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## Using mental well-being impact assessment to understand factors influencing well-being after a disaster

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The increased frequency and magnitude of natural disasters is producing a growing awareness of the need to incorporate mental well-being and resilience into policy and practice. The present research uses mental well-being impact assessment (MWIA) to identify and describe the main factors enhancing mental well-being of people affected by a tsunami on Robinson Crusoe Island in 2010, and explores their effects on people's resilience. The main factors were: the natural environment, meaningful activities, local food, social activities, lifelong learning, transport and security. These factors influenced mental well-being through four main environmental dimensions: ecology, culture, milieu and organization. They could influence mental well-being in a constant, multiple and cumulative way. The findings of this research provide a significant practical knowledge for the improvement of MWIA practice.

**Keywords:** mental well-being; well-being; impact assessment; natural disaster

### 1. Introduction

#### 1.1. Natural disasters and mental health

Natural disasters can overwhelm local resources, and alter the normal activities of communities, causing significant impact on mental health and well-being (Norris et al. 2002; Shear et al. 2011; Ursano et al. 2007). Ursano et al. (2007, p. 4) defines disaster:

The result of exposure to a hazard that threatens personal safety, disrupts community and family structures, and results in personal and societal loss creating demands that exceed existing resources.

The first introduction of a mass mental health response to a natural disaster was in the Asian tsunami of 2005. Since then the World Health Organization (WHO) and other important international organizations have been fostering the inclusion of programmes of mental health promotion in emergency and general health-care settings (van Ommeren & Wessells 2007).

Most of the disaster mental health studies have focused on the effects of traumatic and post-traumatic stress disorders on the quality of life in affected communities. Only recently have studies started to develop mental health responses from a more positive view (Herrman 2012; Wade et al. 2012). This new way of responding to disasters uses mental well-being theory to bring people from illness to a normal state, and to empower them to both reach and sustain a more positive level of mental health (Seligman 2011).

Considering the relevance of global warming and the increments in the frequency and magnitude of natural disasters, well-being assessments should be extended to the realm of impact caused by natural disasters. This is a current issue in impact assessment (IA). There is little

understanding of mental well-being assessment under scenarios of natural disasters. Only recently, mental well-being impact assessment (MWIA) has been performed in the UK to assess projects and developments (Cooke & Stansfield 2009; West & Scott-Samuel 2010). MWIA could also be used to explore the effects of natural disasters on mental well-being, and to identify factors that strengthen positive impacts. The present work aims to understand the environmental characteristics of the factors positively influencing the mental well-being of people affected by a natural disaster. The study area was Robinson Crusoe Island, located in the South Pacific Ocean. This island is part of Chile, and in 2010 was struck by a tsunami that caused deaths and significant destruction in the only existing town of the island.

#### 1.2. Important attributes of mental well-being

Mental well-being is a term that encompasses the range of negative and positive experiences all humans have as they live and interact, yet it primarily describes 'wellness' rather than 'illness' (West & Scott-Samuel 2010). To be healthy involves having a physically, cognitively and emotionally good functioning. Huppert and So (2013) and Seligman et al. (2009) argue that mental well-being is not biological, genetic or ecological. A person diagnosed with an incurable disease does not lose the opportunity to continue nurturing happiness during his life. Mental well-being is about having an emotionally healthy life, coping with negative stress and living a fulfilling life (Cooke et al. 2011). Mental well-being involves positively using cognitive and emotional dimensions together, to experience life and to cope with the stresses that all humans have as they live and interact.

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Although mental well-being is multifaceted and its measurement varies between studies, there is a general agreement that there are four dimensions of mental well-being: emotional, cognitive, meaning and engagement (Forgeard et al. 2011; Friedli 2009). Friedli (2009) comments that the emotional dimension (what we feel) includes resources such as coping style, mood, optimism and emotional intelligence. The cognitive dimension (what we think) includes resources such as knowledge, flexibility, innovation, creativity and learning style. The well-being dimension involves spiritual well-being, as well as purpose, vision, goals, values, sense of coherence and beliefs. The engagement dimension (how we relate to others) includes listening, relating, communicating, cooperating, empathy and tolerance. These four dimensions of mental well-being have become one of the core theoretical foundations informing the practice of the MWIA in the UK and the mental well-being assessments at the WHO (Cooke & Stansfield 2009; Friedli 2009).

Although mental well-being is defined by the emotional and cognitive functioning of individuals, extrinsic factors can influence mental well-being depending on whether or not a person feels in control of the way he lives and interacts (Cooke et al. 2011; West & Scott-Samuel 2010). However, extrinsic factors do not determine well-being: for instance, factors such as education and income could produce an influence or stress, but is up to the individual's intrinsic mental capabilities to determine how much that factor will influence his mental well-being. Although recent studies demonstrate that extrinsic factors can only influence and not determine well-being, authors have continued using traditional terms such as 'social determinants', 'wider determinants', 'mental wellbeing determinants' and 'primary contributors' to refer to the extrinsic factors influencing well-being (Cooke et al. 2011; Wilkinson & Marmot 2003). This kind of statement could be misunderstood, as if well-being can simply be improved by increasing factors such as access to education or employment.

