



## Association of personality profiles with depressive, anxiety, and cancer-related symptoms in patients undergoing chemotherapy



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### ABSTRACT

**Background:** This study identified latent classes of cancer patients based on Big Five personality dimensions and evaluated for differences in demographic and clinical characteristics, depression, anxiety, and cancer-related symptoms.

**Methods:** Patients ( $n = 1248$ ) with breast, gastrointestinal, gynecological, or lung cancer completed the Center for Epidemiological Studies–Depression scale, Spielberger State-Trait Anxiety Inventories, NEO-Five Factor Inventory (NEO-FFI), and Memorial Symptom Assessment Scale (MSAS). Latent class profile analysis of NEO-FFI scores was used to identify patient subgroups.

**Results:** Three latent classes were identified. The “Distressed” class (14.3%) scored highest on neuroticism and lowest on extraversion, agreeableness, and conscientiousness. The “Resilient” class (31.9%) scored lowest on neuroticism and highest on extraversion, agreeableness, and conscientiousness. The “Normative” class (53.8%) was intermediate on all dimensions except openness. Compared to the Resilient class, patients in the Distressed class were younger, less educated, more likely to care for another adult, had more comorbidities, and exercised less. The three classes differed by performance status, marital and employment status, and income, but not by gender, time since diagnosis, or type of prior cancer treatment. The classes differed (Distressed > Normative > Resilient) in depression, anxiety, and cancer symptoms.

**Conclusions:** Personality is associated with psychological and physical symptoms in cancer patients.

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### 1. Introduction

The Five Factor model of personality structure is strongly established (McCrae & Costa, 1997). The Big Five personality dimensions or traits (i.e., neuroticism, extraversion, openness to experience, agreeableness, conscientiousness) (McCrae & Costa, 1987) describe enduring, cross-culturally validated, individual traits that are known to influence numerous important health outcomes, including disease burden (Sutin, Zonderman, Ferrucci, & Terracciano, 2013), self-rated health (Aiken-Morgan, Bichsel, Savla, Edwards, & Whitfield, 2014; Chapman, Duberstein, Sorensen, & Lyness, 2006), impact of illness events (de Jonge, Kempen, Sanderman, et al., 2006), and mortality (Costa, Weiss, Duberstein, Friedman, & Siegler, 2014; Jokela, Batty, Nyberg, et al.,

2013; Martin, Friedman, & Schwartz, 2007; Weiss & Costa, 2005). In addition, personality traits, particularly high neuroticism and low conscientiousness, are associated with greater risk of depression and anxiety symptoms and syndromes (Aben et al., 2002; Jylha & Isometsa, 2006; Kendler, Gatz, Gardner, & Pedersen, 2006; Kotov, Gamez, Schmidt, & Watson, 2010; Noteboom, Beekman, Vogelzangs, & Penninx, 2016; Weiss et al., 2009). Personality is associated with physical symptoms in both clinical and non-clinical populations (Carver & Connor-Smith, 2010).

An extensive literature has documented the risk for depressive and anxiety symptoms in oncology patients undergoing treatment (Institute of Medicine, 2007; Jacobsen, Donovan, Trask, et al., 2005; Zabora, BrintzenhofeSzoc, Curbow, Hooker, & Piantadosi, 2001), as well as in cancer survivors (Deshields, Tibbs, Fan, & Taylor, 2006; Institute of Medicine, 2007; Osborn, Demoncada, & Feuerstein, 2006; Reich, Lesur, & Perdrizet-Chevallier, 2008). These symptoms exert deleterious effects not only on quality of life, but also on many important

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outcomes, including adherence, physical symptoms, functioning, and possibly mortality (Fann, Thomas-Rich, Katon, et al., 2008; Hopko, Bell, Armento, et al., 2008; Institute of Medicine, 2007). Substantial efforts have been made to understand risk factors for depression and anxiety in patients with cancer, in order to identify higher risk patients, provide treatment for those with elevated symptom levels, and elucidate mechanisms of action for interventions.

Despite the well-established relationship between personality traits and depression and anxiety, relatively few studies were identified that examined this relationship in oncology patients (Den Oudsten, Van Heck, Van der Steeg, Roukema, & De Vries, 2009; Golden-Kreutz & Andersen, 2004; Hinnen et al., 2008; Lattie, Asvat, Shivpuri, et al., 2016; Ranchor et al., 2002; Shimizu, Nakaya, Saito-Nakaya, et al., 2015; van der Steeg, De Vries, & Roukema, 2010). These studies suggest that higher levels of neuroticism increase the risk for depression and anxiety in patients with various cancer types. For example, among women with breast cancer who underwent surgical treatment ( $n = 210$ ), neuroticism increased the risk for depression (Golden-Kreutz & Andersen, 2004). Similarly, among patients with lung cancer ( $n = 1334$ ), higher neuroticism, coping characterized by helplessness/hopelessness, and female gender were associated with higher levels of anxiety (Shimizu et al., 2015). A limited number of studies, with inconsistent findings, have examined the relationship between personality and physical symptoms (e.g., pain, fatigue) in cancer patients (Krok & Baker, 2014; Michielsen, Van der Steeg, Roukema, & De Vries, 2007; Stone, Richards, A'Hern, & Hardy, 2001; Sugawara, Akechi, Okuyama, et al., 2005).

