

**Supplementary Document 1 – Service use questionnaire**

**In the past 3 months on how many occasions have you been to visit a health professional:**

	<b>Because of your joint problems (enter number and reason)</b>	<b>Because of other reasons (enter number and reason)</b>
<i>Example: Consulted the GP at the practice</i>	Number of times: <u>  1  </u> Reasons: <u>pain and swelling in left knee</u>	Number of times: <u>  2  </u> Reasons: <u>stomach bug; and chest infection</u>
Consulted the GP at the practice	Number of times: _____ Reasons: _____ _____	Number of times: _____ Reasons: _____ _____
Visited the Practice Nurse at the practice	Number of times: _____ Reasons: _____ _____	Number of times: _____ Reasons: _____ _____
Been to consult or visited by other health and social care professionals (e.g. physiotherapist, osteopath, occupational therapist, psychologist, podiatrist/ chiropodist, orthotist, dietician, etc.)	Number of times: _____ Reasons: _____ _____ Which professionals did you see: _____ _____ Where did you see them? _____ _____	Number of times: _____ Reasons: _____ _____ Which professionals did you see: _____ _____ Where did you see them? _____ _____
Been a hospital in-patient	Number of times: _____ Reasons: _____ _____ Days spent in hospital: _____ Was this a medical or surgical ward? _____	Number of times: _____ Reasons: _____ _____ Days spent in hospital: _____ Was this a medical or surgical ward? _____

Visited hospital Outpatient Department	Number of times: _____	Number of times: _____
	Who did you see there? _____	Who did you see there? _____
	Reasons: _____ _____	Reasons: _____ _____

**In the past 3 months on how many occasions have you been visited at home by:**

	<b>Because of joint problems (enter number and reason)</b>	<b>Because of other reasons (enter number and reason)</b>
GP visited you at home	Number of times: _____  Reasons: _____ _____	Number of times: _____  Reasons: _____ _____
Community Nurse visited you at home	Number of times: _____  Reasons: _____ _____	Number of times: _____  Reasons: _____ _____
Other health and social care professionals visited you at home (e.g. physiotherapist, osteopath, occupational therapist, psychologist, podiatrist/ chiropodist, orthotist, dietician, etc.)	Number of times: _____  Reasons: _____ _____  Which professionals did you see: _____ _____	Number of times: _____  Reasons: _____ _____  Which professionals did you see: _____ _____

Are you currently on any medication for your joints or other problems? **YES / NO** (If YES, please list all medications)

1		6	
2		7	
3		8	
4		9	
5		10	

Have you have started and/or stopped in the last 3 months? **YES / NO** (If YES, please list medication)

<i>Medication Started within the last 3 months:</i>	<i>Medication stopped within the last 3 months:</i>


Are you suffering from any other complaints or illnesses besides your joint problems?

**YES / NO** (If yes, please list any illnesses and year of diagnosis)

\_\_\_\_\_

\_\_\_\_\_

What is your current employment status? (Please tick)

Not employed

Retired

\*Includes self employed

Employed full-time\*

Employed part-time\*

In Education full-time

In Education part-time

**Supplementary Document 2 – HAPPiKNEES Psychologist unit cost rates for patient contact (£)**

NHS Bands	Hourly Rate	Minute Rate
8a	138.00	2.30
7	115.00	1.92
6	92.00	1.53

Travel costs for each trip were calculated using postcodes from hospital base to patients home, where appropriate. Travel rates from the UK government travel allowances website (see: <https://www.gov.uk/government/publications/rates-and-allowances-travel-mileage-and-fuel-allowances/travel-mileage-and-fuel-rates-and-allowances>) for private cars travelling under 10,000 business miles/annum (Rate: £40p/mile).

In Supplementary Document 3 below, the costs per patient for the intervention are provided according to whether they were delivered by a Grade 6, 7 or 8a psychologist.

Total intervention costs (inc. staff time for therapy + travel and mileage costs) are: Grade 8a **£15,028.24** (9988.36+4715+324.88); Grade 7 **£12,598.96** (8338.08+3936+324.88); and Grade 6 **£10,148.64** (6644.42+3179.34+324.88).