Recent studies in well-being psychology have highlighted how mental well-being is determined by the individual's cognitive and emotional capacities to control their lives and nurture interactions (Seligman 2011). Not everyone who is exposed to certain extrinsic factors will be affected to the same degree (e.g. Friedli 2009; Seligman 2011; Seligman et al. 2005). For example, the US-based Positive Psychology Centre trains teachers to strengthen the cognitive and emotional skills of students, and to enhance their engagement capacities and sense of life meaning (Seligman et al. 2009). Keyes (2012) describes this process of cultivating engagement and sense of meaning as 'flourishing'.

### 1.3. Mental well-being impacts in disaster scenarios

Negative stress can impact during a natural disaster, immediately after, or after weeks, months or years (Wade et al. 2012). In other words, there is no unique or well-defined moment or situation where a negative, or indeed a

positive, stressor will impact the mental well-being of individuals. Positive stressors help to weaken the negatives by enhancing resilience and facilitating cognitive and emotional capabilities (Friedli 2009).

There has been a notable increase in climate change-implicated disaster events in recent decades (Christensen & Christensen 2003; Milly et al. 2002; Voss et al. 2002). Climate change and extreme weather events are not likely to decrease in the near future (IPCC 2013). Therefore, developing an effective approach to MWIA for scenarios of natural disaster becomes more important. However, in the realm of IA, the issue of mental well-being under the context of climate change and natural disasters has barely been touched (Harris-Roxas et al. 2012). The last few years, and under the umbrella of the National MWIA Collaborative, some specialists have been successfully testing a comprehensive process of MWIA in England (Cooke & Stansfield 2009; West & Scott-Samuel 2010). However, the process has not been used to assess the well-being of groups experiencing a natural disaster. Therefore, to expand on the knowledge of MWIA under disaster scenarios, the present research addresses the three following objectives:

- (1) To identify and describe the main factors enhancing mental well-being of people affected by a natural disaster.
- (2) To understand the environment through which influencing factors affect mental well-being.
- (3) To describe the environmental dynamics of influential factors.

The present work uses the MWIA framework developed by the UK National MWIA Collaborative (Cooke et al. 2011), which considers the four agreed dimensions of well-being: emotional, cognitive, meaning and engagement. The framework also considers that mental well-being can be positively or negatively influenced by the population characteristics, social relationships and wider influential factors.

### 1.4. Background to case study

On 27 February 2010, 06:34:14 UTC (local time 03:34:14 am), a magnitude 8.8 earthquake occurred off the coast of Central Chile. Thirty minutes later, several tsunamis hit the coastal towns of Central Chile. A tsunami about 3-m amplitude reached the town of San Juan Bautista in Robinson Crusoe Island. The total number of fatalities caused by the tsunami was 124, and 18 of them died on Robinson Crusoe Island (Fritz et al. 2011). The tsunami destroyed houses and other infrastructure (Fritz et al. 2011; UK Channel 4 2010). Robinson Crusoe Island has a population of 555 people, which still depends greatly on the artisanal lobster fishery. This community was equipped with a fleet of 39 boats built of wood and fibre glass, but most of them were destroyed by the tsunami.

For the two years after the tsunami, the town at Robinson Crusoe Island was under an intensive programme of reconstruction. During this period, the limited

places in transports going to the island were prioritized for the transport of residents, construction workers and other people associated with the programme of reconstruction. Therefore, it was not until 2013 that places became available for other people to visit the island, allowing the researcher of this study to travel to the island at the end of May 2013. The researcher had a personal conversation with the Mayor, who advised that the following points be considered before undertaking the research.

- The community was still sensitive to the effects of the tsunami, and therefore it was necessary to be careful not to damage peoples' well-being with the intervention of the assessments.
- There was permission only to work with those people willing to voluntarily participate in the study.

The town was still under reconstruction; therefore, the proposed assessments should not disturb in any way those activities.

## 2. Methodology

### 2.1. Research methods

The study used qualitative methods of analysis to understand the people's perceptions of well-being: interviews, fieldwork observation and artefacts. Interviews were used to understand peoples' experiences and perceptions of well-being. Fifty islanders voluntarily participated in 30–90 minutes interviews to explore their experiences of well-being before and after the tsunami. Most of the interviews were conducted in the participants' homes, and a few of them in their workplaces. Interview responses were written down on a notebook, and only recorded with the permission of the participants. Records were transcribed verbatim.

During participant observations, the attention focused on the community activities (Atkinson & Hammersley 1994). Data were collected using field notes, photographs and video recording. Personal comments about particular situations and reflections on observations were also added to the notebook as journal entries. In some instances, people invited the researcher to observe life within their homes, which was also registered.

Documents and records were the two types of artefacts collected. Local newspapers, worksheets, writings, paintings and assessment complemented the other qualitative information. Sometimes, participants voluntarily provided personal written and visual records of their family and community history. The library was destroyed by the tsunami of 2010, but thankfully the librarian managed to save a digital database of important library books, which includes historical books of the island's culture.

