Research Article

Illness Anxiety and Interpersonal Guilt

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Abstract

Introduction: This study investigated the relationship between illness anxiety and interpersonal guilt as conceived in control-mastery theory. Additionally, we explored how illness anxiety symptoms relate to general anxiety, depression, alexithymia, autonomic nervous system reactivity, personality functioning impairment, sociodemographic factors, and childhood experiences. **Methods**: A sample of 201 participants completed measures of illness anxiety (Health Anxiety Questionnaire), interpersonal guilt (Interpersonal Guilt Rating Scale-20s), anxiety (State-Trait Anxiety Inventory), depression (Beck Depression Inventory-II), alexithymia (Toronto Alexithymia Scale-20), personality dysfunction (Level of Personality Functioning-Brief Form 2.0), and autonomic nervous reactivity (Body Perception Questionnaire-22). Sociodemographic and childhood traumas and adverse experiences data were collected via an ad hoc questionnaire. **Results**:. Individuals with worried and autonomy-limiting caregivers reported higher levels of illness anxiety. Correlation analyses revealed significant positive associations with illness anxiety and all the variables measured. As expected, partial correlation demonstrated that separation/disloyalty guilt and burdening guilt are the most associated with illness anxiety symptoms. Unexpectedly, however, survivor guilt lost significance when controlling for other types of guilt. Hierarchical multiple regression identified anxiety as the strongest overall predictor of illness anxiety, followed by separation/disloyalty guilt and bodily reactivity indices. **Discussion**:. This study suggests that interpersonal guilt may be a key component in sustaining illness anxiety symptoms in anxious people. In particular, the interplay between anxiety, separation/disloyalty guilt, and autonomic overreactivity appears to contribute to illness anxiety concerns and behaviors. Working on these aspects may be essential for positive long-term outcomes of psychotherapy.

Keywords: illness anxiety, control-mastery theory, interpersonal guilt, anxiety, autonomic reactivity

Illness anxiety disorder is characterized by persistent worry with anxious interpretations of symptoms or bodily sensations, which generate

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intense anxiety regarding one's health status. Frequent seeking of medical reassurance or total avoidance of it does not change this attitude, which often significantly compromises the individual's functioning.

The *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (*DSM-5*; American Psychiatry Association [APA], 2013) introduced substantial changes in the classification of somatic disorders. In fact, an illness anxiety disorder was introduced to encompass most cases previously classified as hypochondriasis. The emphasis on medically unexplained symptoms was reduced, and the individual somatoform syndromes were grouped under the label of somatic symptom disorder.

According to the *DSM-5*, the prevalence of illness anxiety disorder in the general population ranges from 1.3% to 10% (APA, 2013). The disorder is more commonly observed in adults, with no significant differences in age, gender, level of education, socioeconomic status, or ethnicity (Gropalis et al., 2012; Scarella et al., 2016, 2019). Furthermore, research suggests that individuals with illness anxiety disorder often report a history of traumatic childhood experiences, such as abuse, neglect, or early exposure to illness—either personally experienced or involving close family members. Moreover, these individuals are frequently raised in familial environments characterized by preoccupied and anxious caregiving styles (Bögels & Brechman-Toussaint, 2006; Gehrt et al., 2022; Schmidt et al., 2002; Wearden et al., 2006; for a review see Thorgaard et al., 2018). These factors may contribute to the development of dysfunctional illness-related beliefs, leading to exaggerated negative interpretations of bodily signals and greater attention to physical symptoms. Most patients with illness anxiety disorder adopt one of these two strategies: frequent reassurance-seeking through repeated medical consultations (care-seeking type) or avoiding medical evaluations and health-related situations due to a fear of diagnosis (care-avoidant type). Both patterns reinforce the cognitive schemas, acting as a maintenance behavior (Newby et al., 2017). Furthermore, other factors, such as somatosensory amplification, and emotional components, such as anxiety and depression, may amplify the perception of somatic symptoms (Perez et al., 2015; Rodic et al., 2016).

Differential diagnoses include somatic symptom disorder, obsessive-compulsive disorder, generalized anxiety disorder, and body dysmorphic disorder. Additionally, illness anxiety disorder is frequently comorbid with other mental conditions, particularly anxiety disorders (such as generalized anxiety disorder and panic disorder), depressive disorders (such as major depression and persistent depressive disorder), obsessive-compulsive disorder, other somatoform disorders, personality disorders (especially dependent, avoidant, and narcissistic types), and substance use disorders (APA, 2013; Bach et al., 2023; Newby et al., 2017).

Regarding the prognosis of illness anxiety disorder, the *DSM-5* highlights a tendency to become chronic if left untreated and that it can be difficult to treat in individuals who do not recognize the irrational nature of their worries.

