# ILLNESS-RELATED INTRUSIVE THOUGHTS AND ILLNESS ANXIETY DISORDER

## Abstract

**Introduction.** Intrusive thoughts about health threats (illness-ITs) are a potential cognitive risk factor for the development and maintenance of illness anxiety disorder (IAD). This study analyzes the dimensionality of illness-ITs from normalcy to psychopathology, and it evaluates whether the appraisals instigated by the ITs mediate between these thoughts and IAD symptoms. **Method.** Two groups of individuals participated in the study and completed the Illness Intrusive Thoughts Inventory and the Whiteley Index. The first group was composed of 446 non-clinical community participants. Of them, 264 individuals (68.6% women; *M*age=30.03 [*SD*=13.83]) reported having experienced an upsetting illness-IT in the past three months and were then included in the main analyses. The second group included 31 patients with a current main diagnosis of IAD based on DSM-5 criteria (51.6% women; *M*age=32.74 [*SD*=9.69]). Their severity was assessed with the Hypochondriasis Yale-Brown Obsessive-Compulsive Scale -Modified version, with scores ranging from 15 to 58 (*M*= 46.12, *SD*= 9.41). **Results.** Illness-ITs are common in both non-clinical individuals and in patients with IAD, and they instigate dysfunctional emotional, cognitive, and behavioral consequences, although with greater intensity in patients than in non-clinical individuals. The relationship between illness-ITs and IAD is mediated by overestimation of threat and thought-action fusion-probability appraisals. **Conclusion.** Illness-ITs are a dimensional cognitive experience. The way they are appraised facilitates their escalation into symptoms of IAD.



## Keywords

Illness anxiety disorder, illness anxiety symptoms, illness-related intrusive thoughts, maladaptive appraisals, Illness Intrusive Thoughts Inventory.

**Practitioner Points**

- Provides support for the cognitive explanatory model of IAD and its usefulness in clinical practice.
- Indicates that the way people interpret and react to naturally occurring intrusive thoughts about illness seems to be a vulnerability marker for developing an illness anxiety disorder.
- Emphasizes that the meaning that patients with IAD ascribe to their intrusive thoughts about illnesses must be a main target in the cognitive-behavioral treatment of IAD.
- Suggests that the importance of intrusive thoughts in IAD does not lie in the frequency with which they are experienced, but in the way, they are appraised/interpreted, which is what determines whether they become a clinically significant symptom.
- Indicates that the relationship between illness intrusive thoughts and IAD symptoms in non-clinical individuals is based on: overestimating the negative consequences of experiencing an illness intrusive thought; and the appraisal that having such a thought would increase its likelihood of coming true.
- Shows that the frequency of illness-related intrusive cognitions is associated with worse cognitive and behavioral consequences.

# INTRODUCTION

Illness anxiety disorder (IAD) is characterized by an excessive preoccupation with having or acquiring a serious illness. Patients have no or minimal somatic symptoms, and they are highly anxious about health and easily alarmed about personal health issues (DSM-5, APA, 2013). Individuals with this disorder perform excessive reassurance-seeking, checking, and related behaviors (e.g., medical test to rule out breast cancer), or, conversely, they perform avoidance behaviors (e.g., seeking healthcare with doctor appointments) in order to reduce their anxiety about the possible meaning and/or cause of their body complaints.

As Rachman (2012) proposed, these individuals misinterpret the significance of normal or naturally-occurring intrusive thoughts about medical concerns and/or non-severe symptoms and sensations, which increases their health anxiety and leads them to deploy safety behaviors in an attempt to diminish the perceived threat. A corollary of this approach is that the first step in the process leading to morbid illness-related preoccupations could involve experiencing illness-related distressing and unwanted intrusive thoughts (illness-ITs) about perceived symptoms, which are misinterpreted as potentially serious health threats with negative consequences in terms of medical diseases (Fergus, 2013; Salkovskis & Warwick, 1986; Warwick & Salkovskis, 1989, 1990). Therefore, the difference between patients with IAD and non-clinical individuals would not be the presence of illness-ITs, but rather the way patients interpret these naturally-occurring thoughts and how they respond to or manage them. These misinterpretations or faulty appraisals could be based on or instigated by individuals' maladaptive beliefs about bodily signs and symptoms and the subsequent illness-ITs triggered by these symptoms. A large body of research supports the relevance of beliefs

such as catastrophic interpretations of bodily sensations and symptoms, dichotomous thinking about health and illness, where health is considered the absolute absence of any physical symptom or bodily sensation, and the tendency to overestimate the frequency of serious illnesses on the basis of minor or innocuous bodily signs and symptoms (for a review, see Marcus, Gurley, Marchi, & Bauer, 2007).

The pioneering cognitive models of IAD (formerly hypochondriasis), conceptualized as severe health anxiety, identified illness-ITs as relevant cognitive events in the development and maintenance of the disorder (Salkovskis & Warwick, 1986; Warwick & Salkovskis, 1989, 1990). However, studies investigating the hypothesized role of illness-ITs in patients with IAD are scarce. Additionally, the research conducted in this field generally approaches different aspects of illness-ITs. For instance, some authors have it has been reported that patients with IAD experience intrusive imagery about their health based on memories of an earlier event, and that the contents of these intrusions primarily refer to potential health threats and feared consequences of having medical problems (Muse, McManus, Hackmann, Williams, & Williams, 2010; Wells & Hackmann, 1993). More recently, Romero-Sanchiz, Nogueira, Godoy, Gavino, and Freeston (2017) compared the similarities and differences among worries, obsessions, and illness intrusions in terms of the appraisals, emotions, and neutralizing strategies that these cognitive products instigate in patients with Obsessive-Compulsive Disorder (OCD), Hypochondriasis, and Generalized Anxiety Disorder (GAD). Results showed that patients with OCD scored higher on responsibility and disapproval appraisals, ego-dystonicity, guilt, and their use of neutralizing strategies than patients with IAD and GAD.