### 2.2. Data analysis

The interviews, the participant observations and artefacts data were analysed with grounded theory analytic methods. Throughout the study, the collected descriptive information was analysed as collected with initial coding,

which helped to systematically sort and organize the data. Themes were then created after comprehensively analysing the initial coding, and the most significant and frequent codes were used to sift through large amounts of data. As a result, the themes became more directed, selective and conceptual than in the initial coding. Using axial coding, themes were then related to sub-themes. These qualitative results were then integrated and refined, in the stage known as selective coding. The criteria for the creation of themes were the frequency, extensiveness, intensity and specificity of responses (Krueger 1998). Finally, a first draft of the qualitative results was written and revised, and then a final document with the results was presented.

## 3. Findings

### 3.1. Main factors enhancing mental well-being

The collected data suggested that the main factors enhancing mental well-being of people affected by the tsunami are as follows:

- The residents of Robinson Crusoe Island willingly nurture their knowledge of, and affection for, the natural environment of the island.

I know the traditional places for walking and picnic, such as the Centinela Hill, Puerto Inglés Bay, and the track to La Punta Area. I can recognize the vegetation, and have also travelled by boat around the island many times. I have also been in Selkirk Island. I was raised, I studied, and I became a mother, all these things just here in Robinson Crusoe Island. (Female resident, 43 years old)

All of the people interviewed had personal and historic knowledge of the island. Most of the females interviewed mentioned that they have only visited the places of the island with good foot or boat access. Conversely, males stated they are raised in the art of fishing, hunting and sawing. As a result, they tend to have a richer knowledge of joyful experiences in the natural environment of the island. However, both genders seem to have a strong affection for the island (Figure 1; Appendix 1a). The personal connection that is constantly nurtured between the individual and the island also builds on the sense of life meaning. For example, interviewees reported they have no intention of leaving the island because they felt part of it and responsible for keeping its natural condition. The natural environment is a strong and positive influential factor for residents' well-being, and did not appear to be affected by the negative effects of the tsunami.

- The meaningful activities of the individuals are greatly rooted in the cultural practices at family level.

I learned the art of fishing by observing the elder and my father. Besides, it was necessary for me to learn all about the hills in the island, so I could use them as reference point to know my position in the sea. (Male resident, 69)

Most of the jobs on the island are connected with artisanal lobster, fish and crab fishing. Some of the fishermen, and very frequently their children, have their own place to process their catch and then send it to the markets in

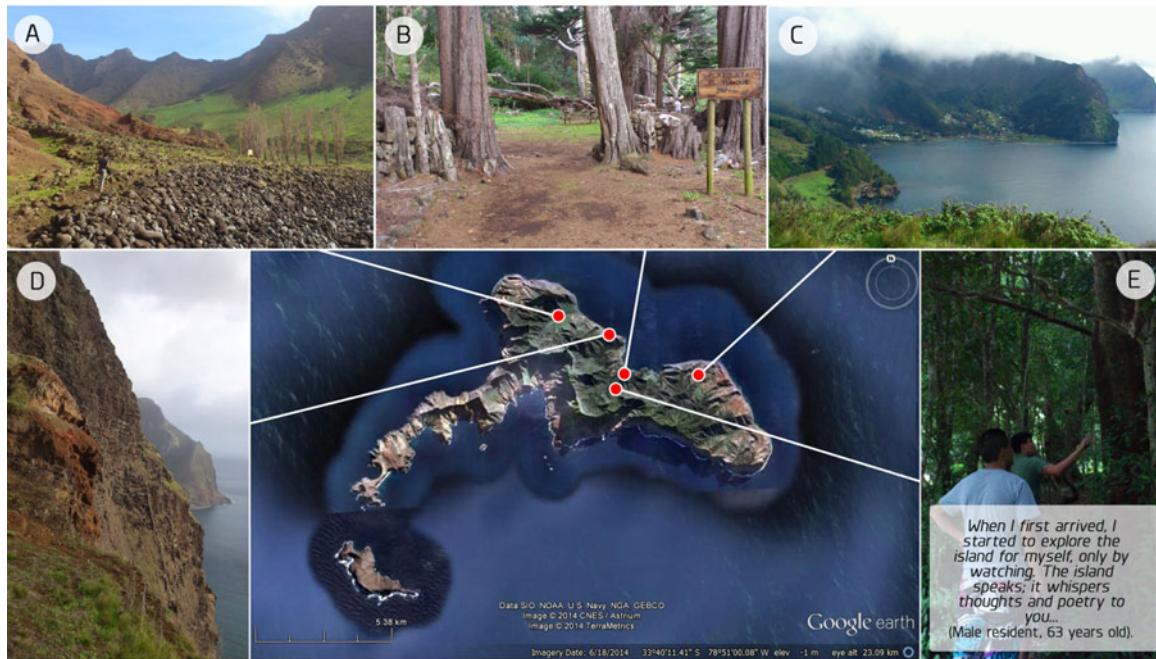


Figure 1. The research participants' commonly visited areas of Robinson Crusoe Island: (A) English Bay, (B) La plazoleta, (C) El Centinela Hill, (D) Salsipuedes Cliffs and (E) the forest. Data source: Photographs and quotation collected during fieldwork; map obtained from Google Earth.

continental Chile. As part of their trade, men also go to the island forest to cut the wood they need to prepare the crab and lobster traps. Some of these fishermen have focused their efforts more on the cutting of wood for traps, which can then be sold to other fishermen. Mothers and daughters are more focused on working in household activities, although they do work also in some of the male activities as necessary (Appendix 1b). All of the interviewees and those who commented during participant observations agreed that one of the things that had made them happier is the experience of family life on the island. The mentioned meaningful activities are practised both during working hours and recreational times, and are important factors for enhancing of self-esteem and personal identity as islanders (Figure 2). Although the tsunami of 2010 caused the destruction of an important part of the fishing fleet, those who lost their boats were quickly given new ones from organizations helping the recovery of the community after the tsunami. Therefore, it was difficult to observe how the tsunami's disruption of such an important meaningful activity affects the mental well-being of families.

