Personality and Utilization of Prostate Cancer Testing: Evidence for the Influence of Neuroticism and Conscientiousness

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Abstract

The present study represents the first instance in which participants' personalities have been systematically measured in relation with prostate cancer (PCa) screening behavior. Cross-sectional data were collected between 2010 and 2011 in Estonia. Subjects were 371 men, 62 of whom were first-time patients of andrology clinic, and 309 were men of probability sample. Neuroticism had a significant inverse association with past, present, and future attendance. In contrary, conscientiousness had a significant positive association with PCa testing attendance in the past and present, and intention to attend PCa testing in the future. In conclusion, as PCa screening is no longer recommended by specialists, it becomes more important to offer personality-based counseling for age-eligible men.

Introduction

Prostate cancer (PCa) is the most frequently diagnosed cancer with prevalence 3.924 per 100,000 persons and the sixth leading cause of cancer death among men worldwide with 0.307 deaths per 100,000 persons in 2012 (Ferlay, 2013). Over the past two decades, PCa incidence has been increasing rapidly. These increasing rates are influenced by early diagnosis via prostate specific antigen (PSA) screening among both symptomatic and asymptomatic men, as well as by the detection of latent cancer in prostate surgery. There are few population-based organized programs for PCa in Europe (in contrast to cervical and breast cancer), while opportunistic testing (case-finding) among men with or without urological symptoms is rather common (Bray, Lortet-Tieulent, Ferlay, Forman, & Auvinen, 2010). Some researchers have claimed that the shift to earlier-stage diagnosis is evidence of the effectiveness of screening (Vickers, Roobol, & Lilja, 2012). Others argue that diagnosing PCa early may not necessarily lead to fewer deaths or that PSA may simply be detecting more indolent cancers (Harris & Lohr, 2002; Woolf & Rothemich, 1999), which has led to some controversy over the unproven benefits of PCa screening (Barry, 2009). Recently, the U.S. Preventive Services Task Force (USPSTF) concluded that PCa screening has no net benefit and the potential harms may not outweigh the benefits (Chou et al., 2011). However, the "no-screening" policy may be a bad investment at the societal level because only persons with certain personality dispositions may have the will to seek help from a physician, and others may not. Thus, it may cost more in terms of treating advanced diseases and missing a significant number of cancer cases. As PCa screening is no longer recommended, there may be an increased need for interventions that, through involvement, increase men's participation in office-based initial screenings (Bowen, Hannon, Harris, & Martin, 2011). Men are not a homogeneous group, and it is important to consider the influence that these several factors, especially dispositional factors (including personality), have on health service use. Knowing the personality characteristics of a man may facilitate active participation of both clinician and patient in the decision-making process. We have chosen to focus here on personality dispositions and their association with utilization of PCa screening.

The recent decades of personality research have suggested that the five-factor model of personality ("Big Five," for example, Goldberg, 1990) is a valid way of describing many salient aspects of an individual's personality. The dimensions that make up the Big Five are Neuroticism (N), Extraversion

