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**Symptoms of posttraumatic stress, quality of life
and post-traumatic growth among cancer patients
and survivors: The role of psychological flexibility**

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Sintomas de stresse pós-traumático, qualidade de vida e crescimento pós-traumático em doentes oncológicos e sobreviventes. O papel da flexibilidade psicológica.

Resumo

O cancro é frequentemente considerado um acontecimento traumático, envolvendo sintomas de stresse pós-traumático que podem comprometer o bem-estar dos doentes durante o curso da doença e após a mesma. Estes sintomas podem dificultar a regulação emocional dos doentes, conduzindo a maior *distress* psicológico e a um decréscimo na perceção da qualidade de vida (QdV). Porém, estes sintomas foram também associados a crescimento pós-traumático (CPT) entre os sobreviventes de cancro, assim enfatizando as diferentes possibilidades de ajustamento que podem emergir após um evento traumático. Neste contexto, o objetivo deste estudo foi estudar o papel da flexibilidade psicológica, uma variável chave na promoção da saúde mental, na associação entre os sintomas de stresse pós-traumático, a QdV e o CPT, numa amostra de doentes com cancro e sobreviventes.

A amostra deste estudo transversal foi composta por 73 participantes, um grupo de doentes com cancro em tratamento ($n = 39$) e um grupo de sobreviventes ($n = 34$). Os participantes completaram questionários de auto-resposta que avaliaram os sintomas de stresse pós-traumático (PCL-C), a flexibilidade psicológica (AAQ-II), a qualidade de vida (WHOQOL-Bref) e o crescimento pós-traumático (PTGI-SF).

Os resultados deste estudo mostraram que os sintomas de stresse pós-traumático estavam associados a menor QdV, contudo, não se encontravam associados de forma estatisticamente significativa ao CPT. A moderação da flexibilidade psicológica nas associações estudadas não foi significativa. Observou-se uma moderação moderada, indicando uma moderação da fase da doença na associação entre os sintomas de stresse pós-traumático, a flexibilidade psicológica e a QdV geral, entre os doentes com cancro.

Este estudo reitera a utilidade e propósito da flexibilidade psicológica enquanto variável promotora de saúde, considerando a sua associação com uma melhor QdV. Uma atenção especial deve ser dada a esta variável entre doentes com cancro, em particular pelo seu papel moderador na associação entre os sintomas de stresse pós-traumático e a QdV geral.

Palavras-chave: cancro, sintomas de stresse pós-traumático, qualidade de vida, flexibilidade psicológica, crescimento pós-traumático

Symptoms of posttraumatic stress, quality of life and post-traumatic growth and among cancer patients and survivors: The role of psychological flexibility

Abstract

Cancer is often considered a traumatic event and may encompass the experience of symptoms of posttraumatic stress, which may compromise the patient's well-being over the course of illness and beyond. These symptoms can hamper patients' emotional regulation, leading to psychological distress and worsening their perception of quality of life (QoL). Nevertheless, these symptoms have also been associated with posttraumatic growth (PTG) among cancer survivors, highlighting the different possibilities of adjustment that can emerge after a traumatic event. In this context, the aim of this study was to examine the role of psychological flexibility, a key variable in mental health promotion, in the association between symptoms of posttraumatic stress, QoL and PTG, among cancer patients and survivors.

The sample of this cross-sectional study consisted of 73 participants, one group of cancer patients in treatment ($n = 39$) and one group of cancer survivors ($n = 34$). Participants completed self-reported questionnaires assessing symptoms of traumatic stress (PCL-C), psychological flexibility (AAQ-II), quality of life (WHOQOL-Bref), and posttraumatic growth (PTGI-SF).

The results of this study showed that symptoms of traumatic stress were associated with reduced QoL, however, they were not significantly associated with PTG. Psychological flexibility was significantly associated with QoL, but not with PTG. The moderation of psychological flexibility was not significant. A moderated moderation was found, which indicated a significant moderation of the disease stage in the association between symptoms of posttraumatic stress, psychological flexibility and overall QoL, among cancer patients.

The results of this study reiterate the usefulness and purposefulness of psychological flexibility as a health promoting variable, considering its association with better QoL. A special attention should be given to this variable among cancer patients, particularly because of its moderating role in the association between symptoms of traumatic stress and overall QoL.

Keywords: cancer, symptoms of posttraumatic stress, quality of life, psychological flexibility, posttraumatic growth

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Introduction

Considering its diagnosis and treatment, cancer is a disease that entails multiple stressors, such as physical, emotional, practical and social demands, which may impact the individual adaptation (Cordova, Riba, & Spiegel, 2017). Being often considered a traumatic event, cancer may involve the experience of symptoms of posttraumatic stress, which presence and impact may be common and widespread in both cancer patients and survivors (Cordova et al., 2017; Tremolada, Bonichini, Basso, & Pillon, 2016), may have a negative impact on individuals' quality of life (QoL) and influence their posttraumatic growth (PTG). In this context, our aim is to examine the regulatory influence, in the association between symptoms of posttraumatic stress, QoL and PTG, of a variable that has been gradually considered an important aspect of health, psychological flexibility. Our study's hypothesis is grounded on the notion that psychological flexibility embodies promotion of adaptation to situational demands, reconfiguration of mental resources, shifts in perspective, and balance between competing desires, needs, and life domains (Kashdan & Rottenberg, 2010) and, consequently, a reduction of psychological distress as well as mood disturbances (Leonidou, Panayiotou, Bati, & Karekla, 2016; Feros, Lane, Ciarrochi, & Blackledge, 2013). To the best of our knowledge, these associations have yet to be studied altogether and in the context of cancer. Taking this into account, the results of this study may increase not only our understanding of the adjustment process to cancer, but may also help devising psychosocial interventions that are sensitive to health-preserving factors, such as psychological flexibility.

The current work is divided in six distinct parts. On the first part, we present the state-of-the-art, which resulted from our literature search on the following topics: cancer as a traumatic event, symptoms of posttraumatic stress, QoL and PTG, and psychological flexibility. On a second part, we present the study's objectives and hypotheses, which were formulated based on the literature review. In a third section, we detail the study's methods, which include information about participants, procedures, measures and data analysis. On the fourth part, we present the results of the study and then their discussion and interpretation, also based on the reviewed literature. Lastly, we present the main conclusions, and provide the limitations, strengths and implications of the present study.

I – Theoretical framework

Trauma and cancer as a traumatic event

The definition of trauma is complex, especially if we consider that the response to stressors is highly variable across individuals (Briere, 1997). In addition, the expression of clinical distress following exposure to a traumatic event varies, and encompasses a multitude of symptoms of different realms (American Psychiatric Association [APA], 2013), which, in turn, can lead to the expression of different disorders. As stated by Wilson and Keane (2004, p. 8): “traumatic events are defined by the existence of stressors that have differential effects on organismic functioning”. It is also noteworthy that the type of trauma experienced may elicit different clinical outcomes (Frans, Rimmo, Aberg, & Fredrikson, 2005). For example, these authors reported that experiencing sexual and physical assault was associated with greater risk of developing post-traumatic stress disorder (PTSD), the most widely studied disorder entailing traumatic stress-like reactions. On the other hand, traffic road accidents were associated with the lowest risk.

Among physical illnesses, the diagnosis of cancer is often associated with stress and is considered a potentially traumatic event. Cancer is the second leading cause of death in the western world, and a disease that affects individuals of “both genders, all ages and ethnic backgrounds” (Cohen, McChargue, & Collins, 2003, p. 325). Considering that cancer is a serious health risk, its psychological ramifications were also subject to numerous studies that assessed the different possibilities of adjustment that it posits. However, it is also important to note that cancer is not a single pathological entity, it is “a family of diagnoses that affect different body sites, including the breasts, prostate, lungs, brain, gastrointestinal organs, skin, soft tissues and blood” (Cohen et al., 2003, p. 325), which makes its full comprehension a complex challenge that is important to address.

Concerning cancer conceptualized as a traumatic event, it is also noteworthy that it differs from other traumatic events (Kangas, Henry, & Bryant, 2002). These authors indicated that experiencing cancer may involve multiple traumatic events over the course of diagnosis and treatment. On the other hand, according to Meeske, Ruccione, Globe, and Stuber (2001), “as with other traumatic events, a diagnosis of cancer evokes feelings of intense

fear, helplessness, or horror and can precipitate a full cluster of symptoms that fulfil the criteria for PTSD” (p. 482). Consequently, in 1994, the APA added “being diagnosed with a life-threatening illness” to the diagnostic and statistical manual of mental disorders [DSM] as a potential precipitating event for PTSD (APA, 1994, p. 424). The most recent version of DSM-5 posits that cancer is only considered a traumatic event when is “sudden” and “catastrophic” (APA, 2013).

