

Behavioural strategies to self-manage low-potassium diets in chronic kidney disease

Morris, A. & Lycett, D.

Author post-print (accepted) deposited by Coventry University's Repository

Original citation & hyperlink:

Morris, A & Lycett, D 2021, 'Behavioural strategies to self-manage low-potassium diets in chronic kidney disease', *Journal of Renal Care*, vol. 47, no. 3, pp. 160-168. <https://dx.doi.org/10.1111/jorc.12361>

DOI 10.1111/jorc.12361

ISSN 1755-6678

ESSN 1755-6686

Publisher: Wiley

This is the peer reviewed version of the following article: Morris, A & Lycett, D 2021, 'Behavioural strategies to self-manage low-potassium diets in chronic kidney disease', *Journal of Renal Care*, vol. 47, no. 3, pp. 160-168, which has been published in final form at <https://dx.doi.org/10.1111/jorc.12361>. This article may be used for non-commercial purposes in accordance with Wiley Terms and Conditions for Self-Archiving.

Copyright © and Moral Rights are retained by the author(s) and/ or other copyright owners. A copy can be downloaded for personal non-commercial research or study, without prior permission or charge. This item cannot be reproduced or quoted extensively from without first obtaining permission in writing from the copyright holder(s). The content must not be changed in any way or sold commercially in any format or medium without the formal permission of the copyright holders.

This document is the author's post-print version, incorporating any revisions agreed during the peer-review process. Some differences between the published version and this version may remain and you are advised to consult the published version if you wish to cite from it.

**Behavioural strategies to self-manage low potassium diets
in chronic kidney disease**

Journal:	<i>Journal of Renal Care</i>
Manuscript ID	JORC-2020-0174.R1
Manuscript Type:	Original Research
Keywords:	Renal Diet, Chronic Kidney Disease, Nutrition/Malnutrition

SCHOLARONE™
Manuscripts

Behavioural strategies to self-manage low potassium diets in chronic kidney disease

For Review Only

Abstract

Background Dietary potassium restrictions may be challenging to follow, due in part to the restrictive nature of recommendations on foods people enjoy. Little is known how people incorporate low potassium diets into their lifestyles.

Objective To examine the self-directed behavioural strategies people employ to follow low potassium advice.

Design Qualitative methodology

Participants Thirty-four adults with chronic kidney disease

Approach Semi-structured interviews were undertaken in an outpatient department.

Thematic Analysis was undertaken on transcribed interviews.

Findings Analysis identified three themes: “*Differing opinions of food*”; “*Food generates positive emotions*”; and “*Doing what works*”. Participants described foods providing different levels of enjoyment. Favourite foods in their habitual diet held either a physiological or a psychological value to them. Five sub-themes underpinned the “*Doing what works*” theme that described the self-management behaviours used by participants to follow low potassium dietary advice. These were positive reframing; reflection; self-talk; social support; decisional balance; paradoxical instruction; and knowledge shaping. These techniques helped overcome conflict between favourite food preferences and dietary restrictions. Dietary restrictions proved more challenging where an emotional connection to a favourite food existed. Restrictions on less preferred foods did not present participants with the same self-management challenges.

Conclusions Promoting behavioural change techniques such as decisional balance, and social support, may be a useful strategy to empower people following dietary restrictions.

Practitioners should understand whether suggested dietary restrictions include an individual's favourite food; the value attached to it, and explore specific ways to include favourite foods in some way when discussing a low potassium diet.

Key words Kidney Diseases, Nutrition Therapy, Renal Diet

Introduction

Over 11% of the global population (mean 13.4% [95%CI: 11.7-15.1]) live with, and self-manage, chronic kidney disease (CKD) (Hill et al. 2016). Self-management can be defined as day-to-day tasks an individual must undertake to control or reduce the impact of disease on physical health status (Clark et al. 1991). In self-managing normal serum potassium levels in CKD, individuals have to decide which foods to choose; knowing that eating too much potassium could cause an irregular heartbeat (Kidney Care 2020). The immediate ramification of this means that when eating outside the home (Morris et al. 2015), dietary potassium restrictions are prioritised over other renal dietary restrictions for long term health, for example, reducing phosphate to prevent renal bone disease. Dietary potassium restrictions may present further concerns for individuals (Morris and Lycett, 2020) due, in part, to changing dietary recommendations because of declining kidney function and the increased risk of hyperkalemia (Ikizler et al 2020). However little is known how people successfully manage these challenges to restrict dietary potassium.

Literature review

A thematic synthesis of qualitative studies (n=48) reported that dietary restrictions CKD are confusing and disorientating (Palmer et al. 2015). Non-adherence to renal dietary restrictions is therefore common, for example, over 50% of haemodialysis patients have been defined as non-compliant to fluid restrictions (Barnett et al. 2008). Barriers to adherence, identified

through in-depth interviews, include competing dietary priorities between CKD and diabetes in haemodialysis (Shirazian et al. 2016). Thematic analysis of transcripts from this co-morbid group reported people who managed CKD and diabetes ate preferred foods regardless of dietary advice, knowledge and social support (Shirazian et al. 2016).

