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# **Personality disorders, but not cancer severity or treatment type, are risk factors for later generalised anxiety disorder and major depressive disorder in non metastatic breast cancer patients**

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## **► To cite this version:**

Anne-Laure Champagne, Paul Brunault, Grégoire Huguet, Isabelle Suzanne, Jean-Louis Senon, et al.. Personality disorders, but not cancer severity or treatment type, are risk factors for later generalised anxiety disorder and major depressive disorder in non metastatic breast cancer patients. *Psychiatry Research*, 2015, 236, pp.64 - 70. <10.1016/j.psychres.2015.12.032>. <hal-03259406>

**HAL Id: hal-03259406**

**<https://hal.science/hal-03259406v1>**

Submitted on 18 Jun 2021

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HAL Authorization

**Title:** Personality disorders, but not cancer severity or treatment type, are risk factors for later generalized anxiety disorder and major depressive disorder in non metastatic breast cancer patients.

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**Highlights:**

- Anxiety (GAD) and depressive disorders (MDD) are frequent in breast cancer patients
- Patients with GAD (or MDD) at diagnosis are at higher risk for later GAD (or MDD)
- Breast cancer patients with any personality disorder are at higher risk for later GAD
- Patients with cluster C personality disorders are at higher risk for later MDD
- Cancer severity and type of treatment used were not associated with later GAD or MDD

**Title:** Personality disorders, but not cancer severity or treatment type, are risk factors for later generalized anxiety disorder and major depressive disorder in non metastatic breast cancer patients.

## **ABSTRACT**

This study aimed to determine whether personality disorders were associated with later Major Depressive Disorder (MDD) or Generalized Anxiety Disorder (GAD) in breast cancer patients. This longitudinal and multicentric study included 120 French non-metastatic breast cancer patients. After cancer diagnosis (T1) and 7 months after diagnosis (T3), we assessed MDD and GAD (Mini International Neuropsychiatric Interview 5.0). We assessed personality disorders 3 months after diagnosis (VKP). We used multiple logistic regression analysis to determine what were the factors associated with GAD and MDD at T3. At T3, prevalence rate was 10.8% for MDD and 19.2% for GAD. GAD at T3 was significantly and independently associated with GAD at T1 and with existence of a personality disorder, no matter the cluster type. MDD at T3 was significantly and independently associated with MDD at T1 and with the existence of a cluster C personality disorder. Initial cancer severity and the type of treatment used were not associated with GAD or MDD at T3. Breast cancer patients with personality disorders are at higher risk for GAD and MDD at the end of treatment. Patients with GAD should be screened for personality disorders. Specific interventions for patients with personality disorders could prevent psychiatric disorders.

**Keywords:** major depressive disorder; generalized anxiety disorder; personality disorders; breast cancer; psychiatric disorders; VKP.

## **1. Introduction**

Breast cancer has become a major public health issue as it is the most common cancer affecting women both in terms of prevalence and incidence (Ferlay et al., 2010). Improved screening and advances in breast cancer treatment over the last two decades have significantly reduced its mortality rate (Rachet et al., 2009), leading health professionals to take into account not only survival but also patients' subjective assessment of his/her own health (i.e., quality of life and psychological well-being) (Montazeri, 2008).

Following a breast cancer diagnosis, patients have to cope with many factors that might be related to psychological distress later on, including facing a life-threatening illness, having painful and impairing treatments, significant role changes, and issues related to body image (Helms et al., 2008). During the first year of treatment, these psychological issues lead to significant anxiety, depression or both in almost half of these patients (Burgess et al., 2005). In the population of breast cancer patients, major depressive disorder (MDD) and generalized anxiety disorder (GAD) are highly prevalent (Stark et al., 2002; Mehnert and Koch, 2007; Hopwood et al., 2010; Hill et al., 2011), especially during the diagnosis phase and at the end of the initial treatment phase (Burgess et al., 2005). MDD and GAD should be screened and treated as early as possible, as they can negatively impact quality of life (Stark and House, 2000; Brunault et al., 2012) and lead to more difficult care (Reich et al., 2008; Brintzenhofe-Szoc et al., 2009). These psychiatric disorders are indeed associated with a higher prevalence for somatic symptoms as well as a lower adherence to treatment (Reich et al., 2008; Brintzenhofe-Szoc et al., 2009). To deliver a high quality of care, one of the most important challenges is to determine the risk factors for these disorders so that we might propose early therapeutic interventions that aim to improve patients' quality of care and quality of life.