The most recent research studies focus mainly on the factors contributing to illness anxiety's genesis. In particular, a study by Reiser et al. (2014) highlighted a significant correlation between adverse experiences in childhood and the onset of illness anxiety in adulthood. Analyses have identified negative affectivity and trait anxiety as mediators in the relationship between traumatic childhood experiences and illness anxiety, starting from the assumption that these factors tend to be correlated with adverse developmental contexts. Berens and colleagues (2020) have expanded the understanding of illness anxiety by exploring its role as a mediator in the genesis of irritable bowel syndrome (IBS). Starting from the hypothesis, already advanced in previous studies, that traumatic childhood experiences (such physical, emotional, and sexual abuse) are precursors of IBS, especially in women, the researchers observed that patients with IBS show significantly higher levels of illness anxiety than healthy controls. This could amplify the perception of gastrointestinal symptoms, creating a vicious circle that fuels concern about physical symptoms, causing a worsening of IBS. Anxiety and depression are considered moderators in the relationship between adverse childhood experiences, illness anxiety, and the development of IBS. When depressive and anxious symptoms are absent, the link between adverse childhood experiences and illness anxiety is not significant.

A study by Görgen et al. (2014) showed that significant difficulties in emotion regulation and the use of dysfunctional coping strategies are closely linked to health anxiety. On this basis, Bailer and colleagues (2017) explored the role of alexithymia and rumination in the context of illness anxiety disorder and depression. Their findings revealed that, while difficulties in identifying emotions are typical of illness anxiety, rumination and difficulty in expressing feelings are more associated with depressive symptoms. Furthermore, both clinical groups showed greater use of dysfunctional emotion regulation strategies and lower activation of functional strategies. These results suggest that difficulty in identifying one's emotions may be a distinguishing characteristic of illness anxiety disorder.

Illness Anxiety Preoccupations and Polyvagal Theory

The polyvagal theory (Porges, 2011) highlights the critical role of autonomic nervous system (ANS) homeostasis in promoting individual

well-being through the integration of its three fundamental subsystems. According to this theory, an individual perceives safety when the stimuli coming from the body, the environment, and one's relationships are assessed as safe through an unconscious process of "neuroception"; thanks to this process, the ANS constantly analyzes and monitors the body and the environment to identify signals of safety, threat, or danger to one's life, and mediates the reactions to these signals.

The ANS of humans is divided into three hierarchical components: the ventral branch of the vagus nerve, the sympathetic system, and the dorsal branch of the vagus nerve. The ventral-vagal section of the vagus nerve, composed of myelinated fibers, innervates the organs located above the diaphragm (such as the structures of the neck, throat, eyes, and ears); this system is engaged in a safe and calm state, fostering social engagement, co-regulation, flexibility, and creativity. Activation of the ventral-vagal system supports prosocial behaviors, enhancing bonding and self-regulation.

The sympathetic nervous system is responsible for the fight/flight reactions to situations perceived as dangerous. When activated, it prepares the body for action, triggering a cascade of physical and physiological responses, such as increased heart rate and blood flow and inhibition of digestion. Its activation under the edge of an activated ventral branch of the vagus nerve is responsible for our mobilization.

The dorsal-vagal section of the vagus nerve affects the subdiaphragmatic organs (lungs, heart, diaphragm, and stomach) and is responsible for states of immobilization, dissociation, and collapse in situations unconsciously perceived as a threat to life. However, its activation under the edge of the ventral branch of the vagus nerve is necessary for rest and digestion.

Polyvagal theory provides a neurobiological perspective of mental health where these three subsystems' balance and dynamic functioning are crucial for a psychological/physiological sense of safety and well-being. ANS dysregulation can lead to maladaptive autonomic states, such as persistent hypervigilance (sympathetic dominance) or dissociation and emotional numbness (dorsal-vagal dominance).

A growing body of evidence highlights the impact of adverse childhood experiences and early-life trauma in shaping autonomic reactivity to perceived threats and reducing sensitivity to safety cues, leading to an increased risk of mental health disorders (Kolacz et al., 2020; Van der Kolk, 2003). The hyperactivation of the sympathetic system, with a failure to activate the ventral-vagal pathways of the vagus, has been associated with anxiety disorders, depression, posttraumatic stress disorder, obsessive-compulsive disorder, and difficulty in regulating emotions (for a review, see Göçen & Özden, 2024; Mansoor et al.,

2024). The parasympathetic nervous system, particularly the dorsal-vagal complex, plays a central role in severe depression, contributing to states of social withdrawal and emotional shutdown (Zwart, 2019). Beyond its implication in psychological dysregulation, ANS dysfunction has been linked to a range of somatic symptoms, often without an identifiable medical cause, including gastrointestinal disorders (e.g., irritable bowel syndrome), fibromyalgia, cardiovascular dysfunctions, and other stress-related bodily complaints (Bonaz et al., 2018; Chrousos, 2009; Kolacz et al., 2019; Mayer et al., 2015; Zalewski et al., 2019).

