A psychosocial intervention for individuals with advanced chronic kidney disease: a feasibility randomised controlled trial

Short running head: Psychosocial intervention for advanced CKD

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Abstract

Objective: The aim of the current study was to evaluate the feasibility and preliminary efficacy of a psychosocial intervention, the Kidney Optimal Health Program (KOHP), in reducing symptoms of depression and anxiety in individuals with advanced chronic kidney disease (CKD).

Methods: Patients with stage 4 or 5 CKD were recruited from a hospital nephrology out-patient clinic and randomised to either a nine-session psychosocial intervention program or to usual care. Feasibility was assessed through recruitment and retention rates and program acceptability. Participants completed assessments of depression, anxiety and psychosocial health at baseline and at 3-, 6- and 12-month follow-up. For full completion cases, a repeated-measures ANOVA was used to compare control and intervention groups on outcomes over time and assess the preliminary efficacy of KOHP.

Results: 128 patients were screened for eligibility; 84 consented to participant and were randomised to receive the KOHP intervention (*N*=42) or usual care (*N*=42). 27 (32.1%) participants withdrew prior to baseline assessment. Of those who completed the baseline assessment (*N*=57), trial retention was high (75.4% at 3-months, 80.7% at 6-months and 70.2% at 12-months follow-up). Participants reported high levels of program acceptability. The patients who completed the KOHP intervention (*N*=17) demonstrated significantly decreased depression at 12-month follow-up compared to the usual care group (*N*=13).

Conclusion: The results support the feasibility of the KOHP intervention in recruitment, retention and program acceptability with an improved screening protocol. Preliminary support is provided for improvement in depressive symptoms in patients with advanced CKD. Further investigation through a fully powered randomised controlled trial is warranted.

Trial registrations:

Australia and New Zealand Clinical Trials Registry (ANZCTR): ACTRN12615000810516 (05.07.15).

http://anzctr.org.au/Trial/Registration/TrialReview.aspx?ACTRN=12615000810516

Keywords

Psychosocial; randomised controlled trial; chronic kidney disease; depression; anxiety; quality of life

Declarations of interest

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Introduction

Chronic kidney disease (CKD) is a global healthcare problem. The Global Burden of Disease study estimated that between 5-10 million people worldwide die from kidney disease each year, with incidence steadily increasing (1). Approximately 10% of Australians present with at least one biomedical indicator of CKD (2) and over 40% of people aged 75 or older are living with the disease (3). Moreover, CKD is a risk factor for developing other illnesses including cardiovascular disease, dementia and stroke, often resulting in a profound disease burden for patients and accounting for 2-3% of the annual healthcare budget in developed countries (4). Symptoms of kidney disease are often not evident until up to 90% of kidney function is lost (2); consequently, many people remain unaware of their condition until an advanced stage, often requiring treatment in the form of dialysis or kidney transplantation to prevent fatality. The estimated glomerular filtration rate (eGFR) is widely accepted as the best overall measure of kidney function, with a universal classification system detailing five stages of increasing kidney deterioration (5). The stages of interest in the current study are stage 4 (eGFR between 15-29mL/min) and stage 5 (when eGFR is <15mL/min) (5), and will heretofore be referred to as 'advanced CKD'.

The transition to dialysis treatment from stage 4 to stage 5 CKD requires substantial lifestyle adjustments including dietary and scheduling restrictions and physiological monitoring (6); balancing of which can prove stressful for patients. In addition, stage 5 CKD (also referred to as end stage kidney disease [(ESKD);(7)], is often associated with unpleasant symptoms such as fatigue, pruritus, constipation, sleep disturbance and swelling of the feet and ankles (8) as well as severe cognitive impairment (9); all of which contribute to an overall reduction in quality of life (QoL). The impact of ESKD on QoL is detrimental to the extent that an average patient would be willing to give up 10 years of life on dialysis in exchange for 4 years with normal

kidney function (4). Patients with advanced CKD, who are not yet dependent on dialysis, experience a comparable overall burden of symptoms and low QoL, which may be related to their anxiety about the condition including possibility of renal replacement therapy (10).

Self-management is a pertinent concept for patients with advanced CKD, given the active participation in treatments necessary to control the signs and symptoms of their condition (11). As such, patients with advanced CKD need to be confident in their capability of managing their long-term health condition (12). Self-efficacy, a mediator of self-management (13), has been associated with improved weight control and enhanced QoL in patients with ESKD (14, 15). Another important protective factor in how patients self-manage and adjust to a diagnosis of advanced CKD is perceived social support (16). Low levels of social support have been associated with decreased treatment compliance (17, 18) and higher mortality rate in patients with advanced CKD (19, 20), with suggestions that social factors are relevant to 'personalised renal medicine' (21). Just as self-efficacy and perceived social support have been identified as health determinants for patients with CKD; a patient's perception of how the disease interferes with their lives, defined as illness perception, is also an important indicator of wellbeing and QoL (22). Previous investigations into illness perceptions in patients with CKD found that poorer illness perceptions increased maladaptive coping strategies, which in turn increased both depression and anxiety (23).

