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"Personas" describing health engagement risk profiles

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[1] **Type**: Use one of the following codes (in consistence with the Description of the Action):
- R: Document, report (excluding the periodic and final reports)
- DEM: Demonstrator, pilot, prototype, plan designs
- DEC: Websites, patents filing, press & media actions, videos, etc.

[2] **Dissemination level**: Use one of the following codes (in consistence with the Description of the Action)
- PU: Public, fully open, e.g. web
- SEN: Sensitive, limited under conditions of the Grant Agreement

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Summary

Study conducted by UCSC resulted in definition of the "Personas," which describe prototypical profiles of IBD patients, based on empirical analysis. The Personas depict different psychosocial risk factor profiles and their real-world impact on health and diet-related engagement behaviors, ultimately suggesting priorities for educational actions to prevent risks.

1 Introduction

A growing scientific consensus acknowledges the critical role of nutrition in modulating gut inflammation in IBD patients (Yan et al., 2022). Diet can significantly influence the course of the disease, with certain foods potentially exacerbating or alleviating symptoms (Bolte et al., 2021). Concurrently, psychological determinants, particularly stress, have been identified as influential factors affecting the severity and frequency of IBD symptoms (Araki et al., 2020). Stress can exacerbate gut inflammation, leading to increased disease activity and a deterioration in the quality of life for IBD patients (Ge et al., 2022; Hirten et al., 2021). Despite the explicit recognition of these two aspects - nutrition and psychological stress - the interplay between them remains underexplored. The innovativeness of this study lies in its attempt to interlace these lines of reasoning, specifically examining **how stress impacts food consumption** among IBD patients. To bridge this gap, it is crucial to investigate the influence of stress on dietary behaviors and how these behaviors, in turn, affect disease activity and patient outcomes (Palamenghi et al., 2022). In addition to exploring the relationship between stress and food consumption, examining the role of psychological factors, such as patient engagement and psychological food involvement, is needed. Health engagement, or the degree to which patients actively participate in their health management, is crucial for successfully implementing dietary and lifestyle changes (Graffigna & Barello, 2018; Graffigna et al., 2015). Psychological food involvement reflects the significance of food in an individual's life, encompassing emotional, social, and cognitive dimensions (Castellini et al., 2023; Castellini & Graffigna, 2022). By incorporating these factors, the study aims to provide a comprehensive understanding of how stress-related changes in food consumption are mediated by levels of patient engagement and psychological food involvement.

Recent research (Palamenghi et al., 2024) identified **distinct patient clusters differentiated by their levels of food involvement and health engagement**, each with unique patterns in food choices and strategies for emotional regulation, and suggested that psychological factors significantly impacted the dietary preferences of the participants, with higher levels of food involvement associated with the inclination to seek pleasurable food. However, individuals with high health engagement levels reflected a better emotional state, which resulted in less need for food to regulate their mood. Despite the lack of direct association with emotional states, individuals highly engaged with health experienced greater satisfaction and fulfillment in their overall quality of life, particularly concerning dietary aspects (Palamenghi et al., 2024). Building on the promising results of this recent research introduced as a milestone within WP5 activities, it underscored the **critical roles of food involvement (FI) and health engagement (HE) in determining the dietary behaviors of IBD patients**, and our research seeks to delve deeper into these constructs.

Based on these premises, **this research aims to create distinct 'Personas'** within each target group. These personas are delineated based on their unique psychological characteristics, encompassing levels of health engagement, psychological food involvement, perceived stress, and disease activity. This stratification intends to transcend traditional one-size-fits-all approaches, enabling a more nuanced understanding of the target populations. This characterization will facilitate the development

of tailored interventions and strategies, enhancing the efficacy of prevention and self-management initiatives.

Our main objective is to conduct an **online survey** involving two samples from the study target groups (IBD patients and high-risk individuals). More specifically, the aims of this study were three-fold: (i) Profiling IBD patients and high-risk individuals to describe the characteristics that are identified as possible risk factors against engaging in health and diet-related behaviors, (ii) Profiling healthy individuals to describe the characteristics that are identified as possible risk factors against engaging in health and diet-related behaviors, and (iii) Clustering participants to develop 3-6 "Personas" for each target group.

