

**Post-Diagnostic Dietary Changes in Prostate Cancer:
Associations with Patients' Wellbeing and the Perceptions
of GPs**

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Review

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3 **Post-Diagnostic Dietary Changes in Prostate Cancer: Associations with Patients'**
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5 **Wellbeing and the Perceptions of GPs**
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8 **Abstract**
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10 This paper aims to investigate associations between perceived control and Health-Related Quality
11 of Life (HRQOL) with dietary changes after prostate cancer diagnosis and to explore General
12 Practitioners' (GPs) perceptions on the role of diet in prostate cancer post-diagnosis. Ninety-five
13 prostate cancer patients completed measures of dietary change, one for after diagnosis and
14 another for after therapy. They also scored their HRQOL and perceived control. There were
15 discrepancies in dietary changes reported between a general question (28.4% no dietary changes)
16 and a specific (42.1-51.5% range of no change for various food items). Most patients initiated
17 healthy changes. Patients who changed their diet after diagnosis had lower cognitive functioning
18 and external locus of control (doctors). Patients who changed their diet after therapy had lower
19 cognitive and emotional functioning, quality of life and external locus of control (doctors). Then,
20 forty-four GPs responded to an online survey. Their open-ended responses were analyzed using
21 Content Analysis. They reported interest in the role of diet in cancer but also lack of relevant
22 knowledge. They were skeptical on providing information. Clinical interventions should consider
23 patients' cognitive ability, their relationship with their health professional and their wellbeing.
24 Also, GPs' confidence to provide dietary advice needs to be addressed.
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43 **Keywords:** prostate cancer; nutrition; quality of life; locus of control; health professionals;
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Introduction

The evidence related to the association between dietary changes and cancer patients' wellbeing is scarce. A patients' perceived control (Hagger and Orbell, 2003), Health-Related Quality of Life (HRQOL) (Alfano et al., 2009; Larsson et al., 2005), fatigue (Pakiz et al., 2005), neuroticism, introversion and increased social support and stress (Choi et al., 2013) were found to affect post-diagnostic changes in diet, exercise and smoking. However, these associations are less clear for patients' post-diagnostic dietary behaviors (Di Noia and Prochaska, 2010; Kristal et al., 2000; Ory et al., 2002).

To this end, the American Cancer Society called for studies investigating associations between dietary changes and HRQOL (Brown et al., 2003). A recent systematic review (Kassianos et al., 2014) suggests that this association is inconclusive and unclear. Greater perceived control may mediate this association. Control is related with a greater likelihood of making difficult behavioural changes (Thompson and Schlehofer, 2008; Thompson and Spacapan, 1991) like adhering to a healthier diet (Parelkar et al., 2013). Also, patients who perceive health as a matter of chance are less likely to adhere to healthy behaviours (Grotz et al., 2011).

The benefits of adhering to a post-diagnostic healthier diet can be observed in patients' psychological outcomes. For example, women with breast cancer who change their diet during the 12 months after diagnosis experience reduced psychological distress whilst changes are driven by the need to regain a sense of control over their cancer (Hebert et al., 2001; Maunsell et al., 2002). Cancer patients' lack of meaning and avoidance coping can lead to unhealthy changes whilst social support, life meaning and sense of control to healthy changes (Park et al., 2008). These patterns are not established among prostate