The disease management burden of advanced CKD and its impact on QoL, social support and illness perceptions means that patients often experience psychological distress, with depression and anxiety affecting anywhere between 22-71% of patients with ESKD (23-33), at higher incidence than other chronic diseases (34). Depression has been associated with an array of negative prognostic outcomes including impaired functional capacity and higher rates of hospitalisation (35), as well as greater dialysis withdrawal resulting in earlier mortality (36).

Depression has also been shown to impact negatively on relationships with friends and family, motivation levels, ability to function at work and general wellbeing (16). Though less investigated, anxiety is also common in patients with CKD (37), with similar prevalence across predialysis and patients undergoing dialysis (38). Elevated anxiety has been demonstrated to negatively impact QoL (38), and may arise in predialysis patients as a result of a loss of control over reduced abilities, sexual dysfunction, frequent hospital visits and/or the threat of dialysis in the near future (39, 40). In renal units, most psychiatric services remain reactive, treating those who are referred with obvious symptoms, representing only a small proportion of those affected.

Given the significant impact depression, anxiety and psychosocial factors have on QoL and treatment prognosis in this population, there is a critical and under-recognised need for a specialised intervention for management and treatment of psychological comorbidities in individuals with advanced CKD, especially during the challenging transition to life on dialysis. Moreover, there is a dearth of research into management and prevention of depression and anxiety in individuals with advanced CKD. Previous studies have demonstrated that psychosocial interventions (an intervention that combines both psychological and social components within its framework (41)) have been effective in decreasing depression and anxiety in other chronic disease populations, yet a recent systematic review found that there are few studies investigating psychosocial interventions in individuals with advanced CKD (42).

This study aimed to evaluate the feasibility of the Kidney Optimal Health Program (KOHP) to improve the psychosocial health of advanced CKD patients, compared to usual care. KOHP is an adaptation of a psychosocial support program, the Optimal Health Program (OHP) (43), tailored to patients with kidney disease. The OHP uses a collaborative therapy framework designed to address psychosocial and physical dimensions of health that has demonstrated effectiveness in improving mental health outcomes in psychiatric populations (43, 44).

The primary objective of the current study was to determine the feasibility of conducting an 8-week psychosocial intervention in patients with advanced CKD through the following objectives to determine the appropriateness of the intervention for a definitive RCT:

i) Explore trial recruitment and retention rates.

ii) Assess the acceptability of the KOHP intervention.

The secondary objectives were to evaluate preliminary efficacy of KOHP in improving depression, anxiety, QoL, self-efficacy, social and workplace functioning, and illness perceptions in individuals with advanced CKD. It was hypothesized that:

i) Recruitment and retention rates would demonstrate feasibility and that participants would report KOHP as acceptable.

ii) KOHP would demonstrate preliminary efficacy in improving depression, anxiety and psychosocial outcomes in individuals with advanced CKD.

Methods

Research design and setting

This was a parallel pilot randomised controlled trial (RCT) to evaluate the feasibility of delivering the KOHP to individuals with advanced CKD. The KOHP was delivered as a nine-(8+1) week individualised support program using health promotion strategies and was compared to usual care. Recruitment was conducted between January 2015 to December 2018 at the nephrology unit of St Vincent's Hospital, a large metropolitan teaching hospital in Melbourne, Australia.

An executive steering committee consisting of a nephrologist, a specialist renal nurse, psychologists, psychiatrists, nurses and a health economist oversaw project planning, procedures and ongoing data collation. The study protocol was approved by the St Vincent's Hospital Human Research Ethics Committee (HREC-A 019/14) and written informed consent was obtained from all participants.

Participants

Participants were recruited from the nephrology department through out-patient clinic attendance or clinician referral. Eligible participants met the following inclusion criteria: 1) Stage 4 or 5 CKD, evidenced by an eGFR of <30ml/min confirmed from medical records; 2) 18 years or older; 3) able to converse in English without an interpreter or professional assistance; and 4) absence of established cognitive deficits impairing their ability to learn from the intervention. Exclusion criteria included: 1) presence of developmental disability or amnestic syndrome impairing their ability to learn from the intervention; 2) participants returning to dialysis following a failed renal transplant; and 3) comorbid serious illness as defined by the treating physician. Individuals who were seeking a mental health professional or taking psychotropic medications were not excluded from participating.

Randomisation, allocation and blinding

Following the initial screening and gaining of consent, participants were allocated to either intervention or control group via a computer-generated block randomisation sequence created by an independent person not directly involved in the study. Participants were randomised immediately after consent and before baseline assessments. Due to the nature and length of the intervention, it was not possible to blind either patient or investigator to the intervention allocation.

Intervention: The Kidney Optimal Health Program (KOHP)

The KOHP was delivered in nine (8 + 1 booster session) sequential sessions based on a structured workbook (see Table 1.). Sessions were approximately one hour in duration and held weekly, apart from the 'booster' session, which was held three months after session eight. Each participant was allocated to one KOHP trained facilitator who conducted the intervention.