**Supplementary Document 3 – Total intervention costs including staff time for delivering session, travel time and mileage costs**

Pat ID	Sessions (n)	Session Duration (mins)	Travel Time/session (Rtn Journey) (mins)	Total Staff Time Costs						Mileage Costs	
				Band 8a		Band 7		Band 6		**Distance	**Total
				(Hourly rate £138)		(Hourly rate £115)		(Hourly rate £92)		/session	Mileage
				Session Delivery (£)	Travel Time (£)	Session Delivery (£)	Travel Time (£)	Session Delivery (£)	Travel Time (£)	(Rtn Journey) (miles)	Costs (£)
N01	6	34.46*, 53.08*, 46.36*, 48.35*, 39.01*, 43.24*	0	610.08	0.00	509.28	0.00	405.83	0.00	0.0	0.00
N03	4	53.33, 49.01, 47.39, 44.58	44	448.50	404.80	374.40	337.92	298.35	269.28	16.4	26.24
S02	2	60.00, 60.00	26	276.00	119.60	230.40	99.84	183.60	79.56	7.0	5.60
S03	7	60.00*, 90.00*, 85.00*, 85.00*, 62.18*, 34.52*, 62.45*	0	1104.00	0.00	921.60	0.00	734.40	0.00	0.0	0.00

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S05	8	58.30, 59.06, 57.31, 77.20, 58.58, 48.40, 49.31, 60.00	14	1082.73	257.60	903.84	215.04	720.25	171.36	5.0	16.00
S09	3	60.00, 60.00, 20.25	32	322.00	220.80	268.80	184.32	214.20	146.88	14.0	16.80
S11	3	60.00, 50.00, 25.52	50	312.80	345.00	261.12	288.00	208.08	229.50	22.0	26.40
S12	6	60.00, 60.00, 60.00, 53.09, 55.20, 36.56	10	748.65	138.00	624.96	115.20	498.02	91.80	3.2	7.68
S15	1	48.31	30	111.55	69.00	93.12	57.60	74.21	45.90	12.4	4.96
S18	1	30.00	28	69.00	64.40	57.60	53.76	45.90	42.84	11.2	4.48
S21	8	70.23, 47.42, 61.16, 47.37, 65.48, 64.14,	10	1056.85	184.00	882.24	153.60	703.04	122.40	3.0	9.60

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		60.00, 42.11									
S22	1	20.00	24	46.00	55.20	38.40	46.08	30.60	36.72	6.6	2.64
S25	3	70.28, 54.15, 49.49	58	401.93	400.20	335.52	334.08	267.37	266.22	32.6	39.12
S26	3	52.09, 39.48, 21.14	60	261.05	414.00	217.92	345.60	173.66	275.40	24.6	29.52
S29	3	42.10, 39.45, 30.00	14	184.58	96.60	154.08	80.64	122.78	64.26	4.2	5.04
S31	6	90.00, 56.47, 61.36, 49.49, 43.25, 38.06	42	782.00	579.60	652.80	483.84	520.20	385.56	15.0	36.00
S34	5	54.00, 43.00, 49.07, 42.35, 34.27	62	513.48	713.00	428.64	595.20	341.57	474.30	25.6	51.20
S35	2	60.00, 50.13	32	253.58	147.20	211.68	122.88	168.68	97.92	11.0	8.80
S38	4	53.22*, 44.53,	30	444.48	276.00	371.04	230.40	295.67	183.60	11.6	18.56

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		43.42,									
		51.10									
S43	2	60.00,	16	276.00	73.60	230.40	61.44	183.60	48.96	5.0	4.00
		60.00									
S47	1	57.02	14	131.10	32.20	109.44	26.88	87.21	21.42	4.6	1.84
S49	1	60.00	40	138.00	92.00	115.20	76.80	91.80	61.20	15.8	6.32
S48	3	60.00,	14	414.00	32.20	345.60	26.88	275.40	64.26	3.4	4.08
		60.00,									
		60.00									
<b>Totals</b>	<b>83</b>		<b>650</b>	<b>9988.36</b>	<b>4715.00</b>	<b>8338.08</b>	<b>3936.00</b>	<b>6644.42</b>	<b>3179.34</b>	<b>254.2</b>	<b>324.88</b>

\* Sessions held at hospital – no staff travel required

\*\* Distance between postcodes and travel time estimated via Google Maps (shortest distance without traffic) (Last accessed 14.4.16).