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(E), Openness to Experience (O), Conscientiousness (C), and Agreeableness (A) (Mccrae & Costa, 1987). To summarize the content of these dimensions briefly, the following mnemonic is suggested by John and Srivastava (1999): E—Extraversion, Energy, Enthusiasm; A—Agreeableness, Altruism, Affection; C—Conscientiousness, Control, Constraint; N—Neuroticism, Negative Affectivity, Nervousness; and O—Openness, Originality, Open-mindedness. N is a personality trait that represents individual differences in the tendency to experience distress, nervous tension, depression, frustration, guilt, and self-consciousness. These experiences are often associated with irrational thinking, poor control of impulses and cravings, somatic complaints, and ineffective coping (Mccrae & Costa, 1987; McCrae & John, 1992). N has been found to be positively correlated to cancer mortality (Nakaya et al., 2006b) and inversely related to attending breast cancer screening (Siegler, Feaganes, & Rimer, 1995) and gastric cancer screening (Arai et al., 2009). Verhaak et al. (2009) also found that mental health patients who received treatment scored higher on N than patients who did not. It is argued that the link between N (which is a risk factor for depression) and cancer survival could be explained by potential intermediaries such as endocrinological or immunological pathways, or compliance with cancer treatment and even suicide (Kiecolt-Glaser & Glaser, 1999; Nakaya et al., 2006a). It is also possible that basic personality traits are associated with an unhealthy lifestyle, which is considered an important risk factor for the development of cancer (Dahl, 2010). E, a trait defined by sociability and positive emotionality (Costa & Mccrae, 1992), has been positively correlated with attending breast cancer screening (Chaitchik & Kreitler, 1991), adherence to gastric cancer screening (Arai et al., 2009), and negatively correlated to perceived screening barriers in cervical cancer (Hill & Gick, 2011). O—a personality factor characterized by traits such as high imagination, creativity, and curiosity, as well as intellectual interests, aesthetic sensitivity, unconventional values, and a preference for variety (McCrae & Costa, 2003; McCrae & John, 1992)—has been found to be inversely related to perceived screening barriers in cervical cancer (Hill & Gick, 2011). C is a trait defined by competence, dutifulness, a strong work ethic, self-discipline and being neat, well organized, diligent, and achievement oriented (McCrae & Costa, 2003). Various health behaviors such as adherence to dialysis medical regimens (Christensen & Smith, 1995), healthy eating, and exercise (Bogg & Roberts, 2004) have been found to be associated with C. Furthermore, C is linked to physical and mental well-being (Goodwin & Friedman, 2006), and longevity (Kern & Friedman, 2008; Martin, Friedman, & Schwartz, 2007), and has also been found to be inversely related to screening barriers in cervical cancer (Hill & Gick, 2011). A has been found to be related to preventive health behaviors (Ingledew & Brunning, 1999).

There are no studies about the link between personality and utilization of PCa screening. Personality is a significant predictor in describing behavior, and thus, it is important to test relations between personality and PCa screening behavior. As every behavior assumes making some decisions, which a person makes according to his values and preferences, personality might have an influence on screening decisions. As the USPSTF recommends against systematic PSA-based screening for PCa, it is important to offer office-based initial screening to those age-eligible men whose personal characteristics do not support participation. The present study represents the first instance in which participants' personalities have been systematically measured in relation with PCa screening behavior. In a cross-sectional study, we investigate the relation of self-reported past and future behavior of patients and non-patients. Moreover, we test the hypothesis that these associations exist independently of symptom severity or/and education. We hypothesized a negative correlation between N and PCa testing, as previous studies have found a similar link between neuroticism and gastric cancer screening (Arai et al., 2009) and breast cancer screening (Siegler et al., 1995). Also, men have mentioned negative emotions such as fear and embarrassment as barriers to PCa testing—high N people are more prone to experience these emotions. We hypothesized that E would be positively associated with PCa testing based on the past research previously mentioned that indicates a relationship between E and gastric cancer screening (Arai et al., 2009), cervical cancer screening (Hill & Gick, 2011), and breast cancer screening (Chaitchik & Kreitler, 1991). Also, positive expectations and belief in personal benefit, which were mentioned by men as motives to attend PCa testing, might be related to E. Based on the characteristics associated with C—self-discipline, dutifulness, and competence—and the previously noted past research linking C with positive health behaviors (Bogg & Roberts, 2004; Christensen & Smith, 1995) and cervical cancer screening (Hill & Gick, 2011), we hypothesized that C would be positively associated with prostate screening. O has a positive association with substance use (Booth-Kewley & Vickers, 1994) and therefore a negative link with healthy behavior; nevertheless, some researchers have found an association between openness and cervical cancer screening (e.g., Hill & Gick, 2011). Thus, we hypothesized that O has no statistically significant association with attending prostate screening. Finally, we hypothesized that there would be a positive correlation between A and PCa testing attendance, as agreeable people tend to comply, and men often go to the doctor because their spouse or doctor recommends it (Cohen & Britten, 2003; Robertson, 2009).

Method

Participants

The study protocol was approved by the Ethics Review Committee (ERC) on Human Research of the University of Tartu. Cross-sectional data were collected between 2010 and

Table 1. Correlation Between Personality and Prostate Cancer Testing (*N* = 370).

