Association between personality traits and self-care behaviors in patients with gastrointestinal cancer undergoing outpatient chemotherapy

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Research Article

Keywords: Chemotherapy, Personality Traits, Self-Care Behaviors, Cancer, Openness, Conscientiousness

Posted Date: November 9th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-1055948/v1>

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Abstract

Purpose

Practicing self-care behaviors is important for patients with gastrointestinal cancer undergoing outpatient chemotherapy. Knowledge of personality traits may be useful in providing individualized support that can improve self-care behaviors. Therefore, we assessed the association between personality traits and self-care behaviors in these patients.

Methods

This cross-sectional study was conducted among patients who received intravenous chemotherapy at a designated regional cancer hospital between June 2020 and October 2020. A self-administered survey was conducted among these patients using the Japanese version of the Ten Item Personality Inventory and a 29-item questionnaire to assess self-care behaviors. Association between the scores of the personality traits and frequency of each self-care behavior was analyzed using the Spearman's rank correlation coefficient.

Results

In total, 53 responses were obtained from 57 participants, of which 52 valid responses were included in the analysis. Openness and conscientiousness were personality traits significantly associated with multiple self-care behaviors. High degree of openness, characterized by the ability to tackle new situations, had a moderately significant positive correlation with adjustment of exercise ($\rho = 0.49, p < 0.01$) and activities for a change of mood ($\rho = 0.40, p < 0.01$). High degree of conscientiousness, characterized by the ability to take a health action, had a significant positive correlation with acquisition of information on disease and treatment ($\rho = 0.30, p = 0.03$) and confirmation of inspection results ($\rho = 0.39, p < 0.01$).

Conclusion

Openness and conscientiousness are associated with self-care behaviors in patients with gastrointestinal cancer undergoing outpatient chemotherapy and may be useful in explaining and predicting individual self-care behaviors.

Introduction

The incidence of cancer increases every year, and gastrointestinal cancer accounts for approximately 26% of all cancer cases in the world [1-2] and 42% of all cases in Japan [3]. The five-year relative survival rate of gastrointestinal cancer has also increased due to early detection of cancer and advances in treatment methods. However, improving the survival rate of gastrointestinal cancer remains a challenge [4]. Even today, recurrence and progression of the disease are a concern for many patients with gastrointestinal cancer, and chemotherapy to prevent recurrence or progression is the main treatment.

Chemotherapy for gastrointestinal cancer involves the use of cytotoxic agents, such as antimetabolites, platinum-containing preparations, and topoisomerase inhibitors. These drugs have a narrow therapeutic range, and in addition to cancer cells, they also act on healthy cells of the body. Hence, the occurrence of side effects is unavoidable. As patients with cancer undergoing outpatient chemotherapy do not have a medical attendant to assist them in daily life, they are required to monitor, prevent, and cope with the side effects themselves. Insufficient self-care for side effects may lead to more serious consequences, eventually resulting in treatment interruption or discontinuation [5-6]. Moreover, side effects

influence not only the physical well-being but also the psychological and social well-being of the patients, which in turn can negatively influence their quality of life.

In patients with gastrointestinal cancer, side effects that cause peripheral neuropathy and changes in the appearance may lead to restrictions on activities of daily living, changes in interpersonal relationships, and a reduction in the range of life, which may lead to anxiety and distress [7-11]. As these side effects are difficult to prevent and treat, patients must learn to deal with them by practicing self-care behaviors. Patients must understand their condition, relieve symptoms, devise suitable lifestyles while adjusting activities and roles, and manage psychological stress [8-9,12]. Individualized self-care support aims to understand the diverse living backgrounds of patients and is important for patients to practice and strengthen their self-care behaviors. However, providing individualized support is a challenge given the short-term involvement of outpatients with healthcare professionals and the short duration of treatment [13-14].