ANS alterations may contribute to increased interoceptive sensitivity, heightening bodily awareness while impairing the accuracy of interpreting benign bodily signals. We believe that polyvagal theory offers a valuable framework for understanding illness anxiety, as autonomic dysregulation may sustain the cycle of somatic distress and health-related anxiety, reinforcing body symptoms, maladaptive perception, and compulsive monitoring (Trevisan et al., 2023).

Psychodynamic Interpretations of Illness Anxiety

According to the hypotheses proposed by Freud (1911/1958, 1914/1957), illness anxiety derives from a stasis of the libido within the ego, or rather, a libidinal overinvestment of specific body organs to the detriment of object investment. Ferenczi (1914, 1931) hypothesized that, in some patients, illness anxiety symptoms represent a posttraumatic narcissistic split, necessary for the psychic health of the observant and caring self to be preserved, while the split part of the traumatized infantile self is projected into the painful organ. Schilder (1935) also stressed the deep connection between illness anxiety and narcissism, maintaining that illness anxiety symptoms represent a fixation of the individual to a narcissistic phase. These symptoms, associated with conversion phenomena, have a specific psychological meaning: The attempt at freeing oneself from "tormenting" internal conflicts is pursued by the projection of psychological discomfort outside, but this projection fails, and the pain remains attached to the body.

Melanie Klein (1935) deepened the hypothesis of projection proposed by Schilder by distinguishing two types of illness anxiety problems. The first type is attributable to the projection of a bad object into the organ perceived as painful, where the object appears bad mainly because of the previous projection of the destructiveness of the self inside it (paranoid-schizoid mode). The second type of illness anxiety derives from the projection into the painful organ of a good object that has been damaged by the destructiveness of the self (depressive mode).

Always from a Kleinian perspective, Rosenfeld (1964) hypothesized that illness anxiety derives from the failure of the early split between good and bad objects and between paranoid-schizoid and depressive anxieties. In individuals with illness anxiety, there is a constant anxiety about the danger that the bad self and the bad internal objects projected into the painful organs could overwhelm the good self and the good internal objects.

Other psychodynamic authors have hypothesized that illness anxiety is the consequence of early relationships that are not adequately sensitive to the infant's needs; according to Kohut (1971), illness anxiety is a sign of the fragmentation of the self deriving from empathic failures in primary caregiving relationships (see also Stolorow, 1977). Other authors (Niessen, 2000; Perrier, 1959) have suggested that illness anxiety may function as a defense against psychotic breakdown. Taken together, psychoanalytic theories support the idea that illness anxiety symptomatology is closely linked to impaired personality functioning.

Finally, Gazzillo et al. (2024), from the perspective of control-mastery theory (Gazzillo, 2021, 2023; Silberschatz, 2005; Weiss, 1993; Weiss et al., 1986), hypothesized that illness anxiety symptoms can be understood as a form of self-punishment deriving from unconscious interpersonal guilt. In particular, it was suggested that nonpsychotic illness anxiety symptoms could serve as a form of self-punishment deriving from the beliefs that to be better off or to have more than important others means hurting them (survivor guilt); that showing one's needs, affects, and way of being implies overwhelming other people (burdening guilt); and that it will hurt important others if one becomes separate, autonomous, and different from them (separation/disloyalty guilt).

Control-mastery theory is an integrative, cognitive-dynamic, relational theory of mental functioning, psychopathology, and psychotherapy process. According to this theory, functional psychopathology is an expression of pathogenic beliefs developed to adapt to childhood trauma and adverse experiences. Pathogenic beliefs can be conscious, explicit, declarative, and verbally articulated or unconscious, implicit, procedural, repressed, or dissociated. Pathogenic beliefs associate the pursuit of a healthy and adaptive goal with dangers for the self, important others, and important relationships. Many pathogenic beliefs support feelings of maladaptive fear, guilt, and shame.

Hypotheses

This study aims to empirically verify the hypotheses proposed by Gazzillo et al. (2024) and several other hypotheses presented in the

literature. In particular, we wanted to verify whether illness anxiety preoccupations were:

1. Stronger in people who were victims of early traumas
2. Positively related to anxiety and depression
3. Positively related to alexithymia
4. Positively related to a low level of personality functioning
5. Positively related to the activation of the sympathetic nervous system and of the dorsal branch of the vagus nerve, but not with the activation of the ventral branch of the vagus nerve
6. Positively related to survivor guilt, burdening guilt, and separation/disloyalty guilt

Methods

Sample

The inclusion criteria for subjects participating in this study were: (1) being over 18 years old; (2) absence of severe physical illness that interferes with physical well-being; (3) absence of neurological diseases or symptoms; (4) absence of psychotic syndromes or symptoms; and (5) absence of substance addiction.

The final sample comprised 201 subjects, recruited through word-of-mouth, social networks, and mailing lists, who were invited to complete a series of online self-report measures. All participants voluntarily agreed to participate in the study after reading the provided information and giving written consent for participation and data processing. To ensure confidentiality, demographic information was collected anonymously. The data were collected in Italy between September and December 2024, and this study was part of a larger research project on interpersonal guilt that the Ethics Committee for Transdisciplinary Research of "Sapienza" University of Rome approved with protocol number 48/2023.