Regarding the symptoms that may arise after a very stressful situation such as cancer, they are grouped into clusters that together comprise PTSD. These clusters are defined by four interrelated sets of symptoms that include: (1) re-experiencing trauma (intrusion); (2) avoidance, numbing and coping patterns; (3) hyperarousal; and (4) negative modifications of cognition and mood (APA, 2013). Many individuals, in the aftermath of traumatic events may, at some level, experience some of these symptoms. This means that people will often re-experience persistently the event, have recurrent memories, nightmares, physiological arousal when presented with stimulus related to the event, and have flashbacks and intense distress after being exposed to stimulus associated with the event. People may also avoid the stimulus related to the event and have negative modifications of cognition and mood (APA, 2013). In addition, Wilson and Keane (2004) suggested that “the traumatic event may also challenge belief systems concerned with meaning, faith, expectancies about humanity and life itself” (p. 12). Parallel to these modifications, and according to these authors, there are disruptions on the interpersonal relationships, patterns of intimacy, conceptions of oneself and personal identity. Kirkpatrick and Heller (2014) also commented on the aetiology of PTSD, proposing that it is maintained by “a failure of recovery caused in part by altered fear learning; i.e., the failure to extinguish behavioural responses to stimuli associated with the trauma” (p. 359), thus highlighting the reason for the presence of symptoms over time.

This evidence reiterates the debilitating nature of the symptoms of posttraumatic stress, also stressing its multidimensional detrimental effects, which is especially important when they occur concomitantly with cancer. In this context, considering that cancer is a potentially chronic and debilitating illness, it is frequently accompanied by mental health symptoms, specifically symptoms of anxiety and depression, but also symptoms of posttraumatic

stress (e.g., Cordova, Riba, & Spiegel, 2017; Mitchell et al. 2011). Because cancer covers a range of aversive associated events, noxious treatments; disfigurement and dysfunctions; aversive disease and/or treatment side effects, as well as disruptions of one's physical, social, and occupational functioning (Kangas et al., 2002), the probability of cancer patients developing mental health symptoms is heightened. Overall, cancer diagnosis and treatment pose a cascade of physical, emotional, practical and social demands on the individual (Cordova et al., 2017). It is important to note, however, that these aversive events may impact cancer patients differently, according to the severity of the disease and its prognosis.

Epidemiological studies developed in the general population showed that not all people exposed to traumatic events develop PTSD (Frans et al., 2005), however, because of the debilitating nature of PTSD, the number is not negligible. Regarding the prevalence of PTSD in the general population, Kessler et al. (2005) estimated a total of 6.8% of lifetime prevalence of the disease in the United States (US). More recently, a survey of the lifetime occurrence of PTSD in the US adult population found prevalence rates of 4% in men and 11.7% in women (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012). In Portugal, an epidemiological study within the general population demonstrated that 75% of Portuguese adults have been exposed to at least one traumatic event, and 43.5% to more than one (Albuquerque, Soares, Jesus, & Alves, 2003). These authors found an overall prevalence rate of PTSD of 7.87% (that is, 205 out of 2606 fit the diagnostic criteria). This prevalence is consistent with the prevalence rates that have been earlier found on other international studies (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995), but higher than the prevalence rates reported in several recent World Mental Health Surveys (e.g., Bromet et al., 2016; Koenen et al., 2017; Liu et al., 2017).

Regarding the population that is the focus of our study, cancer patients and survivors, a recent meta-analysis of prevalence rates of cancer-related PTSD examined the prevalence of this disorder in cancer survivors (Abbey, Thomson, Hickish, & Heathcote, 2015). These authors found that prevalence rates varied according to method of assessment; studies using self-reported measures yielded prevalence rates ranging from 7.3% and 13.8% (depending on the scoring method); on the other hand, studies using clinical interview

methods showed a mean prevalence of 6.4% for current cancer-related PTSD and 12.6% for lifetime cancer-related PTSD. Other studies (Amir & Ramati, 2002) found that 18% of cancer survivors suffered from current PTSD and 56% from partial PTSD (having sub-threshold PTSD). Along with other recent meta-analytic studies (Swartzman, Booth, Munro, & Sani, 2015), this evidence shows that PTSD symptoms are common and widespread after cancer, and include both full PTSD diagnosis and partial PTSD diagnosis.

Among cancer patients during treatment, Cella, Mahon and Donovan (1990) hypothesized that the recurrence of cancer could be understood as a traumatic event and increase the risk for stress response symptoms. These authors found that patients had intrusive and avoidance symptoms, whereas those who had the first recurrence and those who reported being completely surprised by the recurrence, reported significantly more of these symptoms. This evidence emphasized the detrimental impact of the sudden nature of the experienced event, thus predicting the presence of symptoms of traumatic stress. The range of these symptoms and the noxious effects associated with the presence of cancer may impact patients' well-being, thus endangering patient's perception of quality of life (QoL). In this context, studying this association as well as clarifying the underlying factors that support it, may be a significant advance towards a new understanding of this phenomenon.

Symptoms of posttraumatic stress and quality of life

A growing body of research has asserted the negative effect of PTSD on QoL, for different types of trauma (e.g., Fernandez et al., 2012; Giacco, Matanov, & Priebe, 2013; Zhao, Wu, & Xu, 2013; Zatzick et al., 1997). There is extensive evidence showing that PTSD (and PTSD symptoms) may disrupt individual's social functioning, psychological well-being, and self-assessed physical health and physical functioning (e.g., McCaslin et al., 2016; Schnurr, Lunney, Bovin, & Marx, 2009; Zatzick et al., 1997). Even for sub-syndromal PTSD, symptoms of posttraumatic stress (such as avoidance, hyperarousal and intrusion) have been shown to decrease patients' QoL (Abbey et al., 2015).

Among cancer patients, it has been shown that symptoms of post-traumatic stress are a common sequel after the recovery from cancer (Amir & Ramati, 2002) that may persist for longer time. As stated by Tremolada,

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Bonichini, Basso, and Pillon (2016), symptoms such as “intrusive thoughts about past illness or particularly stressful moments during treatment, physiological arousal at reminders of cancer and its treatment” (p. 7), remain common amid adolescent and young adult cancer survivors healed for many years. Irrespective of the nature of the traumatic event, the evidence is consistent that more symptoms of posttraumatic stress are significantly related to lower QoL (Giacco et al., 2013).

Also in the context of cancer, Meeske et al. (2001) conducted a study with young cancer survivors and concluded that PTSD was associated with poorer QoL (physical and mental) and increased psychological distress. Golden-Kreutz et al. (2005) also described the association between initial stress (after diagnosis) and poorer QoL in breast cancer patients, underlining the predictive value of initial stress in terms of QoL. According to these authors, women with more symptoms of posttraumatic stress at diagnosis were more likely to have lower levels of psychological QoL during adjuvant treatment and early recovery. Further evidence of this association has been found in a study by Schwartz and Drotar (2006), which concluded that childhood cancer survivors in early adulthood were more likely to have PTSD and to experience significantly less physical and psychosocial health-related QoL. In another study among women earlier treated for early stage breast cancer, it was found that more symptoms of posttraumatic stress were significantly associated with lower QoL (Morrill et al., 2008).

It is important to note that there are cases on which the full criteria for PTSD was not clearly established, however, most cancer studies reported symptom levels (Meeske et al., 2001), thus making it equally plausible to hypothesize that sub-syndromal PTSD is a threat to patients’ perception of QoL (Andrykowski & Cordova, 1998). As noted, the fact that the symptoms of posttraumatic stress may persist for many years (Tremolada et al., 2016), underline the importance of studying the mechanisms associated with better adjustment after the occurrence of a traumatic event, as well as the need for a timely and specific psychological intervention. This specifically emphasizes the need (and importance) of addressing new possibilities of psychological adjustment, as well as the need of studying positive outcomes that might help to enhance patient’s care. Among these positive outcomes are QoL and posttraumatic growth (PTG), both examined in this study.

Symptoms of posttraumatic stress and posttraumatic growth

Recently, research endeavours have been gradually reoriented towards the study of positive outcome measures on mental health (Fledderus, Bohlmeijer, Smit, & Westerhof, 2010). In this line of research, important benchmarks associated with better adjustment have been proposed and studied. Specifically, and within the scope of our study, concepts such as QoL and PTG have been subject of greater empirical attention.