Variable	Past participation	Present behavior	Future intention
Present behavior	.01		
Future intention	.06	.17*	
Neuroticism	−.13*	−.34**	.32**
Extraversion	.15**	.17**	−.19**
Openness	.07	.07	.02
Agreeableness	−.08	.15**	.03
Conscientiousness	.17**	.24**	.09

*p < .05. **p < .001.

2011. The total sample consisted of 371 men, all Caucasian and native speakers. To measure subjects' current status, the 62 first-time patients at the andrology unit of Tartu University Clinic, who already participated in PCa testing, were involved to research. General inclusion criterion for the study was age—we investigated men between the ages of 45 and 75. The patient group consisted of those who had pelvic/perineal pain without evidence of infection, lasting longer than 3 months, as the key symptom. None of them had received antimicrobial therapy within 3 months. Exclusion criteria were stated according to the suggestions of the National Institutes of Health (NIH) workshop in Bethesda (NIH, 1995). Each participant was recruited individually—The questionnaires were given to the subjects during face-to-face interviews, which also included an informational letter. The patients received their questionnaires from their clinician and men of probability sample during the interviews related to men's health project. The subjects were requested to complete the tests alone and in a standard order. They were asked to return the questionnaires as soon as possible in closed envelopes. The participants signed a written informed consent form, and confidentiality was assured. A total of 600 questionnaires were handed out, 80 to the patients (response rate was 77.5%) and 520 to the general population sample (response rate of 59.4%). The mean age of the participants was 61.17 years (*SD* = 6.11; range 49-74 years), years of education (*M*, range) 11.9 and 3-21, with approximately the same age and other characteristics in both the patient and non-patient samples. Among the participants, 20% (*n* = 75) had utilized PCa testing, 17% (*n* = 62) were currently attending PCa testing, and 20% (*n* = 74) had the intention to utilize PCa testing in the future.

Measures

To measure past behavior, the participants were asked, "Have you ever participated in PCa testing in your life?" (*yes/no*). They were also asked about their intention to utilize PCa testing in the future (from 1 = *certainly will not participate* to 5 = *certainly will participate*). These responses were then recoded from "4"-"5" to "1" (will participate) and from "1"-"3" to "0" (background) groups. Subjects' current status

(whether they were patients at the andrology clinic and participating in PCa testing or not) was treated as a variable measuring the present behavior (participating in prostate testing or not). Thus, a differentiation between retrospective behavior, actual behavior, and future behavioral intentions was made. Personality traits were assessed with the short version of the International Personality Item Pool (IPIP-S; Estonian version; Mõttus, Pullmann, & Allik, 2006), which is a short form of the NEO Personality Inventory including 60 items, each of which is rated on a 5-point scale ranging from *strongly disagree* to *strongly agree*. The IPIP-S has demonstrated good internal consistency and test–retest reliability, and has been validated against other personality inventories (Mõttus et al., 2006). To control the effect of symptom severity on personal values–screening utilization interaction, symptoms of chronic prostatitis/chronic pelvic pain syndrome (CP/CPPS) were measured with the National Institute of Health Chronic Prostatitis Symptoms Index (NIH-CPSI; Litwin et al., 1999), Estonian version (Korrovits, Punab, Mehik, & Mandar, 2006). The NIH-CPSI has a total score range of 0 to 43.

Data Analysis

Prior to conducting the main analyses, the data were tested for normality of the variables, and personality traits were close to normal distribution. Spearman's correlations were conducted to assess the relationship between Big Five personality traits and attending PCa testing in the past and present. A 2 × 2 × 5 MANOVA was conducted to evaluate the differences in personality traits between groups (past, present, and a combination of the two). Binary logistic regression was conducted to assess the influence of Big Five personality traits on the probability of intention to utilize prostate testing in the future.

Results

First, we wanted to know how personality factors are related to attending PCa testing in the past and present as well as intention to attend in the future. Table 1 displays correlations between the personality factors, past prostate testing attendance, present

Table 2. Results of Factorial ANOVAs for the Personality Dimensions and Screening Participation Across Subsamples: Sheffe's Test Results.

| | Past participation | | | | | | Present behavior | | | | | |
| | No | | Yes | | | | No | | Yes | | | |
	M	SD	M	SD	F	p	M	SD	M	SD	F	p
Neuroticism	2.99	.49	2.82	.60	4.716	.031	3.30	.38	2.76	.57	49.479	.000
Extraversion	2.76	.40	2.93	.49	4.648	.033	2.79	.36	2.93	.50	6.429	.011
Openness	3.06	.45	3.09	.47	.117	.732	3.02	.29	3.09	.48	1.246	.272
Agreeableness	3.20	.60	3.27	.58	.808	.370	3.09	.42	3.30	.61	6.432	.013
Conscientiousness	3.29	.29	3.52	.64	7.289	.000	3.12	.51	3.54	.62	24.578	.000

Note. df = 1, N = 363. ANOVA = analysis of variance.