As the KOHP adopts a holistic collaborative care approach, it was not the intention to prevent or treat depression directly, but rather to identify the impact it has on the psychosocial health of patients as per the nine sessions. In summary, session 1 introduced the KOHP within the six domains of 'optimal health'; considering the balance of mental, emotional, social, occupational, physical and spiritual needs of a person. Sessions 2 and 3 initiated development of a health plan exploring the implications and potential complications of advanced CKD and dialysis in terms of strengths and vulnerabilities in session 2 and understanding and monitoring disease impact in session 3. The focus of session 4 was on metabolic monitoring and medication management. Session 5 expanded the health plan to include key CKD treatment partnerships and supports in the community and online. Session 6 focused on change enhancement in terms of understanding past events and establishing new proactive avenues for change. The aim of session 7 was goal setting via creative problem solving and planning around the complexities of renal failure and dialysis. Session 8 strategised wellbeing maintenance and sustainability related to the CKD treatment and management. The objective of the 'booster session' (session 9) was to consolidate progress via reviewing health plans and reflecting on achievements made toward health-related goals.

A health professional (e.g. nurse, psychologist) trained in the collaborative therapy approach (2-day workshop plus regular supervision and fidelity checks) facilitated each session. The facilitator drew on advanced CKD-specific information in concordance with individual circumstances. Further, if a participant identified severe anxiety and/or depression or suicidal

ideation at any time during the study, they were referred to an appropriate mental health service. Patient participation was discontinued based upon self-request and/or feedback from the referred treating mental health service. Participants had the option of participating in sessions via face to face meeting, telephone or video call.

Standard care

The participants allocated to the control group received care as usual by the nephrology team at St. Vincent's Hospital which included education by the doctors, nurses, social worker and/or CKD educator on topics such as dietary management, fluid intake and medication management.

Table 1. Kidney Optimal Health Program (KOHP) – contents and objectives

Session	Title	Contents	Objectives
One	What is health?	a) What is optimal health? b) Behaviour can influence our health c) The health wheel d) Introduction to health plans 1, 2, 3	Understand what is involved in KOHP Provide definition of optimal health Consider how their behaviour influences their health Complete self-assessment
Two	"I Can Do" model part 1 – strengths and vulnerabilities	a) Revision of session 1 b) Overview of "I Can Do" model c) Understanding our strengths and vulnerabilities d) Introduction to Health Plan 1	Understand the "I Can Do" Model Complete their "I Can Do" Model Attempt to identify their strengths and vulnerabilities Understand principles of Health Plan 1
Three	"I Can Do" model Part 2 – Stressors and Strategies	a) Revision of "I Can Do" model b) Stressors and stress c) Strategies and their effectiveness d) Introduction to Health Plan 2	Build understanding of "I Can Do" Model Identify stressors – positive and negative Explore and monitor early warning signs Understand strategies to manage stress

			Understand principles of Health Plan 2
Four	Medication	a) Revision of session 3 b) Effective use of medication c) Monitoring medication d) Metabolic monitoring	Identify +/− aspects of medication Review medication monitoring Understand value of metabolic monitoring
Five	Collaborative partners (CP) and strategies	a) Revision of session 4 b) Collaborative partners c) Collaborative strategies d) Introduction to Health Plan 3	Understand importance of CPs Develop an "Eco Map" Identify roles of people/supports as CPs Identify strategies to develop CPs Understand principles of Health Plan 3
Six	Change enhancement	a) Revision of session 5 b) Timeline activity – understanding past events c) Revision of health wheel d) Visioning and goal setting	Understand the health time line Explore concept of Sub-optimal Health and Episode of Illness Revisit Health Wheel Explore what change means to them
Seven	Visioning and goal setting	a) Revision of session 6 b) Creative problem solving c) Goal setting d) Reflection and celebration	Identify a change and what it means Explore key steps in problem solving Understand principles of goal setting Plan to set a goal and acknowledge achievements
Eight	Maintaining	a) Revision of session 7	Understand Health Plans 1, 2 & 3

	wellbeing	b) Review of health plans c) Review health journal d) Introduce & plan booster session	Revise and update plans Understand Health Journal Plan for booster session
Booster	What is my health like now?	a) Revision and catch up b) Where are you now? c) Review Health Plan 1, 2, & 3 d) Acknowledge achievements	Identify current health status Review and update Health Plans Understand how Health Plans maintain optimal health Celebrate achievements

Outcome measures

Primary outcomes: feasibility and acceptability

i) Recruitment and retention rates were recorded at baseline, 3, 6, and 12 months follow-up. Reasons for withdrawal were recorded as one of the following: 1) Illness/death; 2) Drop-out/relocation; 3) Loss of contact; 4) Failure to return questionnaire; 5) Kidney transplant/recovery of kidney function.

ii) Perceived acceptability of the KOHP was assessed at 3-months post-baseline after completion of the KOHP using the Treatment Evaluation Inventory-Short Form (TEI-SF) (45).

Secondary outcomes: preliminary efficacy

Secondary outcome assessments took place at baseline, 3, 6, and 12 months' post-baseline. All assessments were conducted by mailing out the questionnaires to participants and providing them with reply-paid envelopes to return the completed questionnaires.

Depression and anxiety (Hospital Anxiety and Depression Scale, HADS) (46).

The HADS consists of 14 items with a 4-point scale producing two subscales: anxiety and depression. Higher scores on the anxiety and depression subscales (made up of 7 items each) reflect increased levels of anxiety and depression, with subscale scores of 0-7 indicating normal; 8-10 mild; 11-14 moderate; and 15-21 severe anxiety or depression (46). The HADS is a reliable self-report instrument with sufficient internal validity (47).

Kidney Disease Quality of Life Instrument -Short Form (KDQoL-SF) (48).