Studies conducted in breast cancer patients identified several factors associated with mood and anxiety disorders, including younger age (Burgess et al., 2005), lower socio-economic status (Macleod et al., 2004), lower social support (Mehnert and Koch, 2007) and greater prevalence of somatic symptoms such as pain (Bardwell et al., 2006; Reich et al., 2008). Some other studies demonstrated that objective cancer-related factors (e.g., tumour stage at diagnosis, type of treatment used) were of little predictive value (Bardwell et al., 2006; Brunault et al., 2013). Although personality is a well-known risk factor for later mood and anxiety disorders in the overall population (Hölzel et al., 2011; Latas and Milovanovic, 2014), very few studies assessed the association between personality and later occurrences of future psychiatric disorders in breast cancer patients. These studies, which assessed personality traits or dimensions rather than personality disorders, have demonstrated that the existence of high trait anxiety (Ando et al., 2011), high pessimism and high neuroticism (Den Oudsten et al., 2009) were associated with later mood and anxiety disorders. To our knowledge, no study assessed the association between personality disorders (i.e., using a categorical approach) and later MDD or GAD in breast cancer patients.

To gain insight into the factors associated with later MDD and GAD in breast cancer patients, we propose to test a working model based on Wilson & Cleary's theoretical model (Wilson and Cleary, 1995) (Figure 1). In this working model, we hypothesized that the existence of psychiatric disorders at the end of treatment phase might be associated with some biological and physiological variables (e.g., tumour severity, type of treatment used), some variables related to symptom status (e.g., existence of a psychiatric disorder at baseline), as well as some individual characteristics (e.g., age, education level, existence of a personality disorder) and an environmental characteristic (e.g., marital status).

The objective of this study was to determine whether patients who had a personality disorder reported a higher prevalence for MDD or GAD at the end of treatment phase (7 months post-diagnosis) in breast cancer patients. We hypothesised that patients with a personality disorder, with MDD or with a GAD at the time of diagnosis, were at higher risk for later MDD or GAD at the end of the treatment phase. More specifically, we hypothesised that patients with a cluster C personality disorder (anxious type) were more likely to report MDD or GAD at the end of the treatment phase.

## **2. Methods**

### ***2.1. Participants and procedure***

The participants were recruited based on the ESPOIR study (Early Screening for Psycho-Oncological Intervention Research), which was financed by the National Cancer Institute (INCa) and thanks to a complementary funding from the departmental committees of the Ligue contre le Cancer, France (Departments of Indre-et-Loire and Vienne). Participants were recruited between May 2006 and November 2007 in the Gynaecology Department of Tours and Poitiers University Hospitals, France.

Patients were considered eligible if it was their first breast cancer and if no metastasis had been detected during diagnosis. They also should understand French easily so that they might be able to answer questionnaires. Exclusion criteria were: metastasis or breast cancer relapse, having a cancer of other organ in the past, difficulty understanding the questionnaires, or refusal to participate.

The data collection was conducted at three different steps: the first visit (T1) was conducted shortly after diagnosis and before the treatment began; the second visit (T2) happened three months after diagnosis; the third visit (T3) was conducted 7 months after diagnosis (that is, at the end of the initial treatment phase that included surgery, radiotherapy and the first chemotherapies).

### ***2.2. Measures***

#### ***2.2.1. Socio-demographic characteristics, tumour characteristics and types of treatment received (T1)***

During the first interview at T1, we collected the following socio-demographic data: age, marital status, and education level. Breast cancer severity was assessed for each patient, using the international

“Tumour Node Metastasis” (TNM) classification system and also by detecting the presence of hormone receptors (existence of at least one hormone receptor vs. triple negative). We also assessed medical data related to patient care, including: treatment with chemotherapy, tumourectomy surgery and/or mastectomy, lymph node curettage, radiotherapy and/or hormonotherapy (i.e., planned use of adjuvant endocrine therapy).