The idea that from coping with a traumatic event can emerge a new stage of development, or a sense of personal growth, has been abundantly referred in the literature (Calhoun & Tedeschi, 2006) and embodied in the concept of posttraumatic growth. To clarify what exactly is PTG, Calhoun and Tedeschi, conceptualized PTG into three general domains: changes in the perception of self, changes in the experience of relationships with others, and changes in one's general philosophy of life.

Regarding the first domain, changes in the perception of self, Calhoun and Tedeschi, (2006) stated that people that are facing a major life challenge often become aware of their vulnerability, but also of their strength and capacity to overcome these challenges, and some individuals also experience the emergence of new possibilities in life, that is, “developing new interests, new activities, and perhaps embarking on significant new paths in life” (p. 5). Regarding the changes in the experience of relationships with others, people exposed to trauma experience a greater connection to other people in general, particularly an increased sense of compassion for other people who suffer. The authors also identified in this domain a greater sense of intimacy, closeness, and freedom to be oneself, disclosing even socially undesirable elements of oneself or one's experience among persons who have struggled with traumatic events. They mentioned that “although not always, family members do report a greater sense of intimate closeness in the process of dealing with the terminal illness or with the death of a beloved family member” (p. 6). Finally, these authors proposed a domain related to changes in one's general philosophy of life. In this domain, a changed way of prioritizing what is most important occurs. In the context of cancer, the authors gave the following example: “the goal of amassing a million dollar stock portfolio, for example, may become much less important than the relationship with one's family, when the possibility of loss of one's life exists

in the struggle with cancer” (p. 6).

The literature suggests an inverse association between symptoms of posttraumatic stress and PTG, however, there is also evidence suggesting no association (Antoni et al., 2001) or a curvilinear relationship between these variables (Lechner, Carver, Antoni, Weaver, & Philips, 2006). According to these authors, this curvilinear relationship is assumed that, theoretically, perceived threat is essential to elicit a perception of growth, but too much may overwhelm the individuals’ capacity to perceive growth. There is also evidence of a positive association between symptoms of posttraumatic stress and PTG (Helgeson, Reynolds, & Tomich, 2006). These authors, in a meta-analysis, concluded that higher PTG was associated with more intrusive and avoidant posttraumatic stress experiences. At a first glance, this evidence seems to be contradictory with the negative association between symptoms of posttraumatic stress and QoL, mostly if we consider that PTG is also conceptualised as a positive variable; however, according to Helgeson et al. (2006), “experiencing intrusive thoughts about a stressor may be a signal that people are working through the implications of the stressor for their lives, and those implications can lead to growth” (p. 810).

Posttraumatic stress can be understood as the engine of PTG (Joseph, Murphy, & Regel, 2012). Much like the engine, converting one form of energy into mechanical energy, posttraumatic stress can be converted into PTG through a benefit-finding approach. The adaptation to a traumatic event challenges the assumptive world, that is, challenges the views the individual holds about the world and himself, and requires moments of incredulity, denial and avoidance. It is important to acknowledge, however, that this process is necessary for positive reinterpretation and benefit-finding take place (Butler et al., 2005).

Connecting with the idea of working through the implications of trauma, theoretically, we can expect both symptoms of posttraumatic stress and PTG to co-occur. In cancer, there is evidence suggesting that cancer can be a traumatic stressor for some patients, as there is evidence suggesting that it may precipitate both traumatic stress and PTG, at times within the same individual (Cordova & Andrykowski, 2003). This means that symptoms of posttraumatic stress and growth can simultaneously occur in cancer patients.

Considering recent research, it is increasingly important to learn

more about the architecture of PTG, and its means of development, i.e., it is important to know what may contribute to a better psychological adjustment. In this context, we emphasize the low reliance on experiential avoidance (i.e., high psychological flexibility), mostly because it has been positively associated with PTG (Kashdan & Kane, 2011), and has been shown to be a key ingredient to psychological health, promoting adaptation to situational demands, reconfiguration of mental resources, shifts in perspective, and balance between competing desires, needs, and life domains (Kashdan & Rottenberg, 2010). This is particularly relevant because, as stated by Jim and Jacobsen (2008), “survivors who report greater emotional and cognitive processing of cancer tend to report greater growth” (p. 417).

Overall, these studies provide groundwork for a more systematic study of core concepts associated with better psychosocial adjustment during cancer treatment and survivorship. Therefore, in this study, new variables are being proposed and examined as facilitators of growth, that is, moderators of the relationship between symptoms of posttraumatic stress and PTG.

Psychological flexibility

Research has shown that coping styles can have an important role in psychological adjustment to cancer among individuals with symptoms of traumatic stress (Kashdan & Kane, 2011; Oniszczenko & Laskowska 2014), as well as with in the adjustment to other mental health symptoms such as anxiety and depression (e.g., Garnefski, Legerstee, Kraal, Kommer, & Teerds, 2002; Kulpa, Ziętałewicz, Kosowicz, Stypuła-Ciuba, Ziółkowska, 2016). Among cancer patients, and in the context of symptoms of traumatic stress, Amir and Ramati, (2002) demonstrated that the use of suppression (conceptualised as avoidance of the problem or situation) was significantly related to the presence of hyperarousal symptoms. In the same direction, a study with trauma survivors conducted by Marx and Sloan (2005) found that experiential avoidance predicted the severity of PTSD symptoms. This study also supported the idea that experiential avoidance may play an important role in the maintenance of psychological difficulties following a traumatic experience. Additional findings indicated that experiential avoidance was a significant predictor of emotional well-being and QoL (Aguirre-Camacho et al., 2017). In this study, these authors also found that small reductions on

experiential avoidance predicted small reductions in anxiety and depression, supporting the idea that experiential avoidance may be a crucial aspect in psychological adjustment.

The results of these studies reinforce the importance of developing adequate strategies to process psychological distress after a traumatic event. Indeed, according to Kashdan and Kane (2011), “to successfully process traumatic events, one must be willing to be in contact with private events such as emotions, memories, images, and bodily sensations that often elicit painful reactions” (p. 85). The idea propelled by these authors overlaps with the concept of psychological flexibility. It is of note that although in the literature on this topic the terms experiential avoidance and psychological flexibility are often used interchangeably, experiential avoidance is the main acceptance and commitment therapy (ACT) term for lack of psychological flexibility (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996).¹

Psychological flexibility was defined by Hayes, Pistorello, and Levin (2012) as “contacting the present moment as a conscious human being, fully and without defense, as it is and not a what it says it is, and persisting or changing in behavior in the service of chosen values” (p. 985). According to the ACT, avoidant coping is expected to have a detrimental effect on QoL and overall adjustment to illness(es), while psychological flexibility may mitigate the psychological distress (Leonidou, Panayiotou, Bati, & Karekla, 2016). Psychological flexibility is considered a dynamic and fluid concept that promotes psychological health, spanning processes that are essential to healthy personal and social functioning beyond the simple absence of symptoms (Kashdan & Rottenberg, 2010). According to these authors, and as aforesaid, these processes involve individual adaptation to fluctuating demands of the situation, reconfiguration of mental resources, and shifts in perspective. Given its known health benefits, the importance of cultivating psychological flexibility, which is the aim of ACT, is increasingly becoming a focus of research attention.

¹ In the present study, although we use as the term psychological flexibility as a pivotal variable, the literature revision was mostly based on the term experiential avoidance, as this is the term more frequently used in the empirical studies that have been conducted to date.

For example, the effectiveness of ACT has been recently tested among cancer patients by Feros, Lane, Ciarrochi, and Blackledge (2013). The authors of this study concluded that ACT-based therapy sessions, focused on enhancing psychological flexibility, reduced mood disturbances and distress, and improved QoL. This study also concluded that changes in psychological flexibility predicted changes in mood, distress and changes in QoL at 3-month follow-up. Another example is a study of an intervention that through the enhancement of skills of acceptance and value-based action proved to be successful in promoting psychological well-being of individuals with mild to moderate psychological distress (Fledderus et al., 2010). The evidence of these studies reiterates the importance of studying psychological flexibility as a way of ameliorating mental health, and as a relevant mechanism in the association between symptoms of traumatic stress and QoL. Similar findings were found in relation to PTG. For example, Kashdan and Kane (2011) found that in the aftermath of trauma, people reporting greater distress and low reliance on experiential avoidance reported the greatest posttraumatic growth and meaning in life. This evidence thus reinforces the crucial role of psychological flexibility as means of facilitating PTG.