The KDQoL consists of the generic SF-36 health status survey (49) as well as 11 multi-item scales focused on QoL issues specific to patients with kidney disease. The scoring procedure for the KDQOL-SF first transforms the raw pre-coded numeric values of items to a 0-100 possible range, with higher transformed scores reflecting better quality of life to produce a summary score for general QoL (SF-36) and a Kidney Disease Component Summary (KDCS).

General Self-Efficacy Scale (GSE) (50).

Self-efficacy is defined as the belief of a person in his or her ability to organize and execute certain behaviours that are necessary in order to produce given attainments (51). The GSE consists of 10 items with responses marked on a 4-point scale. The total score is calculated by summing all 10 item scores. The final composite score ranges from 10 to 40, with higher scores indicative of higher self-efficacy.

Work and Social Adjustment Scale (WSAS) (52).

The WSAS consists of 5 questions related to various areas of impairment, with responses made on a 0 to 8 scale; 0 indicates no impairment at all and 8 indicates very severe impairment. The total score is the sum of all responses, with a total maximum score of 40. A WSAS score of above 20 appears to suggest moderately severe impairment; scores between 10-20 are associated with significant functional impairment and scores below 10 are considered normal functioning (52). The WSAS has high internal reliability and is sensitive to treatment effects (53).

Brief Illness Perception Questionnaire (Brief-IPQ) (54)

The Brief-IPQ assesses the cognitive and emotional representations of illness and consists of 8 items that assess cognitive and emotional elements of illness representation including; identity, consequences, cause, time, cure or control, and emotional representations (54). Illness perceptions scores were obtained by averaging the items (subscale ranges 0 to 10) with higher scores indicating a poorer representation of illness (23).

Statistical analyses

Data analyses were performed using SPSS (IBM, SPSS Statistics Version 25). Means and standard deviations were calculated for continuous variables, and frequencies were measured for categorical variables. Demographic characteristics and baseline scores on assessments outcomes were compared between groups using chi-squared analysis for categorical variables and independent samples *t*-tests for continuous variables.

There were a large amount of cases with unreturned follow-up questionnaires for at least one assessment time point (47.4%), resulting in incomplete required data for the secondary outcomes, the complete case analysis approach was adopted (55). Therefore, only the data and results from the 30 full completion cases are reported for preliminary efficacy. Prior to analysis,

data was screened for missing variables and univariate and multivariate normality. Normality was assessed using the Shapiro-Wilks test and examination of skewness/kurtosis values. All continuous variables were found to be normally distributed with no missing values. Differences in assessment outcomes between the control and intervention groups were tested by a 2 x 4 way analysis of variance (ANOVA) [group (KOHP, control) x assessment (BL, 3m, 6m, 12m)] for each assessment outcome. Greenhouse-Geisser [epsilon] corrections were used to correct for violations of sphericity in the data. Differences between groups and across time were established and post-hoc pairwise comparisons with Bonferroni adjustments. All significances were set at $p < .05$.

Results

128 patients were screened for eligibility; 84 consented to participant and were randomised to receive the KOHP intervention or usual care (see Figure 1.). The demographic and clinical characteristics of those who completed the baseline assessment (n=57) in each group are detailed in Tables 2 and 3. There were no differences between groups on demographic characteristics or kidney function, as measured by eGFR or the proportion of patients on either haemodialysis or peritoneal dialysis. Moreover, there were similar proportions of individuals with previous psychiatric diagnosis and history of treatment by a MH professional between groups.