The maladaptive appraisals that instigate the illness-ITs have also been investigated in non-clinical participants. In a pioneering study, Freeston et al. (1994)

observed that appraisals of responsibility and disapproval of the thought were significant predictors of the frequency of illness-ITs, the difficulty and efforts in eliminating them, and guilt feelings. These authors concluded that the appraisals associated with illness-ITs are linked to the person's experience of the thoughts; that is, the more extreme the appraisals about an illness-IT, the more problematic this illness-IT will be. Later, Langlois, Ladouceur, Patrick, and Freeston (2004) observed that, compared to obsessional intrusions and worries, illness intrusions were more egosyntonic. Arnáez, García-Soriano and Belloch (2017) reported that illness-ITs experienced by undergraduate university students were unpleasant and activated not only negative emotional responses, but also dysfunctional appraisals and strategies to eliminate the discomfort caused by the thought. Additionally, a cross-cultural study with community participants in which illness-ITs were compared to obsessional-ITs showed that the two intrusive thought contents provoked a similar degree of disturbance across sites, even though illness-ITs were experienced less frequently than obsessional-ITs (Pascual-Vera et al., 2019).

In sum, the few studies that have focused on illness-ITs have shown that these thought contents are common in healthy individuals, and that maladaptive beliefs about symptoms are specific to health anxiety (i.e., Fergus 2014), thus supporting the cognitive approach to illness anxiety disorder. However, as far as we know, there is no information available about two core tenets of this approach. First, there is no information about the dimensionality of illness-ITs from normalcy to psychopathology. That is, there are no data showing whether there is a continuum of increasing frequency and disturbance of these intrusive cognitions and their consequences (i.e., emotions, interference, faulty appraisals, and thought control strategies) from non-clinical individuals to patients with severe health anxiety or IAD. Second, there is no

information about the mediating role played by faulty appraisals in IAD. As mentioned above, although there are published data about dysfunctional beliefs associated with health anxiety, there is a lack of information about the biased processing of the incoming information provided by the intrusion of an illness-related thought, that is, the appraisal of the intrusive thought (Nanney, Constans, Kimbrell, Kramer, & Pyne, 2015).

The role of these appraisals has been investigated in intrusive thoughts with obsessional contents (Garcia-Soriano & Belloch, 2013). The formulation of these appraisals (over-importance and over-control of thoughts, overestimation of threat, responsibility, intolerance of uncertainty, perfectionism, thought action fusion) was based on the OCD-relevant beliefs proposed by experts on this disorder (i.e., Clark & Purdon, 1993; Obsessive Compulsive Cognitions Working Group, 2001, 2003, 2005; Rachman, 1993; Salkovskis, 1985, 1989; Shafran, Thordarson, & Rachman, 1996; Tolin, Abramowitz, Brigidi, & Foa, 2003). Some recent research suggests that OCD-relevant beliefs might also be significant in explaining IAD symptoms (Arnáez, García-Soriano, López-Santiago, & Belloch, 2019; Reuman et al., 2017). However, as far as we know, there are no studies investigating the putative importance of the aforementioned appraisals in IAD symptoms, considering that the appraisals are the active "*on-line*" interpretation of an intrusive thought when it occurs naturally (Nanney et al., 2015).

Therefore, the two objectives of the current study were: 1) to ascertain whether illness-ITs and their functional consequences (emotional impact, interference, appraisals, and counterproductive behaviors) are experienced by healthy community individuals with less frequency than by patients with IAD; 2) to examine whether the dysfunctional appraisals associated with disturbing illness-ITs mediate between the frequency of illness-ITs and IAD symptoms in healthy community individuals. Thus, we hypothesize, first, that patients with IAD will experience illness-ITs more frequently

than community participants, and that, in turn, these intrusions will be associated with worse functional consequences (i.e., negative emotional reactions, interference, dysfunctional appraisals, and control strategies); and, second, that dysfunctional appraisals will mediate, at least in part, the relationship between the frequency with which the most upsetting illness-IT is experienced and the symptoms of IAD.

## METHOD

### Participants and procedures

Two samples participated in this study. The first sample consisted of 479 community participants. The mean age was 30.56 years (*SD*= 14.21; ranging from 18 to 65), and the majority were female (66.2%). The majority of the participants were single (65.3%), had a medium socio-economic level (65.3%), based on the parameters of the Spanish National Institute of Statistics, had a university education (75.5%), and were employed (53%). The recruitment of non-clinical participants was carried out by advanced Psychology students who received course credit for their recruitment efforts. In a seminar held by the first author, the students received training in how to present the instruments to prospective subjects. Each of the students administered the assessment instruments individually to at least three friends and/ or family members (after informed consent was obtained), who did not receive any compensation for their participation in the study. The main inclusion criteria were age between 18 and 65 years, sufficient knowledge of Spanish to understand and complete the questionnaires, and the absence of any mental disorders or disabling illnesses in the previous year. On the basis of these criteria, 33 individuals who reported a current diagnosed medical illness ($n$ = 24) or a mental disorder ($n$ = 9) requiring treatment were not included in the analyses. Thus, the final community sample included 446 non-clinical individuals (Table 1).

The second sample included 31 patients with a current main diagnosis of IAD (DSM-5 criteria), consecutively recruited from people who requested assessment and treatment at two specialized research and treatment outpatient clinics for OCD, somatoform, and related disorders. The patients were referred to these clinics by other mental health professionals working in the National Health System (NHS), and the clinics were dependent on the University and on the NHS. The mean age of patients was 32.74 years (*SD*= 9.69; range=18-65), and slightly more than half were female (51.6%). The majority of the patients were married (61.5%), had a medium socioeconomic level (80%), and had a university education (64%). Patients were evaluated by one of the authors with a doctoral level in clinical psychology (A.B. or J.L.S.), who decided to include the patient in the study on the basis of the following criteria: (a) having a main diagnosis of IAD with no current co-morbid conditions; (b) age range from 18 to 65 years; (c) not having a past or current history of psychotic and/or alcohol/drug-related disorders; (d) having an adequate level of reading ability; and (e) not being engaged in any form of psychological treatment for their disorder in the two preceding years. All patients were diagnosed using the Structured Diagnostic Interview for Hypochondriasis (SDIH; Barsky et al., 1992). The diagnosis was confirmed with the RV-Module J, Somatic Symptom and related disorders, of the Structured Clinical Interview for DSM-5, Research Version (SCID-5-RV; First, Williams, Karg, & Spitzer, 2015), to ensure that patients fulfilled the current DSM-5 diagnostic criteria for Illness Anxiety Disorder.