2 Description of Activities

2.1 Study design and sample

The data collection for the high-risk group is still ongoing. The data analyzed in the study was collected on the 17th and 29th of May 2024, involving Italian patients diagnosed with IBD, as a preliminary study to describe engagement personas. Patients were contacted with the support of the Italian IBD patient organization, "A.M.I.C.I. ETS," by sending invitation emails and social media announcements and disseminating an informational leaflet about the study. The survey was distributed through the online platform Qualtrics®. The data collection process is still ongoing.

The inclusion criteria for IBD patients are as follows: (i) ≥18 years of age, (ii) having an IBD diagnosis, (iii) being able to read and understand the questionnaire, and (iv) providing informed consent to participate in the study.
The exclusion criterion for the complete study population: Evidence of cognitive impairment or severe mental health conditions

2.2 Data collection tools

The study was based on a self-administered online questionnaire of validated psychometrics scales and ad-hoc items. The study questionnaire included a sociodemographic, health, and dietary-related information form, 10-item Perceived Stress Scale (PSS-10) (Cohen et al., 1983), Salzburg Stress Eating Scale (SSES) (Meule et al., 2018), Psychological Food Involvement Scale (PFIS) (Castellini et al., 2023), Patient Health Engagement Scale (PHE-s) (Graffigna et al., 2015), Inflammatory Bowel Disease Symptom Inventory – Short Form (IBDSI-SF) (Sexton et al., 2019), and Bristol Stool Chart (BSC) (Blake et al., 2016).

2.3 Statistical analysis

Statistical analyses were conducted using IBM® SPSS 29 (IBM Corp., Armonk, USA). Descriptive statistics of the sample were computed to assess the composition of the sample. The categorical variables were represented as frequencies (percentages), and the continuous variables were provided as means (standard deviations) for the descriptive data. The normality of the data was assessed using the Shapiro-Wilk test, yielding a p-value> 0.05, indicating that the data was normally distributed. Consequently, parametric tests were employed for subsequent data analysis. Pearson's correlation coefficients were used to assess the relationships among variables. Subsequently, the characteristics of engagement personas were evaluated by categorizing PHE-s® (cut-off PHE-s®: score <2 and ≥2, respectively) and PFIS scores (cut-off PFIS: score <5 and ≥5, respectively) as low and high to quantify the health engagement and food involvement level of patients. These personas were then analyzed based on comfort food group consumption, disease activity, stool consistency, perceived stress, and stress eating. Differences between low and high-engagement and food involvement groups were

assessed using a chi-squared and independent samples t-test. Also, participants were grouped as their perceived stress levels (cut-off PSS-10: score <21 and ≥21, respectively) as low and high and compared with their characteristics in terms of comfort food consumption, disease activity, stool consistency, stress eating, health engagement, and food involvement levels. A p – value < 0.05 was considered statistically significant.

2.4 Ethical consideration

A final study protocol version received formal ethical approval from the Ethics Committee of Università Cattolica del Sacro Cuore, Milano, Italy, in April 2024 (Protocol number: 72/24). Participants were given access to the information sheet explaining the project's objectives. Only after reading the information sheet and accepting the informed consent did participants have access to the study. Each participant was asked to complete the questionnaire alone and individually. Data was collected anonymously, and it is not possible to trace the identity of the subjects.

3 Results & Discussion

Results described below are shown in tables 1-5, respectively, in section 8.

3.1 Preliminary descriptive characteristics of the IBD patients

Table 1 presents the descriptive characteristics of the 593 IBD patients in the study. The average age of the participants was 49.7 years (SD = 13.99), with a mean duration of IBD diagnosis of 17.8 years (SD = 12.22). The sample comprised predominantly females (60.9%). Educational attainment varied, with the highest percentage having completed high school (47.7%), and most participants were employed (65.8%). Regarding household composition, the majority were married or cohabitating (69.3%). Ulcerative colitis was the most common IBD subtype (52.8%), followed by Crohn's disease (45.5%). Comorbidity was present in 38.4% of the patients, while 35.4% had undergone surgery related to their diagnosis. A significant majority (93.1%) regularly took medication for IBD. Psychological support utilization was notable, with 44.9% having ever consulted with a psychologist or psychotherapist, though only 14.7% were currently following such consultations.

