

Tough men, healthy guts: A cross-sectional survey on the role of masculinity in the Curaçao colorectal cancer (CRC) screening program

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Abstract: Objectives: In Curaçao, men participate half as often as women in colorectal cancer (CRC) screening. Conformity to masculine norms may influence participation. This study aimed to assess the level of conformity to masculine norms and the intention to participate in CRC screening among men in Curaçao. We also assessed the association between the two.

Methods: Questionnaires were collected from men (50–75 years) in Curaçao, through personal distribution and snowball sampling. The Conformity to Masculine Norms Inventory-30 (CMNI-30) was used. CRC screening participation, attitudes towards CRC, cancer worry, self-rated health and CRC risk perception were also measured using validated instruments. Regression analysis determined association between CMNI-30 and intention, while ANOVA measured differences in CMNI-30 means.

Results: Of 109 men, 83% reported a positive screening intention. Conformity to masculine norms was moderate, mean CMNI-30 was 75.2 ± 11.3 (30–150). CMNI-30 score was not significantly associated with screening intention (OR: 0.98, 95% CI: 0.94–1.02; $P = 0.47$). Scoring higher on the CMNI-30 playboy subscale (OR: 0.73, 95% CI: 0.54–0.99; $P = 0.04$) was associated with negative CRC screening intention. Overall, 89% of the men had a positive attitude towards CRC screening, cancer worry was high for 68%, 75% rated their health as "good" and risk perception was low for 88%. CMNI-30 mean was significantly lower for men who participated in CRC screening ($P = 0.04$) and significantly higher for those with high cancer worry ($P = 0.002$).

Conclusions: The men in this study showed moderate conformity to masculine norms, high CRC screening intention and no association between the two. The CMNI-30 mean was significantly lower for those who participated in CRC screening and higher for high cancer worry.

Keywords: Attitude ■ Cancer worry ■ Colorectal cancer ■ Masculinity ■ Risk perception ■ Screening intention ■ CRC screening participation ■ Self-rated health

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INTRODUCTION

With nearly 2 million new cases and 1 million deaths worldwide in 2020, colorectal cancer (CRC) carries a significant global health burden.¹ CRC screening aims to detect CRC and its precursors at an earlier stage, thereby reducing CRC morbidity and mortality.^{2–5}

CRC screening participation varies based on population attributes.² There are differences in CRC screening uptake between the sexes, with men less likely to participate than women.^{5–8} CRC incidence and CRC-related mortality are higher in men.^{2,4,5} Furthermore, men tend to be diagnosed with CRC at a younger age.^{2,6–8} Sex-based differences in participation have also been observed in the CRC screening program on the Caribbean Island, Curaçao. During the first three years of the program (2020–2023), men participated half as often as women.⁹

A possible explanation for this difference in CRC screening participation between men and women is masculinity. The normative gender ideology prescribed to human males and referred to as "masculinity" can be defined as "the social roles, behaviors, and meanings prescribed for men in any society at any time".^{10,11} Much like many places in the world, hegemonic masculinity is common in the Caribbean.¹² Simplified, the concept was developed to identify attitudes and practices among men that promote and uphold a patriarchal society.¹³ The available literature suggests that Caribbean men perpetuate this norm by dis-

playing physical strength through aggression, sexual dominance through promiscuity and a proclivity for violence and risk-taking for example.¹⁴

Masculinity may inform how men view CRC screening and may influence their screening behavior.¹⁵ For example, higher conformity to traditional masculine norms contribute to negative attitudes towards screening. Negative attitudes are associated with a lower likelihood of completing screening.¹⁶ In interviews we conducted with the Curaçao CRC screening target population, respondents stated that local men were less likely to participate in CRC screening.¹⁷ One explanation provided was the fear of being diagnosed with cancer. Cancer fear and worry are deterrents to engagement in preventive health services.¹⁶ Additionally, men sometimes perceive themselves as strong. This perceived strength can influence how they view and rate their own health.¹⁵ Consequently, the feeling of being in good health may also lower the perceived risk of being diagnosed with CRC at some point in their life. This lack of risk perception is negatively associated with screening participation.¹⁸

