Received: 4 July 2019 | Revised: 1 November 2019 | Accepted: 24 November 2019

DOI: 10.1111/nmo.13783

Neurogastroenterology & Motility NGM WILEY

ORIGINAL ARTICLE

Prevalence and impact of self-reported painful and non-painful constipation in the general population

Jasper Pannemans[1] | Karen Van den Houte[1] | Benjamin Fischler[2] | Hubert Piessevaux[3] | Florencia Carbone[1] | Jan Tack[1]

[1]TARGID (Translational Research Center for Gastrointestinal Disorders), University of Leuven, Leuven, Belgium

[2]Psychiatry, CHU Saint-Pierre, Brussels, Belgium

[3]Service de Gastroentérologie, Cliniques Universitaires St-Luc, Brussels, Belgium

Correspondence
Jan Tack, TARGID (Translational Research Center for Gastrointestinal Disorders), Herestraat 49, Box 701, 3000 Leuven, Belgium.
Email: jan.tack@kuleuven.be

Funding information
This work was supported by a Methusalem grant from Leuven University to Jan Tack and by a research grant from Menarini Belgium.

Abstract

Introduction: Chronic constipation, defined by the Rome IV criteria, is a highly prevalent functional bowel disorder with major overlap with other bowel disorders. Therefore, a pooled-analysis to evaluate the presence of self-reported constipation in the general population was conducted. Further, its association with other bowel symptoms and its health-economic impact was analyzed.

Methods: Collection of information on bowel symptoms' prevalence and their impact was done through an Internet survey (Medistrat Internet panel). The analysis focused on patients who reported constipation symptoms over the last 12 months. Firstly, participants who with or without constipation were compared. Secondly, subjects reporting constipation with (PC) or without abdominal pain (NPC) were studied.

Key Results: A total of 1012 subjects (45.2 ± 0.5 years old, 62% females), of whom 217 (21%) reported constipation, completed the survey. Women were significantly more represented in the group reporting constipation compared to those with other bowel symptoms (81.57% vs 56.60%, $P < .0001$). Subjects reporting constipation experienced more additional bowel symptoms than those who did not report constipation [3(2-6) vs 2(1-4), $P < .0001$]. Of those with constipation, 134 patients reported NPC compared to 83 patients with PC. The presence of PC was associated with higher prevalence of diarrhea symptoms, alternating bowel movements, bloating, cramps, gas, and altered stool frequency and consistency (all $P < .01$). Out of 83 PC patients, 38 (45.24%) fulfilled the Rome IV IBS criteria.

Conclusion: Self-reported constipation, often associated with other bowel symptoms, is a highly prevalent condition in the Belgian general population. Especially when abdominal pain is present, this generates major healthcare costs.

KEYWORDS

bowel symptoms, constipation, epidemiology

1 | INTRODUCTION

Chronic constipation (CC) is a common disorder with an estimated prevalence of 11.2% (95% CI: 9.8-12.8).[1] Its pathophysiology, comprising colonic motor dysfunction and defecatory disorders characterized by impaired rectal evacuation, with normal or delayed colonic transit, is very complex and heterogeneous.[2]

The majority of CC patients are managed in primary care and their referral to secondary care occurs mainly when red flags such as important weight loss are present, or when there is a lack of

response to lifestyle adjustments and pharmacological interventions. Depending on the country of origin, 25%-60% of patients with bowel disorders consult primary care physicians for their symptoms, which leads to a high consumption of healthcare resources.[3]

To aid diagnosing different functional bowel disorders, the Rome criteria were developed by teams of experts and have been used since 1989. Criteria were revised as science advanced, and the latest iteration, the Rome IV consensus, was published in 2016. The Rome IV criteria for CC focus on different symptoms such as the presence of straining, lumpy or hard stools, sensation of incomplete evacuation or sensation of anorectal obstruction.[4] However, overlap between CC and other functional disorders is a challenge for both clinicians and researchers. Up to 90% of patients with IBS-C meet the criteria for functional constipation and 44% of functional constipation patients fulfill criteria for IBS-C according to the Rome III criteria.[5] The Rome IV consensus proposes that the presence and intensity of abdominal pain help to distinguish CC from IBS-C.[4]

In addition, not all patients who report symptoms of constipation fulfill the stringent Rome diagnostic criteria, although symptoms, which have a severe impact on their daily functioning, may be present. Overlap and diagnostic uncertainty may lead to inappropriate performance of additional tests and increased cost through use of combination therapies.[6]

The aim of this study was therefore to evaluate the presence of self-reported constipation in the general population, its association with other bowel symptoms and its health-economic impact, in the presence and absence of abdominal pain.

