



ISPA – Instituto Universitário de Ciências Psicológicas, Sociais e da Vida

**“Effects of a psychological inoculation
video on helplessness-hopelessness
and implicit optimism levels
in breast cancer patients.”**

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Abstract

Helplessness-hopelessness (HH) and optimism are psychological variables which have been suggested as influential factors regarding survival rates and prognosis in cancer patients. Psychological inoculation (PI) is a cognitive method that uses the consecutive rejection of challenging sentences as a tool to destroy cognitive barriers. This study aimed to understand whether the exposure to a video simulating a PI session was able to increase implicit optimism levels and lower HH levels in breast cancer patients, when compared to the effects of a video simulating a supportive listening (SL) session.

The sample for this study was composed of 83 Portuguese breast cancer patients. At baseline HH levels were assessed using the Portuguese version of the mini-Mental Adjustment to Cancer scale, whereas implicit optimism levels were assessed through word puzzle tasks. Participants were then randomly assigned to be exposed to either a video simulating a PI session or a video simulating a SL session. HH and implicit optimism levels were assessed again after the intervention. Results showed that the PI video had a significant effect in increasing implicit optimism levels in the intervention group, whereas the SL video significantly reduced HH levels in the control group. If replicated with direct interventions and longer follow-ups, this study could be a useful tool in finding an effective intervention to improve psychological conditions and perhaps prognosis in breast cancer patients.

Key words: psychological inoculation, breast cancer, helplessness-hopelessness, implicit optimism.

Resumo

Desânimo-fraqueza e optimismo são variáveis psicológicas que têm sido referidas como factores influentes nas taxas de sobrevivência e prognóstico de pacientes oncológicos. Inoculação psicológica é um método cognitivo que usa a rejeição consecutiva de frases desafiantes como ferramenta na destruição de barreiras cognitivas. Este estudo pretende compreender se a exposição a um vídeo que simula uma sessão de inoculação psicológica aumenta os níveis de optimismo implícito e diminui os níveis de desânimo-fraqueza em pacientes de cancro da mama, quando comparado com os efeitos de um vídeo que simula uma sessão de escuta compreensiva.

A amostra para este estudo foi composta por 83 pacientes de cancro da mama portuguesas. Antes da intervenção os níveis de desânimo-fraqueza foram medidos através da Escala Reduzida de Ajustamento Mental ao Cancro, e os níveis de optimismo foram aferidos através de puzzles de palavras. Os participantes foram depois aleatoriamente expostos a um de dois vídeos, um simulando uma sessão de inoculação psicológica e outro simulando uma sessão de escuta compreensiva. Os níveis de desânimo-fraqueza e de optimismo implícito foram medidos novamente após a intervenção. Os resultados demonstram que o vídeo de inoculação psicológica teve um efeito significativo no aumento dos níveis de optimismo no grupo experimental, enquanto o vídeo de escuta compreensiva reduziu significativamente os níveis de desânimo-fraqueza no grupo de controlo. Se replicado utilizando intervenções directas e tempos de acompanhamento mais prolongados, este estudo poderá ser uma ferramenta útil no encontro de uma intervenção eficaz na melhoria das condições psicológicas e até de prognóstico de pacientes de cancro da mama.

Palavras-chave: inoculação psicológica, cancro da mama, desânimo-fraqueza, optimismo implícito.

Table of Contents

I. Introduction	1
II. Literature review	2
1. Helplessness-Hopelessness	2
1.1. The concept of helplessness-hopelessness	2
1.2. Relationship between helplessness-hopelessness and cancer	2
1.3. Reducing helplessness-hopelessness levels in cancer patient	4
2. Optimism	5
2.1. The concept of optimism and its effects on well-being levels	5
2.2. Relationship between optimism and cancer	6
3. Psychological Inoculation	7
3.1. The origin and development of the method	7
3.2. The use of psychological inoculation in health behaviour	8
3.3. The negative attributional style in the context of psychological inoculation	9
III. Problem formulation and hypothesis	10
1. Objective	10
2. Hypothesis and variables	10

IV. Methods	11
1. Delineation	11
2. Participants	11
3. Instruments	12
3.1. The mini-Mental Adjustment to Cancer scale	12
3.2. Implicit optimism	12
3.3. The intervention conditions	14
3.4. The study procedure and website	15
4. Design and statistical analysis	17
V. Results	18
VI. Discussion	24
VII. Conclusion	29
References	30
Appendices	35
Appendix I: First and second word puzzles presented to the participants, respectively	35
Appendix II: Translated transcription of the dialogue presented in the PI intervention video (challenging sentences evidenced in bold).....	36

List of Tables and Figures

Figure 1 – First word puzzle, as it was presented to the participants	14
Figure 2 – Mean values of the difference between pre- and post-intervention scores for all variables, compared by intervention groups	22
Table 1 – Descriptive statistics (demographic measures)	18
Table 2 – Descriptive measures for variables at baseline	19
Table 3 – Correlations between dependent variables at baseline	20
Table 4 – Correlations between demographic variables and post-intervention dependent variables	21
Table 5 – Paired samples <i>t</i> -test for mean comparison of pre- and post-intervention scores for all variables, by intervention group	23

I. Introduction

Breast cancer is the type of cancer with the highest incidence rate in Portugal, relating to over 4500 diagnosis per year, 99% of which in women (Liga Portuguesa contra o Cancro, 2009). Despite being a serious and possibly fatal disease, breast cancer is treatable in 90% of the cases if the diagnosis is made early and the disease is treated correctly. In the majority of the cases, nonetheless, being a breast cancer patient often develops into a heavy psychological burden, regardless of the fatality dimension of the diagnosis.

Several studies in the recent literature have concluded that psychological variables can widely affect not only the emotional stability and quality of life of cancer patients (Schou, Ekeberg, & Ruland, 2005) but also their prognosis as well. Helplessness-hopelessness (HH) and optimism are two examples of such influential factors. High levels of HH have been related to faster tumour development and decreased survival times in animals (Sklar & Anisman, 1979). HH has also been described as a significant risk factor for relapse or death in breast cancer patients (Watson, Haviland, Greer, Davidson, & Bliss, 1999). Conversely, optimism has been positively correlated with survival in cancer patients (Allison, Guichard, Fung, & Gilain, 2003). Bearing these results in mind, it would be beneficial to find a method which was able to approach and alter these psychological variables, thus attempting to improve cancer patients' prognosis and survival rates.

Psychological inoculation (PI) is a cognitive method originally developed to enhance resistance to persuasion (McGuire, 1961) which has recently been adapted for clinical health use. This method uses the consecutive rejection of challenging sentences as a tool to destroy cognitive barriers formulated by the patient, and has already been successfully used in subjects such as condom usage in HIV-positive women (Olley, Abbas, & Gidron, 2011). The main objective of this study is to understand whether a video simulating a PI session is effective in lowering HH and increasing implicit optimism levels in breast cancer patients, when compared to a video simulating a supportive listening intervention. Both implicit and explicit measures are assessed, in order to account for possible self-report problems associated with the exclusive use of explicit measures.

II. Literature review

1. Helplessness-Hopelessness

1.1. The concept of helplessness-hopelessness. Helplessness-hopelessness (HH) is a psychological construct that combines two concepts: helplessness, which delineates the perception of having no control over the consequences or the future events of life (Argaman, Gidron, & Ariad, 2005), and hopelessness, which is defined by “negative expectancies about oneself and the future” (Everson et al., 1996, p. 114). As noted by Moorey and Greer (1989), people who embrace HH in account of a negative clinical diagnosis adopt no fighting strategies against their illness, instead embracing a negative perspective where the disease is seen as a definite loss and its prognosis as inevitably negative. HH therefore defines the combination of pessimism and lack of control over life, and there is reason to believe that its levels can be related to specific medical outcomes, possibly bi-directionally.