Dietitians are trained in behavioural change technique skills, for example motivational interviewing, cognitive reframing, to support dietary behavioural change (Gable and Hermann, 2015). The Modification of Diet in Renal Disease self-management randomised clinical trial (RCT) (n=840) reported dietetic support helped participants achieve a greater reduction in dietary protein over 36 months ($P < 0.001$), than those who did not see a dietitian comparison groups (Gillis et al. 1995). Furthermore, systematic review evidence of randomised controlled trials (n=790 haemodialysis patients) reported a moderate effect - 0.23mEq/L (95% CI: -0.37, -0.08) in phosphate restriction after dietetic behavioural interventions to support people choose lower phosphate foods (Milazi et al. 2017). However, specific details of the individualised dietary counselling approach taken by dietitians were lacking in many studies.

Behavioural change techniques are under reported in renal dietetics according to a systematic review of qualitative studies that considered patient attitudes to self-management in CKD (Palmer et al. 2016). Furthermore, theoretical inconsistencies underpinning CKD self-management programmes that consider diet exist, according to a systematic review of renal self-management clinical trials (Bonner et al. 2014). Renal dietitians may, therefore, be less likely to use and recommend specific behavioural change techniques, than dietitians in other specialities, due to limited information on what works for whom, and when.

Evidence from non-renal specialities may offer insight as to how people use dietary behavioural change techniques. A systematic review of qualitative interview studies (n=31)

mapped over 1,000 individuals' weight loss behaviour against behavioural change taxonomy to identify successful self-directed weight loss strategies (Greaves et al. 2017). Self-monitoring, restrictions, scheduling and professional support were common techniques used to reduce body weight. Reframing and self-experimentation were two new self-directed techniques identified through thematic analysis (Greaves et al. 2017). Further evidence that peer and professional support is successful in facilitating change was reported in the Oxford Food and Activity Behaviors (OxFAB) taxonomy. This classified cognitive and behavioral strategies used by individuals during weight management attempts (Hartmann-Boyce et al. 2016), and included distraction, impulse management and restraint as other strategies from the 23 domains identified.

Another systematic review using RCT evidence showed a significant ($P < 0.001$) reduction in body weight for obese patients who used behavioural change techniques, compared with those who did not (Standard Mean Difference (SMD) -1.47kg , 95% CI: $-2.05, -0.88$) (Armstrong et al. 2011). The review identified motivational interviewing was associated with a greater reduction in body mass compared to controls (SMD -0.51kg [95% CI $-1.04, 0.01$]) (Armstrong et al. 2011). Besides this empirical evidence in weight management, qualitative data on self-directed behavioural change techniques in other chronic conditions, such as coeliac disease, identified conscious decision making to regulate oral intake of gluten by positive self-talk and restriction of pre-specified foods, helped improve bowel function and reduce constipation (Rose and Howard, 2014). However, specific details of the individualised dietary counselling approach taken by dietitians were lacking in many studies. Furthermore, current studies underreport successful behavioural strategies and counselling techniques used to restrict dietary potassium.

Dietary restriction to prevent CKD disease complications may be particularly challenging as there are less immediate and identifiable symptoms seen because of non-adherence (Gillis et al. 1995). It is imperative, therefore, that individuals with CKD use effective self-management strategies to maximise their chances of success in adhering to dietary restrictions, in the absence of symptoms, to manage CKD mortality risk associated with dietary potassium intake (Morris et al. 2019).

The objective was to explore the experience of individuals who self-manage dietary potassium restrictions and identify successful strategies to inform behaviour change practice in dietetic consultations.

Materials and methods

[Anonymised for peer review] granted ethical approval.

For our ontological perspective, we took a constructivist paradigm (Guba and Lincoln 2005) to guide this study. Taking this perspective assumed that participants constructed their own reality of understanding and knowledge of living with dietary potassium restrictions through implementing dietary advice and reflecting on these experiences. Our epistemology was interpretivist, whereby social constructions are best captured and understood through dialogue between the renal dietitian (the observer) and the person with CKD (the observed) according to Guba and Lincoln (2005).

Purposeful sampling was used to recruit individuals undergoing haemodialysis as a patient and public involvement exercise undertaken prior to this study (*Anonymised for peer review*). Inclusion criteria was over 18 years old, prescribed a renal diet, and able to converse in English. Recruitment posters were displayed in the renal outpatient department and

explained the purpose of the study. Patients were asked to contact the lead researcher [Anonymised for peer review] for further details. Dietetic records were reviewed at this preliminary stage to ensure the researcher had not provided dietetic services to any participants, to help reduce social desirability bias. Patients were then invited to opt-in to the study by completing the consent form and returning it to the researcher to arrange a convenient time and date for the interviews in the renal outpatient department.