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2 cancer patients who initiate several explanations for their post-diagnostic dietary changes
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4 that include the role of their health professional (Kassianos et al., 2015). Some cancer
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6 patients may change their diet because of a health professional's advice (Dowswell et al.,
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8 2012; Egede, 2003; Truswell, 2000) while others even though advised may not do so
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10 (Salminen et al., 2000). This is important since a healthier diet is associated with prostate
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12 cancer prognosis (Antwi et al., 2015; Hébert et al., 2012; Saxe et al., 2001). In particular
13
14 diet after diagnosis is associated with prostate cancer progression (Chan et al., 2006)
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16 whilst strong evidence exist that increased Body Mass Index (BMI) is associated with
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18 increased risk of advanced prostate cancer (World Cancer Research Fund International,
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20 2014).
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26 We report findings from two studies. The first study aims to explore the post-diagnostic
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28 dietary changes of patients with prostate cancer by investigating whether patients make
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30 healthy or unhealthy changes and how those who change their diet differ from those who
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32 do not in terms of their HRQOL and perceived behavioural control. The second study
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34 aims to explore General Practitioners' (GPs) perceptions of the role of diet in prostate
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36 cancer and on providing dietary-related information to prostate cancer patients. This
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38 study is used to interpret the role of external locus of control from doctors on patients'
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40 dietary changes post diagnosis which is assessed in Study 1. External locus of control
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42 refers to how an individual believes that their health is a matter of chance or other
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44 people's advice like their health professionals (Watson et al., 1990).
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49 **Methods**

50 **Study 1**

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Research Design and Procedure

We used a cross-sectional online and paper survey to assess diet among prostate cancer patients in the UK in 2012. The study received favourable ethical approval from the University of Surrey Ethics Committee (EC/2012/13/FAHS). Paper questionnaires were completed during a visit to a prostate cancer self-help group and a charity event in the UK. The electronic questionnaire was advertised by four prostate cancer self-help and patient-support groups charities based in the UK. Potential participants completed screening questions to ensure that only men diagnosed with prostate cancer were included and to establish date of diagnosis.

Data gathered

Demographic and Medical Information

All participants provided information on their age, years since diagnosis, marital status, education, employment status, treatment status and treatment type. For their treatment status, participants were asked to specify whether they were ‘under treatment’, ‘in complete remission’ or whether their cancer was ‘recurrent’ at the time they completed the questionnaire. For treatment type they were asked to specify what type of treatment they received (if any).

Primary Outcome Variable: Dietary Behaviour Change (general)

Participants were asked whether they changed their diet a) after diagnosis and b) after therapy started. We assessed both because the period after therapy is as an important period regarding prostate cancer patients’ adherence to lifestyle change (Sanson-Fisher et al., 2000).

Secondary Outcome Variable: Dietary Behaviour Change (specific)

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In order to assess whether patients made healthy or unhealthy changes, a retrospective question was used. Participants were asked to rate the consumption of seven food items (fruits, vegetables, red meat, dairy products, alcohol, sweets, fish) on a 7-point Likert scale ranging from “very much less” to “very much more” with the middle option being “the same” to assess no change. Then, responses were coded using a method (Maunsell et al., 2002) where each change was characterized as healthy or unhealthy in the following order: increases in consumption or the introduction of fish, fruit and vegetables were each coded as **healthy** (responses 5-7 in the Likert Scale) as were decreases or elimination of meat, sweets, dairy products and alcohol (responses 1-3 in the Likert Scale). Reductions or elimination of fish, fruit and vegetables were coded as **unhealthy** (responses 1-3 in the Likert Scale), as were increases in consumption of meat, sweets, dairy products and alcohol (responses 5-7 in the Likert Scale). Response 4 in the Likert Scale suggested **no change**. This type of simple and direct self-reporting of health behaviour change has good correspondence in behaviours such as diet and exercise (Mullens et al., 2004; Wayne et al., 2004).

Psychosocial variables

Perceived behavioural control was assessed using the 18-item Form C of the Cancer Locus of Control Scale (Watson et al., 1990), assessing internal and external locus of control (chance, doctors and other people). The scale is widely used and considered to have high validity and reliability (Henderson and Donatelle, 2003). Internal locus of control is assessed with items like “if my cancer worsens it is my own behaviour which determines how soon I will feel better again” and external with “most things that affect my cancer happen to me by chance”. Responses ranged from “strongly disagree” to “strongly agree” on a 6-point Likert scale. Responses were summed producing scores (range 3-36) for internal locus of control and external locus of control (chance) and

