the model fit using different fit indexes to diminish the impact of their limits. We used χ^2 , CFI (Comparative Fit Index; Bentler, 1990), TLI (Tucker-Lewis Index; Tucker and Lewis, 1973) and RMSEA (Root Mean Square Error of Approximation; Steiger, 1990). After deleting some paths that were not significant, the model fit was satisfactory: $\chi^2(230) = 358.57, p < .01; \chi^2/gdf = 1.56; CFI = .92; TLI = .90; RMSEA = .053$. Figure 1 shows the model in graphic form. We found the following significant paths: problem-focused coping increased social relationships ($\beta = .27$), avoidant coping decreased psychological status ($\beta = -.34$), and emotion-focused coping increased psychological status ($\beta = .15$) and place attachment ($\beta = .30$). Place attachment positively influenced the environmental dimension of quality of life ($\beta = .29$). Residing in the contaminated area of the city reduced physical health ($\beta = -.24$), place attachment ($\beta = -.22$), and increased the use of avoidant ($\beta = .29$) and socially supported coping ($\beta = .17$). Working (or being closely related to an employee working) for the steel plant negatively influenced environmental quality of life ($\beta = -.20$). All the WHOQoL subscales were correlated (r ranging from .55 to .87). Problem-focused, socially supported, and emotion-focused coping were correlated (r ranging from .32 to .49). Avoidant coping was correlated with problem-focused coping ($r = -.28$). The bootstrap analyses showed that place attachment mediated the relationship between residing in the contaminated area of the city and environmental quality of life ($\beta = -.06; 95\% CI = -.14 \text{ to } -.02; p < .01; S.E. = .03$), and the relationship between emotion-focused coping and environmental quality of life ($\beta = .09; 95\% CI = .01 \text{ to } .20; p < .05; S.E. = .06$). Avoidant coping mediated the relationship between residing in the contaminated area of the city and psychological status ($\beta = -.10; 95\% CI = -.18 \text{ to } -.04; p < .01; S.E. = .04$). Gender influenced three

out of four dimensions of the WHOQoL, i.e., physical health ($\beta = -.23$), psychological status ($\beta = -.15$), and environment ($\beta = -.27$). In all cases, women had lower values. Moreover, being female increased socially supported coping ($\beta = .29$).

6. Discussion

We conducted the present study in a city facing an environmental and economic threat. A steel plant caused massive pollution, which contaminated part of the city. Because of the pollution, the industrial plant may be closed in the future, potentially causing economic damage to many inhabitants. We investigated the influence of coping strategies on quality of life in this context, as well as the effects of environmental and economic threats on these variables. The quality of life of the participants was lower on all dimensions of the WHOQoL, compared to the findings of a recent previous study conducted in Italy (Gattino, Rollero, & De Piccoli, 2015). Gattino and colleagues investigated quality of life using the WHOQoL on a large sample ($N = 600$) of Italians with sociodemographic features similar to those of our sample (56% females; average age = 42.73 years, $SD = 13.02$ years). Moreover, being directly affected by the ecological pollution or the uncertainty regarding the future economic situation had negative effects on quality of life. Living in the contaminated area of the city decreased the participants' subjective perception of physical health. It is possible that the pollution caused actual damage to residents' health, which also deteriorated subjective perception. Moreover, the exposure to the pollution decreased residents' attachment to the place. This finding may suggest that residents no longer considered the contaminated environment a secure place in which to live. Since place attachment had a positive effect on the environmental dimension of quality of life, living in the contaminated area had a negative mediated effect on this dimension. Finally, living in the polluted area increased the use of avoidant and socially supported coping. This last result may indicate that, in the context of the study, the technological disaster did not lead to the social deterioration phenomenon called corrosive

community (Arata et al. 2000; Freudenburg, 1997; Picou, Marshall, & Gill, 2004). In fact, participants directly facing the pollution tried to cope with the problem using social resources more than other participants did. Furthermore, neither being under the environmental threat nor under the economic threat had negative effects on the social relationships dimension of quality of life. This unexpected result may be explained by cultural specificity of the context of the study, i.e., the importance of family and social bonds in southern Italian culture. However, without further research, this hypothesis cannot be adequately supported. Avoidant coping negatively influenced psychological status and mediated the effect of place of residence. To sum up, living in the polluted area had a direct negative impact on physical health and two negative mediated effects on psychological status and environment, the first of which was the stronger of the indirect effects. The economic threat decreased the environmental quality of life. Following the Conservation of Resources model (Hobfoll, 1989), the perceived loss of resources (i.e., the future closure of the plant) will lead to a lower of quality of life. As expected, coping strategies influenced quality of life (Ben-Zur 2009). Emotion-focused coping was the main factor increasing both the perception of psychological quality of life and place attachment. The positive management of negative emotions may preserve attachment to the place affected by the disaster (Ruiz & Hernandez, 2014). The strategies that had a positive effect on place attachment also indirectly influenced environmental quality of life.