Evidence has shown HH as a determinant factor not only toward psychological features but also regarding biological outcomes in numerous diseases. Molassiotis, Van Den Akker, Milliganm, and Goldman (1997) defended that survival time in haematological patients could be explained by an interactive biopsychological model, claiming that both psychological and psychosomatic characteristics could have direct or indirect consequences in patients’ prognosis, whether by interacting with immune function or by leading to specific behaviour that could affect survival conditions. A study conducted by Morris, Pettingale, and Haybittle (1992) concluded that lymphoma patients who faced their disease with ‘fighting spirit’ had better prognosis than those who reported HH attitudes regarding their clinical situation. Other studies also showed that HH is related to cognitive distortions and major depression. Becker-Weidman and her colleagues (2009) concluded that there was an association between high levels of hopelessness and high levels of depression, low social problem-solving skills, cognitive distortions, and family conflict. HH was also considered a strong predictor for desire for hastened death in Korean cancer patients (Shim & Hahm, 2011).

1.2. Relationship between helplessness-hopelessness and cancer. HH has furthermore been indicated as a predictor of cancer prognosis by several animal studies. Sklar and Anisman (1979) concluded that helpless mice (induced by an uncontrollable stressor) that were injected with a carcinogen developed larger tumours and died faster

than non-helpless mice (exposed to a controllable stressor) that were injected with the same carcinogen. The results of this study suggest a causal relation between helplessness and cancer progression. Argaman and her peers (2005) also presented a psychoneuroimmunological model to explain the relation between HH and cancer progression. The authors focused on interleukin-1 (IL-1 β) since it is a cytokine previously related to both helplessness in animals (Maier & Watkins, 1995) and to multiple aspects of cancer progression (Kothny-Wilkes et al., 1998) and concluded that HH could have a prognostic role in cancer progression, possibly via elevated IL-1 β .

Human studies also corroborated this premise. Everson and her colleagues (1996) concluded that healthy people with high levels of hopelessness have a higher risk of suffering from incident cancer than healthy people with low levels of hopelessness. This study also showed that high levels of hopelessness are associated with increased mortality in other diseases such as acute myocardial infarction, independently of the classic risk factors. Another study, developed by Greer, Morris, Pettingale, and Haybittle (1990), concluded that patients who were diagnosed with early breast cancer and responded with HH were less likely to be alive and free of recurrence at a 15-year follow-up than the patients who responded to the diagnose with fighting spirit. Jensen (1987) also affirmed that higher HH levels in breast cancer patients were associated with metastatic spread and deterioration at a one and a half year follow-up.

A total of 578 early-stage breast cancer patients enrolled in a project developed by Watson and her colleagues (1999) to study the effect of psychological responses on disease outcomes. Among other variables, HH levels were assessed by the application of the Mental Adjustment to Cancer (MAC) scale. After a 5-year period the authors concluded that patients who had high scores on helpless at baseline were more likely to have relapsed or died during the 5-year period of the study. What is more, a 10-year follow-up revealed that a significant effect of HH on disease-free survival was maintained for up to 10 years (Watson, Homewood, Haviland, & Bliss, 2005). Gidron, Magen, and Ariad (2001) also assessed a sample of 49 Israeli breast cancer patients to examine the relationship between HH and breast cancer progression marker CA15-3. The results concluded that hopelessness was positively correlated with post-traumatic stress disorder symptoms, and that helplessness significantly predicted changes in CA15-3 markers in a sub-sample, controlling for cancer stage.

Finally, Schou and colleagues (2005) affirmed that women diagnosed with breast cancer who adopted a pessimistic life orientation and used HH as a coping strategy were at risk for low emotional and social functioning and low global health quality of life levels in the 12-months period following their surgeries. This study not only appears to confirm a relationship between HH and quality of life levels in breast cancer patients, but also verifies a relation between these variables and optimism/pessimism, a variable that shall be discussed below.

1.3. Reducing helplessness-hopelessness levels in cancer patients. Several efforts have been made in order to reduce HH levels in cancer patients. Greer and his colleagues (1992) concluded that adjuvant psychological therapy could be a successful method (up to a 4-month follow-up) for lowering helplessness and anxiety levels in cancer patients. Quintard and Lakdja (2008) assessed the issue by providing beauty treatments to women with breast cancer, which proved to benefit the patients' body image and self-esteem. Although the intervention did not affect psychological distress directly, the HH levels on the control group increased over time, contrary to the levels of the women in the experimental group. Another study, developed by Beatty, Koczwara, Rice, and Wade (2010), concluded that interactive self-help workbooks could be effective in reducing distress and improving quality of life in women recently diagnosed with breast cancer. The results of this study further showed that participants on the workbook group had significantly lowered their levels of HH at the time of the 3-month follow-up. However, these results were no longer significant at the 6-month follow-up.

Though pioneer, these studies have limitations concerning HH effects, for they do not access the concept of HH directly. Furthermore, these studies apply short-term interventions whose effects do not extend over time. Therefore, it cannot be said that an enduring solution for reducing HH levels on cancer patients has yet been found. Taking these limitations into account, it seemed necessary to develop a method that not only helped reduce HH levels in cancer patients, but also perhaps helped to improve their long-term prognosis as well. The present study aims to enhance such line of research, testing a recent method for specifically reducing HH in breast cancer patients.

2. Optimism

2.1. The concept of optimism and its effects on well-being levels. Optimism can be defined as a mood or attitude regarding positive and/or pleasurable expectations about the future (Peterson, 2000). Carver, Scheier, and Segerstrom (2010) defended that optimism should be considered a relatively stable trait that reflected favourable expectancies for the future, being “by definition (...) inversely related to hopelessness” (p. 880). Scheier and Carver (1992) also interpreted optimism as a concept related to several personality characteristics, specifying dispositional optimism as taking form through global stable expectancies that boost the belief that good outcomes generally prevail in life. The authors declared that “optimists report a bias toward accepting the reality of stressful events, whereas pessimists report the use of tactics such as denial and substance abuse that are designed to lessen their awareness of the problem at hand” (p. 209).

The effects of optimism on people’s physical and psychological well-being have been studied for the last few decades. It has been claimed that positive expectations or experiences are able to enhance coping abilities toward negative feedback and even increase attention to negative information (Aspinwall & Taylor, 1997). Scheier and his colleagues (1989) developed a study investigating the reactions of a group of men to coronary artery bypass surgery. The group was interviewed on the day prior to the surgery, again a week after the surgery, and finally 6 months later. The data collected on the interviews gathered information on psychosocial variables and medical outcomes. The results showed that men who showed higher levels of dispositional optimism reported lower levels of hostility and depression before their surgeries, when compared to pessimistic men. Optimists were also less likely to infarct during surgery and less likely to develop markers for myocardial infarction post-surgery. At the one-week follow-up optimists reported higher levels of happiness, relief, and satisfaction with the medical care and emotional support they had been receiving. The patients’ recovery was also predicted by their optimism levels: optimists were faster in achieving behavioural milestones of recovery (e.g., sitting in bed) and also reported higher levels of quality of life at the time of the 6-month follow-up. Another study, developed on a sample of 1306 older men (M age=60.8 years) followed for an average of 10 years, concluded that an optimistic explanatory style could lower the risk of coronary heart disease, independently of health behaviours such as cigarette smoking or alcohol consumption

(Kubzansky, Sparrow, Vokonas, & Kawachi, 2001). In order to study the relationship between quality of life, chronic disease and mortality in the United States of America, an 8-year period study was conducted in which over 97.000 post-menopausal women participated (Tindle et al., 2009). All women were cancer- and cardiovascular disease-free at the beginning of the study, as optimism and cynical hostility levels were assessed. The results showed that optimistic women were less likely than pessimistic women to develop coronary heart disease or to die from coronary heart disease-related causes over an 8-year period. Optimists also reported lower mortality due to all causes over the entire period of the study. Moreover, women who reported high levels of cynical hostility had an increased risk of total mortality and cancer-related mortality. The relationship between optimism, cynical hostility and health outcomes persisted after adjusting for baseline risk factors, which would lead us to conclude that optimism and hostility may indeed influence physiology features directly.