1 scores (range 3-18) for external locus of control (doctors) and external locus of control
2 (other people).
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7 *Health related quality of life (HRQOL)* was assessed retrospectively using the global
8 health status/quality of life (QoL) item and the five functioning scales (physical, role,
9 emotional, cognitive and social functioning) of the 30-item EORTC QLQ C30
10 questionnaire (Aaronson et al., 1993) and the two functioning scales (sexual activity,
11 sexual functioning) from the prostate cancer-specific EORTC QLQ PR25 (van Andel et
12 al., 2008). Responses on the functioning scales were given on a 4-point Likert scale
13 ranging from “not at all” to “very much”. Global health status/QoL was assessed asking
14 participants to rate their overall health on a 7-point Likert scale ranging from “very poor”
15 to “excellent”. The two scales were separately transformed in scores ranging from 0-100
16 with a higher score representing higher level of functioning and QoL.
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30 ***Data Analysis***

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34 Descriptive statistics were used for socio-demographic and medical information. The
35 proportion of patients who were coded as ‘changers’, ‘healthy changers’ and ‘unhealthy
36 changers’ are reported based on their responses to dietary behaviour change (specific).
37 The responses to the primary outcome (general dietary behaviour change) were used to
38 characterize patients into changers and non-changers. A series of chi square tests were
39 used to assess differences between the two groups in categorical variables and a series of
40 independent sample t-tests to assess mean differences between the two groups on
41 perceived behavioural control, functioning and general QoL. We excluded the sexual
42 functioning scale from the analyses because of low reliability ($\alpha < .70$).
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55 **Study 2**

56 ***Research Design***

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1 The second was a qualitative study with one open-ended question sent to London-based
2 GPs in 2012. The study received favourable ethical approval from the University of
3 Surrey Ethics Committee (EC/2012/13/FAHS).
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9 ***Procedure and Data Analysis***

10 The South West Thames Faculty of the Royal College of GPs agreed to facilitate an
11 online questionnaire to its members. The GPs were asked to respond to an online survey
12 and provide informed consent. For their time, all participants were provided with a copy
13 of a Prostate Care Cook Book. This study reports the results of an open-ended question
14 asking participants to comment on the influence of diet on prostate cancer both for
15 prevention and treatment. The participants' responses were analysed using Content
16 Analysis (Krippendorff, 2012) which systematically describes and classifies open-ended
17 responses quantifying the format and content of participants' quotes and until data
18 saturation.
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33 **Results**

34 ***Participants***

35 In Study 1, ninety-five participants took part in the study (Table 1). No significant
36 differences on socio-demographic and medical information were found between those
37 recruited online (67%) and those on site. Their average time since diagnosis was 4.5
38 years (SE = 0.4) with their age range from 55 to 93 years (M = 68.6, SE = 0.7).
39 Participants were well educated with no participants reporting "no formal education" and
40 the majority having a secondary school or job-related qualification or tertiary education
41 (n = 79). Patients who reported changes on their diet post diagnosis were more highly
42 educated than those who did not $\chi^2(2, N = 95) = 8.65, p < .01$. This was not found for
43 patients who reported changes post-therapy.
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4 When participants were simply asked 'did you change your diet following diagnosis'
5 28.4% reported no change. However when they were asked about their changes in
6 specific food items a range of 42.1-51.5% reported no changes in various food items
7 following diagnosis. There were only a few (0-6.4%) participants that initiated unhealthy
8 changes either post diagnosis or post therapy compared to healthy changes (43.2-59.6%)
9 whereas almost one in two participants report no changes in any of the food items post
10 diagnosis or post therapy (39.4-51.5%). None of the participants increased red meat
11 consumption post diagnosis (0%) and only 1% post-therapy On the other hand decrease
12 in red meat consumption was the most frequently reported healthy dietary change (56.8%
13 - 59.6%) (Table 2)
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31 For Study 2, forty four (N = 44) English-speaking GPs responded. The majority were
32 female (65%) and with an average of 15.8 years of experience as a GP (range 1 – 38
33 years).
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42 ***Main Results***