**Supplementary Document 4.** Emerging codes and categories, their descriptors and illustrative examples.

Themes	Sub-themes	Description	Illustrative quotes
Experience of being in the study	Understanding Rationale	Clarity of the study rationale	<i>“Well, as far as I could see, it [the study] was how [...] I was going to cope with it [knee pain] mentally and physically, before and after my operation.”</i> (Interview 4, M, face to face, Intervention group)
	Understanding research process	Clarity of the information provided	<i>“I thought it [participant information sheet] was very well put-together. If I couldn’t understand it too much, then I’d have probably said I wouldn’t have continued with it [the study] [...] Like you said, you know, I don’t have to take part if I didn’t want to.”</i> (Interview 4, M, face to face, intervention group)
		Acceptability of the recruitment process	
		Acceptability of the randomisation protocol	

			<p><i><b>“Interviewer:</b> If you had been randomly put into this group that didn’t receive the treatment, and just received the questionnaires, how would you have felt about that?</i></p> <p><i><b>Respondent:</b> I don’t know because I was lucky enough, wasn’t I, to get the different ones? So I suppose – I still would have filled your questionnaire in [...] and hope that we’d gain something from it, or you would gain something from it.” (Participant 19, F, telephone, intervention)</i></p> <p><i>“I had the pre-op, that’s where the lady [research nurse] first talked about this, because she [research nurse] says ‘you’re a candidate for this HAPPiKNEES thing’, but that’s all, since then, between then and the surgery, nothing. I would have liked to have, you know, sort of, I suppose it would be a bit of reassurance and that sort of thing...” (Participant 8, M, face to face, control)</i></p>
Outcome measures	Focus of measures	Appropriate	<p><i>“Yeah, it [questionnaire] covered everything. I kept thinking some of the questions, I thought oh yeah, you know, you could relate to it.” (Interview 5, M, face to face, control)</i></p>

		Not appropriate	<p><i>"[...] you know, it's a knee operation. It's not a – you've not got cancer. If it was cancer or something that was life-threatening, or something that was disfiguring, I could understand the questions [BDI and BAI] more."</i> (Interview 22, F, telephone, intervention group)</p>
	Quantity	Adequate number of questions	<p><i>"As I say, they're quite straightforward and gave you the variety of choices."</i> (Interview 22, F, telephone, intervention group)</p>
		Too many questions	<p><i>"I think there was too many [questionnaires] personally and I think that would probably put a lot of people off [...] especially somebody on their own, with two of us, we looked at it and went through it together, but I can imagine if somebody was on their own looking at that they'd 'oh', you know, 'I can't be bothered' [...] I think people will fill forms in, the least they are the better [...] I think people just get fed up with filling forms in. Whereas if it's just a quick couple of pages, I don't think people will mind so much"</i> (Interview 8, M, face to face, control group)</p>
		Repetitions	<p><i>"They asked the right questions but they were asking about – one question about four different ways. You know what I mean? [...] Which I think was a bit balmy."</i> (Interview 15, M, telephone, control group)</p>

	<p>Quality</p>	<p>Positive views (ease of completion and understanding)</p> <p>Negative views (contradictory, duplications, difficulty in understanding questionnaires)</p>	<p><i>“Yeah, they [questionnaires] were fine. Yeah, quite easy to fill in. No problems. Straightforward”</i> (Interview 1, F, face to face, control group)</p> <p><i>“The forms [questionnaires, yeah. I’m almost certain them forms were too many [...]] I’ve never been any good with at school like I was saying and these questions they’re bloody hard some of them. I can’t, I’m not very good at spelling. I’ll be truthful...”</i> (Interview 17, M, telephone, intervention group)</p>
	<p>Timing of the questionnaires</p>	<p>Concerns about the timing when they received the questionnaire (soon after surgery)</p>	<p><i>“I found it [timing of the questionnaires] all right, but I don’t know if I filled that [questionnaire] in ‘correctly’, because if I’d have filled that in before I’d had my operation, the answers to my questions might have been different [...] But because I’ve had my knee done and I’m in that much pain, and it’s saying to you ‘in the last so many weeks, how have you felt?’ [...] Because of my negative thoughts, you see, because of – how the question’s worded and how you’ve got to answer, and I try to answer as truthfully as I can because over the past through weeks, how has it been? But it was a few weeks after I’d had the operation, so you got the moany one, whereas you might have got a better one before I’d had it done.”</i> (Interview 19, M, telephone, intervention group)</p>

