



Review

Association of catastrophizing and fatigue: A systematic review

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ABSTRACT

Objective: Catastrophizing is an exaggerated negative evaluation and attention to specific symptoms such as pain or fatigue. A number of studies consistently support the significant role of catastrophizing in pain. However, the role of catastrophizing in fatigue is less frequently investigated. This article provides a critical review of published studies investigating this association.

Methods: Using the keyword “Fatigue AND Catastrophizing”, we performed a search in PubMed, SCOPUS, PsycINFO, and EMBASE.

Results: Fourteen studies were reviewed and all except one were found to provide empirical support for an association between high catastrophizing and high fatigue. Most of these reviewed articles also show the large impact of catastrophizing on fatigue severity. Two longitudinal studies found that fatigue catastrophizing level before cancer treatment is a significant predictor of post-treatment fatigue. Studies also demonstrated that persons who had higher scores for catastrophizing recalled fatigue more accurately than those with lower scores.

Conclusion: In spite the differences of its definition and the measurements used, a similar significant association between catastrophizing and fatigue was reported. Because this observation was based on 14 studies with limited types of patients, further studies are recommended to examine the role of catastrophizing in fatigue from other clinical populations and to investigate its utility as a behavioral marker for central fatigue.

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Introduction

Individuals with chronic illness suffer from debilitating symptoms, such as pain, fatigue, and sleep impairment. Of these three symptoms, fatigue is reported to negatively impact quality of life, and in the worst instances, leads to disability [1]. Studies report that debilitating fatigue is experienced by nearly 50% of cancer patients, 80% of patients with rheumatic disease or fibromyalgia, and 90% of patients with multiple sclerosis [2–4]. Fatigue lasting longer than 6 months negatively impacts individuals not only physiologically [1], but also economically [5]. In 1994, the United States (US) Centers for Disease Control and Prevention published the diagnostic criteria for chronic fatigue syndrome (CFS) [6]. The prevalence of CFS in the US is about 42 cases per a population of 10,000, valuing as high as US\$7 billion of direct cost for medical care, annually [7]. The etiology of chronic fatigue remains elusive and its management continues to challenge practitioners and burden individuals.

Fatigue is defined as persisting and distressing physical, emotional, and cognitive exhaustion that is unrelated to the recent activity and interferes with the person's function [8]. Several psychological conditions such as depression, anxiety, stress, and catastrophizing have been associated with fatigue [9–12]. Among these psychological conditions,

the relationship between catastrophizing and fatigue is the least explored. In this paper, articles that evaluated the association between catastrophizing and fatigue were systematically reviewed.

Catastrophizing is a psychological process characterized by maladaptive, negative evaluation and attention to specific symptoms [13–15]. When a person catastrophizes, it can contribute to increased intensity of the symptom experience and more emotional distress [16]. It has been used to evaluate stressful situations, where it is used as a primary and/or a secondary appraisal mechanism [17]. According to Lazarus and Folkman [18], primary appraisal mechanisms are affective projections of the impact of the stressful condition on the individual's well-being (e.g., “My condition will never get any better.”), while secondary appraisals are cognitive processes that are ongoing in order to address the stressful situation (e.g., “There is no way I can go on any longer.”). The multidimensional concept of catastrophizing is believed to be composed of three elements: rumination (“I can't stop thinking how exhausted I am.”), magnification (“I worry that something worst will happen to me.”), and helplessness (“Being exhausted all the time is awful and overwhelming.”) [19].

In pain studies, catastrophizing is known to significantly predict greater severity of pain behaviors, as well as increase the use of analgesics and health care services [14,20–22]. Moreover, high catastrophizing is believed to influence the activities of neurotransmitters that act on brain structures that are involved with attention, emotion, and motor activity in response to pain [21]. Catastrophizing is very important to consider in measuring fatigue, because in the pain literature, if excessive negative attention is afforded to a symptom such as pain, individuals

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often avoid activities that can cause pain, therefore decreasing their physical functioning [23]. Decreased functional capacity in both cardio-respiratory and neuromuscular functioning due to lack of physical activity is an important contributor to persistent fatigue [24]. This review will examine the relationship between catastrophizing and fatigue, as well as estimate the impact of catastrophizing on fatigue intensity.