When I got married, I started to go with my husband to Puerto Ingles Bay, La Plazoleta Forest, and El Pungal Forest. On Alejandro Selkirk Island I went with him to do goat hunting and also fishing when there was no partner. We carried the goats on our shoulders from the hills. To get water, we had to walk all the way from the beach to inland streams. (Female resident, 64)

Since the first community settled in the eighteenth century, the knowledge and traditions of the fishing community in Juan Fernandez have been passed generationally. It was observed that such knowledge and tradition provide a strong sense of fulfilment in older people, and also promote positive emotions and thoughts in younger

people. Although not all the youth in Robinson Crusoe are pursuing careers as fishermen, many of them still continue to practise the traditional activities as part of family activities, social recreation and leisure. Some of the activities the participants mentioned were rabbit and goat hunting, collecting wild berries, fishing and horseback riding. All of these are meaningful activities that continue to be important sources of social interaction and engagement before and after the tsunami.

- Leisure on Robinson Crusoe Island is directly linked to the occupational activities and relations of islanders.

I used to walk upon the hills taking pictures. When we were planning to go to French Bay, we used to say our children that we would go to France, and so we spent two months camping in French Bay. (Female residents, 73 years old)

Creative pursuits are directly related to the culture and identity of the islanders. Fishing, hunting, horseback riding, hiking, swimming, camping and picnics are the main leisure activities enhancing the well-being of the islanders. Although some of the activities are also occupations, most of the people seem to think and feel of it as leisure. These activities enable islanders to nurture talents and strengths, which enhance their motivations, serenity, contentment and sense of gratitude. Furthermore, through these leisure activities people build engagement with their work colleagues, friends or family members (Figure 2). These experiences therefore help to empower and sustain the cultural identity of the community.

Most of the activities carried out on the island have developed deep cultural or personal value for the people. Meaningful and pleasurable activities are seemingly

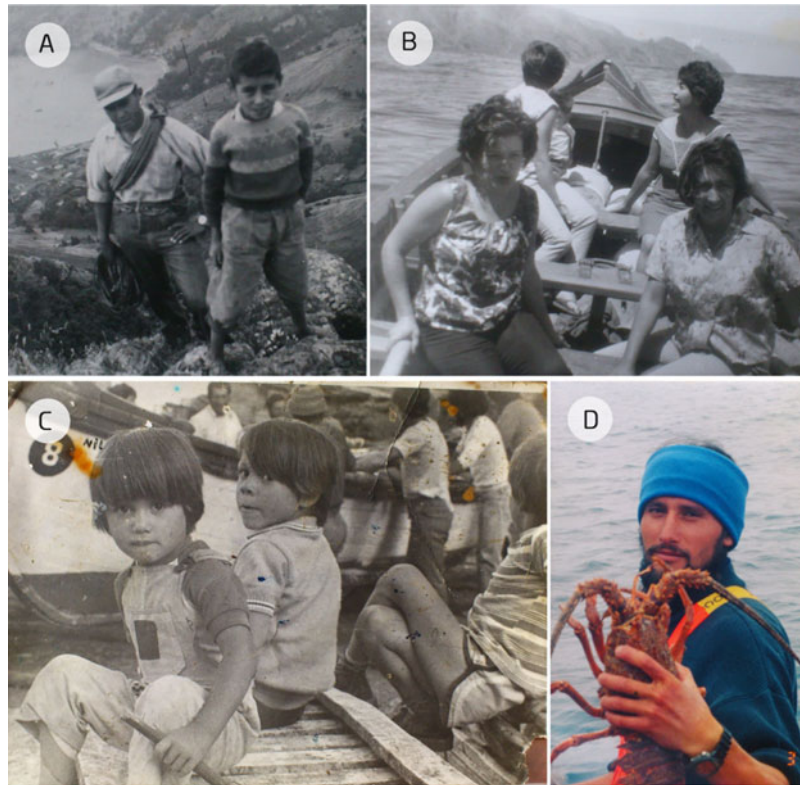


Figure 2. Leisure activities in Robinson Crusoe Island. (A) Father and son hunting in the hills close to Salsipuedes Cliffs; (B) a family navigating towards English Bay for a day of picnic; and (C) people working and socializing at the wharf. The boy sitting at the left side of picture C is currently a fisherman (D). Data source: Photographs provided during interviews.

merged into one common way of experiencing life for the inhabitants of Robinson Crusoe. After the tsunami, most of the traditional leisure activities in the island did not appear to have stopped being practised. Moreover, the culturally rooted leisure activities on the island positively influenced well-being after the tsunami, by being a source of distraction from the difficulties caused by the disaster. The disaster destroyed more than half of the town of San Juan Bautista, including buildings such as the library, the school and the football club. The destruction of those buildings also reduced to a minimum the programmes of art and football activities, affecting the villagers' opportunities for social contact. However, the data showed that people's well-being was not significantly affected by this loss, because their main and constant leisure appeared to be found in their ongoing ancestral traditional activities.