3.2 IBD patients' characteristics of comfort food consumption

Table 2 provides insights into the comfort food consumption patterns of IBD patients over the past seven days. The consumption frequencies (on a scale of 0.0 to 5.0) revealed that coffee was the most frequently consumed item (Mean = 3.1, SD = 1.98), followed by sweet snacks (Mean = 2.1, SD = 1.60). When asked if patients consumed more than usual amounts of certain foods, 91.4% of patients responded, "No." Among the 51 patients (multiple answers, n = 108) who did consume more than usual, sweet snacks were the most commonly over-consumed (25.0%). Regarding stress-induced eating behaviors, 35.2% (209) of patients reported consuming more comfort foods when overstressed. Of the 469 answers, chocolate was the most frequently over-consumed comfort food (26.0%), followed by savory snacks (22.6%) and sweet snacks (22.5%). When asked about the importance of food and beverage in managing stress, the mean importance rating was 2.5 (SD = 1.12) on a 5-point scale. The largest proportion of patients (38.1%) rated this as "Neutral," while 25.1% considered it "Not important at all."

3.3 IBD patients' disease activity, stool consistency, perceived stress, stress-eating, patient engagement, and psychological food involvement scores

Table 3 summarizes various psychological and disease-related metrics of IBD patients. The mean disease activity score (IBDSI-SF) was 21.1 (SD = 15.06), indicating moderate disease activity. Stool consistency, assessed via the Bristol Stool Chart (BSC), averaged 4.5 (SD = 1.54), suggesting variability

in stool form among patients. Perceived stress, measured by the PSS-10, had a mean score of 17.5 (SD = 7.67), indicating moderate stress levels. Stress eating, evaluated using the SSES, had a mean score of 2.8 (SD = 0.85). Patient health engagement (PHE-s®) scored an average of 2.7 (SD = 0.67), and psychological food involvement (PFIS) had a mean of 4.3 (SD = 1.09), both indicating moderate levels. Within the PFIS, emotional balance was rated at a mean of 5.0 (SD = 1.39), self-realization at 4.2 (SD = 1.59), social affirmation at 2.7 (SD = 1.33), and social bonding at 5.5 (SD = 1.48).

3.4 IBD patients grouped by high and low levels of health engagement and psychological food involvement

Table 4 categorizes IBD patients based on their health engagement (PHE-s®) and psychological food involvement (PFIS) to compare various characteristics. Among patients with low health engagement (n = 233, 39.3%) and high health engagement (n = 360, 60.7%), those with high engagement showed significantly lower disease activity (IBDSI-SF: 16.8 ± 11.69 vs. 27.8 ± 17.12, $p < 0.001$), stool consistency (BSC: 4.3 ± 1.52 vs. 4.8 ± 1.52, $p < 0.001$), and perceived stress (PSS-10: 15.1 ± 6.77 vs. 21.2 ± 7.53, $p < 0.001$). They also reported lower consumption of comfort foods when overstressed ($p < 0.001$). When grouping by psychological food involvement, patients with high PFIS (n = 370, 62.4%) had significantly lower disease activity (IBDSI-SF: 19.3 ± 14.09 vs. 24.1 ± 16.13, $p < 0.001$), stool consistency (BSC: 4.4 ± 1.50 vs. 4.7 ± 1.57, $p = 0.003$), and perceived stress (PSS-10: 16.9 ± 7.39 vs. 18.5 ± 8.04, $p = 0.010$). They also exhibited higher stress eating scores (SSES: 2.9 ± 0.85 vs. 2.6 ± 0.83, $p < 0.001$) and placed greater importance on comfort foods for stress management ($p = 0.007$) (Figure 1).