Female participants had a lower quality of life, with the exception of the social relationships dimension. This result is consistent with the findings of the previously cited study by Gattino and colleagues (Gattino, Rollero, & De Piccoli, 2015).

The present study has some limitations. First, a non-probability sampling technique was used, so it is important to exercise caution in interpreting the results. Second, the technological disaster affecting the city of Taranto did not occur in a specific moment as did other disasters. The pollution lasted for years, but awareness of its danger to residents' health developed gradually over time. After judicial proceedings, which are still ongoing, the city has faced the risk of closure and

economic damage. For these reasons, it is difficult to compare our results with those of other studies carried out immediately after a technological disaster continuing over time (i.e., Picou, Gill, Dyer, Curry, 1992). Thus, longitudinal studies are needed. Despite these limitations, the present study contributes to the clarification of specific relationships between different coping strategies and quality of life dimensions for victims of technological disasters. In addition, our results examined the role of place attachment, which has been previously investigated in the context of natural disasters (Ruiz & Hernandez, 2014). Moreover, the study gives useful indications for interventions at both the individual and community levels. For the individual level, the results suggest that interventions should focus on reducing the use of avoidant coping and promoting emotion-focused coping, which was related to several positive outcomes. Avoidant coping had a negative impact on the psychological status of participants; thus, in similar contexts, psychological interventions should be aimed at teaching victims not to avoid thinking about the problem but rather to focus specifically on the emotions caused by the problem. For the community level, the priority is restoring the damaged place attachment for residents who cannot move away from the polluted area. Interventions aimed at promoting place attachment may have positive effects on how people perceive their environmental quality of life.

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Table 1. Scale scores for residents in the contaminated area (n=101) and residents in the rest of the city (n=101): mean scores, standard deviation and T values.

	<i>Rest of the city</i>		<i>Contaminated area</i>		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>T</i>
<i>Whoqol</i>					
Physical health	3.72	.70	3.42	.67	3.11**
Psychological status	3.42	.73	3.28	.64	1.40
Social relationships	3.41	.95	3.33	.88	.61
Environment	2.70	.63	2.57	.61	1.48
<i>Brief Cope</i>					
Problem focused	3.90	.71	3.80	.69	1.02
Avoidant	1.81	.68	2.28	.99	-3.89**
Socially supported	2.97	.83	3.25	.88	-2.36*
Emotion focused	3.26	.85	3.26	.82	.01
<i>Place Attachment</i>	4.48	1.38	4.06	1.38	2.20*

** p<.01; * p<.05

Table 2. Scale scores for participants working (or being closely related to somebody working) for the steel plant (n=55) versus other participants (n=147): mean scores, standard deviation and T values.

	<i>Other participants</i>		<i>Working for the steel plant</i>		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>T</i>
<i>Whoqol</i>					
Physical health	3.63	.68	3.40	.71	2.15*
Psychological status	3.42	.69	3.17	.65	2.30*
Social relationships	3.38	.92	3.33	.89	.37
Environment	2.70	.61	2.44	.60	2.70**
<i>Brief Cope</i>					
Problem focused	3.90	.71	3.71	.65	1.77
Avoidant	2.01	.89	2.13	.85	-.85
Socially supported	3.10	.89	3.16	.81	-.40
Emotion focused	3.26	.86	3.26	.77	-.04
<i>Place Attachment</i>	4.22	1.45	4.39	1.24	-.76