- The security of having access to fresh and healthy food is pleasant for the island residents.

It was generally agreed by the research participants that one of the great pleasures of living on the island is the fresh and healthy food they have access to. The Pacific Ocean surrounding the Juan Fernandez Archipelago is characterized by its high water quality, which is perfect for the survival of species such as lobster and oceanic golden crab. Fresh lobster and golden crabs are regularly eaten by the islanders. Furthermore, people can easily catch fish, even by fishing off the town wharf. Alternatively, they can buy fresh fish at an affordable price. Wild goat, sheep,

rabbit, doves and berries are also readily available (Figure 3A). The residents complement these foods with other foods brought from continental Chile.

The good quality and taste of these foods create constant satisfaction in the everyday life of the islanders. People explained that knowing that the food was either personally obtained, or by another island resident, coupled with the pleasure of eating in a place surrounded by beautiful landscapes, makes the eating experience very pleasant (Figure 3D). While undertaking participant observation on a fishing boat, one of the fishermen expressed the great pleasure and blessing of being able to have fresh caviar from golden crabs for breakfast everyday, in a beautiful sea, with his partner, and with a wonderful view to the island (Figure 3B). He said: 'this is life'. Other reported experiences were fishing or hunting to make traditional dishes, or walking to the hills and valleys to pick local berries to prepare special jams, marmalades and sweets.

For most of the participants, being able to enjoy good-quality food everyday is also part of their inheritance, a continuation of their traditions, which produces constant contentment in their lives. The tsunami and post-tsunami events did not appear to have modified the way that good-quality food positively influences residents' well-being. As was frequently mentioned in the interviews, with or without the tsunami, they feel proud and fulfilled knowing that the same good-quality food they enjoy today was enjoyed by their ancestors.



Figure 3. Illustration of the traditional practice of hunting (A). Seafood is also consumed (B), and it is common tradition to organize and prepare food (C) for family members or friends (D). Data source: Photos obtained from fieldwork.

- Lifelong learning in the island community is a strong factor influencing well-being.

I learn from my girlfriend, friends, and family. The principal element is oral learning of traditions, which also includes the colloquial language, the stories, the memories and so on. (Male resident, 22 years old)

Research participants commented that lifelong learning on the island, mostly from their family, was one of the principal ways of learning and an essential part of their lives. Advice on life, daily living knowledge relating to fishing, hunting, sawing, harvesting, cooking and more, and the history and fairy tales of the island were all seen as key aspects of social island life. In addition, people in the island typically build strong relationships with friends through learning and teaching each other how to live in the island environment. This appeared to be is one of the main foundations and drivers of the islander's intimate relationships. This lifelong learning of the traditional knowledge also enhances social engagement in the community, and builds optimism and hope by believing that this cultural way of learning will continue in future generations just as it has done in the past. The interviews and observations show that the tsunami did not appear to have stopped people from continuing the described traditional ways of learning.

My parents and grandfather taught me the art of fishing. During my childhood we used to go hunting to the cliffs. I started to work at the age of fourteen, and did not like it because I could not stop vomiting. Then I got used to the boat movement and started to do everything by myself. In the school they taught me something, but the main learning source is my family. (Male resident, 33 years old)

Exploration of the effects of primary and high school learning on well-being could not be carried out. The new school created after the tsunami is a provisional school, made out of container classrooms and offices. During the

period of research, the school administration and staff were very busy bringing the educational programme up to date, after being put on hold for two months following the tsunami. Therefore, it was not possible to obtain insights on the influence of learning on well-being under the context of the tsunami event by interviewing students at the school or by facilitating research focus groups. However, we could infer that stopping school for two months post-tsunami also meant stopping school activities that improve cognitive and emotional skills and enhance social engagement for that period. The extent and significance to which those months without formal learning affected the well-being of youth could not be further studied.

Adults also provided important information about the formal learning during their youth. Participants did not mention indoor learning activities in school (e.g. classroom-based) as the more relevant learning enhancing well-being. Instead, they recognized that although not frequent, outdoor school activities provided them significant instances to savour the beauty and history of island places with their classmates. In a similar way, male teenagers agree that sharing with their classmates during football classes gives pleasure, and provides opportunities to engage and empower relationships.

- Robinson Crusoe is a walkable island that enhances social interactions.

The small size of the town of Robinson Crusoe (1.95 km<sup>2</sup>) and the good street connectivity allow residents to get from place to place easily on foot. There are few vehicles on the island, allowing people to walk peacefully in the streets and socialize with others. For instance, it was common to observe young people of primary and high school age walking to school, playing or simply enjoying nature (Appendix 1c). Immediately after the tsunami,

military forces, the residents and volunteers worked to clear affected streets, allowing access for people and vehicles. Many streets and paths were also unaffected by the tsunami. As a result, in the aftermath people were able to continue moving from one place to another as was necessary. According to the information provided by the municipality town planners, the reconstruction of the town was an opportunity to continue improving transport, with a focus on enhancing community connectivity, play and social interactions from walking.