Table 3. Logistic Regression Analysis: Modeled Probability That Future Intention = *Yes*.

Predictor	β	SE β	Wald	p	OR	95% CI
Education	.290	.063	21.105	.000	1.336	[1.181, 1.511]
NIH-CPSI	.152	.030	26.426	.000	1.164	[1.099, 1.234]
Neuroticism	1.119	.236	22.489	.000	3.062	[1.928, 4.863]
Conscientiousness	.894	.248	13.024	.000	2.444	[1.504, 3.971]

Note. df = 1, N = 367. OR = odds ratio; CI = confidence interval; NIH-CPSI = National Institute of Health Chronic Prostatitis Symptoms Index.

prostate testing attendance, and future intention to utilize PCa testing. As expected, among the personality factors, N, C, and E had the strongest correlations with past, present, and future attendance. Correlations were between −.34 and .24 (mild to moderate) and strongest with neuroticism. Also, attending PCa testing in the present was correlated to intention to attend prostate testing in the future.

Then, factorial ANOVA was conducted to evaluate the interactions between past and present attendance (Table 2). N, E, O, A, and C scores were subjected to a two-way analysis of variance, with two levels for past attendance of PCa testing (*yes/no*) and two levels for present attendance of PCa testing (*yes/no*). All effects were statistically significant at the .05 significance level. Interaction between past and present attendance was not significant, $F(5, 344) = 1.747, p > .05$.

To evaluate which personality traits predict the intention to utilize PCa testing in the future, binary logistic regression was conducted. First, a regression model was made adding N, E, O, A, C, age, NIH-CPSI prostate symptoms, education, and participating in PCa testing in the past and in the present. Only N, C, NIH-CPSI prostate symptoms, and education were statistically significant ($p < .05$). A new model was created consisting of these four. Various combinations of personality traits were also tested, but the model consisting of N, C, education, and prostate symptoms explained the most variability (Cox and Snell $R^2 = .353$; Nagelkerke $R^2 = .526$). Table 3 reports the results of logistic regression analysis for future PCa testing attendance. Higher N, C, education, and prostate symptom scores were associated with the intention to utilize PCa testing.

We found the highest and the most significant odds ratio for N, indicating that the likelihood of future participation is greater for participants scoring higher on N. More precisely, if the N score goes up by one standard point, the odds of being in the future participation group relative to the "no participation" group increases by a multiplicative factor of 3.062. We also found the probability of visiting the doctor in the future (relative to not visiting) to be related to C. The likelihood of risk to future participation relative to perceived lack of participation increased with C by 2.444. Both significant personality dimensions exceeded the effect of education and even prostate disease symptom effect.

Discussion

We found indications that personality dispositions, in particular N and C, are positively associated with future behavioral intentions. There was some discrepancy in our data because respondents high in N did not behave in the past based on their intentions—N was significantly negatively related to past prostate testing attendance and personality dispositions of present patients. It is important to note that only present attendance of testing was related to the future behavioral intention, at a low level. These findings about past and present are consistent with previous studies, which have found a similar link between N and gastric cancer screening (Arai et al., 2009) and breast cancer screening (Siegler et al., 1995). Although men with high N tend to worry more about their health and may even be at a higher risk for cancer, it is possible that fear and anxiety prevents them from visiting a doctor. Previous studies

have found that negative emotions such as fear and embarrassment are barriers to cancer testing (Hill & Gick, 2011). Thus, N is strongly related to behavioral intention but not to behavior itself. This emphasizes the importance of monitoring the effects of N on actual behavior.