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45 Patients who changed their diet after diagnosis reported significantly lower levels of
46 cognitive functioning (M = 77.17, SD = 18.99) than those who did not (M = 85.80, SD =
47 15.12), $t(90) = 2.30, p = .02$. They also reported significantly lower levels of external
48 locus of control (doctors) (M = 8.73, SD = 1.94) than those who did not (M = 9.74, SD =
49 1.70), $t(90) = 2.46, p = .01$ (Table 3).
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1 Patients who changed their diet after therapy reported significantly lower levels of
2 cognitive functioning ($M = 76.61$, $SD = 19.12$) than those who did not ($M = 86.27$, $SD =$
3 13.27), $t(89) = 2.83$, $p < .001$ and lower levels of emotional functioning ($M = 76.31$, SD
4 $= 22.03$) than those who did not ($M = 85.78$, $SD = 16.61$), $t(89) = 2.32$, $p = .02$. They
5 also scored significantly lower on general QoL ($M = 73.28$, $SD = 17.94$) than those who
6 did not ($M = 80.39$, $SD = 16.52$), $t(89) = 1.92$, $p = .04$ and had significantly lower
7 external locus of control (doctors) ($M = 8.71$, $SD = 1.88$) than those who did not ($M =$
8 9.55 , $SD = 1.92$), $t(89) = 2.03$, $p = .04$ (Figure 1).
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25 26 27 ***Outcome of the GP survey***

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30 In Study 2, three themes were identified: a) diet mainly as a measure for prevention, b)
31 interest in diet and c) knowledge about diet (Table 4). Participants felt that GPs are the
32 medical specialty mainly responsible for providing dietary-related information to patients
33 with one suggesting that “nutritional science in prevention and management of prostate
34 cancer belongs in primary care or else, probably, nowhere” (male GP, 31 years in
35 practice).
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46 47 48 ***Diet mainly as a measure for prevention***

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51 The GPs were sceptical on the role of diet on cancer after diagnosis. They rationalized
52 this either on patients’ interest with one female GP with 4 years’ experience in practice,
53 mentioning that *‘patients only seem interested in dietary modification after diagnosis’* or
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2 on lack of research evidence. Some were skeptical on the benefits of dietary changes
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4 post-diagnosis as opposed to diet as a measure for prevention.
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7 While dietary role in general health and cancer prevention is likely to be of great
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9 interest I would remain unsure of the role of diet in established disease.
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12 Female GP, 15 years in practice
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15 Therefore they were reluctant “raising false hopes” (female GP, 6 years in practice). A
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17 GP referred to providing information about diet to patients after diagnosis as “shutting the
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19 proverbial stable door after the horse has bolted and at worst risks upsetting the patients
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21 by implying their disease was in some way preventable, and so to have developed the
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23 disease is a ‘failure’ on their part” (female GP, 4 years in practice).
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26 27 ***Interest in diet*** 28

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30 The majority of GPs expressed their interest in diet either in terms of more evidence or in
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32 terms of aids to help them to inform their patients and engage in discussion about what
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34 patients can do to lower the risk of diagnosis or recurrence.
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38 Would appreciate a patient information leaflet to hand out when doing PSAs
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40 (note: Prostate Specific Antigens), discussion of prostate risks etc.
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44 Female GP, 2 years in practice
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47 As a result they tend to rely on ‘*alternative sources*’. This reflects the lack of post-
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49 diagnostic dietary guidelines in the UK (Hori et al., 2011). Also, one recently qualified
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51 female GP indicated that more information is needed in regards to patients’ awareness,
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53 self-care and diet information leaflets available to patients.
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On the other hand a female GP with 8 years of experience in practice suggested that the 'vast majority of patients (are) not usually concerned about these things' even though in reality prostate cancer patients may change their diets post diagnosis to facilitate coping and deal with uncertainty (Avery et al., 2014).