Semi-structured interviews were conducted face-to-face in the outpatient department. Anonymity and the right to withdraw at any time with no explanation, and without affecting the dietetic care were explained to participants. Interviews were recorded on an audio-digital recorder. An interview guide was used to ensure that relevant topics to meet the aim of the study were covered. Two participants piloted the interview guide. Open-ended questions were asked to prompt discussion and included: “Tell me about the experiences of following dietary restrictions”; “How have you made changes to your usual diet to follow dietary restrictions”; “Why did you take this particular approach?” Follow-up questions were asked such as “Which part of changing your behaviour was easier/ more difficult for you?” to explore topics further.

The researcher reflected on their role as clinician-researcher to help reduce any over influence of personal and professional status on data collection and analyses.

The lead researcher transcribed interview data verbatim. NVivo 10 software (QSR International Pty Ltd 2012) was used to provide a method of data management. Data was analysed using thematic analysis following the method of Braun and Clarke (2006). Passages, phrases or words were coded according to subject matter in line with the study’s aims across the entire data set. Codes were collated into sub themes and themes. Analysis was conducted by [Anonymised for peer review], with emergent themes verified by other members of the

research team. The final stage involved extracting vivid examples from the data to verify each emerging theme. Member checking was undertaken where participants reviewed the themes and subthemes for accuracy of experience representation.

Results

Thirty-nine adults expressed an interest in participation. Five did not proceed to interview due to other time commitments (n=3) and inpatient admission (n=2). Thirty-four White British adults (19 women, 15 men) with CKD took part (Table 1). The mean age was 66.7 ± 10.9 years and the length of time on dietary potassium restrictions was 5.2 ± 1.8 years. Our previous study reported cultural themes and behaviour strategies used by a more representative local population (*Anonymised for peer review*)

Table 1: Participant demographics

[INSERT]

Three themes emerged which represented experiences of low potassium dietary self-management.

These themes are described in further detail here. Participant (P) names are represented by numbers (1-34) to ensure confidentiality. Verbatim quotes illustrate the themes. In-text quotes are used to enrich descriptions.

‘Differing opinions on food’

This theme is about contrasting opinions that participants ‘may, or may not love that food’ (P31) that needs restricting. The emotive language used by participants to describe foods reflected how important certain items were to them. The ‘*foods I love*’ subtheme reflected participants’ enjoyment of a food, with participants naming a preferred food to eat, which they termed a ‘favourite food’ (P4). These foods were a ‘positive influence’ and made them

‘feel good about myself’ (P6), through the taste, smell, and emotions associated with eating certain foods. It was participants ‘built in passion for food’ (P5) which resulted in a ‘favourite food that I can’t live without’ (P2).

The contrasting ‘*can’t stand that*’ subtheme reflects how people did not have preferences for recommended restricted foods. These foods were described negatively and in some instance as ‘unappealing’ (P5); where foods were not liked, then restrictions were perceived as having little or no impact on lifestyles.

“I didn’t like most of those foods in your low potassium diet sheet so it was very easy for me to cut out, but if you had my favourite on there, well that would be a challenge” (P11)

‘Food generates positive emotions’

This theme is about the specific meaning that certain foods have for participants. Individuals reported being ‘attached to certain foods I love’ (P8) with two distinct subthemes: a physiological value and an emotional value to foods described. The subtheme ‘*salivated at the thought*’ centres on food taste, smell and texture stimuli widely reported as reasons for choosing certain foods. Sweet and salty foods were widely reported as having a ‘physical attachment too’ (P6) and numerous participants ‘salivated at the thought of a tasty favourite food’ (P13). Non-alcoholic bitter and sweet beverages, such as coffee and hot chocolate, were distinct flavours also reported.

The ‘*certain foods stir emotions*’ subtheme represents the emotional meaning that certain foods had to participants. Various reasons, along a continuum from positive, to less positive experiences, were narrated around particular memories of childhood and family experiences

involving food. The experiences told were of positive and happy times for these participants. Positive attachments were narrated around enjoyment with family and friends in childhood.

“That low potassium diet came very hard; because as far back as I can remember I had a banana for my breakfast, as I never ate cereals. When I was about six my father on a Saturday used to take me to the fruit wholesale market for his fruit and vegetable shop, which I loved. The fella in the banana room used to give me a handful of bananas every Saturday at the market. I went through those bananas with sheer joy”

(P4)

‘Doing what works’

This theme centres on the bespoke strategies that participants developed to incorporate dietary restrictions into their lifestyles: by ‘doing what works’ (P15) for them. The sub-theme *‘Transferring the knowledge over’* represents how people actively sought out education to understand the complexity of dietary restrictions, which inform ‘dietary knowledge’ (P18). Participants were able to restrict high potassium items in their diet, as they understood the rationale for advice, together with verbal and written nutritional knowledge obtained from dietitians, helped facilitated behaviour change.

Participants reflected on, and revisited techniques they had learnt to change previous non-dietary related behaviour, to inform their knowledge in renal self-management, for example, smoking cessation. This helped them ‘transferring the knowledge over’ (P8) from previous experiences. For example, managing nicotine cravings when participants stopped smoking helped them restrict favourite foods.