In contrast to N, E was related positively to the past and present attendance of PCa testing but negatively to future intention. Thus, men who are outgoing, sensation seekers, and welcome new challenges (McCrae & Costa, 2003; McCrae & John, 1992) do not plan to attend PCa testing but, in reality, are still more likely to attend than low E. As positive emotions are primary characteristics of E, these findings are also consistent with the findings that positive prior experience with health services (Nijs, Essink-Bot, DeKoning, Kirkels, & Schroder, 2000) and belief in the efficacy of PCa screening (Myers et al., 2000) are motives for prostate testing. Perhaps it is the optimism and positive beliefs about their current health that results in their lack of plans to attend PCa testing.

As expected, C was predictive of PCa testing attendance in the past and present, and intention to attend PCa testing in the future. The findings for past and present are consistent with previous studies, which have found a link between C and positive health behaviors (e.g., Bogg & Roberts, 2004; Kern & Friedman, 2008) and cervical cancer screening (Hill & Gick, 2011). In addition, our hypotheses related to O were confirmed. O is often described as artistic and intellectual curiosity. It is possible that visiting a doctor for prostate testing is not one of those experiences. Likewise, O has not been found to be correlated to health behaviors in previous studies as strongly as, for example, N or C.

Those with high A scores tend to be more popular and have greater social support. This is likely to help them deal more effectively with stressful experiences through the support of their spouse or doctor. For this reason, it may be that high A had a positive association to PCa testing but only in the present. This finding is consistent with previous literature about the association between agreeableness and preventive health behavior (Ingledew & Brunning, 1999).

Based on binary regression results, there are four important factors that can at least determine future behavioral intention. The first is obvious—prostate disease symptoms are predictive of intention to attend PCa testing. Prostate disease symptoms cause discomfort, and planning to attend testing is a means to relieve these symptoms. Our results also show that education is predictive of intention to attend PCa testing. Educated people may be more informed about health services and take more care about their health. In addition, it seems that worrying about health (N) and prudence and self-discipline (C) are the key motivational factors for utilizing PCa testing. However, it is worth noting that real behavior requires not only motivation but also the capacity to put decisions into practice. High N obviously does not have the emotional capacity to behave in the desired manner because these subjects may be more affected by stress and experience less social support. Their general negative affectivity may induce dissatisfaction with PCa testing, therefore leading to lower real behavior. Compared with N, men high in C manage to put those plans into practice because they have enough self-control to set goals and realize them. It is also noteworthy that although E was not put into the regression model and men high in E do not worry much about visiting a doctor, they do have enough energy and enthusiasm to attend testing when needed. Self-reported past and future behavioral intentions have been shown by this study to be significantly influenced by personality traits. Considering these dispositions, it is possible to improve predictions of men's health behaviors, as well as to help make decisions on management and service provision.

To our best knowledge, the present study is the first attempt to investigate the associations between Big Five personality dispositions and attending PCa testing. Past research on associations between personality and other cancer screenings or health behavior in general supports the findings of the present study. Moreover, our study expands previous research about personality and cancer screening behavior to behavioral intention. Accordingly, the study has many theoretical and practical implications. The methodological advantage of this study compared with other similar studies was that there was a differentiation between behavior (in the present and past) and behavioral intentions (in the future). Intention to attend probably distinguishes men who are going to attend PCa testing in the future from those who are not. Attendance among people high in N might be improved by taking into account the neurotic aspects of their personality, such as providing emotional support to relieve any concerns about screening results, pointing out the benefit to be gained from a screening program, and minimizing any anxiety or discomfort during the test (Arai et al., 2009). Low conscientiousness could be addressed by offering the opportunity to test for prostate diseases and regular reminders provided by physicians.

The study has several limitations. First, the conclusions are based on data from a cross-sectional study, meaning that no cause–effect relationships can be found. Second, we do not know the results of men who refused to participate in the study. This could possibly bias the results. Finally, a short form of the Big Five Inventory was used in the present study. Future studies should consider using personality subscales that allow for assessing different facets of each Big Five trait as well. This could help clarify the findings in the present study that ran contrary to hypotheses.

In conclusion, this study adds the important finding that Neuroticism and Conscientiousness had a significant association with PCa testing attendance in the past and present, and intention to attend PCa testing in the future.