The sample ranged in age from 18 to 74 (M = 36 years; SD = 13.37). Of the 201 participants, 61 were male (30.3%), 139 were female (69.2 %), and 1 participant chose not to specify their gender. The majority of the subjects recruited were White (n = 167; 83.1%); other ethnicities included Latin American (n = 3; 1.5%), African (n = 1; 0.5%) and other not specified (n = 30; 14.9%). The educational level of participants in the sample was distributed as follows: 6 (3%) completed middle school; 53 (26.4%)

completed high school; 72 (35.8%) completed college; and 70 (34.8%) completed postgraduate education. The income levels of the participants was distributed as follows: low for 6 participants (3%), lower-middle for 31 (15.4%), middle for 124 (61.7%), upper-middle for 39 (19.4%), and high for 1 (0.5%). Regarding employment status, the distribution was as follows: 9 individuals were unemployed (4.5%); 32 were students (15.9%); 20 were term employed (10%); 59 were permanently employed (29.4%); 73 were freelancers (36.3%); and 8 were retirees (4%).

Measures

Seven self-report questionnaires were administered in the study.

The *Interpersonal Guilt Rating Scale-20s* (IGRS-20s; Leonardi et al., 2023) is a self-report tool designed to assess interpersonal guilt based on the control-mastery theory. The scale consists of 20 items derived from clinical experience and empirical literature. Participants rate each item on a 5-point Likert scale ranging from 1 (not at all representative) to 5 (completely representative). The IGRS-20s presents a five-factor structure: (1) survivor guilt (e.g., "I do not like feeling better off than other people"); (2) separation/disloyalty guilt (e.g., "I feel I should visit my parents as often as they would like"); (3) omnipotent responsibility guilt (e.g., "I feel overly responsible for other people's well-being"); (4) self-hate (e.g., "I believe that if other people really know me, they will want nothing to do with me"); and (5) burdening guilt (e.g., "I believe that expressing my desires and/or needs makes others feel overwhelmed"). The internal consistency of the five guilt factors, as measured by Cronbach's alpha, ranged from adequate to good (all $p < .001$): survivor guilt, .83; omnipotent responsibility guilt, .82; self-hate, .80; burdening guilt, .80; and separation/disloyalty guilt, .71. Similarly, test-retest reliability at 1 month was also adequate to good: survivor guilt, $rho = .82$, $p < .001$; omnipotent responsibility, $rho = .75$, $p < .001$; self-hate, $rho = .77$, $p < .001$; burdening guilt, $rho = .82$, $p < .001$; separation/disloyalty guilt, $rho = .79$, $p < .001$.

The *revised socio-demographic schedule* (Gazzillo & Faccini, 2019) is a brief self-report measure consisting of forced-choice questions regarding age, gender, educational level, socioeconomic status, health conditions, and self-reported adverse experiences and traumas during early childhood and adolescence. For the latter section, participants were asked to respond with "yes" or "no" to brief questions, such as the following and other, similar questions: "During your childhood or adolescence, were your family members particularly worried that you or another family member might contract an illness?" "During your

childhood or adolescence, were you ever a victim of neglect (e.g., not receiving care, attention or help when needed)?"

The *Health Anxiety Questionnaire* (HAQ; Lucock & Morley, 1996; Italian version by Melli et al., 2007) is a 21-item self-report questionnaire that measures the illness anxiety symptoms on a 4-point Likert scale from 0 (never or almost never) to 3 (most of the time). It comprises four subscales: fear of illness and death, worry and health preoccupation, interference with life, and reassurance-seeking behaviors. Higher scores indicate a higher level of illness anxiety. HAQ has an excellent internal consistency, as measured by Cronbach's alpha (.92) and significant stability over time (r = .87).

The *State-Trait Anxiety Inventory* (STAI; Spielberger et al., 1983; Italian version by Lazzaro & Pancheri, 1980) is a self-report questionnaire composed of two subscales (each comprising 20 items) designed to assess, respectively, state and trait anxiety symptoms. The *state* subscale evaluates how respondents feel "at the moment" using a 4-point Likert scale, ranging from 1 (not at all) to 4 (very much). The *trait* subscale, on the other hand, measures how participants feel "generally" in their everyday life, also using a 4-point scale, from 1 (almost never) to 4 (almost always). In both subscales, higher scores signal greater levels of anxiety. The scale has a strong internal consistency (Cronbach alpha coefficients ranging from .86 to .95) and test-retest reliability (coefficients from .65 to .75).

The *Beck Depression Inventory-II* (BDI-II; Beck et al., 1996; Italian version by Ghisi et al., 2006) is a self-report scale comprising 21 groups of statements to assess depressive symptoms. For each group, participants are asked to select the statement that best describes their feelings over the past 2 weeks, using a 4-point scale (0 to 3). The total score ranges from 0 to 63, where higher scores indicate more severity of depressive symptoms. The internal consistency of the scale, as measured with Cronbach alpha, is high (.91).