“I just stopped coffee which I loved. I miss it and got withdrawal symptoms. No it was like when I smoked. I stopped and that was it. I got up one morning and thought

“err” and put it out and never had cravings, so I knew I could do that potassium diet”
(P5)

‘You need to decide what you want’ subtheme depicts decisional balance techniques with comparison of different outcomes. Participants described how negative caveats associated with dietary advice, such as risk of a heart attack around the consequences of non-compliance to low potassium, informed behaviour. Conversely, participants considered the advantages of not following a potassium restriction, such as ‘being able to eat your normal diet’ (P6), and ‘favourite foods could be eaten’ (P12) and ‘you can keep socialising with less stress’ (P9). These cognitive processes facilitated the participants to decide if they want to change their habitual diet by choosing alternative lower potassium content meals.

“It’s fear ...fear is quite helpful in motivating you to change...particularly with potassium as there are no warning signs...everything else you can judge... with potassium, you fancy one of your favourite chocolates and think “do I really want to risk a heart attack?” (P9)

“Well I loved fresh orange juice. That was the hardest thing for me to change. When I was told I had to cut it down, I said, “You must be joking”. But when I thought about it and the effect of that potassium in my body... well I just weighed up the pluses and minuses, and soon got used to it” (P15)

The subtheme *‘Shining a positive light’* is about how people reported continuous self-talk that focused on the ‘bright side’ (P1) to remind themselves of the reasons for not eating certain foods. This technique provided self-encouragement and reassurance that ‘I’m doing the right thing’ (P14).

“It’s like when you start learning and you do things... “Can I do it yeah...? I can”. Start encouraging yourself ...“yeah I can do that” (P12).

Individuals described how they thought about the suggested dietary recommendations alongside their reason for liking a favourite food with a 'positive attitude' (P9). They identified that the basis for liking a food was 'quite irrational' (P13) and that 'shining a positive light on the situation' (P4) helped. Positive experience outcomes were described, such as 'taking away the guilt' (P16) and 'I feel better now I've cut down' (P2).

"I struggled for a long time with chocolate. That is my favourite you know I absolutely love the stuff. When they said that I had to restrict it – well to be honest it was a relief actually. It took away all that guilt I had after eating it. So yeah, my kidney problems did me a favour in a weird sort of way... a change for the good"
(P10)

'She kept it all about me' subtheme is about people obtaining motivational support to help them make dietary changes around food they found challenging to restrict. Feelings of 'doubt' (P8) and 'uncertainty' (P16) were described around choosing foods lower in potassium. Support was actively sought from family, friends and dietitians to help motivate and encourage with dietary challenges. Face-to-face support was favoured over on-line groups.

"But you still have some doubts at the back of your head and if you do not get encouraged ...it is when you are knocked back. But my mum, well she's been amazing, encouraging me with my diet at just the right time" (P14).

"The dietitian was fantastic; she kept it all about me and my diet. I tried online support but it wasn't for me, and I struggled on my own" (P9).

'I'm allowed anything mentally' subtheme represents how paradoxical thinking helped participants make dietary changes. Participants told themselves that they could eat any

‘desired favourite food’, and also acknowledging that they could not, as it would cause their serum potassium levels to rise. Individuals told themselves they could have the ‘forbidden banana fruit’ (P6) as there were ‘no diet rules, in theory’ (P2). Participants said this strategy allowed people to metaphorically ‘choose items if I wanted too’ (P17) which helped them take ‘ownership of my diet cause in theory I can eat what I like’ (P28).

“They gave me leaflets and when I started to read them, I was like.... “How the hell am I going to manage this?” I thought I would never manage it. I loved cheese and cheese on toast was my special thing at grans. So then, I went on to what I called my own diet. If I says in my diet “you can’t have it” then “have it”. You don't actually have it though; if that makes sense” (P11).

“I stopped eating as you see food as poison and you go neurotic. When you first get your potassium diet, it scares you. In the end I said “this is ridiculous, I’m allowed anything mentally” and that really worked” (P1)

Discussion

We investigated the self-directed cognitive and behavioural strategies people with ESRF employ to follow low potassium advice **by taking a constructivist paradigm and using semi-structured interviews**. Three themes were identified using thematic analysis: ‘Differing opinions of food’ ‘Food generates positive emotions’; and ‘Doing what works’.

A constructivist paradigm allowed us to capture multiple experiences on self-managing dietary potassium in society. All three themes suggested multiple realities of low potassium dietary advice; however, the ‘Differing opinions of food’ and ‘Foods generate positive emotions’ themes clearly demonstrated that the social, physical and cultural environments around food might have informed participants’ dietary related behaviour. Childhood memories around food appear to have influenced certain peoples’ physical and emotional reactions to dietary restrictions in adulthood. For example,

participants found restrictions challenging which involved their favourite foods such as participant 4 who associated his love of bananas with his childhood family and participant 11 who associated positive emotions around favourite foods and visits to family. These realities of past experiences determined how people in our study dealt with the dietary advice given. Similarities have been found in other areas, with cohort studies showing a significant association between adult overeating and reported negative childhood food experiences ($r_s=0.183$, $P<0.005$) (Brunstrom et al. 2005). Systematic review evidence has shown that overcoming these inherent dietary behaviours can be helped with individualised dietary counselling using cognitive interventions, and patient led discussions allowed people to self-manage unhelpful thoughts around food choice according to a systematic review on obesity related eating behaviours (O'Reilly et al. 2014).