With the possible influence of masculinity on CRC screening in mind, the aim of the current study was to assess the level of conformity to masculine norms and the intention to participate in CRC screening among men in Curaçao. The association between conformity to masculine norms and screening intention was analyzed. The level of masculinity based on CRC screening participation, attitudes towards CRC screening, cancer worry, self-rated health and CRC risk perception were also investigated.

MATERIALS AND METHODS

In the Curaçao CRC screening program, men and women between 50 and 75 years are invited by postal mail to complete a fecal immunochemical test (FIT). Participants with a positive FIT are then invited to undergo a colonoscopy. Those with a negative FIT are reinvited after 2 years.¹⁹

This cross-sectional survey study was conducted between September and December 2023. Those who could not communicate in English, Papiamentu, Dutch or Spanish (frequently spoken on Curaçao) or complete the questionnaire (even with help), were excluded from participation. We distributed questionnaires amongst CRC screening aged men and women. The 30-item version of Conformity to masculine norms inventory (CMNI-30) was the last page of the questionnaire and only for men.²⁰ The current study includes male respondents who completed the CMNI-30. See supplementary file 1 for questionnaire distribution and completion details.

The questionnaire was developed by the research team using validated instruments. The questionnaire was devel-

oped in English and translated into Papiamentu before distribution. Nine volunteers from the target population were asked to complete the Papiamentu version, to ensure that the meaning of the questions was not lost in translation. Interviews were held with the volunteers once they had completed the questionnaire. No major changes emerged from the analysis.

Questionnaires were collected in person, at the public affairs office, the Caribbean Prevention Center- Fundashon Prevenshon (CPC-FP) main office, laboratories and local businesses. Snowball sampling supplemented this personal distribution. The questionnaires were available in Papiamentu and in English, on paper and digitally (iPad). Respondents had the option to complete the questionnaire independently and assistance was provided by the research team upon request. The assistance was limited to reading aloud and providing clarification of questions or scales. The purpose of the study and the implications of participation were explained verbally to each respondent. Furthermore, all participants were offered an information letter. The questionnaire and information letter can be found in Supplementary file 2.

We selected the CMNI, which reflects hegemonic masculinity. We used the CMNI-30, a shortened and validated version of the original inventory.^{20,21} There were 10 subscales (3 items each): emotional control, winning, playboy, violence, disdain for homosexuality, pursuit of status, primacy of work, power over women, self-reliance and risk-taking. All 30 items were scored on a 5-point Likert scale that ranged from: “strongly agree” to “strongly disagree” (sometimes mirrored). A higher score indicated greater conformity to masculine norms. Cronbach’s alpha was 0.77 in our study, indicating good internal consistency.

Intention to participate in CRC screening was assessed through one self-developed question: ‘Do you intend to participate (again) in the bowel cancer screening program?’. The answer options were for a positive screening intention were: “definitely, yes” and “most probably, yes”. While “probably not” and “definitely not” indicated a negative screening intention.

Attitude towards CRC screening was measured with 4 items on a 7-point Likert scale.²² The items were “beneficial-harmful”, “important-unimportant”, “bad thing-good thing” and “pleasant-unpleasant” (score range 4–28). A score of ≤ 16 indicated a “negative attitude” and a score of ≥ 17 indicated a “positive attitude”.

Respondents were asked to rate their own health on a 6-point Likert scale that ranged from “very bad” to “very good”.^{23–25} Scores of ≤ 4 indicated “fair to bad” self-rated health and $5 \geq$ indicated “good” self-rated health. Only two individuals rated their health as “bad”, therefore we grouped them with those who rated their health as “fair”.