No studies were found that utilized combinations of traits, rather than single personality traits (e.g., neuroticism), to identify profiles of personality dimensions that may increase risk for depressive, anxiety, and physical symptoms among patients undergoing cancer treatment. Person-centered approaches to examining data (Asendorpf, n.d.) enable the identification of latent classes (subgroups) of individuals with distinct profiles of personality dimensions. Such approaches, which include cluster analysis, latent profile analysis (LPA), and latent class analysis, complement variable-centered approaches by conceptualizing personality as “an interrelated system of several traits.” Subgroups or latent classes can then be evaluated for differences on a wide range of characteristics.

Such person-centered methods can be viewed as complementary approaches to trait-based, variable-centered approaches to examining personality (Asendorpf, in press; Asendorpf, Borkenau, Ostendorf, & Van Aken, 2001; Muthen & Muthen, 2000; Specht, Luhmann, & Geiser, 2014). Examination of multivariate distributions of patterns in personality traits can help identify previously unobserved patterns of personality and compare these patterns or types across samples and studies (Asendorpf et al., 2001). As noted by Specht, “The aim of the typological approach is to identify a preferably parsimonious number of personality types that allow for broad categorizations of individuals” (Specht et al., 2014).

Numerous typological studies of personality have been conducted in non-medically ill populations (reviewed in Specht et al. (2014)). Caspi posited, based on a number of studies, that there are three major personality types (labeled generally as “resilients,” “overcontrollers,” and “undercontrollers”) (Caspi, 1998), and Asendorpf and colleagues confirmed this hypothesis in four studies of children and (primarily young) adults (Asendorpf et al., 2001). Their broadly categorized prototypes differed somewhat depending on the specific sample and method of personality assessment, but the overall generalizability of the three major types was confirmed. Thus, to date, a substantial body of literature exists, primarily in non-medically ill populations (i.e., general population samples, college students, adolescents), that has identified three broad classes of personality based on distributions of patterns of dimensional traits (Specht et al., 2014).

In addition, several studies have utilized latent class methods to examine associations between membership in personality profile classes

and psychological measures and outcomes. For example, Merz and Roesch utilized LPA to examine personality profiles in a sample of university students ( $n = 371$ ), using the International Personality Item Pool (Goldberg, 1999), a measure based on the Five Factor Model (Merz & Roesch, 2011). A three-class solution provided the best fit to the data. Based on the mean levels of each of the five personality dimensions, the classes were characterized as: “well-adjusted,” “reserved,” and “excitable.” Relationships among the classes and measures of affect, self-esteem, depression, anxiety, and coping efficacy were examined. Compared to both the reserved and excitable classes, the well-adjusted class (i.e., low on neuroticism, high on extraversion, agreeableness, and openness) reported better psychological functioning in terms of positive affect, negative affect, depression, anxiety, self-esteem, and coping. The reserved and excitable groups differed on anxiety, with the excitable group (i.e., high neuroticism, high extraversion) reporting generally higher anxiety than the reserved group (i.e., moderate neuroticism, low extraversion, agreeableness and openness).

Hori and colleagues utilized LPA among outpatients with major depression to identify personality profiles using a different personality measure (the Temperament and Character Inventory (Cloninger, Przybeck, Svrakic, & Wetzel, 1994)), with the goal of better characterizing the heterogeneity of symptoms in major depressive disorder (Hori, Teraishi, Nagashima, et al., 2017). They identified three latent profiles that they termed “neurotic,” “adaptive,” and “socially detached.” The three profiles differed on a number of characteristics salient to diagnosis, treatment, and outcomes of major depression (e.g., depressive symptomatology, anxiety symptom, psychotropic medication use, and social functioning) (Hori et al., 2017), suggesting the utility of latent class methods for uncovering important contributors to heterogeneity among clinically-characterized populations.

To our knowledge, no prior studies have utilized latent class methods to examine the relationship between personality profiles and psychological or cancer-related symptoms in patients with cancer. Therefore, the purposes of this study were to: 1) identify, using LPA, latent classes of cancer patients with distinct personality profiles based on the Five Factor Model (Costa & McCrae, 1992a), and evaluate for differences among the latent classes in demographic and clinical characteristics; and 2) examine differences among the latent classes in trait and state anxiety, depressive symptoms, and cancer-related symptoms. Based on prior work demonstrating associations between personality and depression, anxiety, and cancer-related symptoms (Aben et al., 2002; Golden-Kreutz & Andersen, 2004; Jylha & Isometsa, 2006; Kendler et al., 2006; Kotov et al., 2010; Michielsen et al., 2007; Noteboom et al., 2016; Shimizu et al., 2015; Sugawara et al., 2005; Weiss et al., 2009), we hypothesized that classes with personality profiles higher on neuroticism and lower on conscientiousness would exhibit higher levels of anxiety, depression, and cancer-related symptoms and symptom-related distress.

## 2. Methods

### 2.1. Patients, settings, and procedures

This analysis utilizes data from a descriptive, longitudinal study that evaluated the symptom experience of oncology outpatients receiving chemotherapy (CTX) (Kober, Cooper, Paul, et al., 2016b; Kober, Dunn, Mastick, et al., 2016a; Langford, Paul, Cooper, et al., 2016; Wright, D'Eramo Melkus, Hammer, et al., 2015). Eligible patients were  $\geq 18$  years of age; had a diagnosis of breast, gastrointestinal, gynecological, or lung cancer; had received CTX within the preceding four weeks; were scheduled to receive at least two additional cycles of CTX; were able to read, write, and understand English; and gave written informed consent. Patients were recruited from two Comprehensive Cancer Centers, one Veteran's Affairs hospital, and four community-based oncology programs. Eligible patients were approached by a research staff member in the infusion unit to discuss study participation. Written informed

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