Declaration of Conflicting Interests

References

Arai, S., Nakaya, N., Kakizaki, M., Ohmori-Matsuda, K., Shimazu, T., Kuriyama, S., . . . Tsuji, I. (2009). Personality and gastric cancer screening attendance: A cross-sectional analysis from the Miyagi Cohort Study. *Journal of Epidemiology*, *19*, 34-40. doi:10.2188/jea.JE20080024

Barry, M. J. (2009). Screening for prostate cancer—The controversy that refuses to die. *New England Journal of Medicine*, *360*, 1351-1354. doi:10.1056/Nejme0901166

Bogg, T., & Roberts, B. W. (2004). Conscientiousness and health-related behaviors: A meta-analysis of the leading behavioral contributors to mortality. *Psychological Bulletin*, *130*, 887-919. doi:10.1037/0033-2909-130.6.887

Booth-Kewley, S., & Vickers, R. R. (1994). Associations between major domains of personality and health behavior. *Journal of Personality*, *62*, 281-298.

Bowen, D. J., Hannon, P. A., Harris, J. R., & Martin, D. P. (2011). Prostate cancer screening and informed decision-making: Provider and patient perspectives. *Prostate Cancer and Prostatic Diseases*, *14*, 155-161. doi:10.1038/Pcan.2010.55

Bray, F., Lortet-Tieulent, J., Ferlay, J., Forman, D., & Auvinen, A. (2010). Prostate cancer incidence and mortality trends in 37 European countries: An overview. *European Journal of Cancer*, *46*, 3040-3052. doi:10.1016/j.ejca.2010.09.013

Chaitchik, S., & Kreitler, S. (1991). Induced versus spontaneous attendance of breast-screening tests by women. *Journal of Cancer Education*, *6*, 43-53.

Chou, R., Croswell, J. M., Dana, T., Bougatsos, C., Blazina, I., Fu, R. W., . . . Lin, K. (2011). Screening for prostate cancer: A review of the evidence for the U.S. preventive services task force. *Annals of Internal Medicine*, *155*, 762-794.

Christensen, A. J., & Smith, T. W. (1995). Personality and patient adherence: Correlates of the 5-factor model in renal dialysis. *Journal of Behavioral Medicine*, *18*, 305-313.

Cohen, H., & Britten, N. (2003). Who decides about prostate cancer treatment? A qualitative study. *Family Practice*, *20*, 724-729. doi:10.1093/fampra/cmg617

Costa, P. T., & Mccrae, R. R. (1992). The 5-factor model of personality and its relevance to personality-disorders. *Journal of Personality Disorders*, *6*, 343-359.

Dahl, A. A. (2010). Link between personality and cancer. *Future Oncology*, *6*, 691-707. doi:10.2217/Fon.10.31

Goldberg, L. R. (1990). An alternative description of personality: The big-5 factor structure. *Journal of Personality and Social Psychology*, *59*, 1216-1229.

Ferlay, J. Soerjomataram, I., Ervik, M., Dikshit, R. Eser, S., Mathers, C., Rebelo, M., . . . Bray, F. (2013). *GLOBOCAN 2012 v1.0, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 11* [Internet]. Lyon, France: International Agency for Research on Cancer.. Retrieved from http://globocan.iarc.fr

Goodwin, R. D., & Friedman, H. S. (2006). Health status and the five-factor personality traits in a nationally representative sample. *Journal of Health Psychology*, *11*, 643-654. doi:10.1177/1359105306066610

Harris, R., & Lohr, K. N. (2002). Screening for prostate cancer: An update of the evidence for the US Preventive Services Task Force. *Annals of Internal Medicine*, *137*, 917-929.

Hill, E. M., & Gick, M. L. (2011). The big five and cervical screening barriers: Evidence for the influence of conscientiousness, extraversion and openness. *Personality and Individual Differences*, *50*, 662-667. doi:10.1016/j.paid.2010.12.013

Ingledew, D. K., & Brunning, S. (1999). Personality, preventive health behavior and comparative optimism about health problems. *Journal of Health Psychology*, *4*, 193-208.

John, O. P., & Srivastava, S. (1999). The big five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (pp. 1-71). New York, NY: Guilford Press.