I do not think men in generally are as interested as women in nutritional aspects, or indeed in any alternative or non- 'conventional management'. Women mostly do the cooking. I think women would be interested; it would also give them 'something to do'...

Female GP, 31 years in practice

Knowledge about diet

One female GP with 10 years in practice suggested, "we need to educate the public" and another female GP with 28 years in practice feels that GPs 'know very little regarding nutritional factors in relation to prostate cancer or all other cancers'. Other GPs challenged the use of public education suggesting that 'anything to do with diet and cancer is always vulnerable to distortion by the media'. Others, with similar years of experience also suggested focusing on GP education because it is 'a vastly neglected area' (male GP, 3 years in practice).

Discussion

The aims of the paper were to understand the associations between perceived behavioural control and HRQOL with dietary changes after prostate cancer diagnosis and therapy and to explore GPs' perceptions on the role of diet in prostate cancer. Prostate cancer diagnosis and therapy trigger healthy dietary changes or no changes but very few unhealthy changes. Patients who changed their diet post diagnosis and post therapy

1 reported lower levels of cognitive functioning and external locus of control (doctors)
2 while post-therapy changes were also associated with lower levels of emotional
3 functioning and quality of life. GPs suggest diet may impact prostate cancer pre-diagnosis
4 but not after diagnosis. They are interested in more evidence in order to communicate
5 more effectively with patients about their diet. They suggest that they lack the knowledge
6 on the role of diet in prostate cancer.
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15 Even though unhealthy behavior changes following cancer diagnosis are common
16 (Blanchard et al., 2003; Ganz et al., 2002; Stull et al., 2007) one third to half of cancer
17 patients initiate healthy post diagnostic dietary changes (Hawkins et al., 2010; Humpel et
18 al., 2007; Maskarinec et al., 2001; Maunsell et al., 2002; Patterson et al., 2003; Satia et
19 al., 2004). In this study one out of two did not initiate any change but also the majority
20 avoided any unhealthy changes. Some GPs highlighted that men are not very interested in
21 diet. This is questioned as there is evidence that lack of adherence or interest in a
22 healthier diet was found among breast cancer patients as well (O'Neill et al., 2008).
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34 Cognitive functioning refers to an individual's memory as well as their ability to
35 concentrate, read a paper or watch television. In this analysis, lower cognitive functioning
36 was associated with those who made dietary changes. However, in this analysis, there is
37 no indication of the direction (cause versus effect) of this association, even though
38 cognitive decline can negatively influence dietary intake (Biro et al., 2002; Corrêa et al.,
39 2001; Dubois and Boivin, 1990; McNeill et al., 2009; Small, 2002). Our finding is
40 surprising because changing a diet is a habitual change which normally requires
41 individuals having larger ability to store information in memory which are then used in
42 decision-making (cognitive economy) and a greater sense of control (Wood et al., 2002)
43 and therefore patients with lower levels of cognitive functioning are more resistant
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2 towards dietary change. No associations were found with other functioning scales even
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4 though physical functioning is associated with changes in diet (Kassianos et al., 2014).
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7 Patients who changed their diet post diagnosis and post therapy also had lower external
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9 locus of control (doctors). This highlights the inconsistencies related to the impact of
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11 health professionals on cancer patients' dietary habits (Dowswell et al., 2012; Salminen
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13 et al., 2000). Cancer patients believe that health professionals' role on their diet after