Overall, the results of the reviewed studies suggest that enhancing psychological flexibility may be a promising way of promoting individuals' mental health, and also emphasize that its influence is beyond palliative and can also be preventive. Accordingly, in the present study, we focused on the concept of psychological flexibility and, specifically, if psychological flexibility could be a moderator of the associations between symptoms of posttraumatic stress and both QoL and PTG.

The present study

Because psychological flexibility is a variable rooted in the resources of individuals, and considering the evidence that pre-dispositional variables may influence the coping style, the general aim of this study is to understand the importance of psychological flexibility (as a regulatory strategy) in the association between symptoms of posttraumatic stress and positive outcomes such as QoL and PTG in cancer patients and survivors, a population where these resources might enhance the emotional and psychosocial adjustment to cancer.

This study can contribute to a better understanding of the emotional adjustment of patients with cancer and survivors, by addressing potential mechanisms that may impact the perception of QoL and facilitate or inhibit PTG. The focus on psychological flexibility as an emotional regulation strategy may be particularly important to define more efficient psychological interventions for cancer patients and survivors. Although previous studies had been conducted with the aim of examining the association between symptoms of PTSD and QoL in patients with cancer (Meeske et al., 2001), this study introduces psychological flexibility as a new input that may clarify what influences this association. In addition, considering that our sample is divided in two groups, cancer patients (in treatment) and cancer survivors, we will also have the possibility of analysing the role of psychological flexibility in different stages of the illness. This information may be of great importance when planning the best timing for psychological interventions, thus enhancing their sensitivity and specificity. This study may therefore extend the literature on psychological flexibility, a relatively recent research topic, leading up to new scientific questions and possibly to new research endeavours.

II - Objectives

The general objective of the present study was to examine the role of psychological flexibility on the promotion of QoL and posttraumatic growth, among cancer patients and survivors. The specific objectives of this study were: (1) to characterize the symptoms of posttraumatic stress, psychological flexibility, QoL and PTG in a sample of cancer patients and survivors; (2) to analyse the association between symptoms of traumatic stress, psychological flexibility, QoL and PTG in the two study groups; (3) to test if psychological flexibility is a regulatory strategy that moderates the association between symptoms of posttraumatic stress and different domains of QoL (see Figure 1); and (4) to test the moderation role of psychological flexibility in the association between symptoms of posttraumatic stress and PTG (see Figure 1). Finally, for both study outcomes, we will also examine if this moderation is similar for cancer patients and survivors (see Figure 2).

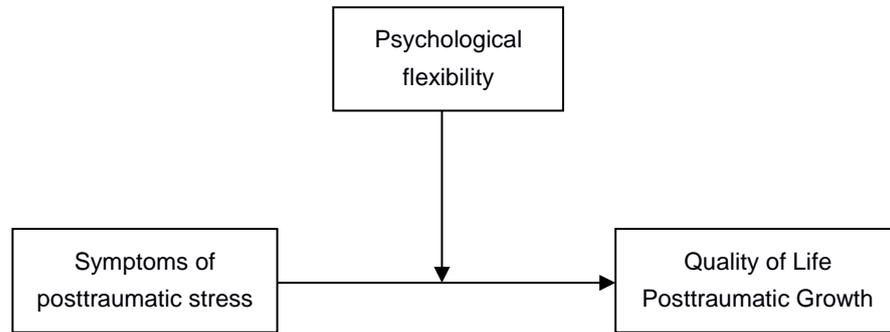


Figure 1. Graphic representation of the moderation role of psychological flexibility in the association between symptoms of posttraumatic stress and the study outcomes (QoL and PTG)

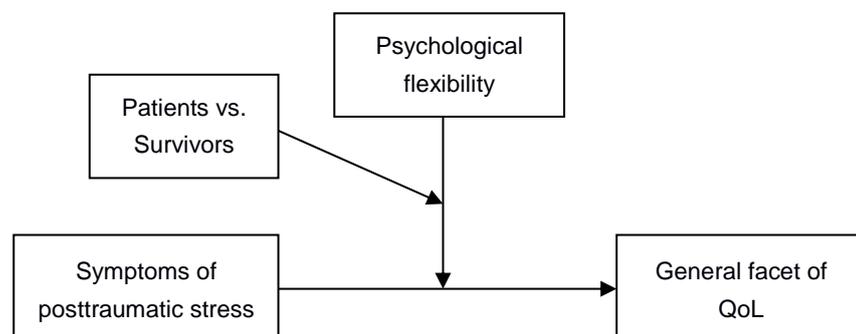


Figure 2. Graphic representation of the moderation role of psychological flexibility in the association between symptoms of posttraumatic stress and the study outcomes (QoL and PTG), moderated by the stage of cancer (patients in treatment vs. survivorship)

Given the objectives and the literature review, we hypothesized that: (1) PTG would be higher in the survivors group and that cancer patients would report lower QoL than survivors; (2) symptoms of posttraumatic stress would be negatively associated with QoL and positively associated with PTG; (3) psychological flexibility would be positively associated with both QoL and posttraumatic growth; (4) among individuals with increased psychological flexibility, the association between symptoms of posttraumatic stress and QoL domains would be weaker; (5) among individuals with higher psychological flexibility, the association between symptoms of posttraumatic stress and PTG would be stronger, therefore indicating that psychological flexibility is a facilitator of growth in the aftermath of a traumatic event such as cancer. Given the absence of literature, no specific hypotheses were defined for the potential moderation of the stage of disease.

III – Method

Participants

The sample of this cross-sectional study consisted of 73 participants, one group of cancer patients in treatment ($n = 39$) and one group of cancer survivors ($n = 34$). The inclusion criteria of this study were: being 18 years or older, having a formal diagnosis of cancer or being a cancer survivor (in this study, a survivor was defined as an individual undergoing follow-up care (Tremolada et al., 2016)), having the ability to write and read in Portuguese, as well as the ability to provide written informed consent.

The sociodemographic characteristics of the study groups are shown in Table 1. Overall, the total sample comprised mostly females (78.1%) and had a mean age of 60.10 years ($SD = 10.07$; range: 39-84). Most participants had primary education (67.6%) and were married/lived as married (66.7%). The comparative analysis between cancer patients and survivors indicated no significant differences on sociodemographic characteristics.

Table 1. Participants' characteristics, by study group ($N = 73$)

	Cancer patients ($n = 39$)		Survivors ($n = 34$)		χ^2	Cramer's V
	<i>n</i>	%	<i>n</i>	%		
Sex					0.97	.04
Male	8	20.5	8	23.5		
Female	31	79.5	26	76.5		
Education					5.34	.27
Primary	26	76.5	20	60.6		
Secondary	7	20.6	7	21.2		
Tertiary	1	2.9	5	15.1		
Marital status					6.49	.30
Single	3	7.7	1	3.0		
Married	25	54.3	21	63.6		
Living as married	0	0	2	6.1		
Divorced	7	17.9	2	6.1		
Widowed	4	10.3	7	21.2		
	<i>M (SD)</i>		<i>M (SD)</i>		<i>t</i>	<i>Cohen's d</i>
Age (years)	59.03 (9.66)		61.32 (10.53)		0.97	.23

* $p < .05$; ** $p < .01$; *** $p < .001$.

Regarding cancer, breast cancer was the most common type of cancer among the group of patients ($n = 15$, 57.7%) and survivors ($n = 11$, 55%). Among the remaining participants, the types of cancer included genitourinary cancers, head and neck cancers, leukemia and lymphoma, lung cancer, colon-rectal cancer, and stomach cancer.

Procedures

This study was authorised by the board of Liga Portuguesa Contra o Cancro, and approved by the Ethics Committee of Research in Psychology of the Faculty of Psychology and Educational Sciences of the University of Coimbra.

The study sample was recruited through a non-probabilistic method (by convenience) in Liga Portuguesa Contra a Cancro, North section – Porto, a non-governmental organization that supports people with cancer. The participants' recruitment occurred between October 2016 and June 2017. A total of 150 participants were initially contacted, five of which refused to participate in the study and 72 that failed to return the set of questionnaires (participation rate = 48.7%).

All participants were informed about the aims and procedures of the study, and those who agreed to participate provided us with written informed consent. All participants that were recruited were volunteers and had the opportunity to withdraw from the study at any time. The confidentiality of the personal information and anonymity of the participants was ensured. The participants had also the option of being informed about the results of the study.

Measures

The assessment protocol included a questionnaire on demographic and clinical information and four self-reported questionnaires.

Sociodemographic and clinical characteristics

The sociodemographic and clinical characteristics were assessed with a self-reported questionnaire and included the following information: age, sex, marital status, professional situation, educational level, type of disease, time since diagnosis and treatment regimen.