- The security on the island permanently boosts mental well-being.

I would never leave the island, because the tranquillity is incomparable. On the contrary, the city and its transport make me sick. When I travel to the continent, after arriving I could perceive another aroma, which is not the same as the one here [in the island]. Here we are free, but I do not know how to express this freedom. In the city I get headaches, and I get sick. I start screaming at others frequently, fall in a bad mood, and want to sleep the whole day. The aroma here is happiness, I want to stay and never leave. (Female resident, 32 years old)

The majority of the people interviewed, and those who shared insights during participant observations, highlighted that Robinson Crusoe was a peaceful and secure place that they would not like to leave. People on the island are very happy in the knowledge that no incivilities are likely to occur in their neighbourhoods. Houses frequently lack fencing, and when they do have boundary structures, it is usually only to avoid animals (e.g. horses and dogs) from making a mess in their yards. Although the quantity of friendships of course varies in each individual's life, almost all participants agreed that they can visually recognize a large percentage of the island residents. For instance, they may know which family a person belongs to, or what area they live in. Therefore, the whole island is like a neighbourhood: a neighbourhood where it is very uncommon to see housing problems, graffiti, street litter, abandoned buildings, traffic, noise, crimes or lack of green spaces. As a result, people can enjoy natural sounds of the island's nature from their homes, streets and public/private buildings (Appendix 1d).

For most of the research participants, their physical conception of 'home' was perceived as a space that goes beyond their house property and neighbourhood limits. As they grow up, islanders have the opportunity to live their daily life freely on the island. Their houses provide them shelter, but their culture makes them see the island and all it contains as a big home where the family, friends and the community flourish. For example, when the participants talked about their home life they would say that the island was the yard, and they did not perceive a physical limit between the house and the island, they were one and the same.

The only research intervention allowed at the island school focused on asking students of first and second year of primary to draw a picture showing their house. The results show that children, aged 7 to 9, already see the island environment as their house, just as the other participants mentioned.

The homes at San Juan Bautista town are very simple and most of them are very old. This is partly due to the fact that fishermen leave their house at Robinson Crusoe for about seven months during the lobster season, and go to live in a temporary settlement at Alejandro Selkirk Island. During that period, their houses at Robinson Crusoe might look like old abandoned houses, but neighbours know they are on the other island. Furthermore, house owners do not seem to have a problem with leaving their buildings, because their perception of home is 'the island and its waters'. This way of living nurtures community trust, happiness and social cohesion. According to participants, this factor of having a different perception of home, the provision of new homes, as well as the physical tranquillity and security in the town helped those who lost their homes in the tsunami cope mentally with the negative effects of the natural disaster.

- Ignoring the characteristics of the island during the reconstruction design process damaged the present and future mental well-being of the community.

The new governmental town hall is terribly big, three floors of concrete, totally out of the local scale and aesthetic ... clearly the new hospital is also a tremendous building, out of scale and inappropriate design for the surroundings, and its improvements in term of service are not very different from the ones our small and humble hospital has ... the opinion of the residents was never considered ... there are basic needs that had to be both provisionally and quickly solved after the tsunami, but the definitive solutions should be done with the required time and responsibility they deserve. (Female resident, 26)

After the tsunami destroyed the central area of the town and some of the main public buildings, a new planning regulation was created. Based on the measures of inundation level taken after the tsunami, the regulation established a tsunami risk zone on the island, and defined the spaces of protection, recreation, tourism and housing development. The implementation of the planning regulation was immediately followed by the creation of a new master plan which defined and designed the town's spatial zones. The master plan was created by professionals from continental Chile who had little knowledge of the urban and cultural dynamics in the island. Furthermore, there was no public consultation or other attempt to understand people's thoughts and feelings about the development and design. Research participants expressed their disappointment and detachment towards the new developments. For them, the new developments do not reflect the island's function or cultural identity (Figure 4).

The original urban features which were destroyed by the tsunami formed part of the community's identity and the traditions. For example, participants describe that before the tsunami, when football games were played, people usually gathered in the area of the football pitch to eat, drink, socialize and also watch the game. Meanwhile, kids played or recreated the game around the pitch; and during break times or after the match people could freely walk across the pitch. However, after the tsunami, the football area was replaced by a brand new football pitch of





Figure 4. Images of the old and new (A) football club, (B) hospital and (C) municipality. Data source: Photographs collected during fieldwork.

synthetic grass and was completely fenced in. People could only get onto the field through a small gate, and they have to wear proper (and ideally clean) shoes. Several other new recreational developments on the island have followed the design styles of continental Chile, such as the installation of imported playgrounds. These new redevelopment designs were not felt to be appropriate for the island landscape aesthetic, and they also discontinue channels that historically have enhanced the satisfaction and meaning of life on Robinson Crusoe Island. Such disconnected developments ultimately hinder the traditional attainment of cultural identity through the built environment.