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15 diagnosis is important (Kassianos et al., 2015). In the UK, patients report little or no
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17 nutritional advice compared to patients from the USA, Canada, Australia and New
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19 Zealand ((Schoen et al., 2004) especially after treatment (Rozmovits et al., 2004). GPs in
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21 the study acknowledge their lack of dietary knowledge. This can explain why patients in
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23 the first study who rely on their doctor for advice were less likely to change their diet.
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25 GPs were also sceptical on the role of diet in prostate cancer after diagnosis even though
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27 benefits in prostate-specific antigen (PSA) levels (Dalais et al., 2004), mortality,
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29 progression (Berkow et al., 2007), and recurrence (Moreira et al., 2013) are reported.
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31 Therefore, enhancing GPs' ability to provide dietary advice has the potential to benefit
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33 patients who rely on their advice while a need is reported to improve nutritional training
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35 in most of primary care colleges in Europe (Pineiro et al., 2005).
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41 Adherence to a healthier diet is also associated with higher emotional wellbeing (Low et
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43 al., 2014) which relates with individuals' tension, worry, irritability and depression. In the
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45 post-therapy phase, emotional functioning and quality of life are associated with dietary
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47 changes but not post diagnosis. This suggests that patients may adhere to healthier dietary
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49 choices post-diagnosis if health professionals focus on patients' emotions.
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53 This study has limitations. Cancer patients may overestimate their change (Maunsell et
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55 al., 2002) because of social desirability bias. For example, cognitive functioning and diet
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57 can be measured using cognitive tasks and objective indices additionally to self-report.
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Retrospective assessment of patients' dietary change and HRQOL was used, which can lead to retrospective bias and also limits inferring causal associations. It is possible that men with better prognoses, HRQOL, and sense of control report better diets. However, given the limited evidence, these findings provide indications of possible associations and not causation. Future longitudinal studies can overcome this problem. Moreover, we did not assess patients' diet before diagnosis and therefore some of the participants' may have had a healthy diet. Future studies can also assess the role of marital status or social support in changes in diet since we could not conduct meaningful comparisons provided that 80% of our participants were married or living as married. Finally, there were discrepancies between the general and specific dietary change measures. Using a simpler method (than for example dietary intake diaries) like the specific Maunsell system can be less cumbersome and time consuming for both researchers and patients in hypothesis-generating research. However, this method is also limited as it addresses dietary intake and change using only seven food items. Therefore, other food items like starchy carbohydrates are not assessed nor total energy (kcal) intake that is commonly used in dietary intake assessment. This may explain the discrepancies between the general and specific dietary change measures used in the study with the general one not being comparable to the sum of specific items. However, this is also the first study using both a general and specific measure and this can inform future studies on the utilities of both.