2.2. Relationship between optimism and cancer. Several studies specifically studied the effects of optimism in cancer patients. Carver and his colleagues (1993) concluded that pessimism in women with breast cancer was associated with distress throughout their first post-surgery year. The authors also affirmed that dispositional optimism levels influenced the adjustment techniques and coping reactions of the participants, finding that optimistic women were less likely to adopt denial coping mechanisms and hopelessness responses. These results are in fact in line with Aspinwall and Taylor's claim (1997) that part of the optimism's benefits are mediated by the optimists' lower use of avoidant coping. Another study, conducted by Allison, Guichard, and Gilain (2000), investigated the relationship between dispositional optimism and health-related quality of life (HRQL) levels in French upper aerodigestive tract cancer patients. Before cancer treatment optimists reported better cognitive and emotional function, higher HRQL levels, and less pain and fatigue than pessimists. After the treatment these results were maintained, with optimists reporting better cognitive functioning, less pain and higher HRQL levels when compared to pessimists. Results also suggested that the cancer treatment had fewer effects on the daily lives of optimists than on the lives of pessimists. Zenger, Brix, Borowski, Stolzenburg, and Hinz (2010) also purposed to examine the relationship between optimism, HRQL, anxiety, and depression in urogenital cancer patients. Their results showed that patients with low levels of optimism and high levels of pessimism were not only at risk for higher levels

of anxiety and depression but also for lowers levels of HRQL. Other studies purposed to show the correlation between optimism levels and cancer prognosis. Schulz, Bookwala, Knapp, Scheier, and Williamson (1996) developed a study in a mixed cancer sample which concluded that a pessimistic life orientation may work as an important risk factor for mortality in younger cancer patients (ages 30-59). Allison and his colleagues (2003) also concluded from a sample of 96 French head and neck cancer patients that pessimistic subjects had smaller chances of being alive at a one-year follow-up than did optimistic subjects, independently of other sociodemographic and clinical variables.

These results conclude that optimism levels and cancer prognosis may indeed be related, thus suggesting that an efficient method to improve optimism levels would be a useful tool in attempting to improve cancer patients' quality of life and perhaps prognosis. The goals of the present study are structured according to this premise, for a psychological intervention is developed, as described below, having the increase of optimism levels as one of its main objectives.

3. Psychological Inoculation

3.1. The origin and development of the method. Psychological Inoculation (PI) is a cognitive method that was created to help people withstand social pressures, and later adapted to help people alter cognitive barriers concerning lifestyle changes. It was first developed by McGuire (1961) to study the immunizing efficacy of the refutational method against political counterargument attacks. McGuire's work suggests that one's attitudes can be strengthened through a process of inoculation against potential counterarguments they may come across with in the future.

Although the majority of studies which embraced PI as their cornerstone were oriented to enhance resistance to persuasion (Banas & Rains, 2010), the method used in the present study is a modified version of the original procedure. In the original method participants were exposed to sentences which challenged their existing attitudes; by refuting these sentences participants would then create *stronger* existing attitudes. Contrarily, in the present method regarding health education the main goal is to *change* existing attitudes to healthier ones. In this manner, patients are exposed to a series of erroneous sentences about their disease, sentences which they must actively refute.

These sentences are specifically designed to exaggerate the distortions of the patients' existing attitudes (e.g.: "because of your disease, you are currently unable to talk on the phone with a friend or family member"). By being exposed to and repeatedly rejecting these sentences patients are then able to change the cognitive distortions they had created. By doing so, patients are then consequently expected to be able to alter the negative attitudes they held, thus adopting healthier attitudes regarding their disease in their daily lives.

3.2. The use of psychological inoculation in health behaviour. Although this is a method which has not been thoroughly studied yet, PI has had positive results in a few different subjects. Evans and his colleagues (1978) conducted a study whose main objective was to find an effective method to prevent children from engaging in peer-, parent-, or media-influenced smoking behaviour. Base rates of smoking were determined by a pre-test condition applied to all subjects in both the experimental and the control group. Subjects in the experimental group were exposed to videotapes with information describing peer pressure on smoking behaviour, and an analysis of advertising techniques as concealed persuasive devices. They were also taught how to produce effective verbal refutations when confronted with persuasive messages on smoking, and received feedback on their counterarguments. The results showed that the subjects in the experimental group had lower smoking onset percentages than the control group subjects (who received no treatment whatsoever), suggesting that the inoculation technique was an effective method in preventing children from engaging in smoking behaviour.

PI was also recently used by Olley and colleagues (2011) in a sample of 22 HIV-positive Nigerian women, with the goal of helping them alter their cognitive barriers on condom usage during sexual intercourse, in order to prevent HIV contamination in the Nigerian population. Women in the control group were provided with two group meetings of safe sex health education, while women in the experimental group were exposed to two individual PI sessions. In these sessions they were presented with challenging sentences – previously constructed based on their cognitive barriers and other predictors for condom non-usage – and asked to refute them, after which they were given feedback on their refutations. Although no changes were reported regarding actual condom use in either group, the results showed statistically significant increases in condom usage negotiation self-efficacy in the experimental group, while no such

changes were observed in the control group. Furthermore, only in the PI group were there statistically significant reductions in condom-use barriers. These results suggest that PI could be a useful tool in altering cognitive barriers regarding health behaviours.

3.3. The negative attributional style in the context of psychological inoculation. It is a widely known fact that depression affects 15 to 25% of all cancer patients (Massie & Popkin, 1998). Peterson and his colleagues (1982) concluded that people who experience uncontrollable negative events (such as cancer diagnosis) become depressed *because* of the causal attributions they make for it. According to Sweeney, Anderson, and Bailey (1986), patients become more depressed as they adopt a more negative attributional style – that is to say, attribute their disease to internal, stable and global causes, as opposed to external, transient and circumscribed ones. As described by Carver, Scheier, and Segerstrom (2010), attributions may yield expectations, depending on which pattern of attributions – optimistic or pessimistic – is related to the cause of the event. If one relates a negative event to a stable cause, they will expect the failure to persist on account of the cause’s supposed permanence. If otherwise the event is associated with an unstable cause which will consequently disappear in due course, it is more likely that the subject will adopt an optimistic perspective on life. The hopelessness theory of depression, developed by Abramson, Metalsky, and Alloy (1989), also defends that patients who adopt a negative attributional style increase their vulnerability to developing retarded initiation of voluntary responses, lack of energy, apathy and other symptoms of hopelessness depression. Another study, developed on 86 HIV-positive men, concluded that embracing a negative attributional style predicted faster decline of CD4 helper T cells (which reflects HIV progression), after controlling for health and psychological factors (Segerstrom, Taylor, Kemeny, Reed, & Visscher, 1996).

Because of the negative impact of the negative attributional style on the patients’ physical and psychological health, part of the challenging sentences constructed to include the PI intervention in the present study were thought and built specifically to target the patients’ negative attributions. Several different sentences were created to address the participants’ internal, stable, or global attributed causes, in order to try and help patients destroy the cognitive barriers created on a negative attributional style context (e.g., “Due to your health condition, it seems that there aren’t many things which you could expect to do in the near future that would mean something to you”).

III. Problem formulation and hypothesis

1. Objective

The main objective of this study is to understand whether the exposure to a video simulating a PI session is able to increase implicit optimism levels and lower HH levels in breast cancer patients, when compared to the effects of a video simulating a supportive listening (SL) session.

2. Hypothesis and variables

The independent variable considered for this study was the type of video, having two categories: PI video or SL video. The dependent variables considered were the HH levels and the implicit optimism levels.

It is hypothesized that exposure to a video simulating a PI session has greater effects lowering HH and increasing implicit optimism levels than exposure to a video simulating a SL session, in breast cancer patients.

IV. Methods

1. Delineation

The participants of this study were associates of five different Portuguese associations specialized in helping breast cancer patients. These associations contacted their associates via e-mail or Facebook asking them to take part in this study, resulting in a total of 83 completed participations. The sample of this study is therefore a purposive one, for it corresponds to a non-representative subset of a larger population in which the subjects were chosen out of availability.