2 | MATERIALS AND METHODS

2.1 | Internet survey methodology

An Internet survey (Medistrat Internet panel) to collect information on the prevalence of bowel symptoms and their impact was used in a sample representative for the entire Belgian population. This completely anonymous survey was conducted in adults above the age of 18 years old, in two different languages: Dutch and French. The panel was chosen to reflect the composition of the Belgian adult population in terms of the province they lived in, age distribution, level of education, and employment status. However, the survey was prespecified to recruit a majority of females (62%), taking into account the known predominance in prevalence of bowel symptoms in female subjects.[1,7,8] Apart from the sex distribution, the quota of the filled out questionnaires were selected to match the adult Belgian population composition. When the quota for the profile of a potential participant is already completed, the participant has no longer access to fill out the survey. To motivate their participation, subjects that answer the survey correctly, entered a draw with the chance of winning a gift voucher. The study was supported by a research grant from Menarini Belgium, who otherwise had no input into the study conduct, data analysis, and reporting. The study protocol conforms to the ethical guidelines of the 1975 Declaration of Helsinki. As this is a fully anonymized Internet survey, no ethical approval was needed in agreement with local legislation.

2.2 | The bowel symptom and impact questionnaire

The questionnaire comprised several sections. Participants were first requested to complete items concerning their personal profile (sex, age, weight, height, education, and occupation). This was followed by, specific questions regarding the presence of bowel symptoms, reflecting the Rome definitions and criteria. When bowel symptoms were present, further details about their frequency and their impact, including absence from work, use of medications, doctor consultations, and medical examinations were collected.

2.3 | Analysis

The current pooled-analysis focused on patients whom reported constipation symptoms in the past 12 months. Additional data from this survey regarding the prevalence of IBS and bothersomeness of symptoms, lifestyle adjustments, treatment, and their perceived efficacy have previously been reported.[9]

In a first approach, we compared the participants who experienced constipation to those who did not report any bowel symptoms and to those who reported bowel symptoms other than constipation such as abdominal cramps, bloating, bowel frequency, and consistency changes.

A sub-analysis was done in constipated subjects. Participants were subdivided in two categories: those who experienced abdominal pain (painful constipation; PC) and those who did not (non-painful constipation; NPC).

Summary data for baseline demographic factors (age, weight, height, and gender), doctors' visits, investigations, medication use, and absence from work were compared between different groups. For categorical data, the Pearson chi-square test was performed for differences in symptom reporting were appropriate. When numbers were small and when appropriate, Fisher's exact test was applied. Further, one-way analysis of variance was applied when comparison of continuous data was performed to compare the means between three difference groups. All the reported *P*-values are two sided. The statistical tests were performed with an alpha of .05 in IBM SPSS statistics version 23. No missing data were imputed. No correction for multiple testing was applied to the descriptive analysis of this data set.

3 | RESULTS

3.1 | Demographic profile of participants

A total of 1012 subjects (45.2 ± 0.5 years old, 62% females, body mass index of 26.0 ± 0.2 kg/m^2) completed the online survey. The

composition of the group matched the population distribution in the Belgian provinces in terms of educational level and employment status, except for the female predominance (62%). The baseline demographics of the three groups are described in Table 1.