Personality comprises a set of traits that indicate individual behavioral tendencies. A unique personality trait can be regarded as individuality [15]. Therefore, personality traits can be useful in explaining and predicting individual behavior [15-16]. Previous studies on patients with cancer and chronic diseases have attempted to investigate the association of personality traits with treatment compliance and behaviors required for disease management, such as medication, diet, and exercise [17-19]. These studies reported that conscientiousness and agreeableness are traits associated with therapeutic compliance. Another study reported that the patient's sex, chemotherapy interval, and the presence of counselors are associated with self-care behaviors in those undergoing outpatient chemotherapy [20]. Thus, a knowledge of personality traits may be useful in providing individualized self-care support. However, none of the studies have assessed the association of personality traits with self-care behaviors including managing daily life. Therefore, in this study, we attempted to clarify the association between personality traits and self-care behaviors among patients with gastrointestinal cancer undergoing outpatient chemotherapy.

Methods

In this cross-sectional study, we investigated the quantitative association between personality traits and self-care behaviors of patients with gastrointestinal cancer undergoing outpatient chemotherapy using a self-administered questionnaire. The study was approved by the Observation Research Ethics Review Committee of the Osaka University Hospital (approval number: 20001-3).

Patients

Patients registered in the gastrointestinal surgery department of a designated regional cancer hospital who received intravenous chemotherapy were enrolled in the study. The survey period was between June 2020 and October 2020. The inclusion criteria were as follows: (1) patients aged 20 years or older, (2) those who received one or more courses of outpatient chemotherapy, (3) those who received chemotherapy with a regimen comprising one or more cytotoxic anticancer drugs, (4) those who knew they had been diagnosed with cancer, and (5) those who were able to complete the questionnaire themselves. In addition, patients who were treated with antibody-drug conjugates were included in the study. The exclusion criteria were as follows: (1) those who experienced cognitive decline, and (2) those who were considered by the attending physician to be ineligible for the study.

Procedure

For patients fulfilling the eligibility criteria, the attending physician first verbally requested the patients' cooperation using a leaflet that described the study outline at the time of examination. After confirming their willingness to participate in the study, the details of the study procedures were explained to the patients, both in writing and verbally, before treatment initiation. Patients who provided written informed consent were finally included in the study. Questionnaires and reply

envelopes were provided to the study participants and the filled questionnaires were submitted by mail. Information related to the age, sex, and disease and treatment status was obtained from the medical records.

Measurement

Personality traits

Personality traits were assessed using the Japanese version of the Ten Item Personality Inventory (TIPI-J). TIPI-J measures five personality traits, namely extraversion, agreeableness, conscientiousness, neuroticism, and openness, using 10 questions [21-22]. The patient responds to each question using the 7-point Likert scale, "1: strongly disagree" to "7: strongly agree." After processing the reversal items according to the scoring system, the evaluation was made with 2 to 14 points. The higher the score, the greater the strength of the personality trait. The reliability and validity of TIPI-J were established as reported previously [22].

Self-care behaviors

We created a questionnaire about self-care behaviors essential for patients with cancer undergoing outpatient chemotherapy, such as information search/utilization, self-monitoring, behavior selection/adjustment, utilization of support resources, prevention of/coping with side effects, and psychological care. Two doctors, one pharmacist, and five nurses specialized in cancer care evaluated the validity of each question. After content validation, a set of 29 questions was finally included in the questionnaire. Participants answered each question using a 4-point scale, with 1 meaning "not at all" and 4 meaning "frequently."

Patients' characteristics

Demographic data included the age, sex, marital status, cohabitant, educational status, employment status, and performance status based on the scale created by the Eastern Cooperative Oncology Group (ECOG PS). Disease- and treatment-related data included the primary tumor site, tumor stage, treatment history for the current disease, past chemotherapy history, and treatment status for the current regimen (cytotoxic anticancer drugs used, cycle, etc.). We also obtained information related to the physical symptoms (stomatitis, fatigue, nausea/vomiting, loss of appetite, dysgeusia, constipation, diarrhea, peripheral neuropathy, hair loss) and the presence or absence of anxiety. Regarding the status of self-care support, we asked about the content of explanations and support received from healthcare professionals in performing chemotherapy.

Statistical analysis

We used the convenience sampling method for enrollment of participants in the study. All patients fulfilling the eligibility criteria were included. Descriptive statistics were used to assess each item of the survey questionnaire. The association between the scores of each of the five personality traits and the frequency of each self-care behavior was analyzed using the Spearman's rank correlation coefficient. The significance level was set to 5% on both sides. All analyses were performed using the statistical software JMP Pro 15.1.0 (SAS Institute Inc., Cary, NC, USA).