3.5 IBD patients grouped by high and low levels of perceived stress

Table 5 categorizes IBD patients based on their levels of perceived stress (PSS-10) to compare various characteristics. Among patients with low perceived stress (n = 397, 66.9%) and high perceived stress (n = 196, 33.1%), those with high perceived stress exhibited significantly higher disease activity (IBDSI-SF: 30.1 ± 16.38 vs. 16.8 ± 12.19, $p < 0.001$) and stool consistency (BSC: 4.9 ± 1.63 vs. 4.3 ± 1.46, $p < 0.001$), but lower health engagement (PHE-s®: 2.3 ± 0.63 vs. 2.9 ± 0.60, $p < 0.001$) and psychological food involvement (PFIS: 4.1 ± 1.15 vs. 4.4 ± 1.05, $p < 0.001$). Regarding comfort food consumption, patients with high perceived stress were more likely to consume fast food (0.3 ± 0.58 vs. 0.2 ± 0.48, $p = 0.036$) and sweetened beverages (0.6 ± 1.20 vs. 0.5 ± 0.94, $p = 0.039$). Additionally, they showed significantly higher consumption of comfort foods than usual when feeling overstressed, including savory snacks (52.8% vs. 47.2%, $p < 0.001$), sweet snacks (47.6% vs. 52.4%, $p < 0.001$), and sweetened beverages (48.3% vs. 51.7%, $p = 0.074$).

The results from the analysis of IBD patients grouped by high and low levels of perceived stress offer crucial insights for achieving the general goals of the miGut-Health project and the specific objectives of WP5. Specifically, the findings revealed significant associations between perceived stress and dietary behaviors among IBD patients. Patients experiencing high levels of perceived stress were notably more inclined to consume fast food and sweetened beverages and demonstrated increased consumption of comfort foods when feeling overstressed. These results highlight the substantial impact of psychological factors, such as stress, on the dietary choices of IBD patients. Moreover, the study showed that individuals with high perceived stress levels displayed higher disease activity and lower levels of health engagement and psychological food involvement. This underscores the **intricate relationship between psychological well-being, health engagement, and disease activity in the context of IBD.** Understanding these connections is paramount for developing effective health promotion strategies and personalized self-care engagement approaches that align with the overarching goals of the miGut-Health project. Additionally, these findings directly support the objectives of WP5, which aims to sustain the engagement of IBD patients and high-risk individuals in

health and prevention initiatives. By establishing a theory-based and data-driven classification system of health and diet-related engagement risk profiling, the project seeks to facilitate behavioral change and enhance adherence to diet and nutritional prescriptions to prevent the development of IBD in targeted populations. In summary, the study results provide actionable insights into the **intricate interplay between perceived stress, dietary behaviors, and health engagement among IBD patients**, thereby facilitating the development of **effective strategies** to **promote gut health**.

4 Conclusion

The results from the analysis of IBD patients grouped by high and low levels of perceived stress provide critical insights into the relationship between psychological factors, dietary behaviors, and health engagement among IBD patients, significantly contributing to achieving the general goals of the miGut project and the specific objectives of WP5. Patients experiencing **high levels** of perceived **stress** were notably more inclined to **consume fast food and sweetened beverages**, as supported by the literature (Campos-Ramírez et al., 2023). This observation underscores the significant impact of psychological factors, such as stress, on the dietary choices of IBD patients (Palamenghi et al., 2022). Additionally, individuals with high perceived stress levels exhibited increased **consumption of comfort foods** when feeling overstressed (Tomiyama et al., 2011). This finding highlights the complex relationship between stress and coping mechanisms, which is crucial for understanding the multifaceted nature of dietary behaviors in the context of IBD. Moreover, the study reveals that patients with high perceived stress had **higher disease activity** and **lower levels of health engagement** and **psychological food involvement**. These results emphasize the intricate relationship between psychological well-being, health engagement, and disease activity in IBD. Understanding these connections is paramount for developing effective health promotion strategies and personalized self-care engagement approaches that align with the overarching goals of the miGut-Health project.