Comorbidity was explored with the International Neuropsychiatric Interview (MINI; Sheehan et al., 1998) in a session lasting between 60 and 120 minutes. At the time of the study, none of the patients met the criteria for a mental disorder other than IAD, and one of them had a lifetime history of Generalized Anxiety Disorder. The absence of comorbidity with a depressive disorder was also confirmed by the patients'

scores on the depression subscale of the Depression Anxiety Stress Scale – Short Version (DASS-21; Lovibond & Lovibond, 1995; score range: 0 to 21). The patients' scores were below the clinical range for depression ($M$ = 5.81, $SD$ = 3.27). Then, disorder severity was assessed by the clinician, using the Hypochondriasis-YBOCS-M (Skritskaya et al., 2012), with scores ranging from 15 to 58 ($M$= 46.12, $SD$= 9.41). Information about basic sociodemographic data (age, gender, occupation, educational level, and socioeconomic status), medical conditions, and current/past psychological or pharmacological treatments was also recorded. Before the assessment session, patients were informed about the purpose and assessment procedure, and they were asked for their explicit consent to participate. Once the signed consent had been obtained, participants completed the assessment instruments described below before entering the treatment protocol.

The study was approved by the Ethics Committees of the University and of the University Hospital on which the outpatient mental health clinics depend.

**Measures**

*Sociodemographic data sheet*. The data required were the following: age, gender, maximum level of studies reached, marital status, and socioeconomic level. Two additional questions about their current and past (last year) mental and physical health status were also included *(Have you received a formal diagnosis of a medical, psychological, or behavioral problem in the past year? In the past year, have you undergone treatment for any current or past medical or psychological problems?)*.

*Illness Intrusive Thoughts Inventory* (INPIE; Arnáez et al., 2017). This is a self-report instrument designed to assess the frequency of unwanted and distressing illness-related intrusive thoughts, images, and impulses (illness-ITs), and the appraisals and control strategies associated with each participant's most upsetting illness-IT. The

INPIE is based on the Obsessional Intrusive Thoughts Inventory (INPIOS; García-Soriano & Belloch, 2013; García-Soriano, Belloch, Morillo, & Clark, 2011), and it has two parts. The first part of the INPIE consists of a list of 42 unwanted intrusive thoughts about serious illnesses involving the respondent or a close relative ("*When a loved one feels some type of discomfort in his/her body, no matter how small, I have a sudden, uninvited thought or doubt, such as: he/she has a serious illness"*); suspicion about a medical explanation or test ("*When waiting for the results of a medical test, or when the doctor tells me everything is fine, I have a sudden, uninvited thought or doubt, such as: my illness doesn't show up on those tests*"); illness-related information ("*When I read, hear, or see some information about a disease in a magazine, on the news, or when listening to someone talk about an illness, I have a sudden, uninvited thought or doubt, such as: I have similar symptoms"*); and death ("*When I read, hear, or see something about death, such as funerals, cemeteries, crematoriums, morgues, etc., I have a sudden, uninvited thought, image, or doubt, such as: my own funeral*"). The frequency of each item is rated from 0 (*never*) to 6 (*always, constantly*). A total frequency score for intrusions is computed as the average frequency of the thoughts actually experienced by the subject at least once in his/her life.

After completing this part, the respondent is asked to look at the 42 items previously listed and choose the most upsetting illness-IT he/she experienced during the past 3 months with a frequency ≥1. This request was made to minimize the memory biases that are common in retrospective studies and relate the study data to clinically significant IAD preoccupations. If the person had not experienced an upsetting intrusion during this time, he/she did not complete the second part of the questionnaire. But if the person had experienced a highly upsetting intrusion in the past three months, then the INPIE-2$^{nd}$ part was presented. With this reported recent upsetting illness-IT in mind,

individuals had to evaluate it in four dimensions using 5-point scales (from 0: “not at all”, to 4: “extremely”). These dimensions were: (a) the emotional reactions linked to the intrusion (6 items: unpleasantness, anxiety, sadness, guilt, shame, and disgust); (b) the interference caused by the thought and the difficulty in controlling it (3 items); (c) the dysfunctional appraisals associated with the intrusion (7 items: personal significance, over-importance of thoughts, responsibility, importance of control, overestimation of threat, thought-action fusion likelihood, intolerance of uncertainty); and (d) how often s/he uses a set of neutralizing or control strategies to get rid of the intrusion (general thought control strategies: 9 items; health anxiety-related strategies: 4 items; and OCD-related strategies: 3 items). A sample copy of the INPIE in English or Spanish is available from the authors upon request. In the present study, the reliability of the first part of the INPIE (total score) in non-clinical participants ($n$= 446) was $\alpha$= .96, and in the clinical sample ($n$= 31), $\alpha$= .85. The reliability of the second part of the INPIE (composite scores of emotions, interference/control difficulties, appraisals, and control strategies) in non-clinical participants ranged from $\alpha$=.74 to $\alpha$=.80, and in the clinical sample from $\alpha$=.76 to $\alpha$=.84.

*Whiteley Index* (WI; Pilowsky, 1967. Spanish version: Avia, 2017). This self-report was one of the first measures developed to assess the dimensions of hypochondriasis (currently, IAD), and its items are based on clinicians’ experiences of illness characteristics of severe health anxiety or IAD. It contains 14 True/False items yielding a total score ranging from 0–14. In the current study, the internal consistency of the total score was only acceptable: $\alpha$ = .70 in the non-clinical sample, and $\alpha$ = .60 in the clinical sample, although it was similar to what was reported in other studies with the general population (Speckens, Spinhoven, Sloekers, Bolk, & van Hemert, 1996).