PTSD Checklist Civilian Version

The PTSD Checklist Civilian Version (PCL-C; Weathers, Litz, Huska, & Keane, 1994; Portuguese version: Marcelino & Gonçalves, 2012) is a self-reporting rating scale for PTSD, which comprises 17 items that correspond to key symptoms of PTSD, according to DSM-IV criteria. The items assess three symptoms clusters, corresponding to the three diagnostic criteria: B (Re-experiencing), C (Avoidance) and D (Hyper-activation). Items are answered in a five-point response scale, ranging from 1 (not at all) to 5 (extremely). The PCL-C has proven to be useful as a screening measure for assessing possible presence of PTSD, has good psychometric properties, and was tested in different contexts of trauma (sexual assault, war, cancer) (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). This scale has three different ways of scoring: (1) continuous measure of the severity of PTSD symptoms (calculated with the sum of all 17 items); (2) Scores of the three clusters of PTSD symptoms (average of each cluster, B items ranging from 1 to 5, C 6-12, and D 13-17); and (3) Presence of a diagnosis of PTSD (including only item scores of at least 3 points and then following the rules provided in DSM; e.g., Criteria B at least 3 symptoms; hence, 3 items from 1 to 5 with 3 points at least). The Portuguese version of PCL-C revealed adequate psychometric properties (Marcelino & Gonçalves, 2012). In this study, Cronbach's alpha was .94 for both study groups, and ranged from .79 (Hyper-activation - survivors) to .91 (Re-experiencing – survivors) for the symptoms clusters.

WHOQOL-Bref

The WHOQOL-Bref is the abbreviated version of the questionnaire WHOQOL-100, and is composed by 26 items with the aim of assessing the perception of QoL (WHOQOL Group, 1998; Portuguese version: Vaz-Serra et al., 2006). This questionnaire can be self-administered and, if necessary, interviewed-assisted or interviewed-administered. One of the major strengths of the WHOQOL-Bref is its cross-cultural development, which allows the comparison of QoL across cultures (World Health Organization, 1997). The WHOQOL-Bref yields a multidimensional profile across the following four domains: Physical, Psychological, Social relationships, and Environment. The WHOQOL-Bref covers 24 items, each one representing specific facets

or aspects of QoL (e.g., pain and discomfort, social support). One additional facet (2 items) pertains to global QoL and general health. The items are answered on a five-point response scale, in which 1 indicated a low, negative perception and 5 indicated a high, positive perception of QoL. All domain scores were transformed to create a 0 to 100 scale on which a higher score corresponded to a better QoL. There is no total score for the WHOQOL-Bref. Acceptable reliability and validity of the European Portuguese version of the WHOQOL-Bref has been demonstrated (Vaz Serra et al., 2006). In the current study, the Cronbach's alpha ranged from .73 (Social relationships – cancer patients) and .85 (Physical - survivors).

AAQ-II

The Acceptance and Action Questionnaire (AAQ-II; Bond et al., 2011; Portuguese version: Pinto-Gouveia, Gregório, Dinis, & Xavier, 2012) is a questionnaire that assesses psychological inflexibility/flexibility. The AAQ-II comprises seven items, which are answered on a seven-point response scale ranging from 1 (never true) to 7 (always true). The seven items produce a total score of psychological flexibility, which represents individual's ability to be aware and accepting of ongoing experiences and engage in values-consistent behaviour (Bond et al., 2011). The total score range between 10 and 70, and higher scores represent greater experiential avoidance (lower psychological flexibility). Similarly, to the original version, exploratory and confirmatory factor analysis supported a single-factor model for the Portuguese version of the AAQ-II. The Portuguese version presented good internal consistency, as well as convergent and divergent validity (Pinto-Gouveia et al., 2012). In the present sample, the Cronbach's alpha was of .93 for both study groups.

PTGI – short form

The Posttraumatic Growth Inventory – Short Form (PTGI-SF; Cann et al., 2010; Portuguese version: Lamela, Figueiredo, Bastos, & Martins, 2014) is a measure for assessing positive outcomes reported by persons who have experienced traumatic events (Tedeschi & Calhoun, 1996). The PTGI-SF comprises 10 items with six response alternatives, ranging from 0 (“I did not experience this change as a result of my crisis”) to 5 (I experienced this change to a very great degree as a result of my crisis”). Scores on the PTGI-

SF range between 0 and 50, with higher scores reflecting a higher level of PTG. This inventory assesses the following five factors: new possibilities, relating to others, personal strength, spiritual change, and appreciation of life (Cann et al., 2010). These factors are equivalent to the full form of the PTGI (Tedeschi & Calhoun, 1996). The original psychometric studies of the PTGI-SF demonstrated satisfactory reliability and validity (Cann et al., 2010). The Portuguese version has the same five-factor structure as the original, and also showed acceptable psychometric properties of reliability and validity (Lamela, Figueiredo, Bastos, & Martins, 2014). In the sample of the present study, the Cronbach's alpha was .93 for patients and .95 for survivors.

Data analysis

Data analyses were conducted using the Statistical Package for the Social Sciences (IBM SPSS, version 20.0). Descriptive statistics were first performed to assess the sample's characteristics. Pearson's correlations were conducted to assess the associations between the study variables. Chi-square and Student t test were used to compare the study groups in respectively categorical and continuous variables. To assess the existence of differences between cancer patients and survivors in the study variables (symptoms of posttraumatic stress, psychological flexibility, QoL and PTG), we performed univariate or multivariate analysis of variance (ANOVA or MANOVA).

Moderation analyses were conducted using PROCESS, a modeling tool that integrates many functions of existing statistical tools for mediation and moderation, and an integration of both (Hayes, 2013). In this study, it was performed a simple moderation (Model 1; Figure 1), where the effect of a variable of interest (symptoms of traumatic stress) on other variable (QoL domains; PTG), is influenced or dependent on a third variable (moderator; psychological flexibility, and a moderated mediation (Model 3; Figure 2), in which was included an additional moderator (cancer patients vs. survivors) to the analysis.

Effect sizes were calculated using Cramer's V , Cohen's d and Partial Eta Squared (η_p^2), adopting the following conventions: small effect: Cohen's $d \geq .20$, Cramer's $V \geq .10$, $\eta_p^2 \geq .01$; medium effect: Cohen's $d \geq .50$, Cramer's $V \geq .30$, $\eta_p^2 \geq .06$; large effect: Cohen's $d \geq .80$, Cramer's $V \geq .50$, $\eta_p^2 \geq .14$ (Cohen, 1992). Statistical significance was set at the alpha .05 level.

IV - Results

Comparison of study variables between cancer patients and survivors

Regarding the symptom clusters and total score of symptoms of PCL-C, significant differences were found between cancer patients and survivors, (Wilks' Lambda = .80, $F(3, 63) = 5.14$, $p = .003$, $\eta_p^2 = .20$). The subsequent test indicated that cancer patients reported significantly higher levels of symptoms of posttraumatic stress than survivors (see Table 2).

In relation to QoL, a significant multivariate effect was found (Wilks' Lambda = .77, $F(5, 64) = 3.84$, $p = .004$, $\eta_p^2 = .23$). The follow-up univariate tests indicated significant differences in the domains physical, psychological and environment, as well as in the general facet of QoL. Specifically, cancer patients reported significantly lower scores in all dimensions of QoL.

Table 2. Comparison of symptoms of traumatic stress, QoL, PTG and psychological flexibility between cancer patients and survivors

	Cancer patients	Survivors	<i>F</i>	η_p^2
	(<i>n</i> = 39)	(<i>n</i> = 34)		
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)		
Symptoms of posttraumatic stress				
Re-experience – B	2.89 (1.01)	2.21 (0.88)	8.18**	.11
Avoidance – C	2.50 (0.91)	1.91 (0.77)	8.12*	.11
Hyper-activation - D	2.98 (1.11)	2.06 (0.75)	15.30***	.19
Total ^a	46.86 (15.02)	34.77 (11.47)	13.36**	.17
Quality of life				
Physical	50.50 (17.62)	67.23 (16.25)	17.00***	.20
Psychological	59.49 (22.33)	72.18 (15.00)	7.70**	.10
Social relationships	61.57 (23.84)	65.44 (19.90)	0.54	.01
Environmental	57.12 (16.03)	66,64 (15.17)	6.49*	.09
Overall QoL	51.74 (20.73)	66.54 (15.91)	11.14**	.14
Posttraumatic growth				
Relationship with others	3.67 (1.86)	4.01 (1.68)	0.67	.009
New Possibilities	3.41 (1.67)	3.59 (1.73)	.020	.003
Personal strength	4.08 (1.66)	4.06 (1.64)	0.003	.000
Spiritual change	3.25 (2.01)	3.50 (1.80)	0.31	.004
Appreciation of life	4.09 (1.67)	3.93 (1.54)	0.19	.003
Posttraumatic growth (Total) ^a	3.70 (1,50)	3.82 (1.52)	0.11	,002
Psychological flexibility				
Psychological flexibility ^a	26.71 (11.32)	19.47 (9.41)	8.27**	.11

* $p < .05$; ** $p < .01$; *** $p < .001$

^a Univariate analysis of variance (ANOVA)

Regarding the dimensions of PTG, no differences were found between cancer patients and survivors (Wilks' Lambda = .96, $F(5, 66) = 0.49$, $p = .786$, $\eta_p^2 = .04$). Similarly, no significant differences were found regarding the total score ($p = .742$).