Cancer worry was assessed with 3 items on a 5-point Likert scale, that ranged from “strongly disagree” to “strongly agree”. The questions were: “Of all the diseases there are I am most afraid of cancer”, “I worry about a lot about cancer” and “It makes me uncomfortable to think about cancer”.²⁶ The scores of each question was summarized to form the total score (range 3–15). Scores of ≤ 9 indicated low cancer worry and ≥ 10 indicated high cancer worry.

Risk perception was assessed with 2 items. The questions were: “What do you think your chances are of getting bowel cancer at some point in your life?” and “What do you think your chances are of getting bowel cancer at some point in your life in comparison to others?”.²⁷ Both questions were on a Likert scale (1–5). The scores of both questions were summarized to form a total score (range 2–10). Scores of ≤ 6 indicated low risk perception and scores of ≥ 7 indicated high risk perception.

The background variables: age, country of birth, marital status, education level and employment status, invitation status and CRC screening participation were also registered. Statistical analysis was performed using R statistical software (2025.09.1 + 401). See supplementary file 3 for packages. Descriptive statistics were performed. ANOVA assessed the mean differences in CMNI-30 scores for background variables, attitudes towards CRC, cancer worry, self-rated health and CRC risk perception (P -value < 0.05). Logistic regression was used to determine the association between screening intention and CMNI-30 total score and subscales. The odds ratio and P -value (< 0.05) were reported. The proportion of missing variables across scales was $< 1\%$. Therefore, we conducted complete case analysis.

RESULTS

In total, 109 men completed the CMNI-30. Table 1 shows the background variables of the study population. The mean age was 60.7 ± 6.2 years and 87% of the men were born in Caribbean or Latin America. The education level was predominantly intermediate (52%) to high (42%). In addition, 76% the men were married or partnered and 69% were employed. One-third of the men answered “yes” to having participated in CRC screening. A positive CRC screening intention was reported by 83% of respondents and 89% reported a positive attitude towards CRC screening. Cancer worry was high for 68% of the men, 75% rated their health as “good” and 88% reported low CRC risk perception.

The mean CMNI-30 score for all 109 respondents was 75.2 ± 11.3 (30–150), indicating moderate conformity to masculine norms (Table 1). Overall, the high-

est mean CMNI-30 scores were observed in single men (80.5 ± 10.8), men with a low education level (84.7 ± 7.3) and men who were unemployed or disabled (84.6 ± 9.1).

Mean CMNI-30 scores and intention

The CMNI-30 mean was significantly lower for men who participated (72.1 ± 10.6) compared to men who did not (76.8 ± 11.4 , $P = 0.04$). For men with a positive screening intention, the mean CMNI-30 score was 74.9 ± 10.1 . Although slightly higher for those with a negative intention (76.9 ± 16.1), the difference in mean CMNI-30 score between these two groups was not statistically significant ($P = 0.47$). In addition, the univariable logistic regression showed no association between CMNI-30 total score and screening intention. The odds ratio was 0.98 (95% CI: 0.94–1.02; $P = 0.47$). Table 2. The mean CMNI-30 score was significantly higher for men who had high cancer worry ($P = 0.002$), Table 1.

CMNI-30 subscales

In the univariable model for the analysis of the CMNI-30 subscales and CRC screening intention, the “playboy” subscale showed a significant association with CRC screening intention. Table 2. The odds ratio was 0.73 (95% CI: 0.54–0.99; $P = 0.04$), indicating a lower odds of intending to screen for men who scored higher on the “playboy” subscale. In the multivariable model the “playboy” subscale retained statistical significance. Additionally increasing “heterosexual self-presentation” score showed a significant association with positive CRC screening intention, OR 1.35 (95% CI 0.35–0.88, $P = 0.01$) in the multivariable model.

DISCUSSION AND CONCLUSION

Discussion

Amongst 109 men of CRC screening age in Curaçao, there was moderate conformity to masculine norms. Screening intention was high and not associated to conformity to masculine norms. Respondents were also positive towards CRC screening and their own health. Mean CMNI-30 score was significantly lower for men who previously participated in CRC screening, while significantly higher for men with high levels of cancer worry.