Self-management strategies described in this study of adults (mean age 66.7 ± 10.9 years) living in the UK undergoing haemodialysis for 3.4 years (± 2.7) are identified as behaviour change techniques described in Michie et al.'s Behavioural Change Taxonomy (2013). Within this Delphi methodology ($n= 32$ participants) derived framework, there are 93 classifications for individual behaviours, which are grouped into 16 behavioural clusters based on change theory (Michie et al. 2013). We considered the consistency of our findings with these behavioural change techniques and theories.

In the theme 'Doing what works', self-belief is evident in the subtheme '*transferring the knowledge over*'. Participant 5 who restricted coffee using previous behaviour change for cigarette smoking cessation, demonstrated self-efficacy (Focus on Past Success [15.5]). Applying the Theory of Planned Behaviour (Armitage and Conner, 2001) to this subtheme suggests that participants may have had high levels of self-belief in their ability to control their behaviour; which included planning and considering dietary changes, for example, 'purchasing different foods that were acceptable to me and my kidneys' (P4). When people in similar age groups (60-64years) with type 2 diabetes mellitus focused on past successes,

physical activity levels increased (standard mean difference (SMD) 1.47 [95% CI 0.91, 2.03]), compared to those who did not use this technique (SMD 0.48 [95% CI 0.28; 0.69]) (Avery et al. 2015). Significant subgroup analysis effect size between both groups of people was reported (Q 10.72, P=0.001). However, there is uncertainty around this technique for facilitating change given the wide confidence intervals, and the lower confidence interval is <1.00, in the group that used self-belief (Avery et al. 2015).

The subtheme '*You need to decide what you want*' describes a decisional balance technique (Comparison of Outcomes cluster 13: pros and cons [9.2]), for example, participant 15 considered the pros and cons of change and decided the advantages of the health benefits outweighed preference for their favourite food. People without CKD, who used this cognitive technique changed their food choice behaviour to increase fruit and vegetable (de Menzes et al. 2018) and iron rich foods in iron deficiency anaemia (Ibrahim et al. 2017). These are consistent findings within this subtheme and are identified as part of bespoke strategies in other subthemes, for example, '*shining a positive light*'.

The subtheme '*shining a positive light*' suggests behavioural techniques of Natural Consequences (cluster 7); Comparison of Outcomes (cluster 13) and Regulation (cluster 16) may have helped participants deal with conflict and resolution between their favourite foods and renal dietary restrictions. The Natural Consequences cluster is reflective of the consequences driving behaviour to restrict dietary potassium. For example, the consequence of declining renal function led participants to restrict potassium rich chocolates, as did the resulting feelings of guilt that accompanied eating something that was forbidden. Although in many studies around weight control, forbidding foods actually increases desirability and consumption (Jansen et al. 2007) so perhaps different factors are at play in those with CKD. Where the comparison of perhaps the more seriously perceived outcomes (cluster 13; pros and cons [9.2]) of deteriorating renal function outweighed the pleasure of eating a favourite

foods. People using self-management strategies for weight control identified regulation of behaviour through pre-specified food avoidance helped weight control (Hartmann-Boyce et al. 2016), which implies this technique may be useful across different conditions and dietary intakes.

This subtheme also suggests self-talk [15.4], as reported by participants 9, 12, 16, 31 and 7, facilitates behavioural change. Further evidence for the effect of this technique is seen in dietary management of heart failure in CKD. Positive self-talk was undertaken to increase self-care confidence such as restricting dietary sodium ($P < 0.0001$) (Riegel et al. 2009). However, heart failure patients used goal setting as part of their self-management plans, which in our study, was not reported. One suggestion is that participants recalled their own self-directed techniques to change behaviour as they have more meaning to them.

In the subtheme '*She kept it all about me*', social support techniques adds further evidence that face-to-face social support in renal is consistent to face-to-face social support which underpinned successful dietary self-management in other conditions where dietary management is the main non-medical management (Murray et al. 2009, Williams and Bond, 2010). Family communication and behaviours effected outcomes in ESRF according to a systematic review of cohort studies (Murray et al. 2009). Self-determination theory (Deci and Ryan, 2011) explains ways which family behaviour supported patients to self-manage through motivation (Kwasnicka et al. 2016). Avoiding direct criticism of and supporting dietary food choices are two effective family support behaviours reported in this study. This social support also facilitates behavioural change maintenance (Kwasnicka et al. 2016). Face-to-face support in other chronic conditions, such as coeliac disease, reported higher quality of life scores than those using online support, even for a longer period (72.6 versus 66.7; $P < 0.0001$) (32) as reported by P9. Study participants may have also used this support against social judgement; a barrier to following low potassium advice in social situations (4), and

may prevent self-management abandonment, seen in weight reduction programmes due to social pressure and perceived judgement (Elfhag and Rössner, 2005).

