

## **Title**

### **Virtual Reality and Empathy on Mental Illness**

**Key-Words:** Empathy; Virtual Reality; Mental Illness.

#### **1. Abstract**

People with severe mental illness have been, through times, target of the most variable forms of stigmatization, discrimination and exclusion and the strategies developed to change these attitudes and behaviors have been, in each moment, insufficient and inefficient. In the last decades, neuroscience, evolutionary biology, ethology and psychology, have shown great interest in the study of empathy, seeing it as the biologic ground of altruism, reciprocity, cooperation and one of the most relevant attributes on social interactions, because it allows being in line with another's person emotional states and needs. Simultaneously virtual reality, for its immersiveness e presence characteristics, has been pointed out as a promising strategy for its stimulation. This projects goal is to analyze empathy towards mental illness and its stimulation using virtual reality. On this framework we will contribute to the analyses and comprehension of this important construct and of different methods for its characterization and stimulation. The results obtained from the different studies that will be performed will allow to identify the relevance of different instruments of analysis of empathy, understand the potentialities of virtual reality on its stimulation and the impact of a virtual reality immersive environment on the stimulation of empathy towards severe mental illness.

#### **2. State of the Art**

Epidemiological and morbidity studies have been demonstrating the enormous prevalence of neuropsychiatric diseases in developed countries and in developing countries as well as its significant impact on functionality, social participation and quality of life of people who experience them, with high social and economic costs (DGS, 2016, 2017; WHO, 2018).

Besides the dimension of this phenomenon, historically mental health problems were always underrated and neglected, and the unfamiliarity, stigma, prejudice and fear associated to mental illness explain, largely, the divestment on mental health and the fact that people who suffer from this type of disease are victims of a large variety of forms of misunderstandings, discrimination and social exclusion (Almeida, 2018).

The investigation conducted in this field for the past few years has been shown that the strategies of protest and mediation, rise on literacy or acknowledgement of the population in general towards mental illness and people who experience it, not only have been insufficient has they have been ineffective in the change of these attitudes and behaviors (Corrigan, Morris & Michaels, 2012; Corrigan, Michaels & Morris 2015).

The making of a personal and reliable relationship with the social fragilized person or in an exclusion situation is one of the fundamental dimensions of its inclusion and social participation process. It has been recognized the importance of treating individuals in social exclusion situations as equals and with true respect, mobilizing with potential resource for the development of relationships with these characteristics, the growth of empathic attitudes (Pinto, 2011).

Empathy has emerged as a structural element in the individual's capacity of relating and put in place of the other, presupposing the comprehension of its point of view, of its expressions and of the way they act to diverse situations, the individual's experimentation of its own emotions, nuclear components for cognitive-emotional comprehension and harmonious acceptance (Veiga & Santos, 2011). The cognitive component relates to the capacity of understanding the feelings and perspective of the other and of expressing that perception (Pavarino et al., 2005), while the affective component bases on the share and comprehension of emotional and other states (Goleman, 2003). Recent investigations have been framing empathy has a human universal response, physiologically proven (Singer, 2014), essential to the development of altruist behaviors, perspective view, emotions recognition and capacity of communicating with that emotional state, absence of judgment, comprehension and acceptance of the other (Hoffman, 2000).

Virtual reality, as an interface of simulation of a real environment, that allows a strong sensation of immersion, interaction, presence and involvement of the user in a determined virtual context representative of a certain reality (Dores et al., 2012), has been pointed out as one of the most advanced and promising resources on the development of empathy related to a variety of social and health conditions, given that it allows the immersion and presence in a close to reality experiential situation, facilitator of the comprehension of what the other thinks, feels and express's in that given situation and allowing the experimentation of that emotions (Schutte & Stilinović, 2017). In the last few years virtual reality has been used in the comprehension e promotion of empathy relative to various social phenomena, such as homeless people, emigrants, racial questions, young people in liberty deprivation, etc. (Christofi & Grigoriou, 2017), having awakened great interest in psychology and other areas related to social and human sciences. Besides the strong increment in its use for this purpose, the investigation developed to show its relevance and evidence it is still extremely residual (Guerry, 2017), becoming essential the development of more studies that contribute to the construction of scientific evidence in this area.