*Hypochondriasis Yale-Brown Obsessive-Compulsive Scale* -Modified version (H-YBOCS-M; Skritskaya et al., 2012). The H-YBOCS-M is a 19-item semi-structured, clinician-administered interview that assesses the presence and severity of IAD symptoms in the previous 2 weeks. The interview measures illness worries, illness-related behaviors, and unhealthy avoidance, with six items each, ranging from 0 (no symptoms) to 4 (extreme symptoms). To determine the H-YBOCS-M severity from the scores, the clinician asks the patient about the frequency and severity of his/her illness-related thoughts. The H-YBOCS-M was only completed by the clinical sample in this study, and it showed adequate internal consistency (total score: $\alpha = .90$).

**Data analyses**

All data were analyzed with the SPSS 22.0 statistical package. An alpha level $\leq .05$ (two-tailed) was used for all statistical tests. Descriptive statistics (*M* and *SD*) were calculated for the sociodemographic variables and the INPIE scores. Gender differences were examined with unpaired *t* tests. Sociodemographic data for the non-clinical participants and the patients with IAD were compared using unpaired *t* tests for continuous variables and the $\chi^2$ test for categorical variables. Differences between non-clinical and clinical participants in the INPIE scores were computed, first by ANOVAs, and then by ANCOVAs, with the frequency of the most upsetting illness-IT as covariate. Effect sizes ($\eta_p^2$) were calculated following the Kinnear and Gray (2009) conventions for small ($\eta_p^2 \leq 0.06$), medium ($\eta_p^2$ between 0.06-0.14), and large ($\eta_p^2 \geq 0.14$) effects. In the whole non-clinical sample, the mediation effect of dysfunctional appraisals (i.e., over-importance of thoughts, responsibility, importance of control, overestimation of threat, thought-action fusion-likelihood, personal significance, intolerance of uncertainty) in the relationship between the frequency of the most upsetting illness-IT (independent variable, IV) and IAD symptoms (dependent variable,

DV) was tested through a multiple parallel mediation analysis using the PROCESS macro for SPSS, version 2.15 (Hayes, 2013). A significance test of the indirect effect was performed through a bootstrapping procedure using 5000 samples, and a 95% bias-corrected confidence interval was calculated.

## RESULTS

### Objective 1. Dimensionality of illness-ITs and their functional consequences

In the non-clinical sample, of the 446 participants evaluated, up to 59% (*n*= 264) reported that they had experienced an upsetting illness-IT in the past three months, and so they completed the second part of the INPIE regarding the functional consequences of their most upsetting illness-IT. Consequently, the following analyses were performed with these 264 non-clinical participants ($M_{age}$= 30.03, *SD*= 13.829 years; 68.6% women). The mean frequency of their illness-IT was low (*M*=1.89, *SD*=0.668), that is, between "rarely" and "occasionally". Nonetheless, when individuals were asked to select their most upsetting illness-IT, its frequency was substantially higher (*M* = 3.03, *SD* = 1.324), which means that the thought was experienced *'once or twice a month'*. Its content was generally related to the possibility of having a serious (30.8% of participants) or minor (24.3%) illness, followed by contents about death (18.6%) or an illness of a relative (17.1%). In general, the most upsetting illness-IT did not provoke very negative emotional reactions (*M*= 0.85, *SD*=0.68) or very dysfunctional appraisals (*M*= 0.97, *SD*=0.51), although it caused some interference and control difficulties (*M*= 1.40, *SD*=0.54). Participants used several modalities of control strategies to get rid of their illness-ITs: general thought control strategies (*M*= 1.75, *SD*=0.75), health anxiety-related strategies (*M*= 1.01, *SD*=0.80), and OCD-related strategies (i.e., compulsions) (*M*= 0.62, *SD*=0.75).

Gender comparisons of the functional consequences of the illness-IT (i.e., frequency, negative emotional reactions, interference, control difficulties, dysfunctional appraisals, control strategies) indicated significant differences only in the use of strategies to manage and keep the IT under control, but no other differences were found. Results revealed that women used the three modalities of strategies more frequently than men to manage and keep the IT under control, as follows: general thought control strategies: $M$= 1.72, $SD$=0.71 vs. $M$=1.40, $SD$=0.75; $t(252)$=-3.320, $p$= .001, $d$=0.44; health anxiety-related strategies: $M$=1.08, $SD$= 0.84 vs. $M$=0.86, $SD$=0.69; $t(252)$=-2.007, $p$=.046, $d$=0.31; and OCD-related strategies: $M$=0.69, $SD$= 0.79 vs. $M$=0.48, $SD$=0.63; $t(252)$=-2.189, $p$= .030, $d$=0.29.

Then, from this sample, a subgroup of 73 participants was extracted, matching their basic sociodemographic features (i.e., sex, age, study level, socioeconomic level) with those of the patients with IAD. A subgroup of 31 individuals was then randomly selected ($M_{age}$= 32.29, $SD$= 10.19 years; age range: 19-52 years; 58.1% women) in order to compare their data with those of patients with IAD. Table 1 includes the descriptive statistics of the samples.

The two established groups (i.e., 31 non-clinical and 31 patients with IAD) did not differ on the sociodemographic variables. However, as expected, patients with IAD obtained significantly higher scores on IAD symptoms (Whiteley Index), and none of the non-clinical individuals scored above 8 points on this index, which has been established as a reliable cut-off point for an IAD diagnosis (Hiller, Rief, & Fichter, 2002).

Regarding the overall frequency of the illness-ITs, patients with IAD experienced them more frequently than non-clinical participants. Moreover, as expected, patients scored higher on the frequency of the most upsetting illness-IT, as

well as on its emotional negative impact, interference and control difficulties, dysfunctional appraisals, and the frequency of use of counterproductive behaviors to resist or control the illness-IT. Differences show large effect sizes, except for the frequency of use of thought control and OCD-related strategies. When dysfunctional appraisals were analyzed independently (i.e., at the item level), significant differences were again observed between the non-clinical participants and the patients with IAD, who scored higher on all of them, with large effect sizes. Results appear in Table 2.