3.2 | Comparison of participant characteristics of those who reported constipation and those who did not

The assessed abdominal symptoms included bloating, diarrhea, flatulence, abdominal cramps, pain, altered stool frequency, altered stool consistency, and constipation. A median of 2 (IQR 1-4) and 3 (IQR 2-6) symptoms ($P < .0001$) were reported by participants who did not experience constipation in the last 12 months compared with those who did. Further, a significantly higher prevalence of abdominal pain, altered stool frequency, alternating bowel habits, and bloating were reported in the constipation group compared with those who did not experience constipation. Conversely, the non-constipated group had more diarrhea symptoms. Figure 1 shows the bowel symptom reporting comparison (in %) between those who experienced constipation in the last 12 months and those who did not. Those reporting constipation (n = 217) and other bowel symptoms (n = 500) were significantly younger and more likely to be female than those reporting no bowel symptoms (Table 1; $P < .0001$).

Concerning improvement of bowel symptoms after defecation in constipated subjects compared to those without constipation, no difference was found (78.8% vs 77.7%, $P = .741$). However, subjects with constipation reported a significantly higher number of days with symptom occurrence compared to those with other bowel symptoms (at least 3 days per month, 65.9% vs 52.9%; X^2 (1, N = 710) = 10.316, $P < .001$). Finally, the number of days with symptom occurrence differed significantly between the two groups in general (Table 1; X^2 (3, N = 710) = 8.532, $P = .036$).

3.3 | Socio-economic impact of constipation compared to controls and other functional bowel symptoms

The employment status and educational status comparison between the three groups, those reporting constipation, those who do not, and those without bowel symptoms are presented in Tables 2 and 3, respectively. In those with bowel symptoms other than constipation, employees, and retired participants represent the largest groups. Participants who experienced constipation were more likely to be students and therefore younger, more often employees, and less often blue-collar workers compared to those without bowel symptoms. In addition, a slightly higher proportion of those who were constipated were unemployed. Furthermore, constipated participants were more likely to have finished higher secondary school and higher education outside university compared to a higher prevalence of technical educations for those without bowel symptoms and those with bowel symptoms other than constipation.

In total, 44% of participants with constipation reported taking laxatives for their complaints, compared to just 8% of those with other bowel symptoms [X^2 (1 (N = 172) = 31.172, $P < .001$]. In addition, a small subset of participants with constipation reported taking anti-diarrheal medications, but this was lower than in the group reporting other bowel symptoms [13.56% vs 28.7%, X^2 (1 (N = 167) = 4.889, $P < .05$]. No significant differences were found for fiber supplements, anti-spasmodic, analgesic, antinausea, sleep, or anxiety medication for constipated subjects compared to those with other bowel symptoms.

In regards to constipated participants and participants with other bowel symptoms than constipation, no significant differences were found for physician consulting [14.2% vs 19.4%, $P = .15$], general practitioner visits (18.5% vs 17.5%, $P = .88$), visits to a specialist (35.2% vs 29.9%, $P = .50$), or other healthcare visits over the last 12 months (6% vs 6%; 95% CI: 0.2-3.7).

3.4 | Constipation with abdominal pain compared to constipation without abdominal pain

One hundred thirty-four participants who reported non-painful constipation (NPC) were compared to 83 patients with painful constipation (PC). The age (mean ± SD) was comparable in both groups (43 ± 14.3 and 41 ± 14.5 years old, respectively). Figure 2 summarizes the symptom experience prevalence over the last 12 months in both groups; constipation was not included in this figure as all subjects experienced it. Of the 83 participants reporting PC, only 38 (45.24%) fulfilled the Rome IV IBS criteria.

Firstly, no difference was found regarding the relief of symptoms after a bowel movement in PC compared with NPC [28% vs 17%, respectively, X^2 (1, N = 217) = 3.41, $P = .065$]. Secondly, comparable results were found for the frequency of symptoms reported as daily, once to twice per week, once or twice per month or twice per month, although the proportion of patients with symptoms on a daily basis tended to be higher in the PC group ($P = .057$).

Importantly, when patients were asked to identify their most bothersome symptom, more patients with NPC compared with PC reported constipation to be their most bothersome symptom (75% vs 44%, respectively, $P = .014$). Concerning the use of other medications such as laxatives, fiber supplements, spasmolytics, antidepressants or anxiolytics, no differences were found between these two groups although these numbers were very small (n = 63). The presence of PC was associated with higher prevalence of diarrhea symptoms, alternating bowel movements, bloating, cramps, gas, and altered stool frequency and consistency (Figure 2; all $P < .01$).

