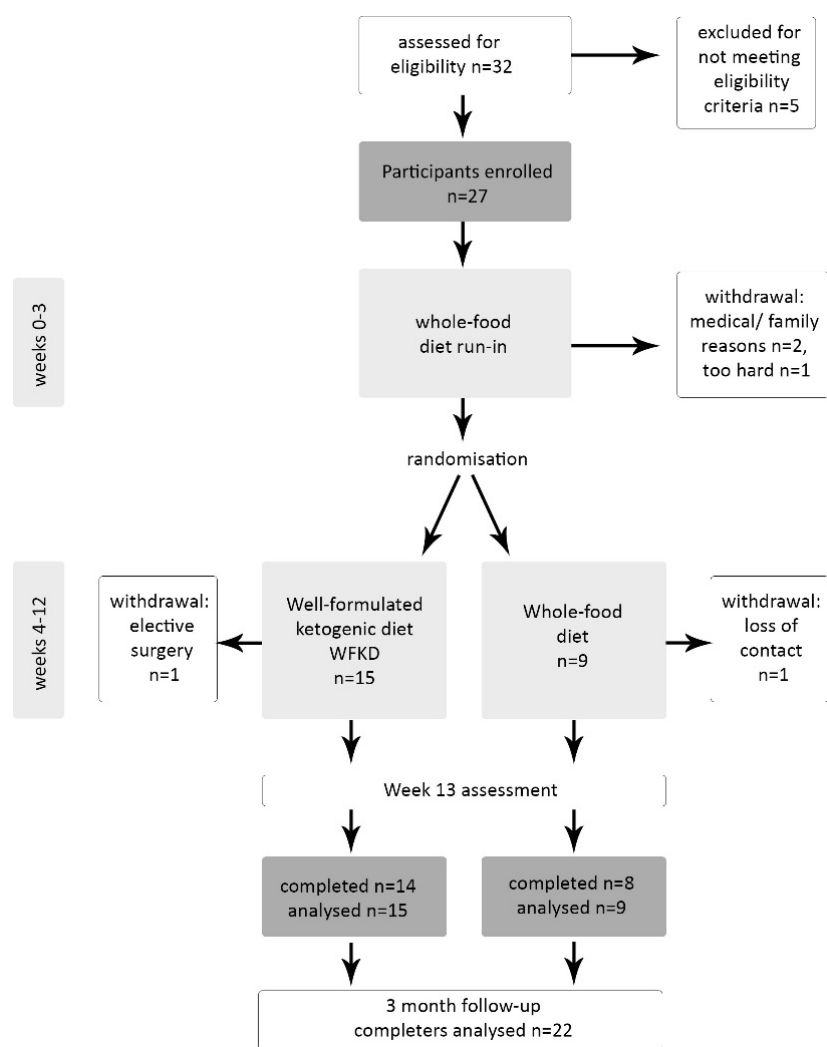


Supplementary Figure 1 – Trial participant flow



Field R, Pourkazemi F, Rooney K. Effects of a low-carbohydrate ketogenic diet on reported pain, blood biomarkers and quality of life in patients with chronic pain: A pilot randomised clinical trial. *Pain Med.* 2021; pnab278. By permission of Oxford Press.

Supplementary Table 1. Study Timeline

time point	-week 1+	week 0	week 1	week 2	week 3		week 4	week 5	week 6	week 7	week 8	week 9	week 10	week 11	week 12	week 13	week 18	Week 24
		face to face contact			face to face contact											face to face contact		
initial contact	x																	
online screening	x																	
enrolment	x																	
Dietary education		x			x				x		x		x					
blood test					x											x		
anthropometric testing		x														x		
Diet Satisfaction Questionnaire		x														x		
Brief Pain Inventory		x														x		x
Quality of Life Questionnaire		x														x		x
Additional questions		x														x		x
WFD run-in							WFD CONTINUATION											
email or text contact	x		x	x			x								x		x	
telehealth review (control)									x		x		x					
finger-prick testing (control)		x			x		x	x	x	x	x	x	x	x	x			
AS24 food recall	x				x				x		x		x			x		x
daily diary entry		x	x	x	x		x	x	x	x	x	x	x	x	x			
WFD run-in							WFKD INTERVENTION											
email or text contact	x		x	x											x		x	
telehealth review (intervention)							x		x		x		x					
finger-prick testing (intervention)		x			x		xxxxxxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx			
AS24 food recall	x				x				x		x		x			x		x
daily diary entry		x	x	x	x		x	x	x	x	x	x	x	x	x			

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Supplementary Table 2 – Dietary Satisfaction Questions

1	How satisfied are you with the amount of time it takes to cook/prepare your meals?
2	How satisfied are you with the variety of your diet?
3	How satisfied are you with the time it takes to shop for food?
4	How satisfied are you with the enjoyment you get from eating?
5	How satisfied are you with the flexibility of your diet?
6	How satisfied are you with your ability to eat out at restaurants or friends' homes?