2. Participants

The sample of this study was composed by 83 Portuguese women (M age=49 years, $SD=8.44$; age range: 30-66 years), all suffering or having suffered from breast cancer. All the participants were associates or members of a Portuguese association who promotes support and help for breast cancer patients. In order to recruit these women, 16 Portuguese breast cancer associations were contacted via e-mail, in which occasion the outline of the study was explained to their coordinators in the form of a research proposal document. Five of these associations consented to cooperate with the study, agreeing to share with their associates the link to the website through which the data for this study were to be collected. Four other associations declined the invitation to participate, and the remaining seven associations did not respond to contact. The disclosure regarding the study was sent to the potential participants via e-mail and divulged through the associations' websites and Facebook pages. The disclosure included the link to the data-collection website and a small text introducing the study and asking for the participation of 18 year old or older women who were suffering or had suffered from breast cancer.

The ideal sample size for this study was calculated using the observed levels of HH in long-term breast cancer patients (6.89 ± 4.66 ; Wang, Tu, Liu, Yeh, & Hsu, 2013). Calculating an effect size between 20% and 40%, using a level of significance of 0.05 and a standard deviation of 0.5, the sample size was calculated to be between 64 and 458. This calculation was completed using the EpiCalc 2000 software (v. 1.02). Consequently, a sample of 83 participants was thought to be sufficient.

3. Instruments

3.1. The mini-Mental Adjustment to Cancer scale. The Mental Adjustment to Cancer (MAC) scale was originally developed by Watson et al. (1988) as a method to evaluate cancer patients' mental adjustment regarding their disease. The original scale was composed by 40 items, but the necessity for a simpler and more approachable measure lead Watson and her colleagues to develop a shorter version of the scale, thus creating the mini-MAC scale (Watson et al., 1994). This new scale is composed of 29 items, 16 of which are residual from the original version of the scale. When going through the scale participants are asked to address its items taking into account how they feel at the moment, classifying their answers on a 4-item Likert-type scale that goes from "doesn't apply to me at all" to "totally applies to me".

The 29 items of the mini-MAC scale are divided in five dimensions: HH, anxious preoccupation, fighting spirit, fatalism, and cognitive avoidance. The five different dimensions of the mini-MAC are measured separately, as this is a multidimensional scale and thus does not provide a total score for all the 29 items combined. This scale represented a useful method to assess this study's participants' HH levels, also allowing for measuring the participants' progression regarding the scale's other dimensions. Although the main objective of this study was to address the evolution in the participants' HH levels, all the dimensions of the mini-MAC scale were assessed and taken into account in the results, in order to obtain a wider range of comparison values for both intervention groups. The version used in this study is the one resulting from the scale's validation for the Portuguese population developed by Pais-Ribeiro, Ramos, & Samico (2003).

3.2. Implicit optimism. In order to counterbalance the possible consequences of using exclusively explicit measures in the outline of a psychological study, an implicit measure was chosen to assess the participants' optimism levels. Dovidio, Kawakami, and Beach (2003) characterize implicit processes as being unintentionally activated and very difficult to alter in account of being "rooted in overlearning and habitual reactions" (p. 176), whereas explicit processes are described as conscious, controllable and relatively easy to modify, often being settled on self-reported responses which can be affected by presentation biases. Because implicit measures tend to be resistant to such

biases, they are generally considered more efficient than explicit measures in capturing certain psychological conceptions.

Two different word puzzles were constructed as measures to assess participants' implicit optimism levels. The optimism score was reflected by the difference between the number of optimistic and pessimistic words found by the participant. Due to an assumed pop-out effect, optimists were expected to perceive positive words faster and pessimists were expected to perceive negative words faster. This word search task was constructed along the lines of the "face-in-the-crowd" search task, used to assess the capacity of depressed patients to find a positive or a negative face in a crowd of neutral faces (Karparova, Kersting, & Suslow, 2005). Balouch (2006) found a similar test to have a positive significant correlation with an explicit optimism scale ($r=0.35$; $p<0.01$). Both word puzzles designed for this study consisted in 12x12 letter matrix squares, designed to include 12 words set in different positions (vertical, horizontal, diagonal, straight and backward) among a group of random letters. The words represented either positive or negative concepts, with six positive and six negative words being presented. The words' positions were paired: for every positive horizontal word there was a negative horizontal word, for every positive backward word there was a negative backward word, and so forth. This was done to avoid an influential effect of the words' positions on the easiness of their detection, thus turning neither positive nor negative words more obvious to the participant. Both the first and second word puzzles included the same six positive and six negative words, only set in different positions to account for possible learning effects. Participants' implicit optimism levels were calculated by the difference between the number of optimistic and pessimistic words found in the matrix.

M	E	S	P	E	R	A	N	Ç	A	F	P
L	E	O	R	E	P	S	E	S	E	D	E
A	G	L	C	Z	O	S	S	E	C	U	S
C	A	F	A	J	R	X	I	O	M	P	S
T	O	L	Ç	N	S	D	C	P	L	O	I
R	R	N	E	H	C	L	E	T	K	S	M
I	H	I	T	G	I	O	U	I	N	I	I
S	M	A	S	E	R	H	L	M	E	T	S
T	G	E	U	T	N	E	Z	I	H	I	M
E	A	F	X	A	E	T	N	S	C	V	O
Z	R	S	I	H	E	O	E	M	D	O	Ç
A	N	E	G	A	T	I	V	O	F	S	A

Figure 1 – First word puzzle, as it was presented to the participants.

The word puzzles were pre-tested in a group of 10 healthy people. The mean value for the number of words found in total in this pre-test was 5.7 (M positive words=4.4; M negative words=3.1). Both utilized word puzzles can be found in the Appendices section of this dissertation (see Appendix I).

3.3. The intervention conditions. In the impossibility to perform the interventions to the participants in person, these were presented in the form of short videos. The method of using PI in a video intervention context had already been successfully tested by Evans, Raines, and Hanselka (1984) although in this particular case the video was combined with a discussion and the participation in a role-playing situation. There were two different videos: a video simulating a PI session (experimental group) and another simulating a SL session (control group). The computer system devising the website randomly assigned one of the two videos to each participant. Both videos had approximately 6 minutes and were filmed in the same setting with the same two female protagonists, differing only in the verbal content of the conversations.

The PI video simulated a PI session between a psychologist and a breast cancer patient. The psychologist exposed the “patient” to each challenging sentence (e.g., “You are now incapable of talking on the phone with a loved one because of your disease”) and the patient was asked to systematically refute each one. The script of the video was previously written by the investigators, its core being based in presenting the patient with a series of challenging sentences to refute. The challenging sentences were chosen taking into account the cognitive barriers that are most commonly indicated by breast cancer patients. The construction of the sentences also took into consideration the internal, stable and global causes that could be attributed to the disease in the context of the negative attributional style (Sweeney et al., 1986). The dialogue presented in the PI video can be found in the Appendices section of this dissertation, with the utilized challenging sentences evidenced in bold (see Appendix II).

The SL video simulated a conversation between a breast cancer patient and a psychologist, being engaged in a supportive listening frame. The SL approach was chosen as a control condition for this study for being a relatively simple approach that controls for non-specific treatment factors such as support, therapist time and attention, and patient expectations of improvement (Bodie, Vickery, & Gearhart, 2013). Rather than being settled in a formal counselling frame, SL therapy encourages patients to choose the topic of the conversation – which can go through their disease or not – and discuss it freely and extensively in a non-judgemental environment. The psychologist’s role in this type of session is to get the patient to feel like he or she is being listened to, using minimal encouragers, asking open questions, empathising and summarising (Moss-Morris et al., 2009). The content of the patient’s answers were based upon a cancer patient’s true statement, regarding her personal experience and reflecting cancer patients’ most common fears.