Finally, in relation to psychological flexibility, the results also showed significant differences between cancer patients and survivors ($p = .005$), with cancer patients reporting significantly higher experiential avoidance (that is, lower psychological flexibility) than survivors.

Associations between symptoms of posttraumatic stress and QoL and PTG

In this study, the associations between symptoms of traumatic stress and the study outcomes, QoL domains and PTG, for both survivors and cancer patients, were also examined. The results are presented in Table 3.

Considering the association between the three criteria evaluated by the PCL-C scale and its total score, and the different domains of QoL, overall, the results indicated significant and negative associations between these variables. This pattern of association was similar for both cancer patients and survivors; however, in the group of survivors the criterion Re-experience was not significantly associated with any QoL domain. In both groups, the correlations between symptoms of posttraumatic stress and PTG were not significant.

Table 3. Correlations between symptoms of traumatic stress, QoL and PTG among cancer patients and survivors

	PHY	PSY	SOC	ENV	QOL	PTG
Cancer patients						
Re-experience – B	-.44**	-.54**	-.33	-.53**	-.35*	-.24
Avoidance - C	-.70***	-.55**	-.37*	-.52**	-.36*	-.03
Hyper-activation - D	-.45**	-.68***	-.46**	-.52**	-.26	.03
Total	-.53**	-.57***	-.36*	-.58**	-.41*	.03
Survivors						
Re-experience – B	-.27	-.30	-.32	-.25	-.24	.15
Avoidance - C	-.39*	-.54**	-.41*	-.52**	-.57**	-.18
Hyper-activation - D	-.53**	-.55**	-.34	-.61***	-.58**	-.07
Total	-.33	-.45**	-.27	-.42*	-.34	-.04

Legend: PHY: Physical; PSY: Psychological; SOC: Social relationships; ENV: Environment; QOL: General facet on QoL and health; PTG: Posttraumatic growth

* $p < .05$; ** $p < .01$; *** $p < .001$

Associations between psychological flexibility and QoL and PTG

Regarding psychological flexibility, overall, and in both groups, the results indicated significant and negative correlations between psychological flexibility and the QoL domains. The exception was the association between the general facet of QoL and psychological flexibility in the group of cancer patients. No significant correlations were found with PTG. The correlations matrix is presented in Table 4.

Table 4. Correlations between psychological flexibility, QoL and PTG among cancer patients and survivors

	PHY	PSY	SOC	ENV	QOL	PTG
Cancer patients						
Psychological flexibility ^a	-.44**	-.63***	-.37*	-.50**	-.20	.06
Survivors						
Psychological flexibility ^a	-.47**	-.50**	-.39*	-.61***	-.53**	-.21

Legend: PHY: Physical; PSY: Psychological; SOC: Social relationships; ENV: Environment; QOL: General facet on QoL and health; PTG: Posttraumatic growth

^a Higher scores denote lower psychological flexibility (higher experiential avoidance)

* $p < .05$; ** $p < .01$; *** $p < .001$

Moderating role of psychological flexibility in the association between symptoms of posttraumatic stress and QoL

To test if the association between symptoms of posttraumatic stress and QoL domains was moderated by psychological flexibility, we computed a series of moderation analyses (Model 1) using PROCESS macro for SPSS. Symptoms of posttraumatic stress was the independent variable (X), psychological flexibility was the moderator (M) and the domains of QoL were the criterion variable (Y). All variables were centered before the analysis.

Results of the model using 10,000 bootstrap simulations, $R^2 = .27$, showed that symptoms of posttraumatic stress were negatively associated with the general facet of QoL, $b = -0.39$, $SE = 0.19$, $t(64) = -2.05$, $p = .045$, 95% CI [-0.77, -0.01], but not with psychological flexibility, $b = -0.31$, $SE = 0.27$, $t(68) = -1.18$, $p = .242$, 95% CI [-0.84, 0.21]. The interaction between symptoms of posttraumatic stress and psychological flexibility was marginally significant, $b = -0.02$, $SE = 0.01$, $t(64) = -1.89$, $p = .063$, 95% CI [-0.05, 0.00]. Regarding the QoL domains, the interactions between symptoms of posttraumatic stress and psychological flexibility were all non-significant (all $p > .450$), suggesting no moderation of psychological flexibility.

Moderating role of psychological flexibility in the association between symptoms of posttraumatic stress and PTG

A moderation analysis (Model 1) was also computed to examine if the association between symptoms of posttraumatic stress and PTG was moderated by psychological flexibility. Results of the model using 10,000 bootstrap simulations, $R^2 = .02$, showed that symptoms of posttraumatic stress were not associated with PTG, $b = -0.01$, $SE = 0.16$, $t(64) = 0.47$, $p = .643$, 95% CI [-0.25, 0.40], neither was psychological flexibility associated with PTG, $b = -0.21$, $SE = 0.22$, $t(64) = -0.93$, $p = .358$, 95% CI [-0.66, 0.24]. The interaction between these variables was not significant, $b = -0.0004$, $SE = .00$, $t(64) = 0.36$, $p = .718$, 95% CI [-0.002, 0.003].

Moderated moderation

To test the hypothesis of the moderation by psychological flexibility and disease stage, moderation analyses (Model 3) using PROCESS macro for SPSS were computed. Symptoms of posttraumatic stress were the independent variable (X). Psychological flexibility and disease stage (Group; dummy coded: 0 [survivor] or 1 [cancer patient]) were the moderators (M and W, respectively). Quality of life domains and PTG were the criterion variables (Y). All variables were centered before the analysis.

Overall, no significant interaction was found in relation to the QoL and PTG, which suggested no moderation of psychological flexibility and disease stage. However, a significant interaction was found in relation to the general facet of QoL.

Results of the model using 10,000 bootstrap simulations, $R^2 = .43$, showed posttraumatic stress symptoms were not significantly associated with the general facet of QoL, $b = -0.23$, $SE = 0.18$, $t(60) = -1.24$, $p = .221$, 95% CI [-0.59, 0.14], nor with psychological flexibility, $b = -0.26$, $SE = 0.25$, $t(60) = -1.02$, $p = .311$, 95% CI [-0.76, 0.25]. The interaction between these variables and disease stage was significant, $b = -0.07$, $SE = 0.03$, $t(60) = -2.68$, $p = .010$, 95% CI [-0.13, -0.02] – see Figure 3.

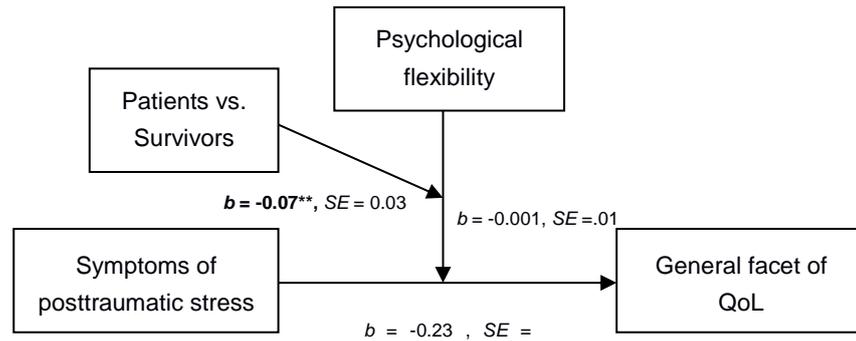


Figure 3. Moderated moderation diagram (Model 3). Path coefficients are presented for the direct association of symptoms of posttraumatic stress on general facet of QoL, for the moderating effect of psychological flexibility on this association, and for the moderating effect of group (cancer patients vs. survivors) on this moderation. $**p < .01$.