### *2.2.2. Assessment of MDD and GAD (T1 and T3)*

We investigated the existence of MDD or GAD at T1 and T3 as well as lifetime prevalence for MDD (prior to diagnosis) at T1 using the MINI version 5.0.0. This semi-structured interview, which was performed by experienced and trained clinicians, assesses the 17 main Axis I psychiatric disorders according to DSM-IV diagnostic criteria. The MINI was validated by Sheehan et al. (Sheehan et al., 1998), and translated and validated in French by Lecrubier et al. (Lecrubier et al., 1997). The MINI is a reliable instrument that is used to assess anxiety and mood disorders. For GAD, its sensitivity is 91%, and it has a specificity of 86% and a kappa coefficient of 0.70; for MDD, the MINI has a sensitivity of 96%, a specificity of 88% and a kappa coefficient of 0.84 (Lecrubier et al., 1997; Sheehan et al., 1998).

### *2.2.3. Assessment of personality disorders (T2)*

Personality disorders were assessed using the French version (Enfoux et al., 2013) of the VKP questionnaire (Duijsens et al., 1996; Lenzenweger, 1997), which is a self-administered questionnaire based on the International Personality Disorder Examination (IPDE) that assesses personality disorders according to the DSM-IV and ICD-10 criteria. The set of 197 items assesses the existence of personality disorders for each of the 10 personality disorders according to ICD-10 and DSM-IV diagnostic criteria: cluster A (paranoid, schizoid, schizotypic personality disorders), cluster B (antisocial, borderline, histrionic personality disorders) and cluster C (avoidant, dependent, obsessive-compulsive disorders) personality disorders. We choose to assess personality at T2 (3 months post diagnosis) to limit the risks of overestimating prevalence rate for personality disorder due to the high situational stress induced by cancer diagnosis (what would have occurred if assessment was too close to T1) and due to fear of cancer recurrence (what would have occurred if assessment was too close to T3).

## **2.3. Ethical considerations**

This study was approved by the ethical committee of the University Hospital Centre of Tours, France (CHRU de Tours), and also by the institutional review board of Tours Hospital (Comité pour la Protection des Personnes). Each patient was automatically asked for a written informed consent before inclusion in the protocol.

## **2.4. Statistics analyses**

Analyses were carried out using the statistical package StatView Version 5.0 (Abacus Concepts, SAS Institute, Cary, NC, USA). All analyses were two-tailed.  $P$ -values  $\leq 0.05$  were considered statistically significant. Descriptive statistics included percentages (ordinal variables), and mean and standard deviation for continuous variables. To compare the prevalence of GAD or MDD between T1 and T3, we used a McNemar Chi-square test.

To determine which factors were associated with the occurrence of GAD or MDD at T3, we performed a multivariate logistic regression analysis. Because GAD at T1 was associated with the occurrence of GAD at T3 ( $p < 0.001$ ), we adjusted our logistic regression analyses on GAD at T1 when determining which factors were associated with GAD at T3. Because MDD at T1 was associated with the occurrence of MDD at T3 ( $p < 0.001$ ), we adjusted our logistic regression analyses on MDD at T1 when determining which factors were associated with MDD at T3. The results of our logistic regression analyses were presented using chi-square and  $p$ -values. If the association was significant ( $p$ -value  $\leq 0.05$ ), we also presented the odds-ratio and its 95% confidence interval.

### **3. Results**

#### ***3.1. Population***

We initially enrolled a total of 141 patients at T1 (first visit). Sixteen out of these 141 patients were withdrawn from the study due to either metastasis evolution (3 patients), consent withdrawal (6 patients), or loss to follow-up (7 patients). In the population of patients who withdrew consent or who were loss to follow up ( $n=13$ ), mean age was  $57.4 \pm 10.5$  years, 38.5% were single, no patients had MDD at T1 and 3 (23.1%) had GAD at T1. Our eligible population at the end of the treatment phase (T3) included 125 patients, of whom 5 had missing data for at least one questionnaire. Our final population was thus based on 120 patients (fully exploitable questionnaires for all patients).

#### ***3.2. Sample characteristics***

Socio-demographic characteristics of our population, tumour characteristics, and the type of treatment received are detailed in Table 1. The prevalence of various personality disorders is presented in Table 2.

The prevalence of GAD at T1 and at T3 was 14.2% ( $n=17$ ) and 19.2% ( $n=23$ ), respectively. There was no significant difference between the prevalence of GAD at T1 and at T3 ( $p=0.24$ ). The prevalence of MDD at T1 and at T3 was 15.8% ( $n=19$ ) and 10.8% ( $n=13$ ), respectively. There was no significant difference between the prevalence of MDD at T1 and at T3 ( $p=0.08$ ). At T1, prevalence for lifetime MDD (prior to diagnosis) was 10.8% ( $n=13$ ). Patients who had a history of MDD prior to diagnosis reported higher prevalence for personality disorder (61.5% vs. 29.9%;  $p < 0.05$ ).