3.4. The study procedure and website. The data collection for this study was only possible through the conception of a website, which was divided in ten different pages. The first page of the website explained the general outline of the study and provided the potential participant with the necessary information to allow her to give her informed consent to her participation in the study. During this explanation the potential participants were thanked for taking the time to invest in the project, being also explained to them that this was an anonymous study. After this the general outline of the study was described. At the bottom of the page it was asked of the participant to

give her informed consent by clicking a button stating that she had understood the general outline of the study and agreed to participate anonymously in it.

On the second page of the website three demographic questions were asked: the participant's age, the cancer stage at the moment of diagnosis, and the amount of time passed since diagnosis. On the third page of the website the participant was asked to answer the twenty-nine questions that constitute the mini-MAC scale. The participant was asked to select for each statement the option that suited more appropriately how she felt at the moment, from "doesn't apply to me at all" to "totally applies to me". After this a list of 12 words would be presented on the next page, intended to prepare the participant for the subsequent presentation of the implicit optimism test in the form of a word puzzle. At this point it was explained to the participant that she could study the list for as long as she wished, but that she would have only two minutes to find the 12 words in the puzzle presented on the next page. It was also explained that the words in the puzzle would be presented in different positions (vertical, horizontal, diagonal, straight and backward) and that from the moment she started solving the puzzle she would not be allowed to see the list again. Below is a representation of the list of words as it was presented to the participants, with positive and negative words intercalated and presented in random order:

“positivo, pessimismo, optimismo, desespero, contente, tristeza,
alegre, melancólico, sucesso, triste, esperança, negativo”.

The word puzzle was presented on the fifth page, and it was composed of a 12x12 letter square, designed to include the 12 words set in different positions. From the moment the participant pressed the button that gave her access to the fifth page – and consequently the word puzzle – a timer would start a 2-minute backward-counting. During these 2 minutes the participant was able to underline on the puzzle the words she could find. When the timer hit the 0:00 mark, the system would automatically turn to the sixth page of the website. At this moment the system would randomly ascribe to the participant one of two different videos, both approximately 6-minute long: a video in which a PI session was simulated, or a video simulating a SL session.

After the video intervention, on the seventh page the participant was once more asked to answer the questions composing the mini-MAC scale. The eighth page was similar to the fourth page, as it prepared the participant to solve a word puzzle. The same list of words was presented to the participant and the same explanations were available. The ninth page presented the revised word puzzle. This second word puzzle was similar to the first one considering it included the same 12 words, although these were set in different positions to account for possible learning effects. Finally, a thank you note to the participant was presented in the tenth page. The e-mail address of the investigator was also displayed, to allow the participant to later clarify any questions she might have had regarding the study.

4. Design and statistical analysis

This study employed an experimental randomized controlled trial design, in which participants were randomly assigned to one of two videos. Optimism and HH levels were assessed at baseline (pre-intervention) and immediately again after the intervention (post-intervention). The statistical analysis of the data was completed using the IBM SPSS Statistics software (v. 21).

Homogeneity of variances was assessed by Levene's test for equality of variances ($p < 0.05$). Paired-samples *t*-tests were used to compare each group's scores on implicit optimism and all five subscales of the mini-MAC scale, from baseline to post-intervention scores. Because performing many statistical tests could increase the chances of a type-I error occurring, a Bonferroni correction was thought to be necessary to control for the relatively large number of dependent variables being tested. The standard *p*-value ($p < 0.05$) was therefore divided by the six dependent variables tested for each participant, resulting in a reduction of the significance level to $p < 0.008$.

V. Results

The descriptive statistics for the sample represented in this study can be found in Table 1.

Table 1 – Descriptive statistics (demographic measures).

	N	Mean	Std. Deviation	Minimum	Maximum
Age	83	49.00	8.44	30	66
Time since diagnosis (in years)	83	4.48	5.19	0.00	20.00
Cancer stage at diagnosis	83	2.06	0.94	1	4

The sample for this study was composed of 83 Portuguese women who were suffering or had suffered from breast cancer. As shown in Table 1, the mean age of the women in the sample approached 50 years, and their mean time from diagnosis was approximately four and a half years. Of these 83 women, 34 women (41%) had been diagnosed with stage II breast cancer, 26 women (31.3%) were diagnosed with stage I cancer, 15 women (18.1%) had a stage III cancer diagnosis, and 8 women (9.6%) were diagnosed with stage IV cancer.

Table 2 - Descriptive measures for variables at baseline.

	Video	N	Mean	Std. Deviation	Std. Error Mean
HHPre	PI	40	2.66	0.40	0.06
	SL	43	2.79	0.25	0.04
FatalismPre	PI	40	2.05	0.42	0.07
	SL	43	2.18	0.35	0.05
FightSpiPre	PI	40	1.79	0.50	0.08
	SL	43	1.94	0.50	0.08
AnxPreocPre	PI	40	2.04	0.39	0.06
	SL	43	2.21	0.37	0.06
CognAvoiPre	PI	40	2.79	0.54	0.09
	SL	43	3.11	0.41	0.06
ImplOptimPre	PI	40	-0.35	1.03	0.16
	SL	43	-0.14	1.46	0.20

HHPre = HH score at baseline; FatalismPre = Fatalism score at baseline; FightSpiPre = Fighting spirit score at baseline; AnxPreocPre = Anxious preoccupation score at baseline; CognAvoiPre = Cognitive avoidance score at baseline; ImplOptimPre = Implicit optimism score at baseline.

Table 2 shows the descriptive measures for all variables at baseline. Levene's test for equality of variances was performed to ensure homogeneity of variances for all variables. However, a *t*-test for equality of means revealed significant differences between groups in anxious preoccupation ($p=0.043$) and cognitive avoidance ($p=0.003$). Nonetheless, since changes from pre- to post-intervention were tested on all dependent variables per group, baseline differences in anxious preoccupation or cognitive avoidance were not controlled for in subsequent analyses.

Table 3 - Correlations between dependent variables at baseline.

		HH Pre	Fatalism Pre	FightSpi Pre	AnxPreoc Pre	CognAvoi Pre	ImplOptim Pre
HH Pre	Pearson Correlation	1	0.241*	0.266*	0.467**	0.591**	-0.095
	Sig. (2-tailed)		0.028	0.015	0.000	0.000	0.391
Fatalism Pre	Pearson Correlation	0.241*	1	0.515**	0.509**	0.127	-0.057
	Sig. (2-tailed)	0.028		0.000	0.000	0.252	0.610
FightSpi Pre	Pearson Correlation	0.266*	0.515**	1	0.837**	-0.024	-0.138
	Sig. (2-tailed)	0.015	0.000		0.000	0.826	0.213
AnxPreoc Pre	Pearson Correlation	0.467**	0.509**	0.837**	1	0.098	-0.117
	Sig. (2-tailed)	0.000	0.000	0.000		0.379	0.291
CognAvoi Pre	Pearson Correlation	0.591**	0.127	-0.024	0.098	1	-0.017
	Sig. (2-tailed)	0.000	0.252	0.826	0.379		0.877
ImplOptim Pre	Pearson Correlation	-0.095	-0.057	-0.138	-0.117	-0.017	1
	Sig. (2-tailed)	0.391	0.610	0.213	0.291	0.877	

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

HHPre = HH score at baseline; FatalismPre = Fatalism score at baseline; FightSpiPre = Fighting spirit score at baseline; AnxPreocPre = Anxious preoccupation score at baseline; CognAvoiPre = Cognitive avoidance score at baseline; ImplOptimPre = Implicit optimism score at baseline.

As shown in Table 3, at baseline HH is significantly positively correlated with fatalism and fighting spirit ($p < 0.05$), reporting also a moderate positive correlation with anxious preoccupation and a strong positive correlation with cognitive avoidance ($p < 0.01$). Fighting spirit reflects an adaptive response, its items reflecting positive phrases (e.g., “I’m determined to beat my disease”); consequently it should be positively correlated with other positive measures such as optimism. Nonetheless in this sample fighting spirit had a significant positive correlation with HH ($r = 0.266$; $p < 0.05$).