The *Toronto Alexithymia Scale* (TAS-20; Bagby et al., 1994; Taylor et al., 1992; Italian version by Bressi et al., 1996) is a 20-item self-administered questionnaire that assesses alexithymia, namely, the difficulty in identifying and describing emotions. Items are rated on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree). The present study used the total score of the questionnaire, where higher scores indicate a greater degree of alexithymia. The scale showed good internal consistency, with a Cronbach's alpha of .75.

The *Level of Personality Functioning Scale-Brief form 2.0* (LPFS-BF; Hutsebaut et al., 2016; Italian version by Natoli al., 2022) is a 12-item measure designed to assess self- and interpersonal functioning impairment. Responses to the 12 statements are rated on a scale from 1 (fully disagree) to 4 (fully agree), with higher scores reflecting greater severe

personality impairment. The tool has demonstrated good internal consistency (Cronbach's alpha between .71 and .85).

The *Body Perception Questionnaire—Short Form* (BPQ-22; Cabrera et al., 2018; Italian version by Poli et al., 2021) is a 22-item self-report scale designed to assess the frequency of autonomic responses and indicators of bodily stress. It consists of two subscales: body awareness, which evaluates an individual's sensitivity and awareness of bodily signals; and the ANS, which is further divided into a supradiaphragmatic reactivity and subdiaphragmatic reactivity. Higher scores are indicative of greater autonomic dysregulation. The tool has a good internal consistency, with Cronbach alpha values ranging between .88 and .91.

Data Analysis

To verify IGRS-20's factor structure, we conducted a confirmatory factor analysis using JASP (version 0.18.3.0). This version of JASP was also used for conducting a network analysis. All the other statistical analyses were performed using the Statistical Package for Social Science (IBM SPSS, Version 22.0, Inc).

Descriptive statistics (frequency, means, and standard deviations) were calculated to evaluate sample characteristics. The Mann-Whitney U test examined differences in reported traumas and adverse life events among participants. Spearman's rank-order correlation coefficients were computed to assess the relationship between all the employed scales. We calculated the Mann-Whitney U test and Spearman rank-order correlations because we did not expect our data to be normally distributed; when we checked the asymmetry and kurtosis of our data, however, we found that they were all between −1 and +1, apart from self-hate, whose asymmetry was 2.25 and whose kurtosis was 4.98. Finally, a hierarchical regression analysis was used to determine the variables that better explained illness anxiety scores based on the entire set of significant correlations previously calculated, and a network analysis was used to show the complex interrelations among the variables investigated.

Results

Descriptive Statistics

In line with our hypotheses, the confirmatory factor analysis demonstrates a five-factor structure of IGRS-20s (survivor guilt, separation/disloyalty guilt, omnipotent responsibility guilt, self-hate, and

burdening guilt). Consistent with the recommendations in the literature (Hu & Bentler, 1999), the five-factor model of IGRS-20s demonstrates an overall adequate to good fit, with the following indices: $\chi^2 = 339.54$; GFI = .95; CFI = .90; RMSEA = .075; SRMR = .081).* Table 1 presents the sample's descriptive statistics for the various administered scales, including the HAQ.

Mann-Whitney U test revealed that illness anxiety, as measured by the total HAQ score, was significantly more pronounced in individuals who reported that, during childhood/adolescence, they felt *their parents suffered due to their distance or autonomy of thinking* (Means: 20.3 vs. 14.01; U = 1698.45; $p = .037$; Cohen's $d = .47$) and in subjects who reported that *their parents were particularly concerned about their (or other family member) health* (Means: 22.6 vs. 15.7; U = 3669.5; $p = .003$; Cohen's $d = .48$)**; furthermore, all four HAQ subscales (fear of illness and death, worry and health preoccupation, interference with life, reassurance-seeking behaviors) were statistically significantly higher in these subjects ($p < .05$).

No significant correlations were found with between health anxiety and the sociodemographic characteristics of the sample (e.g., age, gender, educational level, socioeconomic status). However, the total illness anxiety score showed significant positive correlations with all other scales employed in this study (except body awareness), as detailed in Table 2.

However, regarding the correlation of the HAQ and the IGRS-20s scales, when controlling for other types of guilt through partial correlation, the total illness anxiety score remained significantly correlated only with *separation/disloyalty guilt* (*rho* = .34; CI [0.17, 0.49]; $p < .001$), as the same was true also for all its subscales: fear of illness and death (*rho* = .34; CI [0.17, 0.49]; $p < .001$;); worry and health preoccupation (*rho* = .32; CI [0.15, 0.47]; $p < .001$); reassurance-seeking behaviors (*rho* = .27; CI [0.09, 0.43]; $p < .001$); and interference of illness anxiety symptoms with life (*rho* = .27; CI [0.14, 0.39]; $p < .005$). Additionally, *burdening guilt* correlated with the interference of illness anxiety symptoms with everyday life subscale (*rho* = .14; CI [0.002, 0.27]; $p < .005$).