We found moderate conformity to masculine norms. The existent image of the Caribbean man perpetuating hegemonic masculinity can be better put into perspective when considering the cultural and historical context.¹² Masculinity in the Caribbean cannot be discussed without weighing the influence of slavery and indentured servitude.²⁸ Colonial societies were built on a racial hierarchy.

Table 1. Background information, attitudes towards CRC, cancer worry, self-rated health and CRC risk perception with mean CMNI-30 scores with standard deviations (SD) and P-values (ANOVA).

	n (%)	CMNI-30 mean and SD (range 30–150)	P-value (ANOVA)
Total men	109	75.2 (11.3)	
Age, Mean (SD)	60.7 (6.2)	-	
Place of birth			0.60
Caribbean or South America	95 (87)	75.6 (11.2)	
Other	13 (12)	73.7 (12.1)	
Missing	1 (1)		
Marital status			0.10
Married or partnered	83 (76)	74.0 (11.5)	
Single	16 (15)	80.5 (10.8)	
Widowed or divorced	10 (9)	76.6 (8.4)	
Education level			0.009
High	46 (42)	72.0 (10.7)	
Moderate	57 (52)	76.9 (11.4)	
Low	6 (6)	84.7 (7.3)	
Employment status			0.05
Employed	75 (69)	75.3 (11.8)	
Retired	27 (25)	72.7 (9.1)	
Unemployed or disabled	7 (6)	84.6 (9.1)	
Invitation received			0.19
Yes	43 (39)	76.9 (11.2)	
No or unsure	65 (60)	73.9 (11.3)	
Missing	1 (1)	-	
Participated in CRC screening			0.04
Yes	36 (33)	72.1 (10.6)	
No or unsure	73 (67)	76.8 (11.4)	
CRC screening intention			0.47
Positive intention	90 (83)	74.9 (10.1)	
Negative intention	19 (17)	76.9 (16.1)	
Attitude (4–28)			0.71
Mean (SD)	22.1 (4.3)	-	
Negative (≤ 16)	9 (8)	73.9 (15.6)	
Positive (≥ 17)	97 (89)	75.4 (11.0)	
Missing	3 (3)	-	
Cancer worry (3–15)			0.002
Mean (SD)	10.9 (2.5)	-	
Low (≤ 9)	34 (31)	70.2 (11.9)	
High (≥ 10)	74 (68)	77.4 (10.4)	
Missing	1 (1)	-	

(continued on next page)

Table 1 (continued)

	n (%)	CMNI-30 mean and SD (range 30–150)	P-value (ANOVA)
Self-rated health (1–6)			0.83
Mean (SD)	5.0 (0.8)	-	
Fair or bad (≤ 4)	24 (22)	75.8 (9.6)	
Good (≥ 5)	82 (75)	75.2 (11.7)	
Missing	3 (3)	-	
Risk perception (2–10)			0.10
Mean (SD)	5.2 (1.4)	-	
Low (≤ 6)	96 (88)	75.9 (11.4)	
High (≥ 7)	13 (12)	70.4 (9.3)	

Table 2. Association between CMNI-30 subscale scores (scale: 3–15) and CRC screening intention. Univariable and multivariable logistic regression. Positive intention is coded as “1” and negative intention is coded as “0”.