Scoring: 1= very satisfied, 5= very unsatisfied. A lower total score indicates a higher level of satisfaction

Supplementary Table 3 – Participant responses

Week 13		
What were the biggest challenges in sticking to the dietary intervention?		
	Answers	Extracted code
WFD	Making sure what I was within the guidelines. Completing the Dietary - ASA24 form.	<i>New knowledge integration</i> <i>Time management</i>
	Staying with family over the Christmas New Year period. Big increase in stressors / anxiety in the last four weeks or so made it difficult for me to consistently find the self-control to avoid the food I needed to. Before then I found this quite easy	<i>Lack of individual food control</i> <i>Social food environments</i> <i>Emotional attachment to eliminated foods</i>
	Sticking to the correct food during festivities	<i>Social food environments</i>
	Going out for dinner. Choosing takeaway food. Christmas food	<i>Social food environments</i>
	Having to make things from scratch when life is busy & takeaway or quick dinners are not an option. Finding variety in things I could eat. I'm a reluctant cook so spending time trying new recipes is not something I enjoy.	<i>Time management</i> <i>New knowledge integration</i>
	Being around people in different dining environments and trying to choose your food wisely	<i>Social food environments</i> <i>New knowledge integration</i>
	Shopping for food.	<i>New knowledge integration</i>
	Missing certain foods and not being able to get good quality whole foods to buy for lunch when I go out for the day, or when I have coffee with friends. Temptations to eat sugary foods when out.	<i>Emotional attachment to eliminated foods, Social food environments</i>
WFKD	My mood (depression), time and being prepared/organised.	<i>Psychological status, Time management</i>
	Coming to terms with higher rates of fat allowed on the diet.	<i>New knowledge integration</i>
	Missed having bread & porridge	<i>Emotional attachment to eliminated foods</i>
	having time to prepare / take food with me	<i>Time management</i>
	Christmas and new year, was going very well until then.	<i>Social food environments</i>
	To remember to take own food when spending the day out.	<i>Time management, New knowledge integration</i>
	Getting used not eating bread	<i>Emotional attachment to eliminated foods</i>
	The biggest challenge was getting my bowels to adjust to the diet.	<i>Physiological adaptation</i>
	The amount of celebrations i.e., Christmas, new year, family birthdays in our family. Which meant that there was so much food around which was not part of my program. Getting used to not eating bread and sweets etc	<i>Social food environments</i> <i>Emotional attachment to eliminated foods</i> <i>Lack of individual food control</i>
	Dessert and sweets	<i>Emotional attachment to eliminated foods</i>
	one of the challenges was staying under the recommended carb count, it's surprising how quickly it adds up! after a few weeks it was easy, and in the last 4 weeks of the trial I tried to keep carbs at 20g which is when I started feeling better	<i>New knowledge integration</i>
	Going to visit friends who serve up non-keto food.	<i>Lack of individual food control</i> <i>Social food environments</i>
	Just the time to prepare food.	<i>Time management</i>
	snacks. difficulty in eating enough to carry me through to the next main meal. bread and sugar	<i>Emotional attachment to eliminated foods,</i> <i>New knowledge integration</i>
	Not enough variety. Snack foods.	<i>Food restriction, Emotional attachment to eliminated foods</i>
Week 13		
Which parts of the program (content, delivery, support etc) did you find most helpful?		
WFD	Awareness & what I've learnt about foods, my eating habits, link between diet/pain and just participating. [The researcher] has been great to work with, supportive and accommodating - Thanks heaps.	<i>New knowledge integration</i> <i>Structured support/coaching</i>