Therefore, active strategies for patients to take control of their diet post diagnosis are needed. In line with previous evidence (Parelkar et al., 2013) this paper suggests that interventions should consider strategies to utilize active coping behaviours for patients while educating health professionals on the role of diet in prostate cancer using public health and educational tools. Patient interventions should also take into account cognitive and emotional functioning. However, in this study it is not clear which patients are ready

1 to change their diet and how these changes are sustained and readiness should be taken
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3 into consideration when management strategies are used by GPs. Findings of this study
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5 are also encouraging since GPs' lack of confidence in recommending dietary change,
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7 very few patients made unhealthy dietary changes. Future research may emphasize on
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9 how long these changes are sustained and whether the patients who change their diet post
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11 diagnosis also change other aspects of their lifestyle such as exercise and smoking.
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13 Finally, a holistic approach to lifestyle changes can be more useful because diet cannot be
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15 seen in isolation from other changes like physical activity, sleep, stress etc. (Lagerdahl et
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17 al., 2014). Moreover, a holistic approach requires the involvement of other health
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19 professionals in supporting positive dietary changes such as nurses, dieticians and
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21 secondary health professionals such as oncologists.
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Table 1: Characteristics of Respondents of Study 1 (N=95)

	N	%	M	SE
Age			68.6	0.7
Years since diagnosis			4.5	0.4
Marital status				
Married/living as married/living with another adult(s)	76	80.0		
Single/living alone	19	20.0		
Education				
Primary school completed	3	3.2		
Secondary school or job-related qualifications	31	32.6		
Tertiary education	48	50.5		
Postgraduate degree	13	13.7		
Employment status				
Full-time paid work	8	8.4		
Part-time paid work	7	7.4		
Retired/Not working	80	84.2		
Treatment status				
Under treatment	50	52.6		
In complete remission	36	37.9		
Recurrent	9	9.5		
Treatment type				
Surgery	27	28.5		
Radiation therapy	32	32.6		
Chemotherapy	6	6.3		
Hormone Therapy	30	31.6		

Table 2: Proportions of reported specific dietary changes among respondents in Study 1
(N = 95)

	Post diagnosis			Post therapy		
	Healthy change	Unhealthy change	No change	Healthy change	Unhealthy change	No change
Fruit	47.3	3.2	49.5	46.8	2.1	51.1
Vegetables	51.5	1.1	47.4	48.9	2.2	48.9
Red meat	56.8	0.0	43.2	59.6	1.0	39.4
Dairy	54.7	3.2	42.1	57.4	3.2	39.4
Alcohol	46.3	4.2	49.5	51.0	4.3	44.7
Sweets	50.5	3.2	46.3	50.0	4.3	45.7
Fish	43.2	5.3	51.5	44.6	6.5	48.9

Note: Proportions (%) of participants' specific dietary changes are reported according to the time of change.

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Table 3: Comparing the Means of participants' responses to the psychosocial variables in relation to post-diagnosis and post-therapy dietary changes in Study 1 (N = 95)

Psychosocial variables	α^*	Dietary changes post-diagnosis				Dietary changes post-therapy							
		Changers (n=68)		Non-changers (n=27)		t	p	Changers (n=57)		Non-changers (n=38)		t	p
		M	SD	M	SD			M	SD	M	SD		
Global health status/QoL	0.85	74.51	17.73	78.39	17.94	0.95	.35	73.28	17.94	80.39	16.52	1.92	.04
Physical functioning	0.79	90.78	11.85	88.73	12.31	-0.74	.46	89.72	12.25	91.59	10.95	0.75	.45
Role functioning	0.91	86.91	19.24	85.08	25.06	-0.34	.73	85.36	19.73	89.49	21.5	0.92	.36
Emotional functioning	0.91	77.31	21.27	83.95	20.91	1.38	.17	76.31	22.03	85.78	16.61	2.32	.02
Cognitive functioning	0.72	77.17	18.99	85.80	15.12	2.30	.02	76.61	19.12	86.27	13.27	2.83	.001
Social functioning	0.78	77.34	24.00	69.73	28.50	-1.21	.23	74.11	25.60	77.94	24.86	0.70	.48
Sexual activity	0.86	4.03	1.93	3.77	1.80	-0.59	.55	4.05	1.99	3.85	1.72	.50	.62
Internal locus of control	0.82	13.17	3.87	12.14	3.80	-1.16	.25	12.89	3.75	12.91	4.11	0.02	.98
External locus of control (chance)	0.81	13.82	4.34	14.73	3.91	0.96	.34	14.28	4.14	13.87	4.40	.43	.67
External locus of control (doctors)	0.74	8.73	1.94	9.74	1.70	2.46	.01	8.71	1.88	9.55	1.92	2.03	.04
External locus of control (other people)	0.67	7.84	2.15	8.40	2.25	1.10	.27	7.75	2.08	8.44	2.33	1.41	.16

Note: The M and SD values in bold are the ones that significantly differ between the two groups at the level of significance $p < .05$.

* Cronbach's alphas are reported as evidence of scale's internal consistency.

Table 4: Content analysis of GPs' perceptions of the role of diet in prostate cancer in Study 2 (N = 44).