This project has as purpose analyzing the empathy relatively to mental illness and its stimulation with resource to virtual reality, assuming the specific objectives:

- Characterize the role of empathy in a way to prospect mental illness;
- Compare measures of self-report with instruments of neurophysiologic analyzes on the characterization of empathy;
- Compare distinct method of empathy stimulation;
- Evaluate the impact of a virtual reality program in the promotion of empathy towards mental illness;

- Understand the potentialities of virtual reality on the stimulation of empathy;
- Contribute to the comprehension of the construct of empathy, in its different dimensions;

### **3. Method**

#### **3.1. Participants**

The sample will be recruited from students registered on Porto's higher education institutions. It's a priority to spread the study to young adults (through the respective higher education institutions). We will focus on adults of both genders with 18 years old or older.

#### **3.2. Instruments**

Sampaio and collaborators (2011) refer the existence of various techniques and methods to evaluate empathy, from the cognitive component to the affective one, which have the following examples: physiological signal analyses, facial expression and gestures observations, interviews and auto evaluative scales, etc.

In this investigation project we intend to use self-report measures and neurophysiologic analysis measures, intended to capture the empathic abilities of the participants according to the stated objectives. As a complement, it will be used other qualitative instruments and techniques, interviews and observations, to analyze the relevance of virtual reality as an instrument to promote empathy and identify the participants perspective towards mental illness. The participants will fill the following evaluation instruments:

#### **Interpersonal Reactivity Index - IRI**

Interpersonal reactivity index – IRI (Davis, 1980; Portuguese version: Limpo, Alves e Castro, 2010) allows to evaluate empathy's cognitive and affective dimensions. The instrument's Portuguese version has 24 items, divided in 4 sub-scales and each sub-scale has 6 items. Each item is analyzed with a 5-point Likert scale, in which 0 means "Doesn't describe me well" and 4 means "Describes me very well" (Limpo et al., 2010). The four sub-scales that compose IRI relate to Perspective View (individual's tendency to adopt other's point of view), Empathic Concern (capacity to experience compassion feelings and concern about others), Personal Discomfort (anxiety, apprehension and discomfort feelings evaluation on interpersonal tense contexts) and Fantasy (individual's tendency to put himself in fictional situations evaluation). Empathy's cognitive dimension is evaluated through Perspective View sub-scale and the affective dimension through the other sub-scales (Limpo et al., 2010). IRI's Portuguese version shows good internal consistency indexes, with 0,73 Cronbach alfa coefficient for the Perspective View (PV), 0,76 for

the Empathic Concern (EC), 0,80 for Personal Discomfort (PD) and 0,84 for Fantasy (F) (Limpo et al., 2010).

### **Basic Empathy Scale –BES**

Basic Empathy Scale (Jolliffe & Farrington, 2006; Portuguese version: Nobre Lima, Rijo, e Matias, 2011) has a general goal of evaluating teenager's empathy level. It's composed from 20 items which are sub-divided in two factors – cognitive empathy (9 items) and affective empathy (11 items). The answer to each item is given through a Likert five-point scale, which varies between total disagreement and total agreement, according to the subject's agreement rate in relation to the presented situation. Since it's subdivided, the scale allows not only to calculate the total level of empathy but also the cognitive and affective empathy levels, assuming that, the bigger the value, the higher the empathy rate (Matias, 2012). BES's Portuguese version presents good internal consistency levels with alfa coefficients of 0.80 to the total value, 0,71 to the affective empathy factor and 0,80 to the cognitive empathy factor (Matias, 2012).