	Delivery. Reminder texts from [the researcher] when necessary	<i>Structured support/coaching</i>
	The face to face and emails as I was able to ask any questions at any time.	<i>Structured support/coaching</i> <i>New knowledge integration</i>
	Reminder text	<i>Structured support/coaching</i>
	[the researcher's] support was great especially in the beginning when I was asking if certain foods were ok to eat.	<i>Structured support/coaching</i> <i>New knowledge integration</i>
	The hand outs and having periodic meetings with [the researcher].	<i>Structured support/coaching</i> <i>Comprehensive learning materials</i>
	Learn about food and nutrition and what processed food and additives does to our body. Also I enjoyed fortnightly chats with [the researcher].	<i>New knowledge integration</i> <i>Structured support/coaching</i> <i>Comprehensive learning materials</i>
	Access to [the researcher] when uncertain of certain foods. The handouts were all helpful. Didn't mind doing the daily diet diary.	<i>Structured support/coaching</i> <i>Comprehensive learning materials</i> <i>New knowledge integration</i>
WFKD	[The researcher's] support was great. I like it was all online.	<i>Structured support/coaching,</i> <i>Comprehensive learning materials</i>
	Video chats, Links to videos on LCHF speakers Links to recipes	<i>Comprehensive learning materials</i> <i>Structured support/coaching,</i>
	?	
	All the information available to understand why and how this diet works.	<i>Comprehensive learning materials</i> <i>New knowledge integration</i>
	The booklet with the list of ingredients that we can and can't eat and the table with nutrients.	<i>Comprehensive learning materials</i>
	All articles	<i>Comprehensive learning materials</i>
	Being able to monitor ketone blood levels and see how directly they related to how little pain I was experiencing really shocked me (in a good way). [The researcher] also delivered the diet information and requirements in a really simple non-confrontational way.	<i>Objective feedback</i> <i>Structured support/coaching,</i> <i>Comprehensive learning materials</i> <i>New knowledge integration</i>
	The support and having the blood finger prick ketone test to know you were on the right track	<i>Objective feedback</i> <i>Structured support/coaching,</i> <i>New knowledge integration</i>
	[the researcher] was really helpful	<i>Structured support/coaching</i>
	Every part of the program was excellent. The content was very helpful, the delivery of the program was exceptional, and i loved the support, [the researcher] regularly made time to video call during the trial to catch up to see how things were going and if i needed help with anything, and was always so quick to reply via email if i had any questions	<i>Structured support/coaching,</i> <i>Comprehensive learning materials</i>
	All of it.	<i>Objective feedback</i> <i>Structured support/coaching,</i> <i>Comprehensive learning materials</i>
	Measuring Ketones	<i>Objective feedback</i>
	Support was fantastic. Recipes etc as well. Wouldn't have continued without it.	<i>Structured support/coaching,</i> <i>Comprehensive learning materials</i>
	Support	<i>Structured support/coaching,</i>
Week 13		
Were there any other impacts that you think the diet had on you?		
WFD	I look forward to reading the findings of the survey.	
	No	
	I was able to work out and control my other triggers to my pain a lot better	<i>Body/health awareness</i>
	Thinking more about continuing not to consume Preservatives	<i>Body/health awareness</i> <i>Altered dietary preferences</i>
	The diet has curbed my sugar cravings esp chocolate cravings. I have switched our family to pure butter. I have even grown to like hommus a bit too after previously hating it!!	<i>Altered dietary preferences</i> <i>Body/health awareness</i>
	General well being	<i>General wellbeing</i>
	Appreciate eating basic food. Learning to read labels in food. Enjoying homemade food and knowing that its good for you.	<i>Altered dietary preferences</i> <i>Food appreciation/enjoyment</i>
	I found that I was able to do things in the garden or stand on my feet for longer periods before having to stop and rest.	<i>Activity tolerance</i>
WFKD	It was positive. I just need to push through my depression and stick with it.	<i>Psychological wellbeing</i>
	Noticeable uplift in my mood. Decreased anxiety and depression. Improved length of sleep time.	<i>Psychological wellbeing</i>
	made me feel like I was healthier	<i>General wellbeing</i>
	Definitely felt better overall lost 5kg without trying and seemed to reduce bloating and reflux.	<i>Metabolic health</i>
	Great impact on digestive system	<i>Gut health</i>