Results

Questionnaires were administered to 57 participants, and responses were obtained from 53 (response rate, 93.0%). The responses of 52 participants were included in the final analysis after excluding 1 response due to inadequacies in the responses to the TIPI-J items and difficulty in analyzing the association between personality traits and self-care behaviors (valid response rate, 91.2%).

Patients' characteristics

The mean age±standard deviation (SD) of the participants was 66.1±9.1 years, and there were 35 male participants (67.3%). The most common primary tumor site was the colon/rectum in 24 participants (46.2%). The cytotoxic anticancer drugs most often used in the current regimen were 5-fluorouracil in 17 (32.7%) and irinotecan in 16 (30.8%) participants. Oxaliplatin was used in the current regimen of 13 (25.0%) participants, while 7 (13.5%) participants had it removed from their regimen due to side effects such as peripheral neuropathy (Table 1).

Table 1
Demographic characteristics of participants

		n	% ^a
Demographic data			
Age (n=52)	Mean age in years±standard deviation (SD)	66.1±9.1	
Sex (n=52)	Male	35	67.3
	Female	17	32.7
Marital status (n=52)	Married	40	76.9
	Single	5	9.6
	Divorced/widowed	7	13.5
Cohabitant (n=47)	Yes	40	76.9
	No	7	13.5
Educational status (n=51)	Junior high school	3	5.8
	Senior high school	17	32.7
	Technical school/junior college	10	19.2
	College and above	21	40.4
Employment status (n=50)	Employed	28	53.8
	Unemployed	19	36.5
	On medical leave from job	2	3.8
	Other	1	1.9
Performance Status (PS) (n=50) ^b	0	14	26.9
	1	31	59.6
	2	3	5.8
	3	2	3.8
Disease and treatment-related data			
Primary tumor site (n=52)	Colon/rectum	24	46.2
	Stomach	10	19.2
	Pancreas	8	15.4
	Bile duct/gallbladder	6	11.5
	Esophagus	2	3.8
	Other	2	3.8
Tumor stage (n=52)	Stage I	1	1.9
	Stage II	9	17.3
	Stage III	14	26.9

		n	% ^a
	Stage ^b	22	42.3
	Missing	6	11.5
Treatment history for the current disease (n=52) ^c	Chemotherapy alone	11	21.2
	Surgery ^d	39	75.0
	Radiotherapy	5	9.6
Past chemotherapy history (n=52) ^e	Yes	30	57.7
	No	22	42.3
Treatment status for the current regimen (n=52)			
Cytotoxic anticancer drug ^c	5-Fluorouracil	17	32.7
	Irinotecan	16	30.8
	Oxaliplatin	13	25.0
	Gemcitabine	10	19.2
	Tegafur/gimeracil/oteracil	9	17.3
	Capecitabine	9	17.3
	Paclitaxel	5	9.6
	Trastuzumab deruxtecan ^f	4	7.7
	Cisplatin	3	5.8
	Nab-paclitaxel	3	5.8
	Dacarbazine	1	1.9
Cycle ^g	Median	5.5(1–57)	
^a As it excludes missing values, the total may not be 100%.			
^b Using the Eastern Cooperative Oncology Group (ECOG) classification.			
PS0: Fully active, able to carry out all pre-disease activities without restriction			
PS1: Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, e.g., light house work office work			
PS2: Ambulatory and capable of all self-care activities, but unable to carry out any work activities; up and about more than 50% of waking hours			
PS3: Capable of only limited self-care; confined to bed or chair more than 50% of the waking hours			
^c Multiple answers			
^d Excludes bypass surgery against obstruction to the passage, and proctostomy			
^e Presence or absence of chemotherapy other than the current regimen			

	n	% ^a
^f This study includes those who received antibody-drug conjugate.		
^g This is the number of courses of chemotherapy administered as part of the current regimen when performing the survey.		