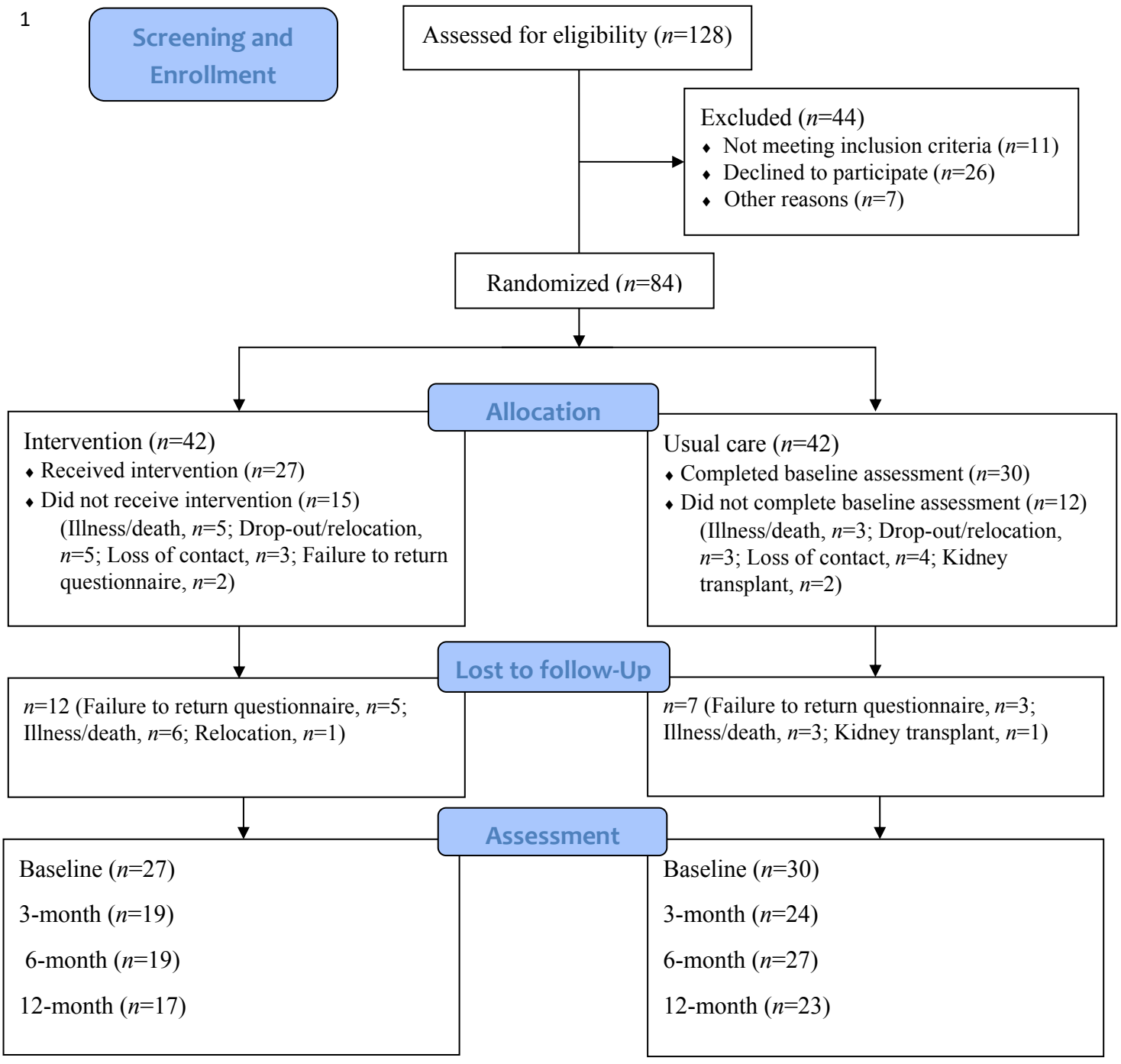
1
Screening and Enrollment
Assessed for eligibility (n=128)
Excluded (n=44)
Not meeting inclusion criteria (n=11)
Declined to participate (n=26)
Other reasons (n=7)
Randomized (n=84)
Allocation
Intervention (n=42)
Received intervention (n=27)
Did not receive intervention (n=15)
(Illness/death, n=5; Drop-out/relocation, n=5; Loss of contact, n=3; Failure to return questionnaire, n=2)
Usual care (n=42)
Completed baseline assessment (n=30)
Did not complete baseline assessment (n=12)
(Illness/death, n=3; Drop-out/relocation, n=3; Loss of contact, n=4; Kidney transplant, n=2)
Lost to follow-Up
n=12 (Failure to return questionnaire, n=5; Illness/death, n=6; Relocation, n=1)
n=7 (Failure to return questionnaire, n=3; Illness/death, n=3; Kidney transplant, n=1)
Assessment
Baseline (n=27)
3-month (n=19)
6-month (n=19)
12-month (n=17)
Baseline (n=30)
3-month (n=24)
6-month (n=27)
12-month (n=23)

Figure 1. Participant flow chart.

Table 2. Participant demographic characteristics at baseline assessment.

Participant characteristic	**Usual care (*n*=30)**	**KOHP (*n*=27)**	***p*-value**
Age	59.78 ± 13.19	60.8 ± 10.19	0.747
Gender			0.342
Female	16 (53.3%)	11 (40.7%)	
Male	14 (46.7%)	16 (59.3%)	
Ethnicity			0.749
Caucasian	24 (80.0%)	22 (81.5%)	
Other European	2 (6.7%)	3 (11.1%)	
Other/Missing	4 (13.3%)	2 (7.4%)	
Education			0.809
Primary school	1 (3.3%)	-	
Secondary school	14 (46.7%)	12 (44.4%)	
Undergraduate	3 (10.0%)	2 (7.4%)	
Postgraduate	7 (23.3%)	6 (22.2%)	
TAFE	4 (13.3%)	4 (14.8%)	
Other	1 (3.3%)	3 (11.1%)	
Employment			0.892
Full-time	6 (20.0%)	6 (22.2%)	
Part-time	4 (13.3%)	5 (18.5%)	
Home duties	3 (10.0%)	1 (3.7%)	
Unemployed	3 (10.0%)	2 (7.4%)	
Unable to work due to illness	4 (13.3%)	5 (18.5%)	
Retired/Other	10 (33.3%)	8 (29.6%)	

Marital Status			0.280
Married/Defacto	15 (50.0%)	17 (63.0%)	
Divorced/separated	7 (23.3%)	2 (7.4%)	
Single	4 (13.3%)	7 (25.9%)	
Widowed	4 (13.3%)	1 (3.7%)	
Accommodation			0.598
Own house	20 (66.7)	20 (74.1%)	
Rental	6 (20.0%)	4 (14.8%)	
Public housing	1 (3.3%)	-	
Lives with family/friends	2 (6.7%)	3 (11.1%)	
Other	1 (3.3%)	-	
Lives with			0.183
Partner	10 (33.3%)	11 (40.7%)	
Family/Friends	10 (33.3%)	8 (29.6%)	
Alone	10 (33.3%)	4 (14.8%)	
Other	-	4 (14.8%)	

1 Values are expressed as mean ± standard deviation or frequencies and percentage. KOHP: Kidney Optimal Health
2 Program.