### 3.2. Environment and the existing factors influencing mental well-being

The optimal goal of MWIA is to improve mental well-being through IA (Cooke et al. 2011). The present work is

the first attempt to understand how wider factors influence mental well-being. From the emerged themes in this study we concluded that there were five important dimensions of the environment, through which extrinsic factors influence well-being experience and learning: the natural ecology of the archipelago; the built ecology of the town; the values that the islanders have kept and practised through generations; the organizational functioning of the institutions in the town such as family, school and municipality; and the community social climate. In their work on organizational behaviour in education, Owens and Valesky (2007) describe the learning environment within an educational institution. They created a model that considers similar dimensions to the ones identified in this study: ecology, organization, culture and milieu. The teaching of well-being in schools is very rare (Seligman et al. 2009), so most of the well-being development is acquired through lifelong learning (Seligman et al. 2009; Strickland & Riesman 2005).

Therefore, since the environmental dimensions identified through this study are similar to the model described by Owens and Valesky (2007), the model could also be extended to the wider environment surrounding communities based on four dimensions. The *ecology* dimension would refer to the natural ecology (e.g. the archipelago islands, the sea and the wildlife) and the built ecology (e.g. community houses, facilities and other material elements). *Culture* refers to the values, assumptions and group-level patterns of thought and behaviour, for example the values islanders keep generation upon generation. The *milieu* dimension involves people's sense of motivation, social patterns within the community and other psychosocial dynamics. Finally, *organization* entails all the aspects of how the town or city operates, such as the organization of the teaching and learning activities and planning (Gislason 2009). With this model, the dynamics of extrinsic influential factors found in the present research could be better described (Figure 5A). For MWIA practitioners, this environmental model could help to define the ways influential factors affect mental well-being (through any of the four environment dimensions) as a result of the impacts of project, development or natural disaster on mental well-being. This would be particularly helpful

during screening when policy-makers, practitioners, stakeholders, project developers and other people decide whether a MWIA should be carried out.

### 3.3. Environmental dynamics of influential factors

Seven influential factors were identified in the results as positively influencing the islanders' mental well-being. These factors were: the access to a well-preserved natural environment; lifelong meaningful activities with loved ones; easy access to local fresh and healthy food; occupational and intimate social activities strongly perceived as leisure activities; traditional lifelong learning; playful and sociable transport; and security. These positive factors manifest through the four environment dimensions to influence mental well-being (Figure 5). In other words, there is not a unique path in which a factor will influence mental well-being. We believe that there is not an absolute rule for influential factors to be manifest in our surrounding space. There could be many ways in which a factor will influence, and not necessarily the social relations, the core economy and the population characteristics, as defined by the current MWIA model (Cooke et al. 2011; Cooke & Stansfield 2009; Friedli 2009). For example, the factors could directly and simply influence

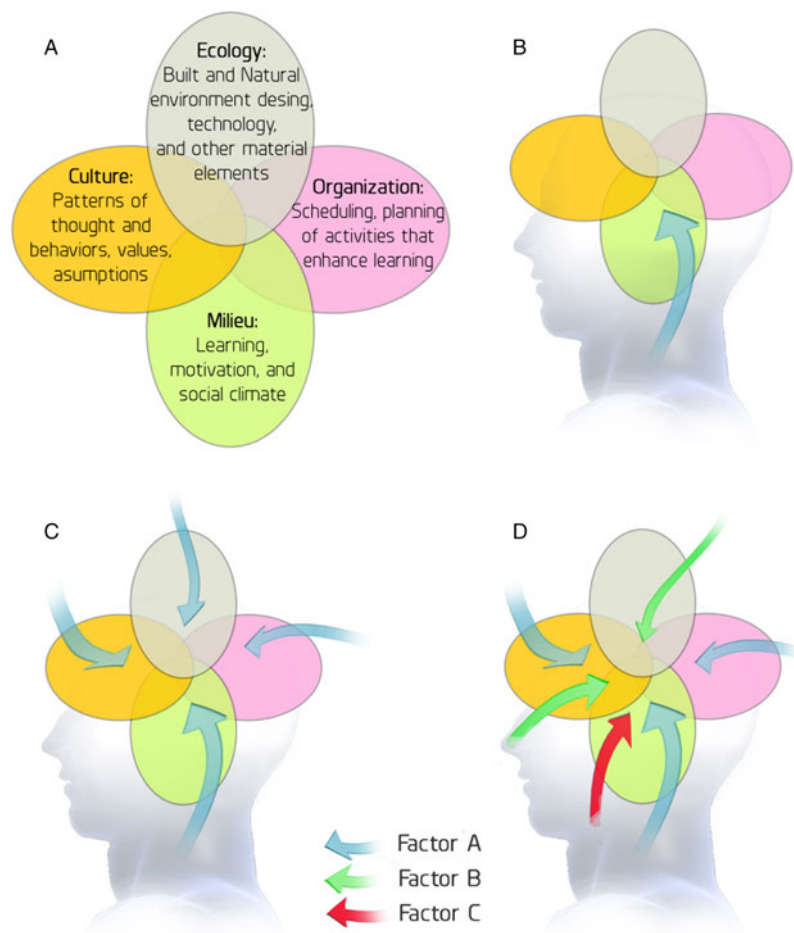


Figure 5. Environmental well-being development model (A). Extrinsic factors can influence mental well-being in (B) single, (C) multidimensional and (D) cumulative ways.

mental well-being through the ecology dimension, with social relations or the core economy having little or none of contribution (Figure 5B). For example, if person A has just arrived at Robinson Crusoe Island, the walking factor could manifest through the ecology dimension because he is enjoying the natural ecology. Then person A stays for a couple of days and the walking factor also manifests through the milieu by others inviting him to walk in the town. Furthermore, person A learns new values and assumptions linked to walking in the island, which is the cultural dimension influencing him to increase the frequency of walking in the island. Finally, while person A is on the island, the municipality could launch its new plan for better transport connectivity in San Juan Bautista town, and some roads could now be intended exclusively for pedestrian use. Besides, the municipality may have also organized a teaching campaign for people to learn all about this initiative. This is the walking factor acting through the organization dimension, influencing person A to engage in walking. The benefit of influential factors acting through different environmental dimensions is that the frequency of opportunities to nurture well-being will increase.