Methods

An initial generic search in PubMed published at any date using the following keywords as titles, “Fatigue AND Catastrophizing” yielded 39 articles. A basic search query based on the common terms from the 39 articles was developed. These common keywords/phrases include: (“fatigue” [MeSH Terms] OR “fatigue” [All Fields]) AND (“catastrophization” [MeSH Terms] OR “catastrophization” [All Fields] OR “catastrophizing” [All Fields] OR “catastrophic” [All Fields]). This basic search query from PubMed yielded 130 articles (including the 39 articles found in the initial generic search). Search on other online databases using the keywords, (“fatigue” [MeSH Terms] OR “fatigue” [All Fields]) AND (“catastrophization” [MeSH Terms] OR “catastrophization” [All Fields] OR “catastrophizing” [All Fields] OR “catastrophic” [All Fields]), yielded 52 articles using SCOPUS, 21 articles using PsycINFO, and 65 articles using EMBASE. Refinement of the search criteria was applied by excluding reviews, editorials, case studies, meta-analysis articles and those not written in English from the 268 articles initially found from all databases. The refined search yielded 22 articles. The abstracts of the 22 articles were visually reviewed to determine if they met the inclusion criteria of mentioning the role, influence, and/or association of catastrophizing with the level, duration and/or worsening in intensity of fatigue. We expanded the search to encompass broader keywords to include, (“negative thinking” [MeSH Terms] OR “negative thoughts” [MeSH Terms] OR “negative affect” [MeSH Terms] OR “catastrophe” [MeSH Terms] OR “catastrophizer” [MeSH Terms] OR “catastrophize” [MeSH Terms] AND “tiredness” [MeSH Terms] OR “loss of energy” [MeSH Terms]) in PubMed, SCOPUS, PsycINFO and EMBASE. The expanded search yielded 3361 articles. We refined the expanded search by selecting articles that were health-related articles and excluded reviews, editorials, case studies, meta-analysis articles, and those not written in English. This expanded search yielded 274 articles. Further refinement was conducted to limit the search to articles that were specific to psychological behavior and/or distress. This further selection yielded 49 articles. The abstracts of these 49 articles were individually reviewed to select articles that specifically investigated the association of the concept of catastrophizing (e.g., negative thinking, negative affect) and fatigue (e.g., tiredness, loss of energy). The initial and expanded searches with the individual inspection of the 71 abstracts (initial search = 22 abstracts + expanded search = 49 abstracts) yielded 14 publications (13 articles and 1 dissertation) to be included in this review.

To estimate the magnitude of the association between catastrophizing and fatigue, effect sizes were calculated from the statistical data provided by each reviewed article. These effect sizes were expressed as correlation coefficient r because most of the reviewed articles reported associations between two continuous variables, catastrophizing and fatigue, and r values have been reported to provide the most versatile effect size in investigating associations of binary data [25]. The magnitude of the relationships between variables using correlation coefficient can vary from small effect size of $r = 0.10$, moderate effect of $r = 0.24$, to a large effect size of $r = 0.37$ [25].

Results

Fourteen publications were included in this review. The earliest article was published in 1995 [26] and 71% ($n = 10$) of the articles were published from 2004 to the present. Approximately 50% ($n = 7$) were written by one research team using a similar patient population (women with early stage breast cancer) [11,12,27–31]. Clinical populations investigated in the articles were early stage breast cancer (50%, $n = 7$ articles), chronic fatigue syndrome (21.3%, $n = 3$), multiple sclerosis (14.3%, $n = 2$), fibromyalgia (7.1%, $n = 1$)

and healthy volunteers (7.1%, $n = 1$). A significant relationship between catastrophizing and fatigue ($p < .05$) was found in all studies except one [32]. Table 1 summarizes the associations between catastrophizing and fatigue in the reviewed articles.

Cancer

Seven studies explored the association of catastrophizing and fatigue in women with early stage breast cancer [11,12,27–31]. Five longitudinal and two cross-sectional studies were conducted by the same research group. Three of the five longitudinal studies measured the association between catastrophizing and fatigue before and immediately after completion of cancer treatment [27,28,31], while the remaining two longitudinal studies measured the association between these variables from completion of cancer treatment up to 42 months post-treatment [12,30]. The results of these longitudinal studies are discussed in detail below.