Table 3. Participant clinical characteristics at baseline assessment.

Participant characteristic	Usual care (*n*=30)	KOHP (*n*=27)	*p*-value
eGFR	9.97 ± 3.86	10.37 ± 3.67	0.688
Dialysis status			0.444
On Haemodialysis	11 (36.7%)	13 (48.1%)	
On Peritoneal dialysis	15 (50.0%)	9 (33.3%)	
Not on dialysis	4 (13.3%)	5 (18.5%)	
Smoking status			0.318
Never smoked	21 (70.0%)	17 (63.0%)	
Former smoker	9 (30.0%)	7 (25.9%)	
1-10 CPD	-	2 (7.4%)	
11-20 CPD	-	1 (3.7%)	
Alcohol consumption			0.979
Don't drink at all	15 (50.0%)	14 (51.9%)	
Drink once a week or less	13 (43.3%)	11 (40.7%)	
Drink every day in moderate amounts	2 (6.7%)	2 (7.4%)	
Previous psychiatric diagnosis	5 (16.7%)	6 (22.2%)	0.596
Depressive disorder	4 (13.3%)	3 (11.1%)	
Anxiety disorder	-	2 (7.4%)	
Bipolar disorder	1 (3.3%)	-	
Schizoaffective disorder	-	1 (3.7%)	
Previously seen MH professional	10 (33.3%)	12 (44.4%)	0.390

Currently seeing MH professional	1 (3.3%)	-	1.00
Previously spent time in hospital for MH	2 (6.7%)	1 (3.7%)	1.00
Presented to ED in past 12 months	15 (50.0%)	10 (37.0%)	0.325

Values are expressed as mean ± standard deviation or frequencies and percentage. KOHP: Kidney Optimal Health Program; eGFR: estimated glomerular filtration rate; CPD: cigarettes per day; MH: mental health; ED: emergency department.

Primary outcomes: feasibility

i) Recruitment and retention rates

In individuals who were eligible and able to participate in the intervention, 77.1% consented to participate and were randomised to either receive the KOHP or usual care (see Figure 1.). Of those randomised to receive KOHP, 64.3% received the intervention and completed the baseline assessment. Reasons for withdrawal prior to baseline for KOHP and control groups included illness/death (33.3% vs 25.0%), self-withdrawal/relocation (33.3% vs 25.0%), loss of contact (20% vs 33.3%), failure to return the baseline assessment in the mail (13.3% of KOHP group) or kidney transplant (16.6% of control group), respectively. Follow-up assessment completion rates by the KOHP and control groups were similar at the 3-month (70.4% vs 80.0%), 6-month (70.4% vs 90.0%) and 12-month (62.9% vs 76.7%) time points. Reasons for withdrawal post-baseline were also comparable between KOHP and control groups; failure to return questionnaire (41.7% vs 42.9%), illness/death (50.0% vs 42.9%), relocation (8.3% of KOHP group) or kidney transplant (14.3% of control group).

ii) Acceptability of the KOHP intervention

Table 4. Summary of KOHP acceptability.

	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
1. I find this program to be an acceptable way of improving my wellbeing	-	5.6%	16.7%	50.0%	27.8%
2. I would be willing to use this program if I had to improve my wellbeing	-	-	11.1%	66.7%	14.8%
3. I believe that it would be acceptable to use	38.9%	25.9%	3.7%	7.4%	3.7%

this program without a person's consent					
4. I like the program used in this way	-	11.8%	11.8%	58.8%	17.6%
5. I believe this program is likely to be effective	-	5.6%	11.1%	55.6%	27.8%
6. I believe a person will experience discomfort during the program	11.1%	11.1%	22.2%	44.4%	11.1%
7. I believe this program is likely to result in permanent improvement	-	-	33.3%	55.6%	11.1%
8. I believe it would be acceptable to use this program with individuals who cannot choose treatments for themselves	-	23.5%	35.3%	29.4%	11.8%
9. Overall, I have a positive reaction to this program	-	-	16.7%	44.4%	38.9%

Of the 27 participants who completed the intervention, 18 (66.6%) returned the TEI-SF assessments in the mail. Table 4. provides a summary of the perceived acceptability (TEI-SF) as reported by the participants. After completion of the program, 77.8% of participants believed that KOHP was an *acceptable* way to improve their wellbeing, 81.5% of participants were *willing* to engage in the program to improve their wellbeing, 83.4% believe that the program was *effective*, 66.7% believe KOHP was likely to result in *permanent* improvement and 83.3% had a *positive reaction* to KOHP (see Table 4.).

Secondary outcomes: preliminary efficacy of KOHP

The results between groups and over time are detailed in Table 5. The two-way repeated-measures ANOVA yielded a significant group by time interaction, $F(2.07, 58.05) = 4.74$, $p =$

0.012, and a significant main effect of time, $F(2.03, 58.05) = 4.52$, $p = 0.014$, on levels of depression.