Table 4 - Correlations between demographic variables and post-intervention dependent variables.

Age		ImplOptim	HH	Fatalism	FightSpi	AnxPreoc	CognAvoi
		Post	Post	Post	Post	Post	Post
PI	Pearson Correlation	0.017	-0.005	0.137	0.047	0.051	-0.115
	Sig. (2-tailed)	0.915	0.975	0.399	0.774	0.753	0.482
	N	40	40	40	40	40	40
SL	Pearson Correlation	-0.021	0.001	0.059	-0.016	0.006	-0.097
	Sig. (2-tailed)	0.892	0.993	0.707	0.919	0.969	0.538
	N	43	43	43	43	43	43
Time since diagnosis		ImplOptim	HH	Fatalism	FightSpi	AnxPreoc	CognAvoi
		Post	Post	Post	Post	Post	Post
PI	Pearson Correlation	0.104	-0.079	-0.001	-0.047	-0.026	-0.025
	Sig. (2-tailed)	0.522	0.628	0.997	0.772	0.872	0.876
	N	40	40	40	40	40	40
SL	Pearson Correlation	0.249	-0.232	0.080	-0.146	-0.114	-0.255
	Sig. (2-tailed)	0.108	0.134	0.608	0.351	0.469	0.099
	N	43	43	43	43	43	43
Stage		ImplOptim	HH	Fatalism	FightSpi	AnxPreoc	CognAvoi
		Post	Post	Post	Post	Post	Post
PI	Pearson Correlation	0.146	0.167	0.056	-0.057	0.210	0.038
	Sig. (2-tailed)	0.368	0.302	0.730	0.729	0.193	0.814
	N	40	40	40	40	40	40
SL	Pearson Correlation	0.080	0.064	0.228	0.194	0.110	-0.089
	Sig. (2-tailed)	0.608	0.685	0.142	0.212	0.481	0.568
	N	43	43	43	43	43	43

HHPost = HH score post-intervention; FatalismPost = Fatalism score post-intervention; FightSpiPost = Fighting spirit score post-intervention; AnxPreocPost = Anxious preoccupation score post-intervention; CognAvoiPost = Cognitive avoidance score post-intervention; ImplOptimPost = Implicit optimism score post-intervention.

As shown in Table 4, Pearson's correlation tests were performed in both intervention groups in order to test whether any dependent variable significantly

correlated with age, time since diagnosis, or stage. All correlations were not significant ($p>0.05$). However, time since diagnosis was significantly negatively correlated with HH at baseline ($r= -0.242$; $p=0.028$). Furthermore, no group differences were found regarding these background variables ($p>0.05$). Hence, these variables were not statistically controlled for in the remaining analyses.

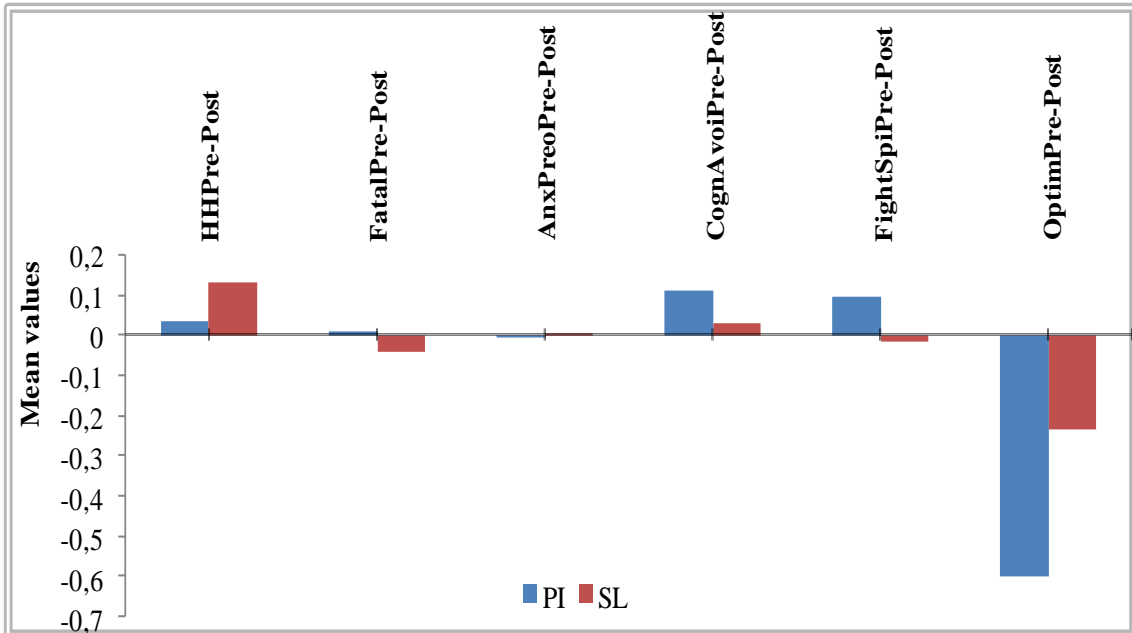


Figure 2 - Mean values of the difference between pre- and post-intervention scores for all variables, compared by intervention groups.

Figure 2 represents the mean values of the difference between pre- and post-intervention scores for all variables, split by intervention groups. As these values represent the difference between two scores per variable (pre - post), positive values represent decreases between pre- and post-intervention scores, whereas negative values represent increases between pre- and post-intervention scores. PI represents the experimental group, while SL represents the control group.

As can be observed optimism had the highest changes between pre- and post-intervention scores, also being the one variable where both groups increased their mean scores (PI group: $M= -0.60\pm 1.31$; $p=0.006$). Simultaneously, HH scores decreased from pre- to post-intervention in both intervention groups (SL group: $M=0.13\pm 0.26$; $p=0.002$). As reported in Table 5, changes in the remaining groups were not significant.

Table 5 - Paired samples *t*-test for mean comparison of pre- and post-intervention scores for all variables, by intervention group.

	Mean	Std. Deviation	95% Confidence Interval of the Difference		<i>t</i>	df	Sig. (2-tailed)	
			Lower	Upper				
PI	HHPre - HHPost	0.03438	0.21181	-0.03336	0.10211	1.026	39	0.311
	FatalismPre - FatalismPost	0.01000	0.25998	-0.07315	0.09315	0.243	39	0.809
	AnxPreocPre - AnxPreocPost	-0.00313	0.19507	-0.06551	0.05926	-0.101	39	0.920
	CognAvPre - CognAvPost	0.11250	0.32498	0.00857	0.21643	2.189	39	0.035*
	FightSpPre - FightSpPost	0.09375	0.25120	0.01341	0.17409	2.360	39	0.023*
	OptimismPre - OptimismPost	-0.60000	1.31656	-1.02106	-0.17894	-2.882	39	0.006**
SL	HHPre - HHPost	0.13081	0.26299	0.04988	0.21175	3.262	42	0.002**
	FatalismPre - FatalismPost	-0.04186	0.26025	-0.12195	0.03823	-1.055	42	0.298
	AnxPreocPre - AnxPreocPost	0.00291	0.26374	-0.07826	0.08407	0.072	42	0.943
	CognAvPre - CognAvPost	0.02907	0.23280	-0.04257	0.10071	0.819	42	0.418
	FightSpPre - FightSpPost	-0.01744	0.34673	-0.12415	0.08927	-0.330	42	0.743
	OptimismPre - OptimismPost	-0.23256	1.71599	-0.76066	0.29555	-0.889	42	0.379

* Changes are significant at the 0.05 level (2-tailed).