In our study, participants demonstrated an internal locus of control within the subtheme '*I'm allowed anything mentally*' such as participant 28 who 'took ownership of her diet' and participant 17 'who could choose items if they wanted too'; suggesting participants who live with CKD and have self-belief accepted responsibility and could control their dietary potassium intake. However cross-sectional single-point questionnaire data suggested, people (n=51, age range 25-85) with high internal locus of control scores (23.2 ± 5.7 units) undergoing haemodialysis, were less likely to adhere to dietary potassium restrictions compared to those with lower scores (18.8 ± 5.3 units) (Gibson et al. 2016). People who adhered had greater belief in the importance of other people, such as renal dietitians, than those who did not adhere to restrictions. The mean locus of control scores, however, overlap between groups indicating people in both groups may have had similar high levels of internal control. Further supporting evidence, for example, from RCTs by Howren et al (2016) and Rosenbaum et al (1986), supports our interpretation that a higher internal locus of control facilitates behavioural change in that people with higher self-belief and control had better adherence to fluid restrictions, than those with lower internal locus of control scores.

There is evidence in our thematic analysis that themes relate through behavioural change theory; for example, The PRIME Theory of Human Motivation (West and Brown, 2013) offers explanations, within and between, the 'Foods generates positive emotions' and 'Doing what works' themes. Participants in our study demonstrated both reflective and automatic motivation to explain behavioural self-management. For example, within the sub-theme '*salivated at the thought*' of a favourite food, in the theme, 'Food generates positive

emotions’; automatic motivation suggests emotional attachments to the foods promote instinctive behaviour to consume these foods. This motive to consume favourite foods was driven by thoughts that consuming said items recalled associated feelings of anticipated pleasure and satisfaction (West and Brown, 2013). The behaviour is stimulated through memory recall according to PRIME theory, for example, participants 13 who ‘salivated at the thought of a tasty favourite food’.

Reflective motivation is demonstrated in the ‘Doing what works’ theme. This motivation involves deliberated decision making to act in a particular way (West and Brown, 2013), for example, participant 15 reflected on the consequences to change behaviour; reporting initial shock on being advised to reduce potassium “You must be joking”. Personal reflection is implied in the comment “when I thought about it and the effect of that potassium in my body” which resulted in acceptance and behaviour change, as they “soon got used to it”.

To increase qualitative rigour we undertook piloting, member checking, reflexivity and peer review of the analysis. The consistency of our results with BCT provided credibility to the study.

However, we did not choose to map data from our initial analysis on to a BCT framework, as this may not have captured all described self-directed behavioural techniques. Undertaking triangulation would have increased rigour further. This qualitative study represents the self-management experiences of 34 White British adults with ESRF on maintenance haemodialysis. **It does not represent the experiences of the culturally diverse population under the renal service.**

Implications for clinical practice

Practitioners should recognise and acknowledge that people may develop their own strategies to integrate low potassium advice into their food environments. Accepting that this may involve experimenting with the advice given so their low potassium diet is compatible with their lifestyle (Morris and Lycett, 2019) may be important in maintaining a helpful professional-patient relationship (Morris et al. 2018).

Recognising individual past experiences with food in renal dietetics may place an important role in dietary adherence. As such, we recommend that practitioners help people identify and understand their favourite foods and any meaning attachment to predict the impact that restricting these foods may have. If identified, it may help to move patients away from memories of childhood and foods, to the present, using techniques like mindful eating (O'Reilly et al. 2014). Explaining to individuals the complex reality of dietary restrictions and possible barriers to food choices for their kidney function may be one support intervention (Morris et al. 2018).

Encouraging social support to help with motivation and self-belief alongside teaching decisional balance may be suitable for some patients who want to self-manage with, or without, ongoing dietetic support. Working through a decisional balance model within a consultation may allow patients to discuss and consider the advantages and disadvantages of following a low potassium diet and helps identify potential conflict with habitual diet. This could be used as an example to work through any ambiguity or conflict identified by the patient, and where guided reflection and discussion may help people identify their own reasons for changing.

Conclusion

People with CKD use bespoke behavioural change techniques to incorporate dietary potassium restrictions into their lifestyles. Realities of experiences around food determined

how people dealt with dietary potassium restrictions. Practitioners should understand whether suggested dietary restrictions include an individual's favourite food; the value attached to it, and explore specific ways to include favourite foods in some way when discussing a low potassium diet.