	Odds ratio	Univariable		Odds ratio	Multivariable	
		95% CI	P-value		95% CI	P-value
CMNI-30 total	0.98	0.94–1.03	0.47	-		
CMNI-30 sub-scales						
1. Emotional control	0.88	0.71–1.08	0.22	0.89	0.67–1.21	0.49
2. Winning	1.03	0.84–1.27	0.77	1.05	0.78–1.41	0.74
3. Playboy	0.73	0.54–0.99	0.04	0.66	0.35–0.88	0.01
4. Violence	0.90	0.73–1.11	0.32	0.80	0.57–1.13	0.20
5. Heterosexual self-presentation	1.12	0.95–1.32	0.18	1.35	1.04–1.75	0.02
6. Pursuit of status	1.0	0.82–1.24	0.97	1.18	0.85–1.65	0.33
7. Primacy of work	0.97	0.82–1.14	0.74	0.94	0.75–1.18	0.62
8. Power over women	0.85	0.65–1.10	0.21	0.80	0.53–1.21	0.30
9. Self-reliance	0.94	0.73–1.20	0.60	1.04	0.71–1.54	0.83
10. Risk-taking	1.03	0.83–1.28	0.80	1.20	0.89–1.62	0.23

This inability to display masculinity through power and status, likely fueled masculine displays in other areas, such as physical strength and sexual dominance.²⁸ However, we were unable to give credence to this image. A possible explanation for the moderate conformity to masculine norms is that mean age of our study population, 60.7 years. It is possible that younger men may display higher conformity to masculine norms.²⁹

Most of the men reported both a positive intention and attitude towards CRC screening. The positive attitude is likely fueled by the focus that individuals tend to place on the benefits of screening, such as peace of mind and early detection.^{30–32} In an Italian study focusing on psychosocial predictors for CRC screening intention, a correlation between positive attitudes and higher screening intention was found.³³ The contrary has also been reported, where neg-

ative attitudes have been associated with decreased odds of completing CRC screening.¹⁵ This supports our results reflecting both positive attitudes and screening intention. At the time of the survey, 33 % of our respondents participated in CRC screening, which is similar to the actual program participation (~30 %).⁹ Our findings reflecting a discrepancy between intention and screening participation is known in the literature as the “intention-behavior gap”.³⁴ Intention to participate in CRC screening, does not necessarily directly translate to actual participation.^{35,36} In our previous qualitative study, interviewees had a positive perception of CRC screening but indicated that they did not know what steps to take to complete CRC screening.¹⁷ This lack of practical knowledge may play a role in the intention-behavior gap. The gap may be narrowed by providing clearer instructions on program logistics, such as FIT pick-up location and completion. We also observed a lower probability of intending to screen for men who scored higher on the “playboy” subscale. The playboy subscale assesses adherence to the idea that it is desirable for a man to have multiple sexual partners.^{20,21} This could be viewed as risk-taking behavior. In the current context it could be interpreted as the men seeing no need to be overly cautious by screening for CRC. However, there is also a CMNI-30 risk-taking subscale, which shows no statistical significance in our study population.

We did not find an association between overall conformity to masculine norms and screening intention. However, we did observe that men who previously participated in the Curaçao CRC screening program had a significantly lower CMNI-30 score. This aligns with the findings of a survey-based study looking at the influence of masculinity barriers on CRC screening completion.¹⁵ They found that higher endorsement of masculine norms is related to avoiding preventive health services, like CRC screening.¹⁵ Another study looking at masculine barriers to care and CRC screening intention among an ethnically varied group of men found that although black men displayed higher masculinity barriers to care in comparison to white men, there was no association with screening intention.³⁷ The lack of association between intention and masculinity maybe attributed to the relatively low CMNI-30 scores. Therefore, it seems reasonable in this context that it is not a mediating factor in the process of CRC screening decision-making in our population. Other factors, such as fear of a cancer diagnosis, which was a major theme in our qualitative study may play a larger role in the decision whether to participate in screening.¹⁷