	Really convinced it decreased my pain	<i>General wellbeing</i>
	Knowing I can control most of my pain with a low carb diet has been incredibly empowering. I don't worry nearly as much about my future health as I used to and I find it much easier to do normal everyday things without being exhausted all the time. Thankyou from the bottom of my heart.	<i>Body/health awareness</i> <i>Psychological wellbeing</i> <i>Activity tolerance</i>
	I think it has improved my mood and I feel better in myself and my body feels better. It has had a positive impact on my mental health	<i>Psychological wellbeing</i> <i>Body/health awareness</i>
	Mental Health, Energy levels	<i>Psychological wellbeing</i> <i>Activity tolerance</i>
	I experienced lots of great improvements, * Reduction in appetite, pre diet change i was always so hungry and now i can go hours without food *Heartburn disappeared *more energy, *improved cognitive function, better concentration, no brain fog *no more PMS , less bleeding during a period, not painful no more cramps, no water retention- yay! * better skin complexion, no acne *weight loss *improved mood *I suffer from constipation, during the diet trial i experienced regular soft bowel movements	<i>Body/health awareness</i> <i>Psychological wellbeing</i> <i>Activity tolerance</i> <i>Metabolic health</i> <i>Gut health</i>
	Made me realise how much I miss eating fresh fruit, other than strawberries and blueberries.	<i>Altered food preferences</i>
	none	<i>None</i>
	I learnt a lot more about carbs mainly. Was an interesting experience. Am more aware of what I eat now.	<i>Altered dietary preferences</i> <i>Body/health awareness</i>
	Weight loss. Discipline.	<i>Metabolic health</i>
3-month follow-up		
What factors have influenced this decision regarding your diet? (e.g. the pain reduction made it worthwhile, I couldn't see the benefit, it was too hard to do) (decision regarding time now on the diet in brackets)		
WFD – (most)	I find it hard to stick to emotionally. However I keep an watch on what a prepared food has in it (except for Ice cream)	<i>Psychological stress limiting behavioural change</i>
WFD – (a little)	It was hard to do and I have struggled to have the mental energy to keep it going due to stressful situations	<i>Psychological stress limiting behavioural change</i>
WFD – (most)	I generally feel better and have less bloating when sticking to the diet	<i>Physiological benefits of diet consistency</i>
WFD – (most)	The pain reduction made it worthwhile. I felt better	<i>Physiological benefits of diet consistency</i> <i>Pain benefits of diet consistency</i>
WFD – (a little)	I didn't see a huge difference in pain either on the trial or off it. Nor did it help my sleep, which has been bad for years. I tried low carb for a few weeks following the trial but ended up dreadfully constipated and still haven't completely gone back to normal.	<i>Lack of objective results</i>
WFD – (all, changed to keto)	Pain reduction made me do this diet and stick to it because I could feel the results.	<i>Pain benefits of diet consistency</i>
WFD – (some)	Learning about good food and bad food and how it affects our health.	<i>New knowledge integration</i>
WFD – (some)	Convenience and enjoying eating things I enjoy occasionally but trying to limit how much I have in a day.	<i>New knowledge integration</i> <i>Implementation challenges</i>
WFKD (a little)	Life has been hectic, not organized enough	<i>Time management</i>
WFKD (most)	The results from the initial study of my being carbohydrate intolerant and insulin resistant and the potential to develop T2D was the incentive for me to continue with LCHF dietary lifestyle. I have noticed pain reduction with regard to fibromyalgia symptoms. While I don't feel the dietary changes have had any bearing on the issue of degenerative arthritis of my hip I do feel it has helped my mood in a positive way, therefore I'm happy to continue with LCHF.	<i>New knowledge integration</i> <i>Pain benefits of diet consistency</i> <i>Psychological wellbeing</i>
WFKD (some)	It felt healthier and the pain was a little better although it was hard to maintain diet (time wise and being organised)	<i>Physiological benefits of diet consistency</i> <i>Implementation challenges (Time management)</i>
WFKD (some)	I love food and cooking so slowly carbs crept back into my diet. I have decided to go back onto the diet because my pain level has increased.	<i>Pain benefits of diet consistency</i> <i>Diet experimentation</i>
WFKD (none)	I wanted see if going back to normal diet would affect inflammation levels.	<i>Diet experimentation</i>
WFKD (most)	Pain reduction made it Definitely worthwhile	<i>Pain benefits of diet consistency</i>
WFKD (some)	I have been travelling a lot and away from home. It is much harder to maintain a routine	<i>Implementation challenges (eating out)</i>