In order to rule out the possibility that the observed differences between patients with IAD and non-clinical participants were due to the differences in the frequency of the most disturbing illness-IT, comparisons were repeated with the frequency of the most upsetting illness-IT as a covariate (ANCOVA). Differences remained significant, with the exception of OCD-related strategies (Table 2).

**Objective 2. Dysfunctional appraisals as mediators between the frequency of illness-ITs and health anxiety symptoms in non-clinical individuals (n = 264)**

The role of dysfunctional appraisals (mediating variable) in the escalation from illness-ITs (IV) to health anxiety symptoms (DV, Whiteley Index-total score) was examined in the whole non-clinical sample of participants using multiple parallel mediation analysis. Results showed that the total indirect effect was significant, indicating that the dysfunctional appraisals collectively mediate the relationship between the frequency of the most upsetting illness-IT and health anxiety symptoms (i.e., total score on the Whiteley Index). Additionally, a further analysis of specific indirect effects indicated that overestimation of threat and thought-action fusion-likelihood were the only mediators of the effect of the frequency of the most upsetting illness-IT on health anxiety symptoms. The direct effect of the frequency of the most

upsetting illness-IT on health anxiety symptoms was also significant. Figure 1 and Table 3 show the results in detail.

## DISCUSSION

According to the cognitive models of IAD, intrusive thoughts about possible threats to health play an important role in the origin and development of the disorder. However, few empirical studies have investigated these cognitive products in patients with IAD and community individuals.

Our first objective was to obtain data about the hypothesized dimensionality of illness-ITs, in terms of their frequency or recurrence from normalcy to IAD. The findings showed that more than half of the non-clinical community participants had experienced illness-ITs in the past three months, although their frequency was generally low (“occasionally"). Nonetheless, it was noteworthy that the reported frequency was identical to what was observed for intrusive thoughts with obsessional contents in community samples (Belloch, Roncero, & Perpiñá, 2016), which supports the notion that intrusive thoughts can be viewed as transdiagnostic variables and might be considered vulnerability factors in different disorders (Belloch, 2012; Pascual-Vera & Belloch, 2018a; Pascual-Vera, Roncero, & Belloch, 2017; Romero-Sanchiz et al., 2017).

When the participants selected the thought that ~~had~~ most disturbed them recently, the recurrence of that thought was quite high (“once or twice a month”). This frequency is comparable to that of the most disturbing obsessional and eating disorder-related intrusive thoughts in the aforementioned study by Belloch et al. (2016). Regarding the content of the illness-IT the participants selected as the most disturbing, the most common was about the possibility of having a severe illness that could affect them, as reported in the pioneering study by Wells and Hackmann (1993). These

authors found that the most frequent intrusive images of patients with hypochondriasis were about serious illnesses and death. Muse et al. (2010) also found similar results in up to 78% of patients with hypochondriasis.

The experience of the thought was not innocuous in non-clinical participants because it caused negative emotions and interference, was dysfunctionally appraised, and instigated neutralizing behaviors, especially body checking and reassurance. These findings agree with those found in studies on OCD, eating disorders, and body dysmorphic-related intrusive thoughts in community samples. The results of these studies indicate that people always do something to alleviate the discomfort caused by intrusive cognitions, regardless of their frequency and the discomfort they cause (Belloch, Roncero & Perpiñá, 2012, 2016; García-Soriano & Belloch, 2013; Giraldo-O'Meara & Belloch, 2018; Pascual-Vera & Belloch, 2018b; Pascual-Vera et al., 2019). It is important to note that the consequences associated with the illness-ITs were more negative for women than for men, a result that agrees with studies reporting that women with IAD use more reassurance-seeking than men (MacSwain et al., 2009). Greater discomfort associated with illness-ITs in women has also been found in studies with non-clinical participants (Arnáez et al., 2017), as well as in studies investigating different contents of intrusive cognitions (obsessional, eating-disorder related, and appearance defect-related) (Pascual-Vera & Belloch, 2018 a, b) .

After verifying that having a disturbing illness-IT was a relatively common experience in non-clinical individuals, the next step was to examine whether there was a continuum between patients with IAD and non-clinical subjects in the recurrence of these illness-ITs and their functional consequences. Our findings show that, as expected, patients experienced these thoughts with greater frequency than the group of community individuals. The differences between patients and non-clinical individuals

were maintained when the two groups assessed the frequency of the thought they selected as the most disturbing. It is important to note that, in the case of the patients with IAD, the thought they selected as the most disturbing corresponds to their main symptom, which supports the validity of INPIE in the clinical context. Together, these findings provide support for a continuum of intensity from normalcy to clinical illness anxiety in terms of the frequency of illness-ITs. Moreover, the functional consequences of the illness-IT also fluctuate on a continuum of intensity because the thought produced more negative consequences, in terms of interference in daily life, negative emotions, dysfunctional appraisals, and neutralizing behaviors, in the patients than in the matched non-clinical controls. Additionally, these results remained stable when thought frequency was partialled-out, which indicates that the frequency of illness-ITs is not a main variable that determines the difference between patients and non-clinical individuals; instead, the difference lies in the interpretation associated with these thoughts.

Overall, our findings support our first hypothesis and coincide with those reported in other studies that evaluated the dimensionality of unwanted and distressing intrusive thoughts with different contents, such as obsessive, dysmorphic, and eating-disorder related thoughts (Belloch et al., 2016; Giraldo-O'Meara & Belloch, 2018; García-Soriano & Belloch, 2013; Pascual-Vera & Belloch, 2018b; Pascual-Vera et al., 2019). Additionally, the results support the dimensionality of illness-ITs on a continuum ranging from normality to pathology. However, they also suggest that the distinction between normal and clinically significant unwanted intrusions not only lies in their presence and frequency, but also in the way they are appraised and the strategies the individual uses to deal with them. This proposal coincides with current cognitive

models of disorders such as OCD, Body Dysmorphic Disorder, and IAD, where these cognitions play a role in the escalation from normalcy to psychopathology.