All studies defined catastrophizing as a cognitive process that involved negative outcome expectations (e.g., thinking that fatigue will get worse, fatigue will cause something to get seriously wrong). Catastrophizing in these studies was measured using the Fatigue Catastrophizing Scale (FCS), a modified version of a catastrophizing scale from the Cognitive Coping Strategies Inventory, which is a 10-item instrument using a 5-point rating scale (1 = never true) to (5 = all the time true) with proven high internal consistency reliability (coefficient alpha = 0.85–0.92) [27,28,31,32]. These studies showed that high catastrophizing was a significant predictor of fatigue severity (r^2 change = 0.14, $p < .001$) [29], ($t = 7.42$, $p < .01$) [31] and intensity ($t = 7.48$, $p < .0001$) [32], as well as a significant predictor of the prevalence of off treatment cancer-related fatigue (Odds ratio = 1.19, $p < .001$) [27].

One study found that fatigue catastrophizing was not significantly different among four groups of breast cancer patients (former radiotherapy group, current radiotherapy group, current chemotherapy group, and current bone marrow transplantation [BMT] group), however, younger subjects reported higher fatigue catastrophizing than older subjects [11]. When subjects were grouped into high and low catastrophizing using their FCS scores (cutoff score = 16), high catastrophizing subjects reported almost three times higher fatigue than low catastrophizing subjects [11]. Another study showed a significant association of high catastrophizing not only with fatigue severity but also with disruptiveness in daily function. A longitudinal study showed that the level of catastrophizing at pretreatment significantly predicted fatigue severity and its disruptiveness of daily function at post-treatment in subjects receiving radiotherapy, but not in those receiving chemotherapy [31]. These differences may be related to the variability in demographic/clinical variables, side effects, or severity of fatigue experienced by patients during chemotherapy versus those experienced by patients during radiotherapy [33]. Further investigation is necessary to understand this finding.

Three studies investigated the association of catastrophizing and fatigue post-cancer treatment. One study showed that women with high fatigue were more likely to be single, have low income, have high Blatt Menopausal Index (BMI), high catastrophizing, and low physical activity [30]. Only BMI (r^2 change = 0.36, $p < .001$) and catastrophizing (r^2 change = 0.14, $p < .001$) significantly predicted post-breast cancer treatment fatigue [30]. A second study investigated the incidence of cancer-related fatigue (CRF) at 6 and 42 months post-treatment [12]. Characteristics associated with CRF, such as age, body mass index, disease stage, obesity (defined as body mass index ≥ 30 kg/m²), postmenopause, catastrophizing, history of major depression, and type of cancer treatments (RT only, CT only, or CT + RT) were compared between CRF cases and non-CRF cases. The result showed that fatigue catastrophizing scores were significantly higher in the CRF cases than in the non-CRF cases at 42 months post-treatment ($p < .01$) [12]. Catastrophizing was not significantly different at 6 months post-treatment between the two groups, which may be related to the differences in the distribution of subjects between the groups (CRF, $n = 26$; non-CRF, $n = 256$). Another study examined the influence of catastrophizing on the memory of the fatigue experience by examining the magnitude of response shift in fatigue rating overtime, pre and immediate post-cancer treatment [28]. This study demonstrated that high catastrophizing was significantly associated with small response shifts in fatigue ratings [28], which suggested that recall and momentary self-report of fatigue scores of these patients were closely identical. Four of the seven cancer articles in this section showed moderate to large associations of catastrophizing on fatigue severity [11,27,29,30].

Chronic fatigue

Two longitudinal and one cross-sectional studies examined catastrophizing in individuals with chronic fatigue syndrome (CFS) [26,34,35]. One of the two longitudinal studies was a natural history study [35], and the other was an interventional study [36]. The natural history study investigated the association between catastrophizing and fatigue weekly for three weeks [35], while the interventional study measured the association of these variables pre and post-(2 and 6 months) mindfulness-based cognitive therapy (MBCT) [36]. The results of these studies are discussed in detail below.

Catastrophizing was defined in these three studies as a belief that fatigue can cause negative outcomes such as dying [26,34,35]. One study measured catastrophizing by coding (catastrophizing versus noncatastrophizing) the patients' responses to the question, “what would be the consequences of pushing yourself beyond your present physical state?” [26]. The reliability of coding patients' responses was confirmed by three raters, which showed agreement ratings of 84% and 88%. Another study used

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