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* The second model tested was a four-factor model that, in line with the results of previous studies, grouped into the same factors the omnipotent responsibility guilt and separation/disloyalty guilt factors. However, this model would not have allowed us to test precisely our hypotheses about the relationship between illness anxiety and the different kinds of interpersonal guilt and presented a worst overall fit (Chi-squared = 421.53; $df = 146$; $p < .001$; GFI = .93; CFI = .85; RMSEA = .097; SRMR = .096).

** The means compared in this and the previous were relative to the group of people who reported this kind of childhood experiences versus the group of people who reported that they did not have them.

TABLE 1. Descriptive statistics (mean, standard deviations and minimum/maximum scores) for all employed scales

	Scales	Min	Max	*M*	*SD*
IGRS-20s	Self-hate	1	5	1.52	0.84
	Burdening	1	5	2.42	0.91
	Survivor	1	5	2.36	0.90
	Separation/disloyalty	1	5	3.06	0.96
	Omnipotent responsibility	1	5	2.90	1.01
HAQ	Illness anxiety	0	55	16.59	13.243
	Worry and preoccupation for health	0	23	6.75	5.572
	Fear of illness and death	0	21	6.66	5.353
	Reassurance-seeking behavior	0	9	2.40	2.356
	Interference with life	0	8	0.79	1.603
BDI-II	Depression	0	45	10.46	8.883
STAI	Anxiety (state)	20	77	42.16	13.334
	Anxiety (trait)	20	75	43.08	12.669
TAS-20	Alexithymia	20	86	50.56	10.397
LPFS-BF 2.0	Personality impairment	12	44	21.28	7.165
BPQ-22	Body awareness	7	21	11.28	3.012
	Supradiaphragmatic reactivity	8	21	9.70	2.472
	Subdiaphragmatic reactivity	4	12	7.56	2.278

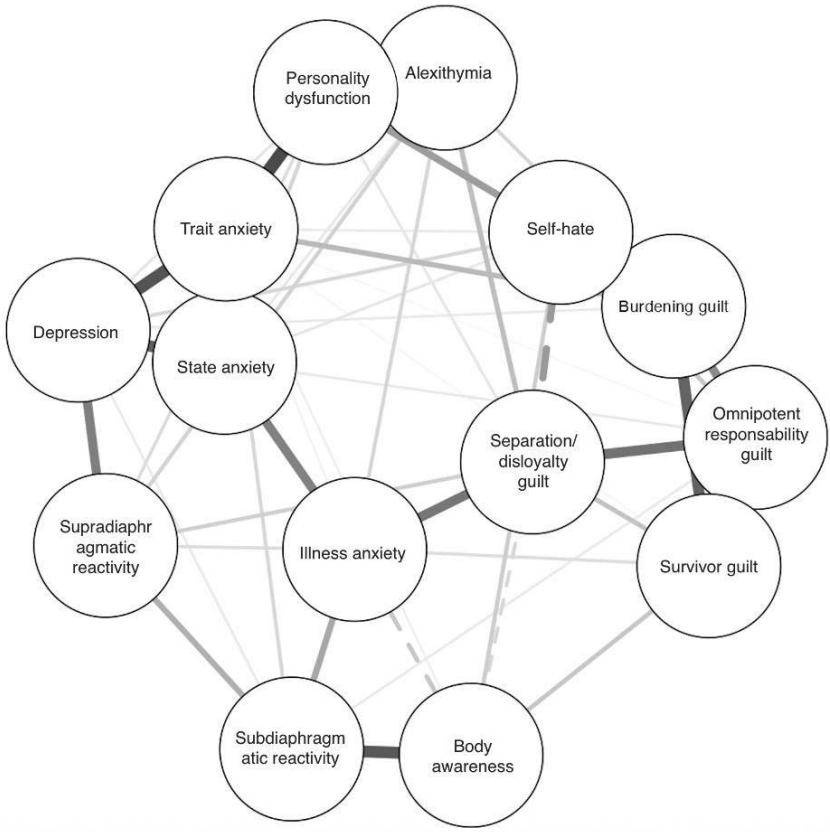
Note: IGRS-20s = Interpersonal Guilt Rating Scale-20s; HAQ = Health Anxiety Inventory; BDI-II = Beck Depression Inventory; STAI = State-trait Anxiety Inventory; TAS-20 = Toronto Alexithymia Scale; LPFS-BF 2.0 = Level of Personality Functioning Scale-short form; BPQ-22 = Body Perception Questionnaire.

A multiple hierarchical regression analysis was conducted, including only the variables significantly correlated with the HAQ as predictors (state and trait anxiety, separation and disloyalty guilt, depression, etc.). The final model showed that the best predictors of illness anxiety scores were state anxiety ($\beta = .393$; $t = 6.36$; $p < .001$), followed by anxiety and separation/disloyalty guilt ($\beta = .288$; $t = 4.87$; $p < .001$). Also, ANS reactivity contributed significantly ($\beta = .148$; $t = 2.49$; $p = .014$). This model explained 36.4% of the variance in illness anxiety ($R^2 = .364$) and was statistically significant (F [3,197] = 37.57; $p < .001$).