The mean CMNI-30 score was significantly higher for men who had high levels of cancer worry. Two thirds (68 %) of the men reported high cancer worry in our study. An English survey with 2878 screening eligible men and

women concluded that more frequent cancer worry was associated with increased intention to participate in CRC screening.³⁸ A 2008 analysis of the HINTS survey results compared risk perception and cancer worry between men and women and concluded that men showed higher perceived risk for developing cancer compared to women.³⁹ This is remarkable, considering 88 % of our male respondents reported low risk perception. An alternative explanation for the low risk perception detected in our study, may be that the men viewed their own health as “good”. The idea of being in good health, may reduce the estimation of getting cancer at some point. Perceived health can be related to physical strength. An element related to masculinity is the self-perception of “being strong”.⁴⁰ In our qualitative study, it was suggested that the men were less likely to participate in CRC screening because they did not want to receive a cancer diagnosis. They considered themselves to be strong and a potential illness was viewed as weakness.¹⁷ This finding supports the presence of cancer worry, despite their reported good health.

Among the strengths of our study is the recruitment of 109 Caribbean men to complete the CMNI-30 questionnaire. To our knowledge, this is the first study using the CMNI-30 questionnaire amongst Caribbean men.

To fully appreciate our findings, some limitations also need to be addressed. The first being that because the CMNI-30 has not previously been used in a population of the Caribbean men, our findings cannot be compared to similar studies. The relatively lower levels of masculinity could also reflect response and selection biases. It is possible that the men who responded, sometimes with the help of a female researcher, gave socially acceptable answers. Due to the nature of the questions about sexuality and the perception of women, it is possible that responses to the questionnaire were not always truthful. Furthermore, the men who decided to complete the questionnaire may have a different level of conformity to masculine norms compared to those who decided against completing the questionnaire. We must also mention that only 19 men reported a negative screening intention. Due to the small size of this group, it is possible that statistic significance was not determined by our analyses meanwhile it was present. There was also no timeline attached to the question assessing screening intention, which may have inflated the number of men with a positive intention. Last, it possible that due to the method of recruitment, we introduced a bias towards intermediate and high education background. In the subset of men who participated in our study, only 6 % had a low education level. However, according to the Curaçao Central Bureau of Statistics (CBS), the education level is low in approximate 38 % of the working population age 55 or older (Education | Central Bureau of Statistics Cu-

ração, 2020). The difference between the current results and those of the CBS is less pronounced for the high education level. In the current study, 46 % of the men had a high education level, whereas this was approximately 34 % in the working population in the age category.⁴¹

Conclusions

Most of the men in our study were positive about CRC screening and intended to participate. However, our findings suggest that masculinity may not play a prominent role in CRC screening behavior in Curaçao.

Practice implications

To better understand the adherence to masculine norms in Curaçao it may be informative to distribute the CMNI-30 questionnaire in a larger sample of more diverse men. Considering we found no significant difference in CMNI-30 mean for CRC screening intention, attitude towards CRC, self-rated health or CRC risk perception, it may be wise to investigate other potential factors related to decision-making in CRC screening amongst men.

ETHICAL STATEMENT

This study was performed in accordance with the Declaration of Helsinki. The study protocol was submitted to the medical ethics committee of the CPC-FP. Seeing as this was a questionnaire study where participants were not subjected to procedures or required to follow behavioral rules, a waiver was granted by the committee. An information letter and explanation of the study goals and what participation entailed were given to all participants. When necessary, the letter was read out loud. The letter explicitly states that questionnaire completion was equal to informed consent.

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AUTHOR CONTRIBUTION

Shacara N. Blake contributed to conceptualization, data curation, formal analysis, investigation, methodology, project administration, resources, software, validation, visualization and wrote the original draft. Manon van der Vlugt contributed to conceptualization, methodology, validation, supervision and reviewed and edited the manuscript. Evelien Dekker contributed to conceptualization, methodology, supervision and reviewed and edited

the manuscript. Jacqueline G. Hugtenburg contributed to conceptualization, methodology, supervision and reviewed and edited the manuscript. Mirjam P. Fransen contributed to conceptualization, methodology, validation, supervision and reviewed and edited the manuscript.

SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.jnma.2026.01.011](https://doi.org/10.1016/j.jnma.2026.01.011).

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