Further, compared to NPC, PC patients reported more consultations with a medical doctor in the past 12 months [40.24% vs 14.29%, X^2 (1, N = 215) = 18.641, $P < .0001$], and more visits to specialists (50%

TABLE 1 Baseline demographics of questionnaire participants divided in three different groups

	No symptoms (n = 295)	Bowel symptoms with constipation (n = 217)	Bowel symptoms without constipation (n = 500)
Baseline			
Sex	46.1% female	81.6% female†	62.8% female†
Age (years)	50.2 ± 14.6	42.4 ± 14.4†	43.5 ± 14.6†
BMI	26.3 ± 4.9	25.3 ± 4.0	26.2 ± 5.3
Height (cm)	171.3 ± 10.6	167.5 ± 8.6	169.9 ± 9.2
Days absent			
0 d from work		53.5%	61.0%
1-2 d due to bowel		4.1%	5.2%
3-5 d Symptoms		1.4%	3.0%
>5 d		1.4%	1.8%
Not applicable		38.7%	29%
Days with Every day symptoms		13.8%	11.6%
1-2 times/wk		28.6%	22.7%
1-2 times/mo		32.7%	30.0%
>2 times/mo		24.9%	35.7%
Doctor visits (last 12 mo)*		24.0%	19.40%
General practice vistis*		20.3%	17.5%
Specialist visits*		8.8%	5.8%
Other healthcare		1.4%	1.2%
Colonoscopy		6.9%	5.4%
Radiology/ultrasound		12.4%	7.8%

*Due to bowel symptoms.

†$P < .05$ compared with no bowel symptoms.

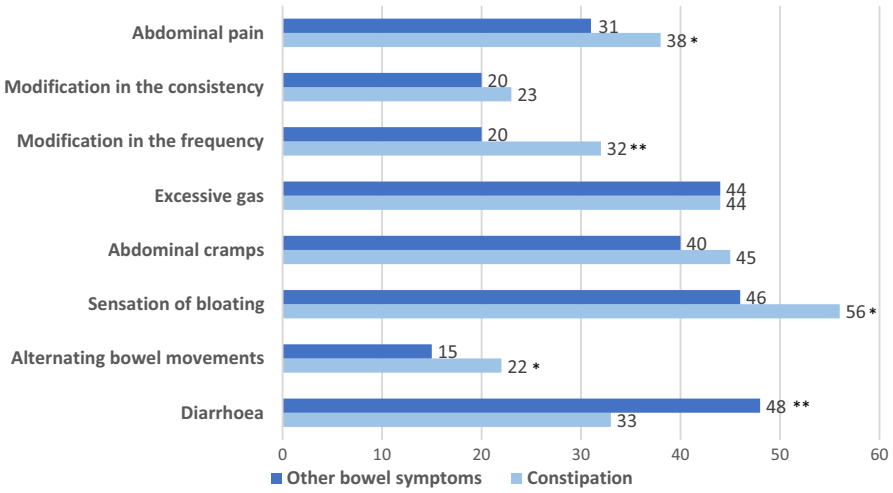

FIGURE 1 Bowel symptom comparison between participants reporting constipation and those reporting other bowel symptoms than constipation (n = 717). *$P < .05$; **$P < .001$

vs 10%, 95% CI: 1.8-44.9), but not to general practitioners or other medical practitioners overall. Finally, no significant differences were found for the performance of additional diagnostic tests such as radiography (50% vs 40, $P = .245$) or colonoscopy (28% vs 28%, $P = .994$). In addition, no differences were found between these two groups in the number of medical doctor visits for abdominal complaints.

Participants reporting constipation (n = 131; 86 not applicable) had comparable results concerning their monthly absence from work, regardless of whether pain was present or not (0 days: 91.8% vs 82.6%, 1 to 2 days: 6.5% vs 7.1%, 3 to 5 day: 4.3% vs 1.2%, more than 5 days: 6.5% vs 0%). No statistical analysis could not be applied to these numbers due to low numbers in certain groups.