### ***3.3. Association between GAD at T3 and socio-demographic characteristics, tumour characteristics and type of treatment received***

After adjustment for the presence of GAD at T1, the occurrence of GAD at T3 was not associated with any socio-demographic characteristic: no link was found with age ( $p=0.61$ ), marital status ( $p=0.29$ ) or education level ( $p=0.37$ ).

The occurrence of GAD at T3 was not associated with the initial tumour characteristics or other treatment received: no link was found between the size of tumour ( $p=0.11$ ), existence of adenopathy ( $p=0.38$ ), the presence of hormonal receptors ( $p=0.98$ ), mastectomy ( $p=0.42$ ), tumourectomy ( $p=0.34$ ), axillary node dissection ( $p=0.11$ ), chemotherapy ( $p=0.27$ ), radiotherapy ( $p=0.30$ ) or hormonotherapy ( $p=0.25$ ). The occurrence of GAD at T3 was not associated with the existence of MDD at T1 ( $p=0.22$ ).

### ***3.4. Association between GAD at T3, personality disorders and GAD at T1***

Having a personality disorder was associated with a higher prevalence for GAD at the end of the initial treatment phase (T3) even after adjustment for GAD at T1 (see Table 3). This association was observed for all personality clusters: cluster A (paranoid personality disorders), cluster B (borderline personality disorders), and cluster C (avoidant, dependent, obsessive-compulsive personality disorders).

### ***3.5. Association between MDD at T3 and socio-demographic characteristics, tumour characteristics and type of treatment received***

After adjusting for the presence of MDD at T1, MDD at T3 was not associated with any socio-demographic characteristics: no link was found with age ( $p=0.69$ ), marital status ( $p=0.15$ ) or education level ( $p=0.69$ ).

MDD at T3 was not associated with the initial tumour characteristics or the type of treatments received: no link was found with the size of tumour ( $p=0.99$ ), node ( $p=0.97$ ) or the presence of hormonal receptors ( $p=0.98$ ).

No link was found with mastectomy surgery ( $p=0.33$ ), tumourectomy ( $p=0.45$ ), axillary node dissection ( $p=0.99$ ), chemotherapy ( $p=0.15$ ), radiotherapy ( $p=0.68$ ) or hormonotherapy ( $p=0.76$ ). MDD at T3 was not associated with GAD at T1 ( $p=0.40$ ).

### ***3.6. Association between MDD at T3, personality disorders and MDD at T1***

After adjusting for the existence of MDD at T1, the existence of a personality disorder was associated with a higher prevalence for MDD at the end of the initial treatment phase (T3), but only for cluster C personality disorders (Table 3).

The existence of a cluster C personality disorder was associated with a higher prevalence for MDD at T3. Cluster A (paranoid, schizoid, schizotypic) and cluster B (antisocial, borderline, histrionic) personality disorders were not associated with MDD at T3.

#### **4. Discussion**

This study shows that in breast cancer patients, having a personality disorder is associated with a higher risk for GAD and MDD at the end of the initial treatment phase (7 months post-diagnosis). More specifically, we found that later GAD was associated with existence of a personality disorder (no matter the cluster type), whereas later MDD was specifically and only associated with existence of a cluster C personality disorder. Finally, we demonstrated that having a personality disorder was associated with a higher prevalence for GAD with an effect size at least as important as the association between GAD at T1 and GAD at T3, while tumour characteristics and the type of treatment received were not associated with future psychiatric disorders.