Table 2 Physical symptoms and anxiety among study participants						(n=52)
	Currently have symptoms	Degree			I had symptoms during chemotherapy, but now I have none	I had no symptoms at all during chemotherapy
	n (% ^a)	Strong n (% ^b)	Moderate n (% ^b)	Weak n (% ^b)	n (% ^a)	n (% ^a)
Physical symptoms						
Peripheral neuropathy	37 (71.2)	7 (18.9)	17 (45.9)	12 (32.4)	7 (13.5)	8 (15.4)
Fatigue (n=50)	27 (51.9)	3 (11.1)	13 (48.1)	11 (40.7)	16 (30.8)	7 (13.5)
Hair loss	22 (42.3)	3 (13.6)	7 (31.8)	12 (54.5)	11 (21.2)	19 (36.5)
Constipation (n=49)	22 (42.3)	3 (13.6)	8 (36.4)	10 (45.5)	15 (28.8)	12 (23.1)
Loss of appetite (n=50)	20 (38.5)	2 (10.0)	6 (30.0)	11 (55.0)	12 (23.1)	18 (34.6)
Diarrhea (n=49)	14 (26.9)	2 (14.3)	6 (42.9)	6 (42.9)	19 (36.5)	16 (30.8)
Dysgeusia (n=51)	14 (26.9)	2 (14.3)	4 (28.6)	8 (57.1)	10 (19.2)	27 (51.9)
Nausea/vomiting (n=49)	13 (25.0)	1 (7.7)	1 (7.7)	11 (84.6)	15 (28.8)	21 (40.4)
Stomatitis (n=50)	10 (19.2)	0 (0.0)	3 (30.0)	7 (70.0)	16 (30.8)	24 (46.2)
Anxiety	28 (53.8)	3 (10.7)	10 (35.7)	15 (53.6)	11 (21.2)	13 (25.0)
^a As it excludes missing values, the total may not be 100%.						
^b Proportion of those who currently have symptoms						

Table 3. Association between personality traits and self-care behaviors (n=52)											
		Personality traits									
		Openness		Conscientiousness		Extraversion		Neuroticism		Agreeableness	
Self-care behaviors		ρ	p	ρ	p	ρ	p	ρ	p	ρ	p
1	Get information about your own disease and treatment	0.16	0.271	0.30	0.032*	0.19	0.170	0.04	0.752	0.15	0.297
2	Continue to measure the body temperature	-0.04	0.777	0.05	0.724	-0.10	0.500	0.09	0.531	-0.04	0.753
3	Check the results of the clinical examination performed (n=51)	0.22	0.123	0.39	0.005**	0.12	0.399	0.00	0.980	0.04	0.762
4	Keep track of your body and treatment status (n=51)	-0.09	0.526	0.19	0.174	-0.08	0.588	-0.14	0.320	0.06	0.662
5	Try to adjust the level of activity according to your physical condition	0.28	0.046*	0.12	0.396	0.05	0.704	0.06	0.655	0.04	0.772
6	Try to adjust the amount of work and housework according to your physical condition	0.29	0.036*	0.21	0.136	0.15	0.299	-0.07	0.620	0.23	0.094
7	Ask people around you to help with work and housework	0.10	0.498	0.06	0.653	0.07	0.640	-0.06	0.661	0.10	0.489
8	Choose a method to deal with side effects that you think you can implement and do it in your life	0.15	0.301	0.24	0.091	0.27	0.056	-0.01	0.928	0.02	0.899

Table 3. Association between personality traits and self-care behaviors											(n=52)
9	Exchange information with people who have experienced the same disease or treatment	-0.20	0.156	-0.02	0.891	0.10	0.467	0.02	0.907	-0.11	0.452
10	Inform your healthcare professional about your physical and mental condition at the time of examination	0.08	0.575	0.31	0.024*	0.24	0.085	-0.07	0.639	-0.03	0.842
11	Contact the hospital when you are unable to handle the situation (n=51)	0.11	0.433	0.11	0.434	0.11	0.423	-0.05	0.728	0.03	0.825
12	Discuss treatment with your healthcare professional	0.25	0.079	0.19	0.169	0.05	0.737	-0.01	0.930	-0.11	0.440
13	Communicate the status of disease and treatment to people other than healthcare professionals	0.13	0.374	0.13	0.345	-0.07	0.617	-0.09	0.535	-0.03	0.848
14	Ask someone other than healthcare professionals for help	-0.01	0.958	0.03	0.859	-0.05	0.727	0.03	0.835	0.10	0.468
15	Take preventive action against infection	0.29	0.039*	-0.06	0.690	-0.09	0.545	0.07	0.625	0.15	0.296
16	Try to keep your mouth clean	0.11	0.420	0.21	0.129	-0.29	0.040*	-0.05	0.701	0.01	0.970
17	Exercise moderately according to your physical condition	0.49	<0.001**	0.16	0.259	-0.16	0.263	-0.09	0.507	0.07	0.638