Examining the conditional effects of X (symptoms of traumatic stress) on Y (overall QoL), a detailed analysis indicated that symptoms of post-traumatic stress were associated with the general facet of QoL, $b = -0.92$, $SE = 0.23$, $t(60) = -3.94$, $p < .001$, 95% CI [- 1.39, -0.45] in the group of lower psychological flexibility (higher experiential avoidance) among the group of cancer patients (see Figure 4), but not in the group of survivors (Figure 5).

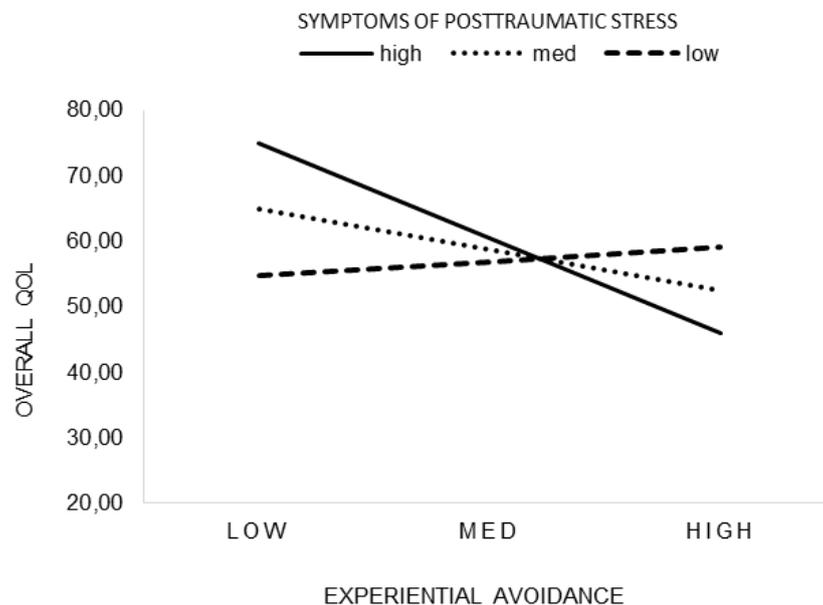


Figure 4. Conditional effect of symptoms of traumatic stress on General facet of QoL in cancer patients, and according to different levels of psychological flexibility/experiential avoidance. Scores for symptoms of traumatic stress and psychological flexibility are defined low (Mean minus one SD), average (Mean) and high (Mean plus one SD).

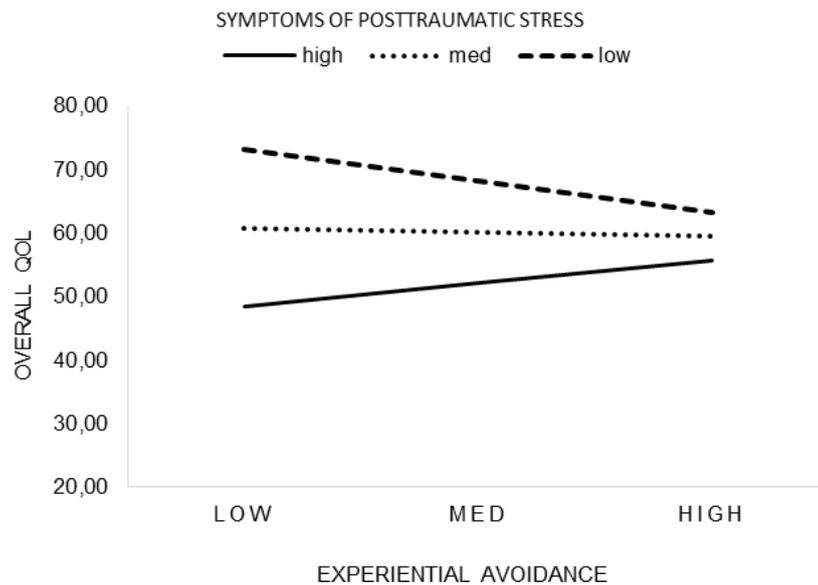


Figure 5. Conditional effect of symptoms of traumatic stress on General facet of QoL in survivors, and according to different levels of psychological flexibility/experiential avoidance. Scores for symptoms of traumatic stress and psychological flexibility are defined low (Mean minus one SD), average (Mean) and high (Mean plus one SD).

V – Discussion

Cancer, as a life-threatening disease, is considered a traumatic event comprising several challenges to the physical and psychological adjustment of the individual. These challenges may have numerous detrimental effects, translating into symptoms of traumatic stress (Abbey et al., 2015; Mitchell et al. 2011) and consequent decreases on individuals' QoL (Golden-Kreutz et al., 2005; Meeske et al., 2001; Morrill et al., 2008; Schwartz & Drotar, 2006). Nevertheless, we should not also disregard the transformative potential of trauma, considering it has been associated with PTG (Helgeson et al., 2006; Kashdan & Kane, 2011). In this study, in a sample of cancer patients and survivors, we examined the associations between symptoms of posttraumatic stress, QoL and PTG, also proposing psychological flexibility as a pivotal variable in these associations.

Regarding the differences between cancer patients and survivors, our results show that cancer patients reported more symptoms of posttraumatic stress than survivors, as well as lower perception of QoL, particularly in the physical, psychological, and environment domains, and on the general facet

on QoL and health. These findings are not surprising and reinforce the idea that cancer, along with its various treatment and symptoms, has a significant impact on individuals' well-being, namely in the multiple domains of QoL (e.g., Golden-Kreutz et al., 2005; Meeske et al., 2001; Morrill et al., 2008; Schwartz & Drotar, 2006), which is likely to improve alongside the end of treatments and acute symptoms, particularly during survivorship (Silva, Bettencourt, Moreira, & Canavarro, 2011). Additionally, this evidence reiterates previous findings (e.g., Mitchell et al. 2011; Oniszczenko & Laskowska, 2014; Tremolada et al., 2016) that suggest that symptoms of posttraumatic stress are present both among cancer patients and survivors, reinforcing that cancer is a potentially traumatic experience able to precipitate symptoms of PTSD (Meeske et al., 2001). The fact that cancer patients reported more symptoms of posttraumatic stress than cancer survivors is expected, principally considering that the prevalence of PTSD symptoms declines considerably within 3 months postdiagnosis or following treatment completion (Kangas, Henry, & Bryant, 2002). A likely explanation for this finding may be related to the perception of disease severity, which is likely to be greater in cancer patients than survivors, considering that survivors are already distanced from the active phase of treatment, being therefore in disease remission (Mosher & Danoff-Burg, 2009). Therefore, in agreement with the notion suggested by Danhauer et al. (2013), because the perceived threat is smaller among cancer survivors, it is also expected that psychological distress may also be reduced.

Regarding PTG, no significant differences were found between cancer patients in treatment and survivors. This result is consistent with what was found on other studies (Mosher & Danoff-Burg, 2009). Cancer survivors presented higher scores of PTG, which was expected due to re-calibration of the assumptive world, propelled by the examination of core beliefs that follows the exposure to the threat (Tedeschi & Calhoun, 2004). The lack of statistical significance in the difference between the study groups may be related to the small size of the sample that conveyed a lack of statistical power. In future studies it would be relevant to confirm this result.

In the present study, consistent with our hypothesis, symptoms of posttraumatic stress were significantly and negatively correlated with the different domains of QoL. This pattern of negative correlations was observed

in both cancer patients and survivors. The strongest correlations with the QoL domains were observed between the criteria C-avoidance, and D-Hyper-activation. These findings are in line with previous studies (e.g., Abbey et al., 2015; McCaslin et al., 2016; Schnurr et al., 2009; Zatzick et al., 1997) and support the idea that, for both patients and survivors, symptoms of post-traumatic stress are significantly related to a disruption of QoL, specifically highlighting the detrimental effect of avoidance and hyper-activation. Along with other symptoms, avoidance (perceived as a strategy to avoid distressing emotions) is likely to contribute to the failure to extinguish behavioural responses to stimuli associated with the trauma (Kirkpatrick & Heller, 2014), therefore having a negative impact on QoL. According to the same authors, fear extinction is conditioned by these symptoms, considering that they limit the exposure to safe reminders. Regarding the experienced hyper-activation, this symptom is related to somatic function and may also reflect fear of possible re-occurrence (Kangas, Henry, & Bryant, 2002). Consequently, this symptom has also a negative effect on mood and QoL.