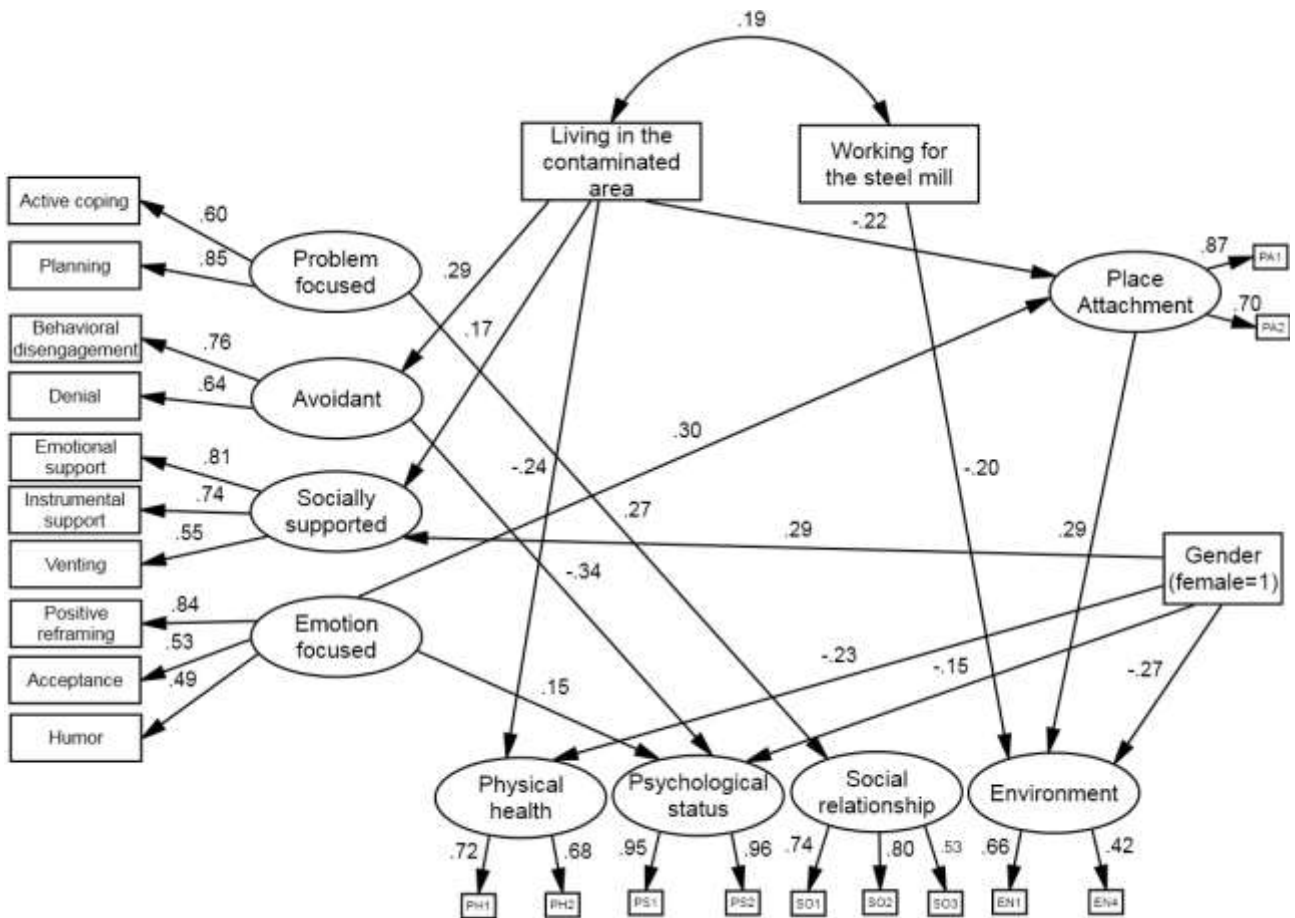
** p<.01; * p<.05

Table 3. *Correlations among scales: Pearson r.*

	1	2	3	4	5	6	7	8
<i>Whoqol</i>								
1. Physical health								
2. Psychological status	.65**							
3. Social relationships	.51**	.56**						
4. Environment	.50**	.52**	.29**					
<i>Brief Cope</i>								
5. Problem focused	.11	.21**	.23**	.14*				
6. Avoidant	-.16*	-.22**	-.14*	-.03	-.16*			
7. Socially supported	-.10	-.07	.05	-.11	.24**	.20**		
8. Emotion focused	.20**	.26**	.09	.17*	.31**	.01	.22**	
<i>Place Attachment</i>	-.01	-.05	.08	.13	.08	-.07	-.04	.15*

** p<.01; * p<.05

Figure 1. *Quality of Life prediction model: Standardized regression weights and squared multiple correlations.*



Errors and the correlations among subscales are omitted from the figure to enhance viewing.