Table 5. Two-way ANOVA of intervention effects between groups and over time

Measure	**Treatment Group**		
	Usual care (*n*=17)	**KOHP (*n*=13)**	**Interaction *p*-value, effect size (η^2), η^2 95% C.I.**
HADS (Depression) (*N*=30)			
Baseline	4.59 ± 3.66	6.77 ± 3.17	
3-months	3.88 ± 3.43	4.46 ± 2.07	
6-months	4.82 ± 3.92	4.85 ± 2.79	
12-months	4.76 ± 3.60	2.92 ± 1.38	**.012, .14, [.008, .29]**
HADS (Anxiety) (*N*=30)			
Baseline	4.65 ± 3.30	5.54 ± 2.50	
3-months	4.59 ± 4.33	5.00 ± 2.55	
6-months	4.88 ± 4.46	3.62 ± 2.50	
12-months	5.00 ± 3.91	4.62 ± 2.02	.25, .047, [.000, .15]
GSE (*N*=30)			
Baseline	32.53 ± 6.70	30.85 ± 3.72	
3-months	31.88 ± 5.01	31.69 ± 2.53	
6-months	31.76 ± 6.51	30.38 ± 4.44	
12-months	31.47 ± 4.86	31.31 ± 3.04	.66, .016, [.000, .090]
WSAS (*N*=27)			
Baseline	13.07 ± 9.79	16.25 ± 12.42	

3-months	13.53 ± 10.25	18.17 ± 10.95	
6-months	14.20 ± 11.39	17.50 ± 12.76	
12-months	13.73 ± 10.09	15.92 ± 11.47	.88, .009, [.000, .050]
Brief-IPQ (*N*=28)			
Baseline	42.76 ± 11.66	39.31 ± 9.20	
3-months	39.81 ± 14.74	40.58 ± 9.30	
6-months	39.25 ± 12.11	39.92 ± 9.92	
12-months	38.31 ± 15.40	38.25 ± 13.36	.78, .010, [.000, .078]
KDQoL-SF12 (*N*=20)			
Baseline*	64.07 ± 20.76	51.97 ± 18.03	
3-months	69.77 ± 20.36	52.67 ± 23.61	
6-months	73.64 ± 16.09	56.93 ± 22.74	
12-months	66.67 ± 17.44	54.73 ± 18.32	.81, .017, [.000, .10]
KDQoL-KDCS (*N*=20)			
Baseline*	72.78 ± 11.16	62.71 ± 11.12	
3-months	71.92 ± 14.98	67.37 ± 7.48	
6-months	76.89 ± 11.83	68.81 ± 8.14	
12-months	75.18 ± 12.61	67.18 ± 9.57	.47, .045. [.000, .16]

Values are expressed as mean ± standard deviation. GSE: General Self-Efficacy Scale; WSAS: Work and Social Adjustment Scale; Brief-IPQ: Brief-Illness Perceptions Questionnaire; HADS: Hospital Anxiety and Depression Scale; KDQoL-SF12: Kidney Disease Quality of Life Short Form generic core; KDQoL-KDCS: Kidney Disease Quality of Life-Kidney Disease Component Summary.*significantly different at baseline ($p<.05$)

Post-hoc pairwise comparisons between time points in the KOHP group revealed a significant reduction in depression between baseline to 3-months [p=.042, 95% CI (.10, 4.52)], baseline to 12-months [p=.002, 95% CI (1.71, 5.98)] and between 6-months to 12-months [p=.033, 95% CI (.19, 3.66)] (see Figure 2.), but not between 3-months to 6-months [p=.51, 95% CI (-1.61,.84)]. There were no other significant interactions between group and time on assessment outcomes over the intervention or follow-up period.

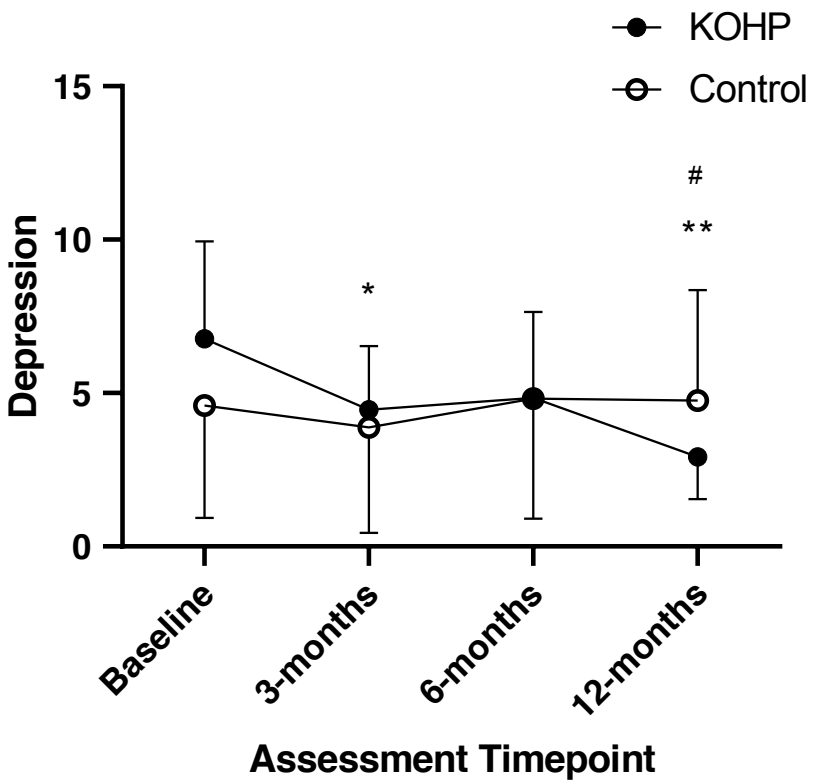

Figure 2. Depression scores of participants in KOHP and control groups over time. Data are expressed as mean (SD). *$p < .05$, **$p < .005$ from baseline for KOHP group; #$p < .05$ from 6-months for KOHP group (post hoc Tukey's test).