5 Next steps

The data collection process in Italy is still ongoing, and the collaboration of "A.M.I.C.I. ETS" is ongoing. Besides, to extend the generalizability of the study, questionnaires are in the process of translation into German and Lithuanian languages, and the further data collection process has been planned with LSMU, CAU, and the German IBD patient organization - DCCV e.V. - Deutsche Morbus Crohn / Colitis Ulcerosa Vereinigung. Also, Task 2, Task 5.2: Co-design of the Personalized Health Engagement Information Package ("miGut Engagement Package") that will be led by EFCCA between M18 and M24, involves the conduction of a co-creation workshop aiming to define a set of informational materials to improve patient/citizen engagement in health and food-related preventive behaviors, which will also include inputs from relevant stakeholders.

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7 Proof of ethical approval

The study protocol received formal ethical approval by the Ethics Committee of Università Cattolica del Sacro Cuore, Milano, Italy, on April 22nd, 2024, under protocol number 72/24. Screenshots of the approval letter are attached.



UNIVERSITÀ CATTOLICA DEL SACRO CUORE

20123 MILANO – LARGO A. GEMELLI 1

Dipartimento di Psicologia

Università Cattolica del Sacro Cuore

Commissione Etica per la Ricerca in Psicologia (CERPS)

Titolo della ricerca:

Stress, eating habits, and inflammatory bowel disease (IBD): Exploring the role of health engagement and psychological food involvement in developing and progress of IBD!

Proponente: *Guendalina Graffigna, Dipartimento di Psicologia, Università Cattolica del Sacro Cuore*

data di invio progetto: febbraio 2024
data di parere positivo: marzo 2024
numero protocollo: 72/24

In merito allo studio in oggetto, la commissione etica ha valutato i seguenti documenti:

- ***Modulo richiesta***
- ***Procedura di ricerca/ strumenti***
- ***Consenso informato***

La commissione etica ha espresso all'unanimità parere favorevole allo studio
Si produce la seguente per gli adempimenti del caso, secondo le rispettive competenze

Il Direttore del Dipartimento di Psicologia
Antonella Marchetti

Il Presidente CERPS
Emanuela Confalonieri

Milano, **22/04/2024**

8 Tables

Table 1. Preliminary descriptive characteristics of the IBD patients (N = 593)

Characteristics	Mean ± SD / *n* (%)
Age *(years)*	49.7 ± 13.99
Duration of IBD diagnosis *(years)*	17.8 ± 12.22
Gender	
Female	361 (60.9)
Male	232 (39.1)
Educational attainment	
Elementary-secondary school	65 (11.0)
High school	283 (47.7)
University and further	245 (41.3)
Employment status	
Employed	390 (65.8)
Unemployed	203 (34.2)
Household	
Unmarried-single	159 (26.8)
Married-cohabitation	411 (69.3)
Parents-siblings-children	23 (3.9)
IBD subtype	
Ulcerative colitis	313 (52.8)
Crohn's disease	270 (45.5)
Indeterminate colitis	6 (1.0)
Suspicion of Crohn's disease	3 (0.5)
Suspicion of IBD	1 (0.2)
Comorbidity status	
No	365 (61.6)
Yes	228 (38.4)
Ever undergone surgery	
No	383 (64.6)
Yes	210 (35.4)
Regular medication intake	
No	41 (6.9)
Yes	552 (93.1)
Ever consulted with a psychologist/psychotherapist	
No	327 (55.1)
Yes	266 (44.9)
Currently following a psychotherapy/psychological consultation	
No	506 (85.3)
Yes	87 (14.7)

Table 2. IBD patients' characteristics of comfort food consumption (n = 593)