4 | DISCUSSION

In the present study, we analyzed the results of a population-based Internet survey of the prevalence, the burden of overlapping bowel

TABLE 2 Employment status of participants in percentages (%)

	No symptoms	Constipated	Other bowel symptoms
Blue-collar worker	13.0	5.6	11.5
Employee	31.2	40.7	45.7
Unemployed	7.5	10.2	6.5
Houseman/-woman	6.8	8.3	6.1
Retired	30.8	13.4	16.0
White collar worker	1.0	0.5	1.2
Student	2.7	6.9	4.6
Other	6.8	14.4	8.5

Note: The relationship between these variables was as follows, X^2 (14, N = 1003) = 60.536, $P < .0001$.

TABLE 3 Educational status of participants in percentages (%)

	No symptoms	Constipated	Other bowel symptoms
Primary school	8.9	4.2	4.8
Lower secondary school	15.4	15.3	18.0
Higher secondary school	17.5	27.8	20.2
Lower technical school	5.5	2.8	5.5
Higher technical school	17.5	10.6	14.5
Higher education outside university	25.7	30.1	25.5
University education	9.6	9.3	11.5

Note: The relationship between these variables was as follows, X^2 (12, N = 1003) = 22.983, $P < .05$.

symptoms and impact of self-reported constipation in the Belgian general population. A total of 21.4% of participants reported constipation in the last 12 months. This number is in agreement with earlier published data on the prevalence of constipation.[10] Only diarrhea was reported as a more prevalent bowel symptom in this survey with a prevalence of 30.8%. In addition, in agreement with the general predominance of females who suffer from IBS and CC, the vast majority of subjects reporting constipation were female, which is in agreement with earlier reports.[11,12] The impact of constipation in terms of absence of work was limited, but there was an important associated medical cost, as more than 20% of the constipated subjects consulted a physician for these symptoms in the preceding year.

Constipation can or cannot be associated with pain. In the present study, close to 40%% of constipated subjects also reported abdominal pain, bringing them near to the IBS-C spectrum. In addition, these participants reported higher prevalence of other gastrointestinal symptoms such as diarrhea, alternating bowel movements, bloating, abdominal pain, gas production, altered stool frequency, and altered stool consistency. These results are comparable to study results published by Heidelbaugh et al[13] who reported increased frequency and bothersomeness of abdominal symptoms and bowel symptoms in patients with IBS-C compared to CC. Similarly, Shah et al[14] reported a post hoc evaluation of a nationwide survey, in which abdominal symptoms were more common and more severe in IBS-C compared with CC patients.

In addition, these results confirm that several other symptoms beside constipation can be prevalent in these patients even though these are not included in the diagnostic criteria. Previous work on the impact of abdominal pain on global measures in patients with chronic idiopathic constipation has shown that the presence of multiple abdominal symptoms positively correlates with ratings of constipation severity.[15] Similar results were observed in our study suggesting that the increased number of additional bowel symptoms could contribute to an increased symptom perception. The reporting of many other symptoms underlines again that disorders of brain-gut interaction can be part of a continuum and that overlap between these disorders is highly prevalent. The Rome criteria can be used as a guidance for diagnosis and are helpful in offsetting up clinical trials and in the development of treatments for these disorders. In clinical practice, however, many patients seem to suffer from a broader symptom burden and not all patients seem to fall within the specific diagnostic categories of single bowel disorders.

In the present study, constipated patients had comparable healthcare resource utilization and absence from work compared to patients with bowel symptoms without constipation, but the presence of abdominal pain was a major determinant of doctor visits. Earlier reports on health seeking for constipation in a population-based survey showed 16% of participants (95% CI: 13-20) had ever sought medical help.[16] In the present study, a higher number of medical doctor visits in the last 12 months and specialist visits were found in the PC compared to NPC. Earlier data confirmed that IBS-C respondents were more likely to seek physician care for gastrointestinal symptoms compared with those who were only constipated.[13] Further, these results are comparable to earlier results in IBS-patients, of which 73% (95% CI: 63-81) had sought medical care for abdominal pain or discomfort.[17] Talley et al[17] reported that increasing pain severity (odds ratio (OR) = 2.10, 95% CI: 1.11-3.95) and duration of pain (OR = 1.53, 95% CI: 1.10-2.13) were independently associated with healthcare-seeking behavior for IBS. The number of participants in our survey who experienced abdominal pain besides constipation, and who could therefore be considered close to the IBS-C spectrum could explain the higher number of doctor visits in this study. A subgroup of patients with constipation, more specifically those with normal-transit constipation have been reported to overlap considerably with IBS-C.[18] No specification of transit data was available for the current epidemiological study; however, normal-transit constipation is thought to make up the largest group of constipated patients.