The cumulative effects of different extrinsic factors have not been given much attention in MWIA. For example, Cooke and Stansfield (2009) showed the result of 300 MWIAs undertaken in the UK, but cumulative was not even mentioned. However, the present research results suggest that several factors could influence well-being through one or more environmental dimensions at the same time (Figure 5C). For example, a boy from the Robinson Crusoe Island goes walking to French Bay (ecology), motivated by his friends, siblings (milieu) and own values (culture), while parents and other adults organize the trip to make sure everything goes well (organization). However, if the boy's friends and siblings no longer continue motivating him to walk, the boy can continue walking as part of the activities and the walkable spaces in the Bay. Therefore, we conclude that the multidimensional manifestation of an extrinsic factor can magnify the influences on people's well-being.

Furthermore, different extrinsic factors can influence the same experience, producing a cumulative influence on people's mental well-being (Figure 5D). For example, returning to the previous illustration, while enjoying the walk, the boy observes some wild fresh berries along the path and starts eating them (fresh and good-quality food factor). Then, while walking and enjoying picking berries on the way, he also admires the beautiful view towards the Pacific Ocean (access to appreciation of nature factor). Finally, during the walk, one of his friends notices a herd of goats that begins to run away. This triggers the friend to start informing the boy about goat hunting techniques (learning factor). These multidimensional and cumulative dynamics allowed extrinsic factors to continue influencing well-being after the tsunami, throughout paths that were not perturbed the disaster impacts.

These everyday dynamics influencing mental well-being in the environment help people to be naturally

resilient when facing adversities such as a tsunami. As the results show, the community at Robinson Crusoe Island has a high index of mental well-being (Figure 2). This appears to have helped them to recover from the disaster impacts. Wade et al. (2012) argue that most people who experience a natural disaster will not require mental health assistance, because they cope naturally with the negative stress on their own and with the support of others in the community. Therefore, to enhance the resilience capacities of an affected community, professional assistance could put part of its efforts into supporting the existing natural paths through which mental well-being is sustained. As Seligman et al. (2005) point out, the new interventions from well-being theory are not intended to exclude conventional individual talking or drug therapies. Instead, all effective actions that mitigate mental stress should be carefully implemented to help people recover. As Wade et al. (2012) advise, professional interventions to help people cope with the negative stress of disaster should be done carefully, without perturbing the natural resilience capacities of people.

#### 4. Summary and challenges for the future

The IA of mental well-being is very new within the area of IA (Harris-Roxas et al. 2012). Several pilot studies have shown the benefits of assessing well-being for projects and developments (Cooke & Stansfield 2009; West & Scott-Samuel 2010). The present study contributes to the knowledge on MWIA by proposing an environmental model of mental well-being that could help MWIA screening to more effectively identify the impacts of projects and disasters. The research also uncovers that extrinsic factors influencing mental well-being of people exposed to a natural disaster acts in multidimensional and cumulative ways. Considering these findings will assist practitioners in the creation of the community profiles and geographical boundaries during the scoping and assessment stages of MWIA; and it can also help in the following stages of impact identification and the identification of more accurate indicators.

However, the results of this study have some limitations. The environmental model proposed here needs to be tested in other case studies to evaluate its reliability and make necessary improvements. The research has shown that people's lives are normally exposed to a diversity of positive influential factors of well-being (Cooke et al. 2011), and cumulative effects can produce major impacts on people's mental well-being. The latter deserves better consideration in future MWIAs. Since these findings are primarily descriptive, further studies could measure and describe in depth the well-being enhancements under simple, multidimensional and cumulative influences of extrinsic factors, and in other scenarios of natural disasters (e.g. flooding, earthquake, hurricanes), projects or developments. These actions will definitively improve the way impacts are assessed in MWIA, and the way recommendations are made to improve resilience capacities on mental well-being of people.

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## Appendix 1: Video recordings

- The research participants' commonly visited areas of Robinson Crusoe Island:  
<http://www.youtube.com/playlist?list=PLLQt32xGacEYK48pQauxEEyCoM00wUE6e>
- Meaningful activities in Robinson Crusoe Island:  
<http://www.youtube.com/playlist?list=PLLQt32xGacEZ639V38nqjw-rxXlrJgpO1>
- A walkable island:  
<http://www.youtube.com/playlist?list=PLLQt32xGacEYWcPufqbkhs81vsna4HUSia>
- Robinson Crusoe Island – views of the town:  
<http://www.youtube.com/playlist?list=PLLQt32xGacEZ9UH2fxnS61an17pWYKwzA>