Kern, M. L., & Friedman, H. S. (2008). Do conscientious individuals live longer? A quantitative review. *Health Psychology*, *27*, 505-512. doi:10.1037/0278-6133.27.5.505

Kiecolt-Glaser, J. K., & Glaser, R. (1999). Psychoneuroimmunology and cancer: Fact or fiction? *European Journal of Cancer*, *35*, 1603-1607.

Korrovits, P., Punab, M., Mehik, A., & Mandar, R. (2006). The Estonian version of the National Institutes of Health Chronic Prostatitis Symptom Index. *Andrologia*, *38*, 106-109.

Litwin, M. S., McNaughton-Collins, M., Fowler, F. J., Nickel, J. C., Calhoun, E. A., Pontari, M. A., . . . Network, C. P. C. R. (1999). The National Institutes of Health Chronic Prostatitis Symptom Index: Development and validation of a new outcome measure. *Journal of Urology*, *162*, 369-375.

Martin, L. R., Friedman, H. S., & Schwartz, J. E. (2007). Personality and mortality risk across the life span: The importance of conscientiousness as a biopsychosocial attribute. *Health Psychology*, *26*, 428-436. doi:10.1037/0278-6133.26.4.428

McCrae, R. R., & Costa, P. T. (1987). Validation of the 5-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology*, *52*, 81-90.

McCrae, R. R., & Costa, P. T. (2003). *Personality in adulthood: A five factor theory perspective*. New York, NY: Guilford Press.

McCrae, R. R., & John, O. P. (1992). An introduction to the 5-factor model and its applications. *Journal of Personality*, *60*, 175-215.

Mõttus, R., Pullmann, H., & Allik, J. (2006). Toward more readable big five personality inventories. *European Journal of Psychological Assessment*, *22*, 149-157.

Myers, R. E., Hyslop, T., Jennings-Dozier, K., Wolf, T. A., Burgh, D. Y., Diehl, J. A., . . . Chodak, G. W. (2000). Intention to be tested for prostate cancer risk among African-American men. *Cancer Epidemiology Biomarkers & Prevention*, *9*, 1323-1328.

Nakaya, N., Hansen, P. E., Schapiro, I. R., Eplov, L. F., Saito-Nakaya, K., Uchitomi, Y., & Johansen, C. (2006a). Personality traits and cancer survival: A Danish Cohort Study. *British Journal of Cancer*, *95*, 146-152. doi:10.1038/sj.bjc.6603244

Nakaya, N., Hansen, P. E., Schapiro, I. R., Eplov, L. F., Saito-Nakaya, K., Uchitomi, Y., & Johansen, C. (2006b). Personality traits and cancer survival: A Danish Cohort Study [Corrigendum]. *British Journal of Cancer*, *95*, 1610. doi:10.1038/sj.bjc.6603489

National Institutes of Health. (1995). *National institutes of health summary statement. Executive summary*. Bethesda, MD: Author.

Nijs, H. G. T., Essink-Bot, M. L., DeKoning, H. J., Kirkels, W. J., & Schroder, F. H. (2000). Why do men refuse or attend population-based screening for prostate cancer? *Journal of Public Health Medicine*, *22*, 312-316. doi:10.1093/pubmed/22.3.312

Robertson, S. (2009). *Theories of masculinities and men's health-seeking practices*. Mexico City: Nowhere Man Press.

Siegler, I. C., Feaganes, J. R., & Rimer, B. K. (1995). Predictors of adoption of mammography in women under age 50. *Health Psychology*, *14*, 274-278.

Verhaak, P. F. M., Phins, M. A., Spreeuwenberg, P., Draisma, S., van Balkom, T. J. L. M., Bensing, J. M., . . . Penninx, B. W. J. H. (2009). Receiving treatment for common mental disorders. *General Hospital Psychiatry*, *31*, 46-55. doi:10.1016/j.genhosppsych.2008.09.011

Vickers, A. J., Roobol, M. J., & Lilja, H. (2012). Screening for prostate cancer: Early detection or overdetection? *Annual Review of Medicine*, *63*, 161-170. doi:10.1146/annurev-med-050710-134421

Woolf, S. H., & Rothemich, S. F. (1999). Screening for prostate cancer: The roles of science, policy, and opinion in determining what is best for patients. *Annual Review of Medicine*, *50*, 207-221.

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