There are some potential limitations to our findings. The data reported is pooled from a database that was generated from questionnaires send to the Belgian population to evaluate the prevalence and

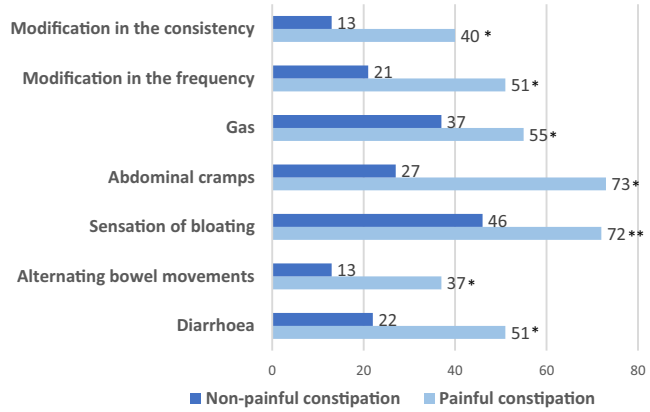

FIGURE 2 Bowel symptom experience in the last 12 mo in painful constipation (PC) and non-painful constipation (NPC). (n = 217). *P < .0001; **P < .01

impact of self-reported bowel symptoms, but with a focus on IBS, which may contribute to the impact of pain in this cohort. The use of an online questionnaire could have introduced a form of selection bias, eliminating participants who do not readily use the Internet, although the sample was well representative of the Belgian adult population. Participants were thereafter divided based on the presence of abdominal pain, as defined by the Rome criteria using abdominal pain as one of the main differentiators between IBS-C and CC. Further, a number of relevant features of constipation such as sensation of incomplete evacuation, anorectal obstruction, and the need for manual manoeuvers were not addressed in the questionnaire. Finally, participants were asked about their symptoms over the past 12 months, which could add a form of recall bias. In addition, no correction for multiple testing was applied as this was an exploratory investigation, in which we wanted to reduce the false-negative outcomes that could limit further research.

To summarize, we found that self-reported constipation is a prevalent condition in the general Belgian population and is associated with more bowel symptoms compared to those reporting no constipation. In addition, these reported more days with symptoms per week or month. In our analysis, higher prevalence's of abdominal pain, altered stool frequency, alternating bowel habits, and bloating were reported in the constipation subgroup. Further, those reporting constipation experienced symptoms more frequently, possibly explaining the higher number of unemployment, despite finishing high school, and higher education more often. Those with PC were less likely to point constipation as their most bothersome symptom, reflecting that asking a patient's most bothersome symptom in a clinical setting allows useful further classification. Finally, when abdominal pain is present, more major healthcare costs concerning medical doctor and specialist visits were generated.

ACKNOWLEDGMENTS

This work was supported by a Methusalem grant from Leuven University to Jan Tack and by a research grant from Menarini Belgium.