Items	Mean ± SD / *n* (%) (Min-Max)
How often did you consume the following food/beverage groups in the past seven days?	(0.0 - 5.0)
Alcoholic beverages	0.9 ± 1.26
Chocolate	1.3 ± 1.33
Coffee	3.1 ± 1.98
Fast food	0.3 ± 0.52
Savory snacks	1.3 ± 1.19
Sweet snacks	2.1 ± 1.60
Sweetened beverages	1.5 ± 1.04
Have you consumed more than usual amounts of the following food groups in the past seven days?	
No	542 (91.4)
Yes	51 (8.6)
Comfort foods consumed more than usual amounts in the past seven days *(n = 108)*	
Alcoholic beverages	17 (15.6)
Chocolate	19 (17.5)
Coffee	18 (16.6)
Fast-food	5 (5.0)
Savory snacks	14 (12.9)
Sweet snacks	27 (25.0)
Sweetened beverages	8 (7.4)
Do you consume these foods more than usual when you feel overstressed?	
No	384 (64.8)
Yes	209 (35.2)
Comfort foods consumed more than usual amounts when feeling overstressed *(n = 469)*	
Alcoholic beverages	35 (7.5)
Chocolate	122 (26.0)
Coffee	46 (9.8)
Fast-food	26 (5.5)
Savory snacks	106 (22.6)
Sweet snacks	105 (22.5)
Sweetened beverages	29 (6.1)
How important is it for you that a food/beverage helps you manage your stress?	2.5 ± 1.12
Not important at all	149 (25.1)
Somewhat important	112 (18.9)
Neutral	226 (38.1)
Important	80 (13.5)
Very important	23 (3.9)

Table 3. IBD patients' disease activity, stool consistency, perceived stress, stress-eating, patient engagement, and psychological food involvement scores (n = 593)

Variables	Mean ± SD
Disease activity (IBDSI-SF)	21.1 ± 15.06
Stool consistency (BSC)	4.5 ± 1.54
Perceived stress (PSS-10)	17.5 ± 7.67
Stress eating (SSES)	2.8 ± 0.85
Health engagement (PHE-s®)	2.7 ± 0.67
Psychological food involvement (PFIS)	4.3 ± 1.09
Emotional balance	5.0 ± 1.39
Self-realization	4.2 ± 1.59
Social affirmation	2.7 ± 1.33
Social bonding	5.5 ± 1.48

SD, Standard deviation, *IBDSI-SF,* Inflammatory Bowel Disease Symptom Inventory Short Form; *BSC,* Bristol Stool Chart; *PSS-10,* Perceived Stress Scale; *SSES,* Salzburg Stress Eating Scale, *PHE-s®,* Patient Health Engagement Scale; *PFIS*, Psychological Food Involvement Scale

Table 4. IBD patients grouped by high and low levels of health engagement and psychological food involvement (n = 593)

	Health engagement (PHE-s®)			**Psychological food involvement (PFIS)**		
	Low (*n* = 233) (39.3%)	**High (*n* = 360) (60.7%)**	***p*-value**	**Low (*n* = 223) (37.6%)**	**High (*n* = 370) (62.4%)**	***p*-value**
	Mean ± SD / *n* (%)	**Mean ± SD / *n* (%)**		**Mean ± SD / *n* (%)**	**Mean ± SD / *n* (%)**	
Consumption of CFG more than usual in the past seven days[b]						
No	210 (38.7)	332 (61.3)	0.375	205 (37.8)	337 (62.2)	0.722
Yes	23 (45.1)	28 (54.9)		18 (353)	33 (64.7)	
Consumption of CFG when feeling overstressed[b]						
No	132 (34.4)	252 (65.6)[++]	**<0.001**	156 (40.6)[+]	228 (59.4)	**0.040**
Yes	101 (48.3)[+]	108 (51.7)		67 (32.1)	142 (67.9)[++]	
Importance of CFG when overstressed[a]	2.6 ± 1.13	2.5 ± 1.11	0.086	2.4 ± 1.11	2.6 ± 1.11	**0.007**
Disease activity[a] (IBDSI-SF)	27.8 ± 17.12	16.8 ± 11.69	**<0.001**	24.1 ± 16.13	19.3 ± 14.09	**<0.001**
Stool consistency[a] (BSC)	4.8 ± 1.52	4.3 ± 1.52	**<0.001**	4.7 ± 1.57	4.4 ± 1.50	**0.003**
Perceived stress[a] (PSS-10)	21.2 ± 7.53	15.1 ± 6.77	**<0.001**	18.5 ± 8.04	16.9 ± 7.39	**0.010**
Stress eating[a] (SSES)	2.8 ± 0.92	2.8 ± 0.81	0.140	2.6 ± 0.83	2.9 ± 0.85	**<0.001**