For Review Only

Table 1: Participants demographics

Demographic	Data
Age	66.7± 10.9 years
Sex	56% female
Length of time living with CKD	14.1 ± 8.2years
CKD cause	
Hypertension	11
Diabetes	18
Polycystic kidney disease	2
Other (e.g. Lupus)	3
Marital status	80% married
Highest level of education	2 postgraduate degree 6 undergraduate degree 21 secondary school 5 no formal education
Employment status	5 employed 26 retired 3 unemployed
Time on dialysis	3.4 ± 2.7years
Dietetic contacts (face-to- face/ non face-to-face e.g. review of biochemistry) (mean frequency over past 12 months, as recorded in dietetic records)	9 ± 4.3 consultations

Addolorato G, Mirijello A, D'Angelo C, Leggio L, Ferrulli A, Vonghia L, Cardone S, Leso V, Miceli A, Gasbarrini G. (2008). Social phobia in coeliac disease. *Scandinavian Journal of Gastroenterology* 43, 410-5.

Armitage, C.J. and Conner, M., (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British journal of social psychology* 40, 471-499.

Avery, L., Flynn, D., Dombrowski, S.U., Van Wersch, A., Sniehotta, F.F. and Trenell, M.I., (2015). Successful behavioural strategies to increase physical activity and improve glucose control in adults with type 2 diabetes. *Diabetic Medicine* 32, 1058-1062.

Armstrong, M.J., Mottershead, T.A., Ronksley, P.E., Sigal, R.J., Campbell, T.S. and Hemmelgarn, B.R., (2011). Motivational interviewing to improve weight loss in overweight and/or obese patients: a systematic review and meta-analysis of randomized controlled trials. *Obesity Reviews* 12, 709-723.

Barnett T, Li Yoong T, Pinikahana J, Si-Yen T. (2008). Fluid compliance among patients having haemodialysis: can an educational programme make a difference? *Journal of Advanced Nursing* 61, 300-6.

Bonner A, Havas K, Douglas C, Thepha T, Bennett P, Clark R. (2014). Self-management programmes in stages 1–4 chronic kidney disease: a literature review. *Journal of Renal Care* 40, 194-204.

Braun V, Clarke V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology* 1, 77-101.

Brunstrom, J.M., Mitchell, G.L. and Baguley, T.S., 2005. Potential early-life predictors of dietary behaviour in adulthood: a retrospective study. *International journal of obesity*, 29(5), pp.463-474.

Clark NM, Becker MH, Janz NK, Lorig K, Rakowski W, Anderson L. (1991) Self-management of chronic disease by older adults: a review and questions for research. *Journal of Aging and Health* 3, 3-27.

Deci EL, Ryan RM. (2011) Self-determination theory. In *Handbook of Theories of Social Psychology*. Aug 31; 1:416-33.

Elfhag K, Rössner S. (2005). who succeeds in maintaining weight loss? A conceptual review of factors associated with weight loss maintenance and weight regain. *Obesity Reviews* 6, 67-85.

Gable J, Herrmann T. (2015) *Counselling skills for dietitians*. John Wiley & Sons: Chichester

Gibson EL, Held I, Khawnekar D, Rutherford P. (2016) Differences in knowledge, stress, sensation seeking, and locus of control linked to dietary adherence in hemodialysis patients. *Frontiers in Psychology* 29, 1864.

Gillis BP, Caggiula AW, Chiavaccain T, Coyne T, Doroshenko L, Milas NC, Nowalk MP, Scherch LK. (1995) Nutrition intervention program of the Modification of Diet in Renal Disease Study: A self-management approach. *Journal of the American Dietetic Association* 1, 1288-94.

Greaves C, Poltawski L, Garside R, Briscoe S. (2017). Understanding the challenge of weight loss maintenance: a systematic review and synthesis of qualitative research on weight loss maintenance. *Health Psychology Review* 11, 145-63.

Guba, E. G., & Lincoln, Y. S. (2005). *Paradigmatic Controversies, Contradictions, and Emerging Confluences*. In N. K. Denzin & Y. S. Lincoln (Eds.), *The Sage handbook of qualitative research* (p. 191–215). Sage Publications Ltd.

Hartmann-Boyce, J., Aveyard, P., Koshiaris, C. and Jebb, S.A., (2016). Development of tools to study personal weight control strategies: Ox FAB taxonomy. *Obesity* 24, 314-320.

Harris JE, Gleason PM, Sheean PM, Boushey C, Beto JA, Bruemmer B. (2009) An introduction to qualitative research for food and nutrition professionals. *Journal of the American Dietetic Association* 109, 80-90.

Hill NR, Fatoba ST, Oke JL, Hirst JA, O'Callaghan CA, Lasserson DS, Hobbs FR. (2016) Global prevalence of chronic kidney disease—a systematic review and meta-analysis. *PloS one*.11(7).

Howren MB, Kellerman QD, Hillis SL, Cvengros J, Lawton W, Christensen AJ. (2016). Effect of a behavioral self-regulation intervention on patient adherence to fluid-intake

restrictions in hemodialysis: a randomized controlled trial. *Annals of Behavioral Medicine*.50, 167-76

Ibrahim, H.A.F., El Sayed, H.A.E. and El-aal, E.M.A., (2017). Diet Behavior Modification of Pregnant Woman with Iron Deficiency Anemia Using Construct of the Trans-Theoretical Model: A Theory-Based Study. *IOSR Journal of Nursing and Health Science*, 6, 1-7.