** Changes are significant at the 0.008 level (2-tailed).

Table 5 represents the paired-samples *t*-test executed to compare the mean values of the difference between pre- and post-intervention scores for all variables, by intervention groups. Because performing many statistical tests might increase the chances of occurring in a type-I error, a Bonferroni correction was thought to be necessary to control for the relatively large number of dependent variables being tested in this study. The standard *p*-value ($p < 0.05$) was therefore divided by the six dependent variables tested for each participant, which resulted in a reduction of the significance level to 0.008. As a result, the only significant changes found in these results were relative to optimism levels in the PI group [$t(39) = -2.882$; $p = 0.006$] and HH levels in the SL group [$t(42) = 3.262$; $p = 0.002$]. Although no longer significant due to the Bonferroni correction, there is a tendency for significant changes in the cognitive avoidance and fighting spirit difference scores in the PI group as well.

VI. Discussion

The main objective of this study was to understand whether the exposure to a video simulating a PI session was able to increase implicit optimism levels and lower HH levels in breast cancer patients, when compared to the effects of a video simulating a SL session. Implicit optimism levels at baseline were measured through a word puzzle task, whilst HH levels were measured through the explicit assessment of a mini-MAC scale. After an experimental intervention, in which the participants in the experimental group watched a video simulating a PI session and the participants in the control group were exposed to a video simulating a SL session, the HH and implicit optimism levels of the participants were measured once more. The results of this study revealed that, when comparing for differences between the pre- and post-intervention scores of all the variables in both groups, there were significant increases in the implicit optimism levels of the participants in the PI group, and significant decreases in the HH levels of the participants in the SL group. These outcomes lead to the conclusion that only the first half of this study's hypothesis was met, for the PI condition managed to significantly increase the participants' implicit optimism levels, failing however to significantly decrease their HH levels.

The results of this study seem to confirm substantial differences between explicit and implicit measures' outcomes. Greenwald, McGhee, and Schwartz (1998) compared both implicit and explicit measures and concluded that the first exposed racially discriminatory results that were overlooked by the explicit measures. According to the authors, implicit measures' ability to resist self-report or self-presentational factors can be particularly important when measuring racial or ethnical discriminatory attitudes, particularly accounting for the tendency of explicit measures to mask socially undesirable associations. Nausheen and colleagues (2010) also used both implicit and explicit measures to assess levels of loneliness in patients with colorectal tumours. Similarly to the procedure adopted for the present study, the authors opted for an electronic implicit measure combined with a scale-type explicit measure to assess loneliness levels. The results concluded that, because of their indirect access to constructs and resistance to presentation biases, implicit measures represented an important assessment tool for socially sensitive constructs. Greenwald, Poehlman, Uhlmann, and Banaji (2009) also reviewed 122 research reports on the effects of an

implicit measure compared to the effects of self report measures. Their results concluded that each type of measure captures distinct phenomena, with implicit measures having much higher predictive validity than self report measures when regarding socially sensitive topics.

The fact that precedent literature affirms implicit measures as more reliable tools than explicit measures when assessing socially sensitive concepts is determinant when discussing the results of the present study. Optimism, helplessness and hopelessness levels in the context of a cancer diagnosis are undoubtedly socially sensitive subjects that need to be assessed with extreme caution, for the psychological state of a cancer patient is not only a determinant factor for their quality of life and emotional stability (Schou et al., 2005) but can also be decisive for the patient's prognosis and recovery process (Watson et al., 1999; Allison et al., 2003). When approaching the results of this study through the independent variables' outlook, it is clear that the experimental intervention (PI) significantly altered only the participants' implicit optimism levels, not significantly changing their HH levels, whereas the control intervention (SL) significantly altered participants' HH levels, failing however to alter their implicit optimism levels. Considering the previously mentioned sensitivity of implicit measures to capture alterations in psychological constructs regarding socially sensitive subjects, and taking into account that PI significantly improved the participants' implicit optimism levels, one could reach the conclusion that PI seems to successfully operate at an implicit level and could perhaps be a helpful tool in improving the scores of implicit variables such as optimism. The fact that PI did not significantly alter the HH levels, assessed by an explicit measure, also seems to confirm its preference at an implicit level when compared to an explicit one. This is an interesting result because PI in itself is not considered an implicit intervention; the patient's constant and repeated rejection of the challenging sentences presented to him or her results in quite an explicit and conscious process. However, in this particular study the participants were not directly exposed to the intervention, instead having watched a video portraying the intervention being made to someone else. This could have altered the participants' expected cognitive process, focusing on an implicit interpretation of the intervention instead of an explicit one, consequently making it so effective at an implicit level. Conversely, the fact that the control intervention (SL) significantly decreased the participants' HH levels (assessed by an explicit measure) and left the implicit optimism levels unaltered suggests that a

SL-type of intervention is more efficient at an explicit level than at an implicit one. These results also suggest that a SL type of intervention may represent a useful tool in lowering HH levels in breast cancer patients.

It is however important to take into consideration that this study was developed on a Portuguese sample. Although the actual nominative concept of supportive listening might be a bit too specific to be part of the general population's common knowledge, the actual therapeutic approach is a widespread conception which is at least vaguely familiar to the majority of the Portuguese population. It might even be added that this familiarity could have settled a common (although at times erroneous) direct association between the concept of psychotherapy and a supportive listening type of intervention. It is therefore only natural for the participants in the control group of this study to have easily related to the SL video intervention, for it represents a kind of psychological treatment they are familiar with, regardless of whether they have been directly exposed to it or not. Naturally knowing what is expected of this kind of treatment, it would be easier for the patients to relate not only to the characters but also to the entire therapeutic situation portrayed in the video, thus facilitating a change in their explicit outcomes. The familiarity factor could also help to explain why the HH levels were not altered by the PI intervention video. PI has not yet been thoroughly explored as a therapeutic instrument in Portugal; there are virtually no Portuguese studies using PI as a psychological therapy or studying its domain, and it is a widely unknown intervention to the majority of the population. The non-relating with the patient or the clinical situation portrayed in the PI video could have caused the absence of changes concerning the explicit measures assessed, regardless of the changes occurring in the participants' optimism scores at an implicit level.

This study has a few important limitations that should be considered. What seems to be one of the most obvious limitations relates to the fact that the participants were not directly exposed to the clinical intervention, having been exposed instead to a 6-minute video representation of the intervention session. This has undoubtedly influenced the participants' relation and reaction to the intervention; being asked to watch a video simulating a session could perhaps have led the participants to feel estranged from a therapeutic situation and to not relate to the clinical environment as well as they would if they were directly exposed to the treatment situation. The ideal treatment arrangements for both the PI and the SL group would include several 20-minute live

sessions, a few days apart from each other, taking part in a clinical environment where the dependent variables would also be assessed in. However, it is impossible to predict how the interventions would affect the dependent variables in these conditions. As previously discussed, PI seems to work at an implicit level when presented as an indirect intervention to the participants; it would thus be interesting to observe whether this behaviour is preserved in experimental conditions were the participants are directly exposed to the intervention. Another great limitation of this study relates to the fact that the pre- and post-intervention measurements of the dependent variables' levels were very approximate in time, having been made with just a few minutes between them. This means that the effects of the intervention videos were measured immediately after the intervention itself, undoubtedly influencing the assessed dependent variables' levels and resulting in very short-term measurements of the independent variables' effects. Longer follow-up times would be important to quantify the real effect of the type of treatment on the participants' implicit optimism and HH levels. The positive correlation between HH and the fighting spirit dimension of the mini-MAC scale also represented a rather unexpected outcome in this study's results. Fighting spirit is defined by an attitude of determination to fight the disease, reflecting an adaptive response and being represented by positive phrases (e.g., "I'm determined to beat my disease"). It would thus be expected to correlate negatively with HH and correlate positively with other positive measures, such as optimism. Why this unexpected correlation occurred in this sample is yet not clear, and future studies should be advised to address this issue carefully.