[a] Chi-square test, [b] Independent samples t-test, $p < 0.05$ is considered as statistically significant

SD, Standard deviation, *IBDSI-SF,* Inflammatory Bowel Disease Symptom Inventory Short Form; *BSC,* Bristol Stool Chart; *PSS-10,* Perceived Stress Scale; *SSES,* Salzburg Stress Eating Scale, *PHE-s®*, Patient Health Engagement Scale; *PFIS*, Psychological Food Involvement Scale

[+] significantly lower compared to the total sample

[++] significantly higher compared to the total sample

Table 5. IBD patients grouped by high and low levels of perceived stress (n = 593)

	Perceived stress (PSS-10)		
	Low (*n* = 397) (66.9%)	**High (*n* =196) (33.1%)**	***p*-value**
	Mean ± SD / *n* (%)	**Mean ± SD / *n* (%)**	
Frequency of comfort food consumption in the past seven days[a]			
Alcoholic beverages	1.0 ± 1.27	0.82 ± 1.23	0.055
Chocolate	1.3 ± 1.32	1.2 ± 1.34	0.145
Coffee	3.2 ± 1.95	3.0 ± 2.04	0.128
Fast food	0.2 ± 0.48	0.3 ± 0.58	**0.036**
Savory snacks	1.2 ± 1.14	1.3 ± 1.30	0.131
Sweet snacks	2.0 ± 1.57	2.1 ± 1.66	0.227
Sweetened beverages	0.5 ± 0.94	0.6 ± 1.20	**0.039**
Consumption of CFG more than usual in the past seven days[b]			
No	210 (38.7)	332 (61.3)	0.375
Yes	23 (45.1)	28 (54.9)	
Comfort foods consumed more than usual amounts in the past seven days[b]			
Alcoholic beverages	7 (41.2)	10 (58.8)$^{++}$	**0.022**
Chocolate	9 (47.4)	10 (52.6)	0.065
Coffee	10 (55.6)	8 (44.4)	0.297
Fast food	2 (40.0)	3 (60.0)	0.198
Savory snacks	5 (35.7)	9 (64.3)$^{++}$	**0.012**
Sweet snacks	11 (40.7)	16 (59.3)$^{++}$	**0.003**
Sweetened beverages	2 (25.0)	6 (75.0)$^{++}$	**0.011**
Consumption of comfort food when feeling overstressed[b]			
No	132 (34.4)	252 (65.6)$^{++}$	**<0.001**
Yes	101 (48.3)$^{+}$	108 (51.7)	
Comfort foods consumed more than usual amounts when feeling overstressed[b]			
Alcoholic beverages	22 (62.9)	13 (37.1)	0.596
Chocolate	62 (50.8)	60 (49.2)$^{++}$	**<0.001**
Coffee	23 (50.0)	23 (50.0)$^{++}$	**0.011**
Fast food	13 (50.0)	13 (50.0)	0.060
Savory snacks	50 (47.2)	56 (52.8)$^{++}$	**<0.001**
Sweet snacks	55 (52.4)	50 (47.6)$^{++}$	**<0.001**
Sweetened beverages	15 (51.7)	14 (48.3)	0.074
Importance of CFG when overstressed[a]	2.5 ± 1.13	2.6 ± 1.11	0.284
Disease activity[a] (IBDSI-SF)	16.8 ± 12.19	30.1 ± 16.38	**<0.001**
Stool consistency[a] (BSC)	4.3 ± 1.46	4.9 ± 1.63	**<0.001**
Stress eating[a] (SSES)	2.8 ± 0.75	2.8 ± 1.04	0.439
Health engagement[a]	2.9 ± 60	2.3 ± 0.63	**<0.001**
Psychological food involvement[a]	4.4 ± 1.05	4.1 ± 1.15	**<0.001**

[an] Independent samples t-test, [b] Chi-square test, $p < 0.05$ is considered as statistically significant