Ikizler, T.A., Burrowes, J.D., Byham-Gray, L.D., Campbell, K.L., Carrero, J.J., Chan, W., Fouque, D., Friedman, A.N., Ghaddar, S., Goldstein-Fuchs, D.J. and Kaysen, G.A. (2020) KDOQI clinical practice guideline for nutrition in CKD: 2020 update. *American Journal of Kidney Diseases*, 76(3), S1-S107.

Jansen, E., Mulkens, S. and Jansen, A., (2007). Do not eat the red food!: prohibition of snacks leads to their relatively higher consumption in children. *Appetite* 49, 572-577.

Kidney Care (2020) Lowering your potassium levels. https://www.kidneycareuk.org/documents/260/Lowering_your_potassium_levels.pdf. Last accessed 27.10.20

Kwasnicka D, Dombrowski SU, White M, Sniehotta F. (2016) Theoretical explanations for maintenance of behaviour change: a systematic review of behaviour theories. *Health Psychology Review* 10, 277-296

de Menezes MC, Roux AV, de Lima Costa BV, Lopes AC. (2018) Individual and food environmental factors: association with diet. *Public Health Nutrition* 21, 2782-92.

Milazi M, Bonner A, Douglas C. (2015). Effectiveness of educational or behavioural interventions on adherence to phosphate control in adults receiving hemodialysis: a systematic review. *JBI database of systematic reviews and implementation reports*. 15, 971-1010.

Michie S, Richardson M, Johnston M, Abraham C, Francis J, Hardeman W, Eccles MP, Cane J, Wood CE. (2013). The behaviour change technique taxonomy (v1) of 93 hierarchically clustered techniques: building an international consensus for the reporting of behaviour change interventions. *Annals of Behavioral Medicine* 13, 81-95.

Morris, A. and Lycett, D. (2020). Experiences of the Dietary Management of Serum Potassium in Chronic Kidney Disease: Interviews with UK Adults on Maintenance Hemodialysis. *Journal of Renal Nutrition* [published online ahead of print, 2020 Apr 6]. doi:10.1053/j.jrn.2020.01.025

Morris, A., Love, H., van Aar, Z., Liles, C. and Roskell, C., 2015. The problematic world of following a renal diet outside the home. *Journal of Renal Care*, 41(4), pp.253-259.

Morris A, Herrmann T, Liles C, Roskell C. (2018). A qualitative examination of patients experiences of dietitians' consultation engagement styles within nephrology. *Journal of human nutrition and dietetics*. 31, 12-22.

Morris A, Biggerstaff D, Krishnan N, Lycett D. (2018). Identifying barriers and enablers in the dietary management of chronic kidney disease using the PEN-3 cultural model. *Journal of Human Nutrition and Dietetics* 31, 11.

Morris, A., Krishnan, N., Kimani, P.K. and Lycett, D., 2020. Effect of dietary potassium restriction on serum potassium, disease progression, and mortality in chronic kidney disease: a systematic review and meta-analysis. *Journal of Renal Nutrition*, 30(4), pp.276-285.

Murray MA, Brunier G, Chung JO, Craig LA, Mills C, Thomas A, Stacey D. (2009). A systematic review of factors influencing decision-making in adults living with chronic kidney disease. *Patient Education and Counseling* 76, 149-58.

O'Reilly GA, Cook L, Spruijt-Metz D, Black DS. (2014) Mindfulness-based interventions for obesity-related eating behaviours: a literature review. *Obesity reviews* 15, 453-61.

Palmer SC, Hanson CS, Craig JC, Strippoli GF, Ruospo M, Campbell K, Johnson DW, Tong A. (2015) Dietary and fluid restrictions in CKD: a thematic synthesis of patient views from qualitative studies. *American Journal of Kidney Diseases* 65, 559-73.

QSR International Pty Ltd. (2012) NVivo qualitative data analysis software. Version 10.

Riegel B, Dickson VV, Garcia LE, Creber RM, Streur M.(2017) Mechanisms of change in self-care in adults with heart failure receiving a tailored, motivational interviewing intervention. *Patient Education and Counselling* 1, 283-8.

Rose C, Howard R. (2014) Living with coeliac disease: a grounded theory study. *Journal of Human Nutrition and Dietetics* 27, 30-40.

Rosenbaum M, Ben-Ari Smira K. (1986) Cognitive and personality factors in the delay of gratification of hemodialysis patients. *Journal of Personality and Social Psychology*. 51, 357.

Shirazian S, Crnosija N, Weinger K, Jacobson AM, Park J, Tanenbaum ML, Gonzalez JS, Mattana J, Hammock AC. (2016). The self-management experience of patients with type 2 diabetes and chronic kidney disease: a qualitative study. *Chronic Illness*, 218-28.

Williams KE, Bond MJ. The roles of self-efficacy, outcome expectancies and social support in the self-care behaviours of diabetics. *Psychology, Health & Medicine*. 2010, 7:2, 127-141, DOI: 10.1080/13548500120116076

West R, Brown J. *Theory of addiction*. John Wiley & Sons; 2013 Aug 14.