TABLE 2. Spearman rank-order correlations between illness anxiety, interpersonal guilt, depression, anxiety (state and trait), alexithymia, level of personality impairment and body stress reactions

SCALE	1.	1a.	1b.	1c.	1d.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Illness anxiety																	
1a. Illness anxiety (worry and preoccupation)	.935**	—															
1b. Illness anxiety (fear of illness and death	.940**	.846**	—														
1c. Illness anxiety(reassurance-seeking behavior)	.819**	.768**	.711**	—													
1d. Illness anxiety(interference with life)	.449**	.413**	.320**	.347**	—												
2. Separation/	.410**	.375**	.325**	.325**	.180**	—											
Disloyalty guilt																	
3. Survivor guilt	.272**	.235**	.265**	.199**	.207**	.303**	—										
4. Burdening guilt	.215**	.213**	.166*	.149*	.270**	.179*	.552**	—									
5. Omnipotent responsibility	.256**	.221**	.255**	.240**	.162**	.381**	.528**	.524**	—								
6. Self-hate	.145*	.135	.137	.091	.220**	−0.001	.380**	.543**	.346**	—							
7. Depression	.416**	.367**	.380**	.279**	.380**	.294**	.299**	.509**	.337**	.402**	—						
8. State anxiety	.491**	.454**	.450**	.390**	.339**	.278**	.283**	.503**	.349**	.397**	.741**	—					
9. Trait anxiety	.472**	.435**	.441**	.333**	.351**	.275**	.400**	.400**	.398**	.513**	786**	.824**	—				
10. Alexithymia	.351**	.342**	.286**	.300**	.239**	.349**	.281**	.427**	.237**	.338**	.491**	.503**	.559**	—			
11. Personality impairment	.364**	.348**	.332**	.264**	.289**	.320**	.327**	.554**	.375**	.477**	.688**	.708**	.788**	.694**	—		
12. Supradiaphragmatic reactivity	.384**	.323**	.307**	.241**	.351**	.305**	.275**	.286**	.244**	.213**	.396**	.368**	.433**	.386**	.436**	—	
13. Subdiaphragmatic reactivity	.252**	.229**	.205**	.205**	.184**	.084	.193**	.208**	.224**	.188**	.302**	.292**	.322**	.184**	.254**	.329**	—
14. Body awareness	−.002	−.019	−.014	.084	−.011	−.019	.227**	.229**	.180*	.245**	.189**	.143*	.249**	.153*	.216**	.195**	.338**

Note: ** The correlation is significant at p < .001; * The correlation is significant at *p* = .001.



Note. Solid lines show positive correlations; dotted lines show negative correlations. The thickness of lines indicates the strength of the correlation.

FIG. 1. Network analysis of illness anxiety, interpersonal guilt, anxiety, depression, alexithymia, level of personality functioning and autonomic reactivity.

In Figure 1, the result of a network analysis (a network plot based on the correlation method with normalized centrality measures; number of nodes = 14; number of nonzero edges = 56/91; sparsity = .39) shows the complexities of the interrelations among our variables. In particular, it shows how depression, state anxiety, sympathetic activation, and illness anxiety correlate together, and how illness anxiety is correlated with separation/disloyalty guilt.

Discussion

The primary aim of this study was to deepen our understanding of the relationship between illness anxiety and interpersonal guilt, as conceptualized in control-mastery theory (Faccini et al., 2020; Leonardi et al., 2023), starting from clinical hypotheses presented in a previous study (Gazzillo et al., 2024). Additionally, we investigated how illness anxiety relates to other psychological variables.

Firstly, a confirmatory factor analysis confirmed a five-factor structure for the IGRS-20s, consistent with the control-mastery theory theoretical propositions. All five interpersonal guilt factors positively correlated with illness anxiety as measured by the HAQ. As expected, partial correlation analysis revealed that the most significant associations were with separation/disloyalty guilt and burdening guilt. Particularly, separation/disloyalty guilt—the belief that seeking independence or differentiation from loved ones is harmful to them—showed the strongest association with the overall HAQ score and all its subscales. This finding aligns with our trauma-related results: Subjects with higher levels of illness anxiety reported childhood experiences where (1) *their autonomy and distance were perceived as harmful or distressing* to caregivers and (2) *caregivers were particularly concerned about health issues*. These data are also consistent with the prevalence of preoccupied attachment style in caregivers of individuals with illness anxiety symptoms (Noyes et al., 2003; Reiser & Wright, 2019; Schmidt et al., 2002; Wearden et al., 2006). However, unexpectedly, we did not find evidence of significant reference to early health-related experiences in participants' life histories. Based on these results, we hypothesize that illness anxiety may function as an unconscious way to maintain proximity to caregivers by adopting a vulnerable role and inhibiting autonomy or can be the outcome of identification with a caregiver overly concerned about illness. From this perspective, somatic symptoms and illness anxiety rumination may be a form of self-punishment deriving from an internal conflict between the desire for independence/differentiation and the fear of harming significant others.