SD, Standard deviation, *IBDSI-SF,* Inflammatory Bowel Disease Symptom Inventory Short Form; *BSC,* Bristol Stool Chart; *PSS-10,* Perceived Stress Scale; *SSES,* Salzburg Stress Eating Scale, *PHE-s®,* Patient Health Engagement Scale; *PFIS*, Psychological Food Involvement Scale

[+] significantly lower compared to the total sample

[++] significantly higher compared to the total sample

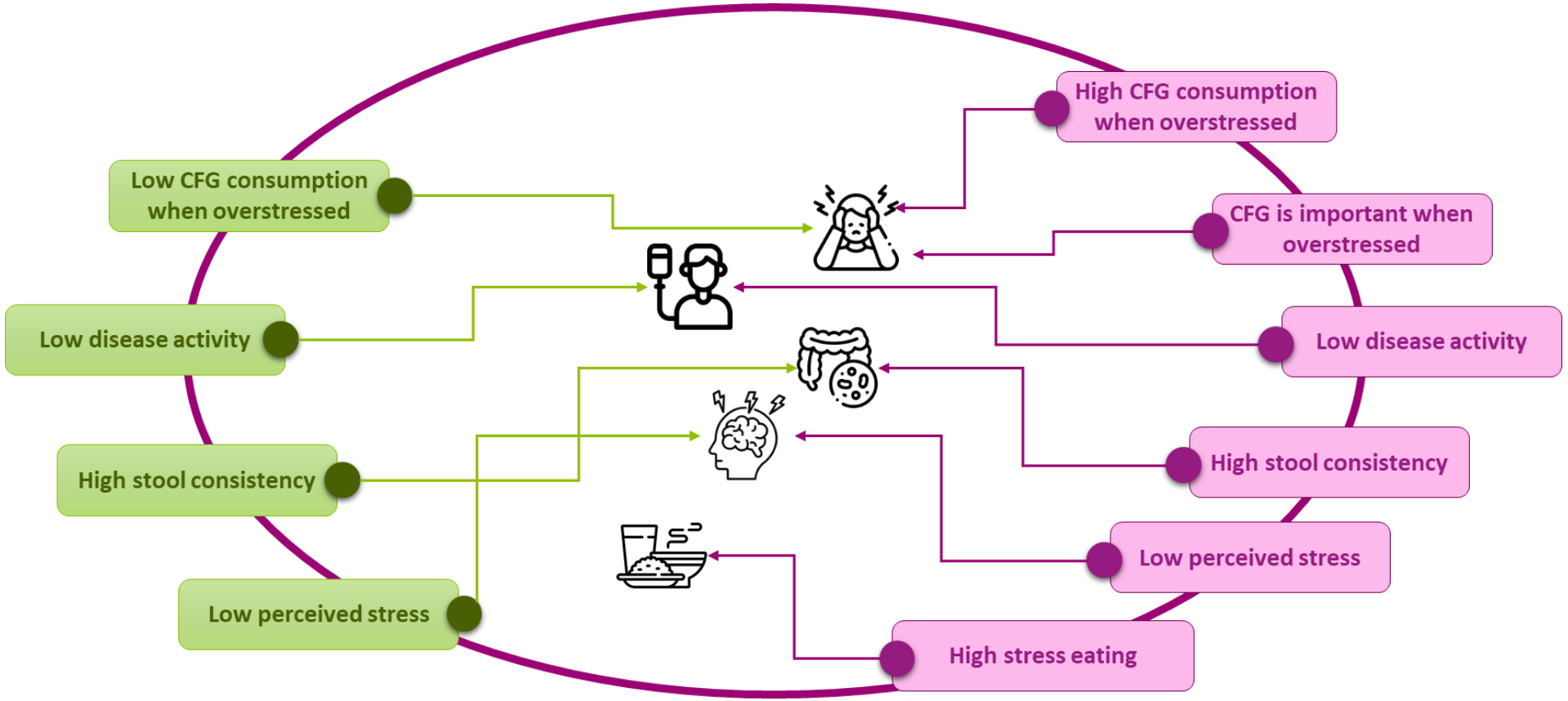


Figure 1. Characteristics of patients with a high engagement and high psychological food involvement personas. The green text indicates results from the PHE-s® and the purple from the PFIS