Table 3. Association between personality traits and self-care behaviors											(n=52)
18	Manage your life such that fatigue does not increase	0.32	0.023*	0.32	0.022*	-0.01	0.919	-0.12	0.384	0.03	0.844
19	Manage your life such that nausea and vomiting do not increase (n=51)	0.14	0.326	0.16	0.264	0.20	0.156	-0.08	0.566	-0.11	0.443
20	Eat according to your own bodily symptoms	0.26	0.067	0.12	0.395	0.10	0.472	-0.06	0.658	0.21	0.134
21	Consciously drink water	0.05	0.737	0.03	0.808	-0.13	0.351	0.12	0.397	-0.13	0.363
22	Observe stool (n=50)	0.29	0.040*	0.14	0.329	0.06	0.688	-0.16	0.258	0.21	0.141
23	Manage your life such that constipation and diarrhea do not increase (n=51)	0.20	0.156	0.23	0.103	0.14	0.336	0.02	0.893	-0.05	0.732
24	Make an effort to pay attention to numbness in the limbs	0.14	0.320	0.08	0.596	0.02	0.869	0.00	0.979	-0.16	0.258
25	Apply ingenuity to adapt to changes in appearance	0.41	0.002**	0.49	<0.001**	0.12	0.409	-0.28	0.042*	-0.02	0.869
26	Follow therapeutic instructions received from your healthcare professional	0.10	0.492	0.12	0.399	-0.15	0.302	-0.07	0.634	0.14	0.310
27	Take medicines according to the symptoms based on the instructions of your healthcare professional	0.06	0.689	0.10	0.474	-0.09	0.509	0.02	0.888	0.24	0.093
28	Express your thoughts and emotions to someone	0.23	0.109	0.31	0.024*	0.19	0.185	-0.15	0.301	-0.05	0.740

Table 3. Association between personality traits and self-care behaviors											(n=52)
29	Perform activities for a change of mood	0.40	0.003**	0.05	0.751	0.18	0.209	-0.03	0.836	-0.06	0.654
Spearman's rank correlation coefficient(ρ); * $p<0.05$; ** $p<0.001$											

The participants reported a mean $\pm$ SD of 3.4 $\pm$ 2.2 out of 9 physical symptoms. The most commonly reported current physical symptoms were peripheral neuropathy in 37 (71.2%) participants, fatigue in 27 (51.9%), hair loss in 22 (42.3%), and constipation in 22 (42.3%) participants. In addition, 28 (53.8%) participants reported that they currently experienced anxiety (Table 2).

None of the participants answered they had no counselors on chemotherapy; they reported one or more counselors were available to them. A total of 50 (96.2%) participants reported that they consulted the doctors about chemotherapy, while 28 (53.8%) consulted nurses, 21 (40.4%) consulted family, 3 (5.8%) consulted acquaintances, and none (0.0%) consulted people with the same disease. The information and support provided by healthcare professionals pertained to observation/recording of side effects in 44 (84.6%) participants, information acquisition about cancer and its treatment in 34 (65.4%), life adjustment in 33 (63.5%), psychological care in 11 (21.2%), and utilization of support resources in 6 (11.5%); 4 (7.7%) participants reported that they received no information and support pertaining to the above aspects.

The mean score $\pm$ SD for the personality trait of extraversion was 8.9 $\pm$ 2.7, agreeableness was 11.0 $\pm$ 1.9, conscientiousness was 8.8 $\pm$ 2.7, neuroticism was 6.7 $\pm$ 2.8, and openness was 8.9 $\pm$ 2.5.