The second objective was to examine whether the impact of illness-ITs on IAD symptoms is mediated by dysfunctional appraisals, that is, by the active and/or immediate misinterpretation of the thought. Results revealed that the relationship between the thought's frequency and IAD symptoms was statistically mediated by a combination of maladaptive appraisals. However, only two processes emerged as potentially underlying this relationship: overestimating the negative consequences of experiencing an illness-IT and the appraisal that having such a thought would increase its likelihood of coming true (i.e., thought-action fusion-likelihood). These results support the second hypothesis and are especially relevant because, as far as we know, this is the first study to systematically analyze the mediating role of dysfunctional appraisals in the relationship between the frequency of an upsetting and unwanted intrusive thought and IAD symptoms in non-clinical individuals. Moreover, they are consistent with other studies showing that overestimation of threat beliefs and metacognitive beliefs that having illness-related thoughts can lead to negative health outcomes are specific to IAD and, hence, play a key role in its development and/or maintenance (Bailey & Wells, 2015, 2016a, 2016b; Fergus, 2014; Gellatly & Beck, 2016; Marcus & Church, 2003; Melli, Bailey, Carraresi & Poli, 2018; Reuman et al., 2017; Scarella, Laferton, Ahern, Fallon, & Barsky, 2016; Wheaton, Berman, Franklin, & Abramowitz, 2010). In addition, these results, especially with regard to overestimation of threat, are congruent with other studies showing that, in terms of primary appraisals, increased perceptions of threat were consistently associated with increased levels of IAD symptoms (Ferguson et al., 2000).

Additionally, these results suggest that some of the appraisals about intrusive thoughts with obsessional contents that have been postulated as significant in explaining the escalation from those normal intrusive thoughts to obsessions (i.e., Clark & Purdon, 1993; OCCWG, 2005; Rachman, 1993; Salkovskis, 1985, 1989) also play a relevant role in other disorders, such as IAD. These findings might indicate that appraisals about intrusive thoughts are relatively independent from the thought content, but related to the intrusive nature of disturbing and unwanted thoughts.

Several limitations of the study should be mentioned. First, the study results rely on a self-report questionnaire. We used several strategies to control the possible biases associated with the use of self-report questionnaires. First, we based the INPIE design on previously validated self-report measures (García-Soriano et al., 2011; Purdon & Clark, 1993, 1994). Second, we contextualized the appearance of illness-ITs and the disturbance they provoked, and, third, we established a limited time period (past 3 months) in order to minimize recall bias and avoid overestimating the ITs' recurrence. The second limitation is the fact that patients did not have comorbidities with other disorders at the time of the study, which limits the generalization of the results to other clinical samples with IAD in which comorbidity is common. A third limitation is related to the generalization of the results obtained from the mediation analyses to clinical samples because they were only conducted with community participants, given that the size of the clinical sample was limited. Moreover, it is not clear whether partial mediation indicates the presence of other intervening variables that were not investigated in this study, or if it merely reflects the variation in measurement properties (i.e., INPIE is a self-report questionnaire, and it assesses the variables retrospectively). The fact that most of the community participants had high levels of education keeps us from generalizing the results to broader samples with more diverse education levels.

In spite of these limitations, the results of this study support the universality of illness-ITs and point out that, although these intrusions are not particularly upsetting to non-clinical individuals, they trigger negative emotions and maladaptive appraisals, interfere with what the individual is doing, and ultimately instigate strategies to control the thoughts. The data also support the hypotheses of cognitive models about the experience of illness-ITs and, especially, the dysfunctional appraisals/interpretations individuals make of them, as probable vulnerability factors for the development of IAD. The results indicate that the way an illness-IT is appraised is the key to turning a disturbing but normal thought into a clinical problem, as demonstrated in other disorders such as OCD, where unwanted intrusive cognitions play a relevant role. Specifically, our data highlight the importance of overestimation of threat and thought-action fusion-likelihood appraisals in the escalation from normal unwanted illness-ITs to IAD symptoms.

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**Table 1.** Sociodemographic and psychopathology-related data of the different samples and subsamples.

| | Community participants (*total sample*) | Community participants (those *who selected an upsetting illness-ITs*) | Community participants (*matched to clinical sample*) | Patiens with IAD[2] |
|---|---|---|---|---|
| **Sociodemographic data** | | | | |
| *N* | 446 | 264 | 31 | 31 |
| Female, % (*n*): | 65.7 (293) | 68.6 (181) | 58.1 (18) | 51.6 (16) |
| Age, *M* (*SD*) | 30.77 (14.23) | 30.03 (13.82) | 32.29 (10.19) | 32.74 (9.69) |
| Age range | 18-65 | 16-64 | 19-52 | 19-52 |
| Socioeconomic level[1], % (*n*): | | | | |
| Low | 3.6 (16) | 4.9 (13) | 0 | 0 |
| Medium-low | 22.2 (99) | 20.9 (55) | 25.8 (8) | 4 (1) |
| Medium | 61.6 (274) | 62.7 (165) | 67.7 (21) | 80 (20) |
| Medium-high | 12.6 (56) | 11.4 (30) | 6.5 (2) | 16 (4) |
| Marital Status, % (*n*): | | | | |
| Single | 64.5 (287) | 66.9 (176) | 61.3 (19) | 38.5 (10) |
| Divorced | 5.2 (23) | 4.9 (13) | 0 | 0 |
| Married/in union | 30.3 (135) | 28.1 (74) | 38.7 (12) | 61.5 (16) |
| Education level, % (*n*): | | | | |
| Primary school | 12.6 (56) | 10.2 (27) | 6.5 (2) | 12 (3) |
| High school | 13.5 (60) | 15.2 (40) | 22.6 (7) | 24(6) |
| University level | 74 (330) | 74.6 (197) | 71.0 (22) | 64 (16) |
| **Psychopathology measures** | | | | |
| Whitely Index | 3.08 (2.22) | 3.53 (2.46) | 3.1 (2.45) | 9.6 (1.71) |
| Overall frequency of illness-ITs | 1.73 (0.63) | 1.89 (0.66) | 1.63 (0.47) | 3.91 (1.12) |
| Frequency of most upsetting illness-IT | - | 3.03 (1.32) | 3.00 (1.31) | 5.29 (0.86) |
| Negative emotional impact | - | 0.85 (0.68) | 0.91 (0.57) | 2.00 (0.70) |
| Interference & control difficulties | - | 1.40 (0.54) | 1.51 (0.52) | 2.17(0.57) |
| Dysfunctional appraisals (total) | - | 0.97 (0.51) | 0.96 (0.68) | 2.17 (0.73) |
| *Thought importance* | - | 0.93 (1.00) | 1 (1.06) | 2.41 (1.08) |
| *Responsibility* | - | 0.92 (1.00) | 1 (1.06) | 1.93 (0.84) |
| *Control Importance* | - | 1.42 (1.14) | 1.42 (1.14) | 2.86 (1.02) |
| *Threat overestimation* | - | 0.97 (0.99) | 0.97 (1.08) | 2.55 (1.21) |
| *Thought-action fusion-likelihood* | - | 0.77 (0.94) | 0.74 (0.89) | 2.14 (1.27) |
| *Personal significance* | - | 0.34 (0.74) | 0.68 (1.16) | 1.69 (1.25) |
| *Intolerance of uncertainty* | - | 1.19 (0.89) | 1.32 (1.00) | 2.71 (0.86) |
| Thought control strategies | - | 1.75 (0.75) | 1.95 (0.76) | 2.50 (0.59) |