This study is the first to demonstrate an association between the existence of a personality disorder and future GAD at the end of the initial treatment phase in breast cancer patients. The strong association between GAD and personality disorder is in accordance with previous cross-sectional studies performed on the general population (Latas and Milovanovic, 2014). While the prevalence of personality disorders is usually of 6 to 13% in the overall population, the prevalence rate is approximately 35% in patients who have an anxiety disorder (Sanderson et al., 1994). To explain this association, we can either assume that personality disorder might be a consequence of GAD, GAD might be a consequence of the personality disorder, or this association might be due to a third confounding factor that would explain the comorbidity. The strong association observed between personality and GAD might also be due to the timing of our assessment (T3: end of the initial treatment phase). Paradoxically it is commonly accepted that patients who are at the end of their treatment can be psychologically more vulnerable. At this time, the security feeling given by therapeutics and care disappear, which can turn into a feeling of abandonment and the persistence of a feeling of vulnerability (Bézy and Jalenques, 2007). After a long battle against cancer, the end of the treatment phase often implies a psychological and social reconstruction (going back to work and to personal life), in which patients can also express fear of a relapse and increased psychological distress. In patients who have a personality disorder, this period of time can increase anxiety, especially due to a more significant social isolation (especially for cluster A), a fear of abandonment (cluster B) or even a great fear of not being able to face a relapse (especially for cluster C). Our results suggest that

patients with a personality disorder are particularly vulnerable to psychiatric disorders during the critical time at the end of the treatment and that the existence of MDD or GAD during this period of time should systematically question an associated personality disorder.

Interestingly, having a personality disorder was associated with a higher prevalence of GAD at T3 even after adjusting for the existence of GAD at beginning of treatment. We observed this association for all personality clusters, and not only for cluster C as initially supposed. These data suggest that the presence of a personality disorder should be considered as a specific indicator of psychopathological severity at least as important as the existence of GAD at the initial treatment phase. This hypothesis is in line with the current literature that demonstrates that patients with a comorbid personality disorder and GAD are a high-risk group, especially with an increased risk for suicide, a greater severity of anxiety disorders, a reduced likelihood of chronic depression remission (Agosti, 2014), and a negative impact on the treatment outcome of anxiety disorders (Ansell et al., 2011; Latas and Milovanovic, 2014). Patients with personality disorders should be screened early because it involves a specific management strategy that is different than that proposed for anxiety disorders.

As for MDD, our results have underlined that only cluster C personality disorders were associated with higher prevalence for MDD at T3, unlike cluster B and cluster A personality disorders. To explain the frequent association already described between personality disorder and MDD (Farabaugh et al., 2004; Nubukpo et al., 2005), the current literature cannot determine whether one disorder might be causally related to the other. In some cases, depression may influence personality pathology and may even lead to personality disorders, while in some other cases personality disorders may lead to MDD (Farabaugh et al., 2004). According to the latter hypothesis, personality could have a direct impact on the occurrence of MDD, through existence of alexithymia, through the tendency of patients to suppress their feelings, alteration of self-esteem, pessimism or low support (Mehnert and Koch, 2008). More specifically, the increased propensity to develop MDD and GAD in patients with a cluster C personality disorder might be explained by the negative impact that neuroticism and trait anxiety might have on mental health. This hypothesis is supported by a study which demonstrated that in breast cancer patients, high neuroticism and high trait anxiety were the main predictors for the alteration in quality of life one year post treatment (van der Steeg et al., 2010). Future studies might investigate whether this specific personality dimension might predict occurrence of subsequent psychiatric disorders, and whether other personality dimensions such as openness, harm avoidance or sensation seeking might also be risk factors for subsequent psychiatric disorders.

Although the lack of association between the existence of a cluster A or cluster B personality disorder and risk for later MDD might be due to our small sample, the association between the existence of at least one personality disorder and MDD was lower than with GAD. Interestingly, the

most frequent psychiatric disorder at the end of the treatment phase was not MDD, but GAD. Even if this finding might be explained by the high prevalence of personality disorders in our patient sample, these data suggest that we should develop early detection programs and care for GAD for patients with breast cancer. GAD diagnosis implies a different strategy for care, such as the implementation of a cognitive behaviour therapy, relaxation, mindfulness or the use of antidepressant (Otte, 2011).

Our study found the intriguing result that, in non-metastatic breast cancer, tumour characteristics and the type of treatment used were not associated with prevalence for psychiatric disorders at T3. These results might seem counter-intuitive for many clinicians, because tumour severity has often been hypothesised to be an important predictor for later psychological distress (Aapro and Cull, 1999; Ciaramella and Poli, 2001). However, these results included studies that assessed quality of life rather than depression itself (Aapro and Cull, 1999), and some of these studies included patients with metastasis (Ciaramella and Poli, 2001). Our results are in line with previous studies conducted in non-metastatic breast cancer that suggested that objective cancer-related factors (e.g., tumour stage at diagnosis, type of treatment used) were of little predictive value for later depression (Casso et al., 2004; Burgess et al., 2005; Bardwell et al., 2006; Brunault et al., 2013). Our results suggest that in non-metastatic breast cancer, GAD and MDD are more linked to premorbid individual characteristics and to the way a patient copes with cancer rather than are the initial tumour severity or the type of treatment used. In line with this hypothesis, the patient's subjective evaluation of the disease rather than the objective tumour characteristics might play a key role in the development of later psychiatric disorders.