Self-care behaviors

Figure 1 shows the implementation status of self-care behaviors among patients with gastrointestinal cancer undergoing outpatient chemotherapy. The most frequently practiced self-care behaviors among the participants were following therapeutic instructions received from their healthcare professional and taking medicines according to the symptoms based on the instructions of their healthcare professional, as reported in 45 (86.5%) and 42 (80.8%) participants, respectively. Frequently practiced self-care behaviors reported in less than 30% of the participants were applying ingenuity to adapt to changes in appearance in 15 (28.8%) participants, expressing thoughts and emotions to someone in 14 (26.9%), exercising moderately according to the physical condition in 14 (26.9%), asking people nearby to help with work and housework in 12 (23.1%), communicating the status of disease and treatment to people other than healthcare professionals in 11 (21.2%), asking someone other than healthcare professionals for help in 9 (17.3%), contacting the hospital when they are unable to handle the situation in 4 (7.7%), and exchanging information with people who have experienced the same disease or treatment in 3 (5.8%) participants.

Association between personality traits and self-care behaviors

Table 3 shows the correlation coefficient (ρ) between personality traits and self-care behaviors of patients with gastrointestinal cancer undergoing outpatient chemotherapy. Openness and conscientiousness were significantly correlated with multiple self-care behaviors.

Openness had a significant positive correlation with the following eight self-care behaviors: exercising moderately according to the physical condition ($\rho = 0.49$, $p<0.001$), applying ingenuity to adapt to changes in appearance ($\rho = 0.41$, $p=0.002$), performing activities for a change of mood ($\rho = 0.40$, $p=0.003$), managing life such that fatigue does not increase ($\rho = 0.32$, $p=0.023$), trying to adjust the amount of work and housework according to the physical condition ($\rho = 0.29$, $p=0.036$), taking preventive action against infection ($\rho = 0.29$, $p=0.039$), observing stool ($\rho = 0.29$, $p=0.040$), and trying to adjust the level of activity according to the physical condition ($\rho = 0.28$, $p=0.046$).

Conscientiousness had a significant positive correlation with the following six self-care behaviors: applying ingenuity to adapt to changes in appearance ($\rho = 0.49, p < 0.001$), checking the results of clinical examinations performed ($\rho = 0.39, p = 0.005$), managing life such that fatigue does not increase ($\rho = 0.32, p = 0.022$), expressing thoughts and emotions to someone ($\rho = 0.31, p = 0.024$), informing the healthcare professional about their physical and mental condition at the time of examination ($\rho = 0.31, p = 0.024$), and getting information about their disease and treatment ($\rho = 0.30, p = 0.032$).

Discussion

We observed that the personality traits of openness and conscientiousness were significantly associated with multiple self-care behaviors required for patients with gastrointestinal cancer undergoing outpatient chemotherapy. High degree of openness was found to be associated with adjustment of exercise and activities, while a high degree of conscientiousness was associated with acquisition of information on disease and treatment and confirmation of inspection results.

Our study was focused on examining self-care behaviors rooted in the daily lives of patients with gastrointestinal cancer and showed that openness was significantly associated with the implementation of activity adjustment and ingenuity towards changes in appearance. Previous studies have shown that the intent of exercise is associated with a high degree of openness in patients undergoing chemotherapy [23]; this finding is in agreement with our results that suggest a moderately significant positive correlation of openness with adjustment of exercise. Those with a high degree of openness are not bound by existing values and are characterized by actively working on new situations [21-22,24-25]. Therefore, exercise during outpatient chemotherapy may be considered as a new initiative by the patient. Traditionally, it is believed that patients with cancer undergoing chemotherapy tend to refrain from physical activity due to concerns of emerging physical symptoms and side effects [26-28]. In our study, exercising moderately according to the physical condition was a frequently practiced self-care behavior reported in less than 30% of the participants. Despite the apparent benefits of moderate exercise during chemotherapy [29], it is a challenging self-care behavior among patients undergoing chemotherapy. Therefore, the attitude and involvement of healthcare professionals can play an important role in supporting patients engaged in new self-care behaviors.

In our study, openness had a moderately significant association with applying ingenuity to adapt to changes in appearance. Those with a high degree of openness are also characterized by creativity, imagination, and unique ideas [21-22,24-25]. Side effects of the regimens that patients receive may manifest as changes in their appearance, such as hair loss, weight loss, and hand-foot syndrome [30-31]. For the patients to respond to these changes in appearance and continue activities of daily life, creativity is essential. Therefore, it is understandable that ingenuity is exhibited by those with a high degree of openness. This study suggests that responding to changes in appearance requires support based on the creativity encouraged by openness.