Theme	Operational definition
Diet mainly as a measure for prevention	<ol style="list-style-type: none"> 1. Patterns of perceptions on the role of diet in preventive medicine and post-diagnosis 2. Patients interest in diet post-diagnosis
Interest in diet	<ol style="list-style-type: none"> 1. GPs' interest in diet 2. Patients' interest in diet
Knowledge about diet	<ol style="list-style-type: none"> 1. GPs' knowledge on the role of diet 2. Available evidence 3. The role of other sources (i.e. public education, media)

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Figure caption

Figure 1. Significant associations between dietary changes with HRQOL and perceived behavioural control in Study 1 (N = 95)

Note: CF: Cognitive Functioning, EF: Emotional Functioning, QoL: Global Health Status/Quality of Life, ELQ (D): External Locus of Control (Doctors), HRQOL score: Health-Related Quality of Life Score measured with the EORTC QLQ-C30, PBC score: Perceived Behavioural Control measured with the Cancer Locus of Control Scale. * $p < .05$, ** $p < .001$

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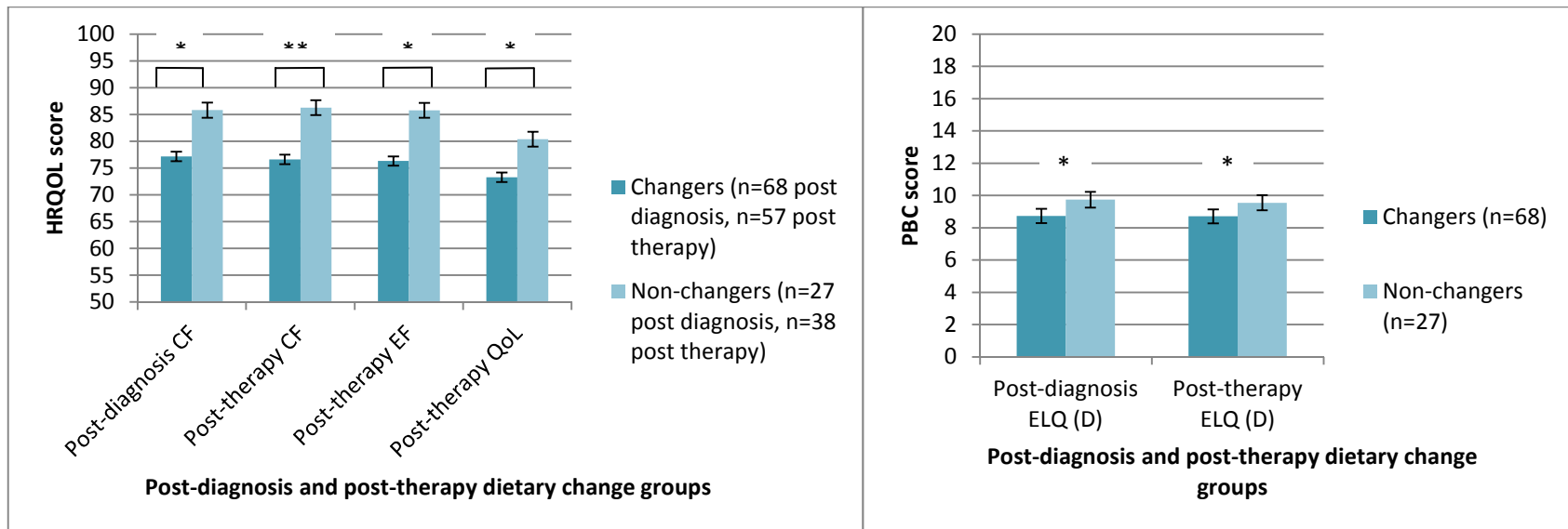


Figure 1. Significant associations between dietary changes with HRQOL and perceived behavioural control

Note: CF: Cognitive Functioning, EF: Emotional Functioning, QoL: Global Health Status/Quality of Life, ELQ (D): External Locus of Control (Doctors), HRQOL score: Health-Related Quality of Life Score measured with the EORTC QLQ-C30, PBC score: Perceived Behavioural Control measured with the Cancer Locus of Control Scale. * $p < .05$, ** $p < .001$