Additionally, burdening guilt was associated with the illness anxiety subscale measuring interference with daily life. The belief that one's needs, emotions, and feelings are burdensome to others may prevent individuals from freely expressing themselves or seeking support, leaving them overwhelmed by their emotional distress, which could lead to an increase in illness anxiety and further amplify its impact on daily functioning. Given the correlational nature of our results, however, this data can also be explained by these people being afraid of burdening others with their health-related preoccupations.

Contrary to our expectations, although a significant correlation emerged also with survivor guilt, this association did not remain significant when controlling for other types of guilt. Nevertheless, it remains open whether illness anxiety symptoms reflect not only a conflict related to differentiation from caregivers, but also a difficulty in tolerating the opportunity of being "better" than them (such as being healthier, less anxious, less weak, more capable, or more fortunate).

Regarding anxiety and depression, our findings align with previous evidence indicating a significant positive relationship between them and illness anxiety (Fink et al., 2004; Lee et al., 2004; Melli et al., 2016; Reiser et al., 2020; Scarella et al., 2016; Wright et al., 2016). Depressive mood may contribute to negative evaluation of thoughts and somatic sensations, leading to catastrophic scenarios of illness and death. Anxiety disorders, on the other hand, have been widely recognized as the most frequent comorbidity of health preoccupations; persistent worry is one of their core features and its physiological components (autonomic arousal) are often misattributed to illness. Consistently in our study, anxiety emerged as the strongest predictor of the HAQ, followed by separation-disloyalty guilt and ANS reactivity. These results are in line with polyvagal theory (Porges, 2022), which posits that dysregulation of the ANS—characterized by a persistent state of hypervigilance and the inability to restore a sense of safety through effective vagal regulation—may lead to gastrointestinal disorders and somatizations (Bonaz et al., 2018; Chrousos, 2009; Mayer et al., 2015). Additionally, ANS dysregulation may increase maladaptive interoceptive sensitivity, causing individuals to misinterpret benign body signs (Trevisan et al., 2023).

In line with previous literature (Bailer et al., 2017), we also found a positive correlation between alexithymia and illness anxiety, which supports the hypothesis that difficulties in recognizing and interpreting one's own emotional state may bring individuals to process and express it through physical sensations or preoccupations. Furthermore, alexithymia also showed a positive correlation with both the reactivity ANS scales, that is, a heightened physiological stress response (Kanbara & Fukunaga, 2016).

Moreover, we found illness anxiety to be associated with a lower level of personality functioning, as measured by the LPFS-BF 2.0. A low level of self-integration and interpersonal functioning may contribute to increased health concerns, in line with evidence on the co-occurrence of personality pathology and illness anxiety (Bach et al., 2020; Fallon et al., 2012; Pan et al., 2018; Sakai et al., 2010).

Network analysis underscored the important connection between illness anxiety, general anxiety, and separation/disloyalty guilt while also

highlighting complex linkages with the other variables we examined. One possibility for future research, implied by this analysis, is that certain network pathways could reflect mediated relations whereby one variable may contribute indirectly to illness anxiety through the effects of other variables. For example, it is possible that self-hate—which was only modestly associated with illness anxiety—may be linked with worry about health as a driver of impaired personality functioning, which in turn may lead to health anxiety. Alternatively, network variables might function as moderators, potentially strengthening or buffering relations between interpersonal guilt and illness anxiety. Such possibilities could be explored in prospective studies and samples large enough to detect subtle interaction effects.

Some limitations of this study need to be pointed out. The first limitation concerns the underrepresentation of the general population (e.g., we included only participants capable of using electronic devices to complete the online questionnaires, predominantly White subjects, a higher proportion of females than males). These aspects reduce the generalizability of our conclusions. Secondly, all data were derived from self-report measures, which may be subject to response bias, individual awareness, and other potential confounding variables. Thirdly, the study's cross-sectional design prevents us from drawing causal inferences. Finally, this study was conducted on nonclinical subjects. For these reasons, further longitudinal studies on clinical populations that consider all these limitations might help clarify our findings.

Despite these limitations, our findings offer a new perspective on the role of interpersonal guilt in illness anxiety and further reinforce its connection with other clinical conditions. From the perspective of control-mastery theory, illness anxiety originates from an internal conflict between striving for personal goals and the unconscious need to preserve a bond with traumatizing parents (either as compliance with their messages or as identification with them). Understanding patients' pathogenic beliefs, interpersonal guilt, and traumatic experiences that may sustain health-related anxiety symptoms can guide clinical interventions aimed at disconfirming these pathogenic beliefs, helping patients master their traumas and reducing their guilt to foster long-term symptom reduction.

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