ORCID

Jasper Pannemans https://orcid.org/0000-0001-7313-020X
Karen Van den Houte https://orcid.org/0000-0003-4910-4639
Hubert Piessevaux https://orcid.org/0000-0003-1193-0601
Jan Tack https://orcid.org/0000-0002-3206-6704

REFERENCES

1. Lovell RM, Ford AC. Global prevalence of and risk factors for irritable bowel syndrome: a meta-analysis. *Clin Gastroenterol Hepatol*. 2012;10(7):712-721.e4.
2. Bharucha AE, Pemberton JH, Locke GR 3rd. American gastroenterological association technical review on constipation. *Gastroenterology*. 2013;144(1):218-238.
3. Koloski NA, Talley NJ, Boyce PM. Epidemiology and health care seeking in the functional GI disorders: a population-based study. *Am J Gastroenterol*. 2002;97(9):2290-2299.
4. Mearin F, Lacy BE, Chang L, et al. Bowel Disorders. *Gastroenterology*. 2016;150(6):1393-1407.
5. Wong RK, Palsson OS, Turner MJ, et al. Inability of the Rome III criteria to distinguish functional constipation from constipation-subtype irritable bowel syndrome. *Am J Gastroenterol*. 2010;105(10):2228-2234.
6. Spiegel BM, Farid M, Esrailian E, Talley J, Chang L. Is irritable bowel syndrome a diagnosis of exclusion? A survey of primary care providers, gastroenterologists, and IBS experts. *Am J Gastroenterol*. 2010;105(4):848-858.
7. Sperber AD, Dumitrascu D, Fukudo S, et al. The global prevalence of IBS in adults remains elusive due to the heterogeneity of studies: a Rome Foundation working team literature review. *Gut*. 2017;66(6):1075-1082.
8. Hungin AP, Whorwell PJ, Tack J, Mearin F. The prevalence, patterns and impact of irritable bowel syndrome: an international survey of 40,000 subjects. *Aliment Pharmacol Ther*. 2003;17(5):643-650.
9. Van den Houte K, Carbone F, Pannemans J, et al. Prevalence and impact of self-reported irritable bowel symptoms in the general population. *United European Gastroenterol J*. 2019;7(2):307-315.
10. Higgins PD, Johanson JF. Epidemiology of constipation in North America: a systematic review. *Am J Gastroenterol*. 2004;99(4):750-759.
11. Klem F, Wadhwa A, Prokop LJ, et al. Prevalence, risk factors, and outcomes of irritable bowel syndrome after infectious enteritis: a systematic review and meta-analysis. *Gastroenterology*. 2017;152(5):1042-54.e1.
12. Suares NC, Ford AC. Prevalence of, and risk factors for, chronic idiopathic constipation in the community: systematic review and meta-analysis. *Am J Gastroenterol*. 2011;106(9):1582-1591; quiz 1, 92.
13. Heidelbaugh JJ, Stelwagon M, Miller SA, Shea EP, Chey WD. The Spectrum of constipation predominant irritable bowel syndrome and chronic idiopathic constipation: US survey assessing symptoms, care seeking, and disease burden. *Am J Gastroenterol*. 2015;110:580.
14. Shah ED, Almario CV, Spiegel BMR, Chey WD. Lower and upper gastrointestinal symptoms differ between individuals with irritable bowel syndrome with constipation or chronic idiopathic constipation. *J Neurogastroenterol Motil*. 2018;24(2):299-306.
15. Chang L, Lembo AJ, Lavins BJ, et al. The impact of abdominal pain on global measures in patients with chronic idiopathic constipation, before and after treatment with linaclotide: a pooled analysis of two randomised, double-blind, placebo-controlled, phase 3 trials. *Aliment Pharmacol Ther*. 2014;40(11-12):1302-1312.
16. Galvez C, Garrigues V, Ortiz V, Ponce M, Nos P, Ponce J. Healthcare seeking for constipation: a population-based survey in the Mediterranean area of Spain. *Aliment Pharmacol Ther*. 2006;24(2):421-428.

17. Talley NJ, Boyce PM, Jones M. Predictors of health care seeking for irritable bowel syndrome: a population based study. *Gut*. 1997;41(3):394-398.
18. Camilleri M, Ford AC, Mawe GM, et al. Chronic constipation. *Nat Rev Dis Primers*. 2017;3(1):17095.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

How to cite this article: Pannemans J, Van den Houte K, Fischler B, Piessevaux H, Carbone F, Tack J. Prevalence and impact of self-reported painful and non-painful constipation in the general population. *Neurogastroenterol Motil*. 2020;00:e13783. https://doi.org/10.1111/nmo.13783