WFKD (most)	It made me feel better mentally which had a roll on effect. I also physically felt better and lost weight. I'm no longer taking antidepressants or my nortriptyline medication daily for my chronic pain.	<i>Pain benefits of diet consistency</i> <i>Psychological wellbeing</i> <i>Physiological benefits of diet consistency</i>
WFKD (some)	Too busy, too many birthdays to go	<i>Implementation challenges (time management)</i>
WFKD (most)	I was feeling better, more happy, more energy. I lost some weight and that motivated me to keep going. It was easy to stick to.	<i>Psychological wellbeing</i> <i>Physiological benefits of diet consistency</i>
WFKD (most)	I like the diet. I try to stick to it, but stray a little sometimes. Have to watch how much dairy I have. Also have to cut down on red meat.	<i>Diet enjoyment</i> <i>Implementation challenges</i>
WFKD (some)	Working, time to prepare the food	<i>Implementation challenges (time management)</i>
WFKD (some)	It was too much work for no change in our health.	<i>Implementation challenges (time management)</i> <i>Lack of objective results</i>
WFKD (a little)	I didn't see any changes and didn't like the foods	<i>Lack of objective results,</i> <i>Lack of diet enjoyment</i>
3-month follow-up		
Reflecting back on your 12 weeks of the dietary trial and the 3 months since, do you think changing your diet altered any other aspects of your health or well-being? If so, what changed?		
WFD	I was happy to be looking after my well-being. However, due to unforeseen circumstances with my prosthesis failing I don't think I was able to give my best attention / commitment to the trial.	<i>General health and well-being</i>
	Since stopping the dietary trial my weight has increased.	<i>Weight management</i>
	General feeling of wellness	<i>General health and well-being</i>
	i feel better	<i>General health and well-being</i>
	It caused me to look closer at preservatives and additives in our foods. I've made some small adjustments for my family cooking.	<i>General health and well-being</i>
	My pain has changed. Lessened a lot. Depending on what I have done or eaten can change my pain experience in one day. I have unintentionally lost weight and that makes me feel good. I have been more in tune with my body. I seem to get days where I have high energy. Then I have days where I am really fatigued and a bit foggy. I am not sure why this happens I am not able to define it. I seem to have more clarity on how my body runs.	<i>General health and well-being</i> <i>psychological health</i>
	I had more energy, I felt good inside as in less bloated etc, I was very happy to learn about food and nutrition.	<i>energy</i> <i>gut health</i>
	Going on the diet helped me to lose 3 kilos which has had a beneficial affect on my blood pressure, and feeling of well being has improved because of the weight loss.	<i>General health and well-being</i>
WFKD	Probably. But it was stressful.	
	Yes, definitely a change in my mood, more positive more of the time. Brain fog is for the most part gone.	<i>psychological health</i>
	Felt healthier	<i>General health and well-being</i>
	Definitely my reflux almost disappeared on keto. It has since increased with my carb intake. I didn't have the 3pm slump (where i was looking for a coffee or chocolate) on keto. I slept better, but sleep maybe affected by current stressful events more than diet.	<i>gut health,</i> <i>energy,</i> <i>sleep</i>
	It has definitely improved gut function and energy levels.	<i>gut health, energy</i>
	More energy	<i>energy</i>
	The month after trial I stuck to low carb and felt good. Pain and inflammation in back, legs and arms has returned due to stress and poor diet.	<i>General health and well-being</i>
	Yes it had a positive effect on my mental health and general wellbeing. I'm no longer taking antidepressants	<i>psychological health</i>
	Yes. My mood	<i>psychological health</i>
	yes, overall health and well being has improved. no more heartburn no more constipation no more PMS, lighter period, with less clotting sleep is better mood is better skin looks better	<i>General health and well-being,</i> <i>psychological health</i>
	Stayed the same.	<i>NA</i>
	No not really	<i>NA</i>
	The only benefit was losing some weight.	<i>Weight management</i>
	It became a concern as I was losing weight and I'm thin as it is.	<i>Weight management</i>

Supplementary Table 4. Nova Classification

Nova 1	Nova 2	Nova 3	Nova 4
Unprocessed or minimally processed foods	Processed ingredients	Processed foods	Ultra-processed food and drinks
Unprocessed foods include the natural edible food parts of plants and animals. Minimally processed foods have been slightly altered for the main purpose of preservation, but which does not substantially change the nutritional content of the food. Examples include cleaning and removing inedible or unwanted parts, grinding, refrigeration, pasteurization, fermentation, freezing, and vacuum-packaging.	Food ingredients derived from a minimally processed food by pressing, refining, grinding, or milling. They are typically not eaten on their own but used to prepare minimally processed foods.	Foods from either of the two previous groups that have added salt, sugar, or fats. These foods usually are made from at least 2-3 ingredients and can be readily eaten without further preparation	These are foods from the prior group that go beyond the incorporation of salt, sweeteners, or fat to include artificial colours and flavours and preservatives that promote shelf stability, preserve texture, and increase palatability. Several processing steps using multiple ingredients comprise the ultra-processed food. They are typically ready-to-eat with minimal additional preparation. These foods tend to be low in fibre and nutrients.
fresh fruits, vegetables, whole grains, rice, nuts, meats, seafood, herbs, eggs and milk	oils from plants, seeds, and nuts, or flour and pastas formed from whole grains	canned fruits and vegetables, some cheeses, freshly made bread, and canned fish	sugary drinks, flavoured milks, energy drinks, packaged breads and buns, cookies, crackers, chips & fries, takeaway food, ice-cream, flavoured yoghurts, breakfast cereals, frozen dinners, hotdogs, chicken nuggets, pizza, burgers, sauces and luncheon meats.

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