As previously stated the hypothesis of this study was only half met, for the PI intervention successfully increased the participants' implicit optimism levels but failed to decrease their HH levels. However, it seems important to note that the changes in the implicit optimism levels in the PI group ($M = -0.60 \pm 1.31$) were almost 5 times bigger than the changes in the HH levels in the SL group ($M = 0.13 \pm 0.26$), as can be clearly observed in Figure 2. This indicates that, although both results were statistically significant, the PI intervention seems to have had a greater impact on the difference between the pre- and post-intervention optimism scores, when compared to the impact of the SL intervention on the difference between pre- and post-intervention HH levels. Moreover, the changes achieved by the PI intervention were assessed through an implicit measure, which according to several previous studies is more efficient than an

explicit measure when assessing socially sensitive constructs (Nausheen et al., 2010), category in which the psychological state of a cancer patient would certainly fit. Consequently, the value of the PI as a clinical intervention should not in any way be undermined by its failure to fulfil the second half of the original hypothesis of this study. However, the crucial role of HH in the prognosis and recovery process of a cancer patient should not be forgotten, for numerous studies have proven that HH has a significant detrimental effect on cancer patients' outcomes, as so clearly demonstrated by Greer (2002). Because this study concluded that PI is probably not the most efficient intervention type to alter HH levels, the results seem to indicate that, when choosing the appropriate type of psychological intervention to increase implicit optimism levels and lower HH levels in breast cancer patients, a combined therapy including both PI and SL approaches would be the most appropriate choice. Because both approaches achieve different yet complementary results, a combined intervention would probably have greater results than the utilization of only one of the approaches alone, perhaps representing the establishment of an effective way to improve breast cancer patients' clinical outcomes.

VII. Conclusion

The results of this study suggest that PI is an effective method in increasing implicit optimism levels in breast cancer patients, while SL appears to be efficient in decreasing patients' HH levels. The differences between the two interventions types are evident, especially taking into account the different explicit and implicit measures and how both intervention types interact with these variables. However, the previously discussed limitations suggest that the results of this study should be interpreted with caution.

It is evident that there is much left to explore on the effects of psychological inoculation as a therapeutic instrument, especially regarding cancer patients. However, the results found thus far have exposed PI as a promising tool in helping to improve and promote healthier behaviours. Future interventions on this topic should carefully assess the limitations expressed in this study, constructing an intervention alignment that allows for a clear observation of the intervention's impact on the considered psychological variables.

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Appendices

Appendix I – First and second word puzzles presented to the participants, respectively.

M	E	S	P	E	R	A	N	Ç	A	F	P
L	E	O	R	E	P	S	E	S	E	D	E
A	G	L	C	Z	O	S	S	E	C	U	S
C	A	F	A	J	R	X	I	O	M	P	S
T	O	L	Ç	N	S	D	C	P	L	O	I
R	R	N	E	H	C	L	E	T	K	S	M
I	H	I	T	G	I	O	U	I	N	I	I
S	M	A	S	E	R	H	L	M	E	T	S
T	G	E	U	T	N	E	Z	I	H	I	M
E	A	F	X	A	E	T	N	S	C	V	O
Z	R	S	I	H	E	O	E	M	D	O	Ç
A	N	E	G	A	T	I	V	O	F	S	A

D	P	E	S	S	I	M	I	S	M	O	C
E	S	P	E	R	A	N	Ç	A	C	O	L
S	M	D	F	A	J	E	O	I	N	L	I
E	O	S	D	T	R	V	L	T	H	O	R
S	G	V	X	G	I	O	E	G	M	N	T
P	Ç	A	E	T	C	N	X	S	Z	R	S
E	R	L	A	N	T	Ç	I	B	I	M	U
R	A	G	A	E	G	M	J	S	L	Q	C
O	E	L	T	R	I	S	T	E	Z	A	E
N	E	A	F	T	C	E	Ç	G	X	V	S
M	T	E	P	Q	P	X	A	H	I	F	S
I	U	O	V	P	O	S	I	T	I	V	O

Appendix II – Translated transcription of the dialogue presented in the PI intervention video (challenging sentences evidenced in bold).

Psychologist: *Good morning Miss Paula, how are you? Are you feeling well?*

Miss Paula: *Yes, I'm fine, and you?*

Psychologist: *I am fine too, thank you. Miss Paula, you have been diagnosed with breast cancer, correct?*

Miss Paula: *Yes, unfortunately... I was diagnosed 9 months ago, yes. It was very hard for me back then. Actually, it still is a bit difficult for me to talk about it.*

Psychologist: *Yes, I can imagine that. Please know that nothing that we say here should cause you any kind of damage - but if you feel uncomfortable during any stage of this process please tell me and we can stop it immediately, alright?*

Miss Paula: *Okay. If I feel uncomfortable I'll let you know.*

Psychologist: *Miss Paula, now I will say to you several sentences that are incorrect. All the sentences are incorrect, do you understand? What I want you to do is to reject each one of these sentences, explaining to me why they are wrong. Imagine we are playing a table tennis match – I'll tell you a sentence and you'll reject it. Do you understand?*

Miss Paula: *Yes, I think I got it. Let's give a try.*

Psychologist: *Good. Thank you so much for your cooperation. Let's begin then. Miss Paula, **you are incapable of speaking with a loved one over the telephone because of your disease.***

Miss Paula: *Hmm...No, no. I talk to my daughter everyday, or at least every other day. So no, that is not true.*

Psychologist: *Very good, Miss Paula. You rejected my sentence very well. Shall we continue then? **It is not you but your disease who decides whether you shall leave the house or not to meet a friend of yours or a family member.***

Miss Paula: *Well...sometimes I do feel a bit weak to leave the house. So I suppose that it might be the truth sometimes...*

Psychologist: *Ok, Miss Paula, but remember: you must try to reject each sentence I tell you! So: your disease decided if you could leave the house to meet a friend or a family member everyday of the last two weeks!*

Miss Paula: *Oh...Well no, that's not true. I went to my brother's house to see my nephews last week. So no, it isn't true.*

Psychologist: *Very good, very good. But Miss Paula, **you cannot tell me of one single event occurring in the next 4 weeks for which you are anxious about!***

Miss Paula: *No, no. In 2 weeks will be my nephew's birthday, we are planning to have a picnic in the park with the whole family and I think it will be really enjoyable.*

Psychologist: *Very well indeed. You're making an excellent job in rejecting my sentences. Now, Miss Paula: **you are incapable of giving good advices to you children or your family!***

Miss Paula: *Oh dear...I haven't been feeling so well to advise anyone, not really... You know, with all this I've been feeling so down that I don't think my advices can be useful to anybody!*

Psychologist: *Miss Paula, I must ask you to keep on disagreeing with me, please. You haven't given any good advice to anyone in the last 4 weeks!*

Miss Paula: *Well...the other day I went shopping with my daughter, and I managed to advise her not to buy a pair of hideous shoes... I suppose that counts as a good advice!*

Psychologist: *Very good, very good. But right now **you are so incapable of predicting someone's reactions that you were incapable of making anyone smile in the last couple of months!***

Miss Paula: *Oh, that's not true... For example last night at dinner I made my husband laugh!*

Psychologist: *Excellent work, Miss Paula. **But I'm certain that you don't know any way you can help yourself sleep better at night.***

Miss Paula: *Actually it was pretty hard to find a comfortable position to sleep – you know, after the surgery. But now that I got the hang of it, I know the trick!*

Psychologist: *Very well, Miss Paula. **But surely you can't find a way to calm yourself down if you wake up in the middle of the night with nightmares.***

Miss Paula: *Well... like I said, it was rough in the beginning – I had many nightmares, you know. I couldn't stop thinking about the disease. But now everything is better – I know that if I wake up I just need to breathe calmly and remember that everything will be alright!*

Psychologist: *Excellent! You're doing beautifully. Miss Paula, **due to your health condition and to the long and tiring treatment you have made, it seems that there aren't many things which you could expect to do in the near future that would mean something to you!***

Miss Paula: *No, I can't agree with that. I thought a lot about this in the last couple of weeks and have decided to live my life to the maximum – I'm planning to do the things I never could do, like taking a cooking class, visiting the south of France, taking long walks with my children more often, and smiling everyday that I can! You know...I really am very strong!*

Psychologist: *Very well! Thank you, you did a great job!*