Moreover, our study provides new insights into the association between conscientiousness and self-care behaviors. In our study, conscientiousness was associated with information acquisition about the disease and its treatment, as well as with the expression of thoughts and emotions. Conscientiousness is the will and desire to achieve a goal; it is a trait of carrying out work in a systematic manner [21-22,24-25,32]. Obtaining information about one's disease, treatment, and the examination performed can be considered an action to grasp one's situation and continue both treatment and daily life while having a perspective [12]. This suggests that those who are highly conscientious not only comply with the instructions from their healthcare professionals but also practice self-care behaviors to manage their disease and treatment.

We also observed that conscientiousness was significantly associated with the expression of one's thoughts and emotions. In a previous study that investigated the association between personality traits and stress coping patterns in healthy individuals, extroversion and neuroticism were found to be associated with the ability to cope with emotional

stress [32]. In our study, there was no association of expression of thoughts and emotions with extroversion or neuroticism; however, there was a significant association with conscientiousness which is characterized by practicing healthy behavior. This suggests that the expression of thoughts and emotions may be a self-care behavior that a patient is working hard on. Therefore, it is necessary to create an environment in which patients can express their thoughts and emotions to healthcare professionals with honesty.

To the best of our knowledge, ours is the first study to comprehensively examine the association between personality traits and self-care behaviors practiced by patients with gastrointestinal cancer undergoing outpatient chemotherapy to deal with the physical, psychological, and social impact of the side effects of treatment. Nevertheless, our study has some limitations. First, the implementation of self-care behavior was assessed based on the patients' self-evaluation; therefore, the appropriateness of the reported self-care behavior in individual situations cannot be judged. Second, as this study was a cross-sectional survey, we could only consider the effects of treatment history and treatment processes up to the time of the survey. Lastly, although the purpose of this study was to clarify the association between individual personality trait and self-care behaviors, it has been reported that a collection of individual personality traits is actually reflected in the behavior of a person [15]. Therefore, in future, larger studies are required to assess the association between self-care behaviors and the combination of an individual's personality traits.

Conclusion

The personality traits of openness and conscientiousness are associated with self-care behaviors in patients with gastrointestinal cancer undergoing outpatient chemotherapy and may be useful in explaining and predicting individual self-care behaviors. In the future, it is necessary to conduct larger studies to assess the association between self-care behaviors and the combination of an individual's personality traits.

Declarations

Acknowledgements

We gratefully acknowledge the patients who participated in the study. We would like to thank hospital staff who helped to carry out the research. We would also like to thank the experts who cooperated in creating the question. Finally, we would like to thank Osaka Cancer Society for providing the grant.

Funding

This study was carried out with the 2019 Cancer Research Grant Incentives (Nursing Department) of Osaka Cancer Society.

Conflict of interest

The authors declare that they have no conflict of interest.

Data availability

Not applicable.

Code availability

Not applicable.

Author contribution

Yuri Takei: study design; development of questionnaire; data collection; analysis; writing manuscript; approval of manuscript.

Harue Arao: study design; development of questionnaire; analysis; writing manuscript; review; approval of manuscript.

Sena Yamamoto: study design; analysis; writing manuscript; review; approval of manuscript.

Keiko Tazumi: study design; development of questionnaire; data collection; review; approval of manuscript.

Masao Mizuki: study design; data collection; review; approval of manuscript.

Taroh Satoh: study design; data collection; review; approval of manuscript.

Ethics approval

This study was conducted in accordance with the ethical standards of the Helsinki Declaration. The study was approved by the Observation Research Ethics Review Committee of the Osaka University Hospital (approval number: 20001-3).

Consent to participate

Written informed consent was obtained from all individual participants included in the study.

Consent for publication

Participants signed informed consent regarding publishing their data.

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Figures

Figure 1

Self-care behaviors in patients with gastrointestinal cancer undergoing outpatient chemotherapy Figure 1 shows the implementation status of self-care behaviors among patients with gastrointestinal cancer undergoing outpatient chemotherapy. The implementation status is shown in the categories of "frequently", "sometimes", "not so often", "not at all" and "no answer". They are arranged in the order of self-care items which more respondents answered "frequently"