### **Attribution Questionnaire- AQ 27**

Attribution Questionnaire AQ 27 (Corrigan et al., 2003; Portuguese version: Sousa et al., 2008) intends to measure the stigma towards mental illness through 9 factors/stereotypes: Blame, (people with mental illness may control their symptoms and are responsible for having the illness), Pity (people with mental illness are overcome by their disease and, therefore, deserve preoccupation and pity), Anger (people with mental illness are accused of having the disease and cause anger and irritation), Dangerousness (people with mental illness are not safe), Fear (people with mental illness are dangerous), Help (people with mental illness need help), Coercion (people with mental illness have to participate in the treatment management), Segregation (people with mental illness are sent to localized institutions far away from the community) and Avoidance (people with mental illness don't live in society). AQ-27 is composed by a vignette with the description of a Schizophrenia patient case, followed by 27 affirmations to which exists a 9 position Likert scale, in which 1 corresponds meagerly to the response "no or nothing" and 9 to "much or completely". The results are calculated through the mean of the scores obtained for the items that compose each factor. The punctuation is inverted in the items of the avoidance factor (Barbosa, 2010; Sousa, 2012). Corrigan and collaborators associated some of this factors with discriminative attitudes (blame, pity, anger, dangerousness, fear, help, coercion, segregation and avoidance) or with proximity attitudes and assistance (help and pity) (Corrigan, et al., 2003). The Portuguese version of AQ27 presents good internal consistency indexes, with a Cronbach's Alpha coefficient of 0,80.

The neurophysiologic perspective brings an important contribute on the comprehension of empathy's individual variability, identifying two distinct physiologic bases. The first one binds itself with a fast and reflexive subcortical process, that corresponds to the emotional empathy, and the second one to a slower cortical process, that corresponds to cognitive empathy (Preston & Waal, 2002). Even though the neurophysiologic evaluation protocol might suffer adaptations we will resort to the characterization of psychophysiological peripheric correlates, as measured trough the electrodermal activity and cardiac activity, underlying the empathic response. For this effect we equated the use of a new generation of thermic cameras and integrated analyses software's of psychophysiological parameters, for its noninvasive characteristics, portability and real time collection (Cardone & Merla, 2017; Topalidou & Ali, 2017). We put as a possibility to use the EEG has an electric brain activity registration for cortical activation analyses, centered in gamma waves oscillations (Hill & Tarrant, 2018; Tarrant & Cope, 2018), above 30Hz frequencies, with very low rhythmic amplitudes (1-2 $\mu$ V), intimately related with sensorial cognitive functions and dependents of the physical stimulus parameters (Hermann & Demiralp, 2005).

Finally, we will perform structured interviews and we will build an observation grid of the participants behavior during the realization of the multiple studies, filled rom the analyses of the session video tapes, to retrieve data that contributes to the comprehension of the virtuosities of virtual reality to the promotion of empathy relatively to mental illness. The interviews script and the observation grid will set on the main characteristics of virtual reality- immersion and presence- and of the different emotional and cognitive components of empathy (Archer & Finger, 2018; Carey et al., 2017).

### **3.3. Ethical Issues**

The Project will be submitted to the Escola Superior de Saúde Ethic Commission and all the participants will sign the informed consent term, before integrating the studies.

## **4. Project Outcomes Schedule**

- Virtual reality program of empathy simulation towards mental illness;
- Submission of an article about "Empathy and attitudes towards mental illness;"
- Article submission about "Self-reports and neurophysiological analyses on empathy characterization";
- Preparation of an article about "Potentialities of virtual reality on the promotion of empathy towards mental illness".

## 5. Chronogram

The project contemplates studies with non-experimental and experimental design, whose program presents on the following table.

Chronogram:	Sept 2018	Oct	Nov	Dec	Jan 2019	Feb	Mar	Apr	May	Jun	Jul	Aug 2019
Selection of the participants												
Studies organization												
Data collection												
Data analyses												
Submission of two articles												
Preparation of the last article												

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