Discussion

The current study reports on the evaluation of the feasibility and preliminary efficacy of a novel psychosocial intervention, the KOHP, which aimed to improve the mental health of individuals living with advanced CKD. Assessment of recruitment and retention rates and acceptability of the KOHP intervention support our primary hypothesis and confirm the feasibility of a future definitive RCT. Our secondary hypothesis that KOHP would provide preliminary efficacy was partly supported. There was a reduction depressive symptoms in advanced CKD patients, however there were no improvements in anxiety or psychosocial factors.

Feasibility

The recruitment rate from eligible participants was high yet we identified a disproportionately large withdrawal rate prior to baseline assessment. The reasons for withdrawal prior to baseline did not differ between the intervention and controls groups, with a large proportion due to illness and patient mortality. However, there were a substantial proportion of patients who electively withdrew or were lost to follow-up. This could be due to participants being provided an inadequate description of the study requirements during screening. This highlights a need to enhance the screening protocol of patients to confirm willingness to complete the extensive outcome assessments. Intervention and control group study adherence was high post-baseline assessment, with the most common reason for withdrawal being either illness or death.

Acceptability of the KOHP intervention was high, with the majority of participants reporting willingness to engage, belief in efficacy of the program and an overall positive reaction to KOHP. Furthermore, there were no unintended effects or potential harms found during the pilot study. Given the limited research on interventions targeted towards psychosocial health in

advanced CKD, the current findings support the feasibility and acceptability of a definitive RCT of KOHP in individuals with advanced CKD.

Preliminary efficacy

Over the course of the trial, individuals randomised to the intervention demonstrated a significantly greater reduction in the primary outcome of depression, as compared to those allocated to the usual care group. Depressive symptoms in the KOHP group significantly decreased between baseline assessment and post-intervention (3-month assessment), and decreased further at the 12-month follow-up. This supports the potential utility of psychosocial interventions, and specifically KOHP, for the reduction of depressive symptoms in this population. While some immediate benefit as a result of direct facilitator-related influence cannot be ruled out, particularly given similar indications in other intervention studies (56), there was a significant difference in depressive symptoms between groups following the booster session held at 6-months. This indicated a beneficial effect from the follow-up session which may have reinforced implementation of health management strategies developed throughout the intervention.

In contrast, no associated changes were observed in anxiety. Given the comorbid nature of depression and anxiety (57), it was hypothesised that both depression and anxiety would be significantly improved. This hypothesis was not supported by the current findings, despite evidence that previous psychosocial interventions have reported some beneficial effect on anxiety symptoms in advanced CKD populations (42). Similarly, there was no significant improvement in the secondary psychosocial measures of QoL (both general and disease-specific), self-efficacy, work and social adjustment or illness perceptions. Possible reasons for the disparity in our pilot include the progressive impact of lifestyle adjustments on anxiety and

QoL that may accumulate over time, the burden of medications that can have side effects and inadequate sample size. The ideal time to demonstrate the intervention effect on anxiety and QoL may be after 12 months when medical management and physical symptoms are optimised, stabilised, and synergised with the reduction in depression. Therefore, further evaluation of these outcomes in a larger sample size and possibly for a longer duration is required.

Limitations

As this was a feasibility evaluation, our analyses were not statistically powered to detect clinically meaningful change in outcomes, which could have also precluded the emergence of significant outcomes of KOHP on other assessed variables (e.g. QoL). Feasibility and acceptability of the KOHP may have also varied between the different delivery modalities (i.e. phone vs face-to-face) which we were unable to compare in the current study. Moreover, baseline levels of cognition were also not assessed, which could have impacted on feasibility of the KOHP, particularly with noted cognitive deficits in CKD patients (9). Future work should consider inclusion of an explicit measure of level of disease activity or associated disease-related demands (e.g. number and duration of dialysis visits).

Conclusion and future directions

Overall, despite these limitations, this evaluation confirms the feasibility and acceptability of a psychosocial intervention RCT in individuals with advanced CKD. Moreover, it provides preliminary and important support for its efficacy, and the expansion of this research with a broader and larger sample size. The prevalence of psychological distress in advanced CKD populations is profound, negatively impacts prognostic outcomes and is a key intervention target. Management of mental and psychosocial health is of upmost clinical importance for individuals with CKD, given the high rates of comorbid depression (34) that are associated with poorer

quality of life and treatment outcomes (36, 38). The research team is currently conducting an expanded RCT, with an additional hospital as a recruitment site. This is the next step towards obtaining the necessary evidence to support the translation of KOHP into renal services to be offered to patients as standard care.

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