| | | | | |
|---|---|---|---|---|
| Health-related strategies | - | 1.01 (0.80) | 0.93 (0.71) | 2.37 (0.87) |
| OCD-related strategies | - | 0.62 (0.75) | 0.76 (0.82) | 1.31 (0.96) |

*Note* .[1] Socioeconomic level described following the parameters of the Spanish National Institute of Statistics. [2] In the clinical sample, socioeconomic and educational level was calculated based on 25 participants, and marital status based on 26 participants.

**Table 2.** Differences between clinical and non-clinical participants in study measures without controlling (ANOVA) and controlling (ANCOVA) the frequency of the most upsetting illness-ITs appraised.

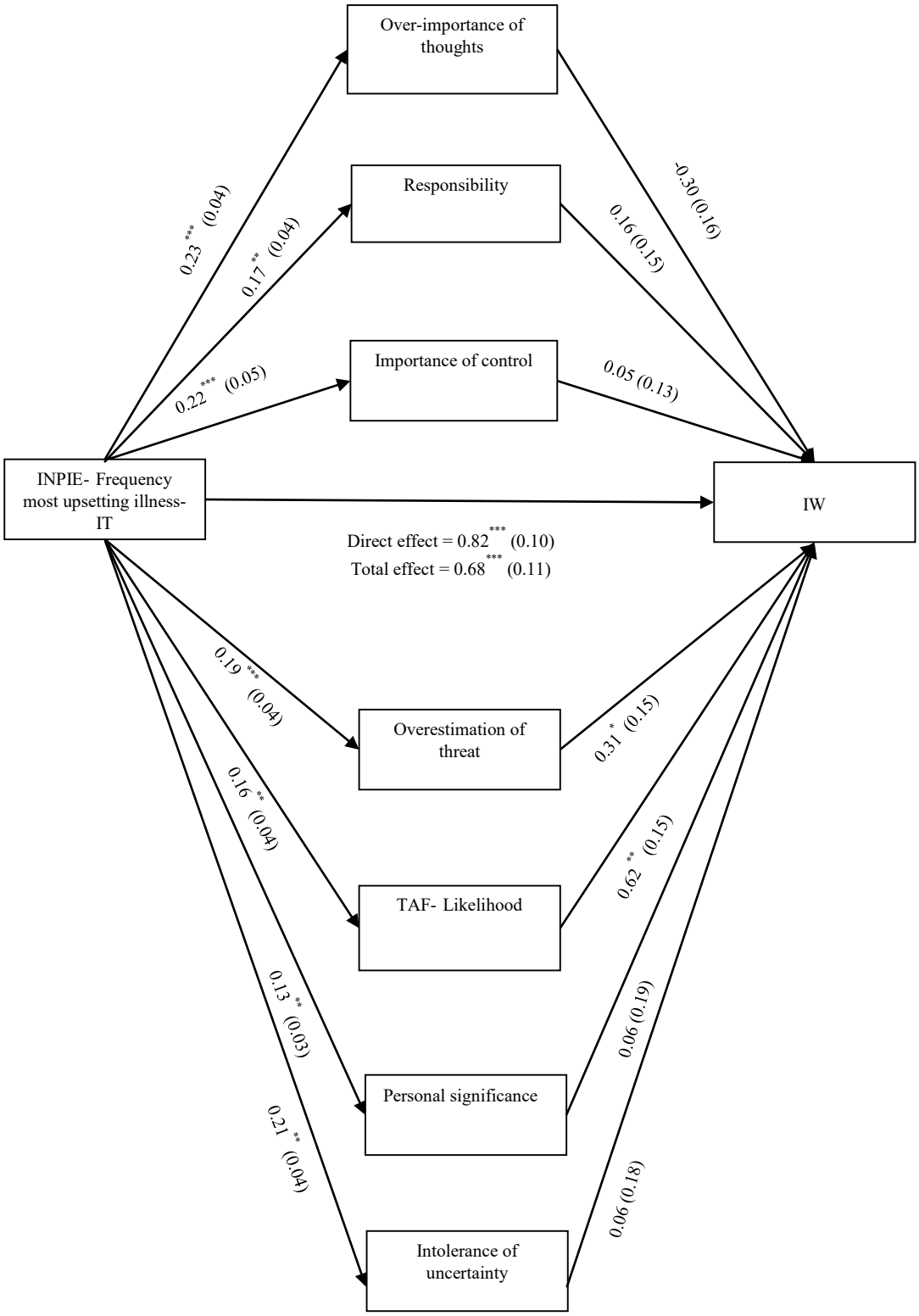
| Illness Intrusive Thoughts Inventory | Non-clinical participants (*N*=31) | Patients with IAD (*N*=31) | ANOVA | | ANCOVA | |
|---|---|---|---|---|---|---|
| | | | $F_{(1, 61)}$ | $\eta^2$ | $F_{(1, 63)}$ | $\eta^2$ |
| Whitely Index | 3.1 (2.45) | 9.6 (1.71) | 124.800*** | .722 | - | - |
| Overall frequency of illness-ITs | 1.63 (0.47) | 3.91 (1.12) | 108.090*** | .643 | - | - |
| Frequency of most upsetting illness-IT | 3.00 (1.31) | 5.29 (0.86) | 65.581*** | .522 | - | - |
| Negative emotional impact | 0.91 (0.57) | 2.00 (0.70) | 43.181*** | .423 | 29.379*** | .521 |
| Interference & control difficulties | 1.51 (0.52) | 2.17(0.57) | 22.035*** | .269 | 19.669*** | .421 |
| Dysfunctional appraisals (total) | 0.96 (0.68) | 2.17 (0.73) | 49.815*** | .462 | 37.179*** | .579 |
| *Thought importance* | 1 (1.06) | 2.41 (1.08) | 25.913*** | .309 | 24.566*** | .463 |
| *Responsibility* | 1 (1.06) | 1.93 (0.84) | 13.986*** | .194 | 13.834*** | .327 |
| *Control Importance* | 1.42 (1.14) | 2.86 (1.02) | 26.216*** | .311 | 17.246*** | .377 |
| *Threat overestimation* | 0.97 (1.08) | 2.55 (1.21) | 28.637*** | .331 | 17.407*** | .379 |
| *Thought-action fusion-likelihood* | 0.74 (0.89) | 2.14 (1.27) | 24.409*** | .296 | 12.654*** | .307 |
| *Personal significance* | 0.68 (1.16) | 1.69 (1.25) | 10.478** | .153 | 5.609** | .164 |
| *Intolerance of uncertainty* | 1.32 (1.00) | 2.71 (0.86) | 34.957*** | .368 | 16.171*** | .215 |
| Thought control strategies | 1.95 (0.76) | 2.50 (0.59) | 9.717** | .139 | 4.982* | .156 |
| Health-related strategies | 0.93 (0.71) | 2.37 (0.87) | 43.206*** | .427 | 25.009*** | .481 |
| OCD-related strategies | 0.76 (0.82) | 1.31 (0.96) | 5.498* | .087 | 2.743 | .092 |