#### ***4.1. Limitations***

This study had several limits: our relatively small sample size did not allow us to study the impact of rare personality disorders; use of the VKP may have slightly over-evaluated the prevalence of personality disorders in comparison with a semi-structured interview; the high prevalence rate for personality disorder observed in our sample might be explained by the timing of assessment (i.e., assessment in a time of high situational stress), by the longitudinal design of our study (that might have selected patients with cluster B or cluster C personality disorders) and by existence of a history of MDD prior to the diagnosis; we have limited this study to risk factors for MDD and GAD because they were the two most prevalent psychiatric disorders in this population, but future research could also study predictors for other psychiatric disorders. We did not assess lifetime prevalence for GAD, duration of MDD or GAD symptoms at T1. Finally, the prevalence rates of MDD and GAD observed in our population are similar to those usually reported in breast cancer patients (Stark et al., 2002; Burgess et al., 2005; Mehnert and Koch, 2007; Brintzenhofe-Szoc et al., 2009), suggesting that the MINI is a reliable tool and that our population might be comparable to those assessed in previous studies.

## ***4.2. Practical implications and conclusion***

This study has several practical implications. First, our results suggest that an early screening for personality disorders might improve our ability to determine earlier which patients should benefit from more intensive follow-up and from specific psychotherapeutic and psychopharmacological strategies. In line with this finding, the development of evaluation tools that might screen patients with personality disorders could help nursing and oncology staff. As another practical implication, every patient diagnosed with GAD at the end of the treatment phase should be systematically screened for personality disorders, because both disorders are highly comorbid and because such a dual diagnosis implies different care. Because the end of the treatment phase is often a difficult period for patients with a personality disorder because they might perceive a lower social support from health care professionals and from their relatives, we can assume that these patients could benefit from tailored interventions during this period of time (Meyer and Block, 2011), including interventions that could improve perceived social support (e.g., better care to relatives, more tailored follow-up at this time period) or a more progressive interruption of cancer-related treatment. Finally, this study underlines the need to screen early for GAD in patients with breast cancer. In addition to current recommendations which suggest that depressive disorders are usually under diagnosed in this population (Fallowfield et al., 2001; Reich et al., 2008), our study also suggests the need to screen for GAD in this population.

In conclusion, our results suggest that breast cancer patients who have personality disorders are at higher risk for later GAD and MDD. Further studies are needed to improve our knowledge about risk factors for psychiatric disorders in this population. Interventional studies are needed to determine whether specific interventions for these disorders might reduce the prevalence rate for later psychiatric disorders and improve the quality of life in this population.

**Acknowledgments:** This work was supported by the French National Cancer Institute (grant number INCA05-IS/ESPOIR), with an additional financing from the Cancer league committees (Ligue contre le Cancer) of the French departments of Indre-et-Loire and Vienne. We thank Vanessa Davy for translating this manuscript into English.

**Conflict of interest:** None.

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## TABLES

**Table 1. Characteristics of our study population (n=120)**

	Mean ( $\pm$ SD) <sup>1</sup>
	Number of patients (%)
<b><i>Sociodemographic characteristics</i></b>	
<i>Age at baseline (years)</i>	56.4 ( $\pm$ 10.8)
<i>Marital status (single)</i>	37 (30.8%)
<i>Level of education</i>	
Primary school	47 (39.2%)
High school	26 (21.7%)
University studies	47 (39.2%)
<b><i>Cancer-related variables</i></b>	
<i>Tumour stage at diagnosis (T)</i>	
T0	16 (13.3%)
T1	56 (46.7%)
T2	37 (30.8%)
T3	5 (4.2%)
T4	3 (2.5%)
<i>Node status (positive)</i>	17 (14.2%)
<i>Hormonal receptors (presence of at least one hormonal receptor)</i>	98 (81.7%)
<b><i>Type of treatment used</i></b>	
<i>Mastectomy</i>	44 (36.7%) <sup>2</sup>
<i>Lumpectomy</i>	90 (75%) <sup>2</sup>
<i>Axillary node dissection</i>	
<i>Chemotherapy</i>	68 (56.7%)
<i>Radiotherapy</i>	69 (57.5%)
<i>Hormonotherapy</i>	108 (90%)
	54 (45%)

Legends:

<sup>1</sup> SD: Standard Deviation.