In addition, no significant relationship was found between symptoms of posttraumatic stress and PTG. Despite being contrary to our hypothesis, this result was already found on other studies (Antoni et al., 2001; Kashdan & Kane, 2011). However, given the lack of coherent and consistent data about this association, it would be valuable to examine in future research this association, clarifying if this is indeed a curvilinear relationship as suggested on previous investigations (Lechner et al., 2006).

Concerning the association between psychological flexibility, the QoL domains and PTG, as hypothesized, greater experiential avoidance/lower psychological flexibility was associated with lower QoL, for both study groups, consistent with earlier studies demonstrating an association between avoidance and lower levels of QoL and well-being (e.g., Aguirre-Camacho et al., 2017). As mentioned, experiential avoidance is a futile attempt to alter the form, frequency or situational sensitivity of private events, paradoxically increasing their functional importance, considering they become more salient and verbally linked to negative outcomes (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Accordingly, individuals' QoL is at risk, considering the non-remission of symptoms and the association with their severity (Marx & Sloan, 2005). In relation to the association between psychological flexibility

and PTG, no significant association was found. This result is consistent with previous findings that evidenced no significant direct association (Kashdan & Kane, 2011) between experiential avoidance and PTG, thus, emphasizing the possibility of the two variables being associated through other variables (e.g., length of time since cancer diagnosis) and mechanisms (mediation or moderation). Further studies would be relevant to test these hypotheses.

Regarding our hypothesis of moderation of psychological flexibility in the association between symptoms of posttraumatic stress, QoL and PTG, no significant interactions were found, suggesting that psychological flexibility was not a significant moderator. These results may be partially explained by the small sample size, especially if we consider that the interaction was marginally significant for the general facet of QoL. However, we should also consider other explanations, such as the interaction of other variables already surveyed in other studies (e.g., Amir & Ramati, 2002; Jacobsen et al., 2002; Kashdan & Kane, 2011), which are plausible to influence this interaction, particularly social support. For example, Jacobsen et al. (2002) found a significant interaction effect between lower social support, higher avoidance coping, and PTSD symptom severity; therefore, this variable may also be a valuable addition to the proposed model. Another important note is that the role of psychological flexibility on the examined association might not be of moderator but of mediator. For example, in a study among cancer survivors, it was found that disengagement coping was a mediator between stress and mental health QoL and engagement coping was a moderator of the same association (Yang, Brothers, & Andersen, 2008). Considering this evidence, it is also important to consider the alternative model of the mediating role of psychological flexibility in the associations tested in this study. Indeed, since experiential avoidance has also been proposed as mediator, for instance in the relationship between maladaptive coping styles, emotional and psychological well-being, and psychopathology (Fledderus, Bohlmeijer, & Pieterse, 2010), further investigations must ascertain the best-fitting model for the role of psychological flexibility among cancer patients and survivors. Finally, another possible explanation for our results may relate to the heterogeneity between the two study groups. Considering that this model was tested with people in different stages of the disease, with the aforementioned differences in the symptoms of posttraumatic stress and QoL domains, it is possible that

the lack of significant findings may actually reflect the greater heterogeneity of the sample.

In line with this last assumption, we tested if the initial moderation was moderated by the stage of the disease (cancers patients vs. survivors). Our findings showed that the moderation of psychological flexibility of the association between symptoms of posttraumatic stress and the general facet of QoL was moderated by disease stage (the moderated moderations were not significant for the remaining QoL domains however). Particularly, this moderation was significant only for cancer patients. This moderated moderation means that among cancer patients, higher levels of avoidance (i.e., lower psychological flexibility), strengthened the negative association between symptoms of posttraumatic stress and overall QoL. A possible reason for this result may be related to differences about the importance of psychological flexibility as a regulator across different phases of the disease. For example, cancer patients are subject to more imminent cancer-related fears and greater perception of disease severity (Mosher & Danoff-Burg, 2009), which may contribute to a cascade of proximal consequences in terms of physical and emotional distress, and which often translate into symptoms of posttraumatic stress and concurrent lower QoL. Hence, this may increase cancer patients' tendency to rely more than cancer survivors on avoidant coping strategies to regulate their psychological adaptation to a cancer diagnosis as well as to the demands associated with its treatment. In line with this argument, Heim, Valach, and Schaffner (1997) found different correlations between variables of social adaptation and distress/well-being, and the same coping strategies over different cancer stages, therefore highlighting the differential impact of the same coping strategies on the assessed outcomes across different stages of cancer. This evidence reinforces that specific features of the interaction between symptoms of posttraumatic stress, psychological flexibility and QoL across different disease stages are rather plausible and merit further investigation.

VI - Conclusions

In conclusion, the findings of the present study suggest that symptoms of posttraumatic stress are common in cancer patients and survivors, and

particularly, among cancer patients, the group that reported higher levels of symptoms of posttraumatic stress and poorer QoL. Moreover, the negative association between these symptoms and the different domains of QoL highlight their detrimental impact on individuals' well-being. We did not find a significant association between symptoms of posttraumatic stress and PTG, which underlines the lack of consensus about the dynamics of this relationship, and reinforces the discussion by Jim and Jacobsen (2008) about the conflicting evidence existing on this topic. Further research is therefore needed to clarify the significance and direction of this association. Regarding psychological flexibility, we found that it was indeed an important variable, considering its positive association with different QoL domains, in line with a recent review that suggests this variable as a fundamental aspect of health (Kashdan & Rottenberg, 2010).

Additionally, our proposed models of moderation, although possibly lacking statistical power due to the small sample size, provided a valuable hint in creating a framework that clarifies the relationships among symptoms of posttraumatic stress, psychological flexibility and QoL and PTG, in both cancer patients and survivors. Specifically, particularly for cancer patients, we were able to find the important role of psychological flexibility in the association between symptoms of posttraumatic stress and overall QoL.

This study is not without limitations. First, it is important to recognize that the small sample size, the convenience sample, with greater proportion of breast cancer patients/survivors and female participants, and the cross-sectional study design, limit the generalizability of the results. Because of the sample size, we may have had lack of power to perform some of the tested models; therefore, it would be relevant to test these models in studies with larger samples. The cross-sectional design also prevents conclusions regarding causal associations between study variables. Further longitudinal studies should be undertaken to determine the directions of the associations reported herein. Second, the use of self-report questionnaires conveys some disadvantages such as social desirability bias and the likelihood that some participants may have not understood the questions properly. Third, other variables that were not assessed in the present study (e.g., social support) could have been important in explaining the moderation models proposed.

In future studies, the role of psychological flexibility, particularly if it

acts as moderator or mediator, also deserves to be closely observed. Indeed, new advances in research on this topic are warranted to better understand the psychological mechanisms that may have an important role in the adaptation to challenging events such as cancer. Future studies may also address other types of outcome measures, such as behavioral responses. These responses could be also valuable as they may demonstrate, for example, participants' engagement in valued actions, a variable that may be examined concurrently with psychological flexibility. Having these outcomes will also enable the comparison between data from self-reported measures and behavioral data.

Notwithstanding these limitations, this study has extended scientific literature on a relatively recent topic on psychological research, the concept of psychological flexibility. Furthermore, this study offers some valuable conclusions that may be translated into important clinical applications. Specifically, these possible clinical applications might be more sensitive to the pervasive nature of symptoms of posttraumatic stress and knowledgeable of its detrimental effects, as well as knowledgeable of adequate strategies to meet challenges imposed by cancer. This study highlights the necessity of an appropriate psycho-social screening of PTSD symptoms in both stages of the disease, active treatment and follow-up. In addition, by indicating a strong association between increased psychological flexibility and higher QoL, this study may help promote the development new psychotherapeutic approaches where psychological flexibility may have a greater focus, to confirm, as demonstrated on previous studies (e.g., Feros et al., 2013) that enhancing psychological flexibility is important to improve QoL. Moreover, by finding differences between cancer patients and survivors, in terms of symptoms of posttraumatic stress and QoL domains, as well as a moderated moderation of the disease stage, the present study emphasizes the importance of attending to specific needs, related to a particular phase of cancer. This knowledge may help clinicians to devise more specific psychotherapeutic interventions, taking into account the disease phase. This is particularly important, since the role of psychological flexibility seems to be relevant to the patient's QoL in the early phases of the disease. Another merit of the study is related to its contribution on extending the literature about psychosocial adjustment of cancer patients and survivors in Portuguese population. Lastly, it is also a strength of the study, the focus on mental health promoting variables, such

as psychological flexibility, and positive indicators of adjustment, such as different dimensions of QoL and PTG, drifting away from the traditional disease-centered approaches.

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