*Note.* Data are offered as mean (SD). $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$
IT=Illness related intrusive thought; OCD= Obsessive-Compulsive Disorder

**Table 3.** Coefficients, Standard errors (*SE*) and Confidence intervals (CI) of the Parallel Multiple Mediation for dysfunctional appraisals associated with a highly upsetting illness-IT, its frequency, and IAD symptoms.

| | Coefficients (*SE*) | 95% CI |
|---|---|---|
| ***Indirect effects*** | | |
| Total indirect effect | 0.14 (0.07) | [0.02, 0.30] |
| Overimportance of thoughts | -0.07 (0.04) | [-0.17, 0.00] |
| Responsibility | 0.03 (0.03) | [-0.02, 0.10] |
| Importance of control | 0.01 (0.03) | [-0.06, 0.06] |
| Overestimation of threat | 0.06 (0.03) | [0.04, 0.15] |
| TAF-Likelihood | 0.10 (0.04) | [0.03, 0.21] |
| Personal significance | 0.01 (0.03) | [-0.04, 0.08] |
| Intolerance of uncertainty | 0.01(0.03) | [-0.05, 0.10] |
| ***Contrasts*** | | |
| Overimportance of thoughts- Responsibility | -0.09 (0.06) | [-0.25, 0.06] |
| Overimportance of thoughts- Importance of control | -0.71 (0.05) | [-0.19, 0.01] |
| Overimportance of thoughts- Overestimation of threat | -0.13 (0.06) | [-0.28, -0.02] |
| Overimportance of thoughts- TAF-Likelihood | -0.17 (0.71) | [-0.34, -0.05] |
| Overimportance of thoughts- Personal significance | -0.07 (0.04) | [-0.19, 0.00] |
| Overimportance of thoughts- Intolerance of uncertainty | -0.08 (0.06) | [-0.23, 0.03] |
| Responsibility- Importance of control | 0.02 (0.04) | [-0.05, 0.12] |
| Responsibility- Overestimation of threat | -0.03 (0.04) | [-0.13, 0.05] |
| Responsibility- TAF-Likelihood | -0.07 (0.05) | [-0.18,0.01] |
| Responsibility- Personal significance | 0.01 (0.05) | [-0.08,0.12] |
| Responsibility- Intolerance of uncertainty | -0.01 (0.04) | [-0.07, 0.11] |
| Importance of control- Overestimation of threat | -0.06 (0.51) | [-0.17, 0.02] |
| Importance of control- TAF-Likelihood | -0.10 (0.05) | [-0.22, -0.01] |
| Importance of control- Personal significance | -0.00 (0.04) | [-0.10, 0.07] |
| Importance of control- Intolerance of uncertainty | -0.01 (0.05) | [-0.13, 0.09] |
| Overestimation of threat- TAF-Likelihood | -0.04 (0.04) | [-0.14, 0.05] |
| Overestimation of threat- Personal significance | 0.05 (0.05) | [-0.04, 0.16] |
| Overestimation of threat- Intolerance of uncertainty | 0.04 (0.05) | [-0.04, 0.16] |
| TAF-Likelihood- Personal significance | 0.09 (0.05) | [-0.05, 0.21] |
| TAF-Likelihood- Intolerance of uncertainty | 0.09 (0.05) | [-0.01, 0.20] |
| Personal significance - Intolerance of uncertainty | -0.00 (0.05) | [-0.11, 0.09] |

**Figure 1.** Dysfunctional appraisals about illness-ITs as mediators in the relationship between the frequency of the most upsetting illness-IT and IAD symptoms (Whiteley Index).




*Note.* All coefficients represent unstandardized regression coefficients (and standard error in parentheses). * $p < .05$; ** $p < .01$; *** $p < .001$. Due to missing values, mediation analyses were carried out with $n = 187$ non-clinical participants. INPIE= Illness Intrusive Thoughts Inventory; TAF-Likelihood=Thought-Action Fusion- Likelihood.