<sup>2</sup> Percentage of patients who had both mastectomy and lumpectomy was greater than 100% because some patients had successively received both types of surgery.

**Table 2. Prevalence rate for personality disorders in our study population (n=120)**

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	Mean ( $\pm$ SD <sup>1</sup> )
	Number of patients (%)
<i>At least one personality disorder</i>	41 (34.2%)
<i>At least one Cluster A personality disorder</i>	22 (18.3%)
Paranoid	18 (15%)
Schizoid	8 (6.7%)
Schizotypic	5 (4.2%)
<i>At least one Cluster B personality disorder</i>	10 (8.3%)
Antisocial	1 (0.8%)
Borderline	8 (3.7%)
Histrionic	1 (0.8%)
Narcissistic	0
<i>At least one Cluster C personality disorder</i>	28 (23.3%)
Avoidant	22 (18.3%)
Dependent	5 (4.2%)
Obsessive-compulsive	12 (10%)

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Legends:

<sup>1</sup>SD: Standard Deviation.

**Table 3. Association between the existence of personality disorder and later generalized anxiety disorder at the end of treatment (T3).**

<b>Existence of a personality disorder</b>	<b>Chi-squared</b>	<b>p-value</b>	<b>Odds-ratio</b>	<b>[CI 95 %]</b>
<i>At least one personality disorder</i>	16.03	<0.001	9.12	[3.09 – 26.89]
<i>At least one cluster A personality disorder</i>	16.30	<0.001	9.21	[3.13 – 27.09]
Paranoid	17.43	<0.001	11.88	[3.72 – 37.96]
Schizoid	1.27	0.26		
Schizotypic	0.01	0.96		
<i>At least one cluster B personality disorder</i>	8.85	<0.001	8.52	[2.08 – 34.97]
Antisocial	0.01	0.98		
Borderline	7.15	<0.01	8.44	[1.77 – 40.32]
Histrionic	0.01	0.98		
<i>At least one Cluster C personality disorder</i>	16.44	<0.001	8.42	[3.01 – 23.58]
Avoidant	14.72	<0.001	8.17	[2.79 – 23.88]
Dependent	5.89	<0.05	17.13	[1.73 – 169.90]
Obsessive-compulsive	7.01	<0.01	5.71	[1.57 – 20.72]

Results were systematically adjusted for existence of a generalized anxiety disorder (GAD) at T1, because this variable was associated with GAD at T3 in all analyses, except for avoidant personality disorder (p=0.16). Because no patient had a narcissistic personality disorder, we could not study the link between this personality disorder and GAD at T3.

**Table 4. Association between the existence of personality disorder and later Major Depressive Disorder at the end of treatment (T3).**

<b>Existence of a personality disorder</b>	<b>Chi-squared</b>	<b>p-value</b>	<b>Odds-ratio</b>	<b>[CI 95 %]</b>
<i>At least one personality disorder</i>	4.19	<0.01	0.12	[0.03 - 0.48]
	1.24	0.27	2.38	[0.52 – 10.93]
<i>At least one cluster A personality disorder</i>	1.62	0.20		
Paranoid	0.10	0.76		
Schizoid	1.82	0.18		
Schizotypic			2.08	[0.29 – 14.68]
	0.54	0.46		
<i>At least one cluster B personality disorder</i>	0.01	0.98		
Antisocial	0.56	0.45		
Borderline	0.01	0.98		
Histrionic			4.96	[1.10 – 22.32]
	4.35	<0.05		
<i>At least one Cluster C personality disorder</i>	3.66	0.06		
Avoidant	2.56	0.11		
Dependent	2.63	0.10		
Obsessive-compulsive	4.19	<0.01	0.12	[0.03 - 0.48]

The results were systematically adjusted for the existence of a major depressive disorder (MDD) at T1, because this variable was associated with MDD at T3 in all analyses ( $p < 0.001$ ). Because no patient had a narcissistic personality disorder, we could not study the link between this personality disorder and MDD at T3.