		<p>Confusion about filling in the questionnaires at follow-ups</p>	<p><i>“And then I when I received your letter about the pain [...] I didn’t realise it [questionnaire] was post-op. You know what I mean? [...] I sent it [questionnaire] back. I’d already had the surgery [...] I thought, well, I’ve had the surgery now. Why do they want...? You know [...] And I thought, ‘Oh, they’ve probably overlooked it and sent it [questionnaire] me again. Maybe they lost the other one or something.’ [...] did it [cover of questionnaire] say post-surgery on it, or not? If you’d highlighted that a little bit more”</i> (Interview 14, M, face to face, intervention group)</p>
	<p>Specific comments on specific outcome measures</p>	<p>ICOAP (confusion over the constant and intermittent pain subscales)</p> <p>Mood questionnaires (connection unclear between TKR and mood questionnaires)</p>	<p><i>“Yeah I did find some of it [questions] a bit strange cos you see, I mean the first one ‘How intense is your constant knee pain?’ and I tried to separate constant because I didn’t get really intense constant, I mean I suppose everybody’s different aren’t they so what’s going to be relevant to some isn’t to others. Mine’s more of like a nagging, always there, yeah. The constant knee pain threw me a bit cos it, it comes and goes and it can depend on what you’ve done the day before or I sometimes wonder what I’ve eaten or yeah.”</i> (Interview 6, F, face to face, intervention group)</p>

		<p>EQ-5D-5L (unclear whether EQ-5D-5L questions were specific to OA or general health, confusion over too many options)</p>	<p><i>“Some of these questions I found a bit strange like agitation and loss of interest, you know, I find those a bit, I suppose some people might do, like worthlessness, I do not feel I am worthless, you know, questions like that, I mean, I don’t know if, I just find those a bit strange, them [sic] questions. I suppose some people might but why would having knee replacement make you feel worthless? I don’t know. Well, I mean, I did try to answer everything as much as I can [...] It seemed like this, feelings of choking, you know, what’s that got to do with a knee replacement!”</i> (Interview 8, M, face to face, control group)</p> <p><i>“So I was itching, all these hives and they were like, I’d got them in my ears didn’t I? And I sat and I thought well I’m going to get this out the way but how am I focusing on these when I’ve got all this. And then I think there was one bit in the survey where it said ‘And how do you rate yourself today?’ or something [...] At the end, is it the one with the ruler, on a scale of zero to a hundred or something, how good is your health today [...] And I thought well that, cos I thought, and this survey it was really difficult to do because I’d got extra problems other than – is this my survey or is this another one?”</i> (Interview 6, F, face to face, intervention group)</p>
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		Service use questionnaire	<p><i>“Some of the questions – like, you’ve got that many options; it confuses you a little bit. It [questionnaire instructions] does say don’t think about it too long, doesn’t it? Like, you know, try and read them and give your answer [...] It was it on the last page, where you’ve got that chart [EQ-5D-5L visual analogue scale] thing? [...] Yeah, I think probably sometimes you’ve answered one question and you go onto one probably two or three bits later on and I think, ‘Well, am I going to contradict myself here, or what?’ You know what I mean?” (Interview 14, M, face to face, intervention group)</i></p> <p><i>“I think perhaps I felt that there wasn’t quite enough space [on questionnaire]. But I’ve been back for several other things and there wasn’t quite enough room there [on questionnaire].” (Interview 6, F, face to face, intervention group)</i></p>
Treatment experience	Rationale (understanding and acceptance of CBT)	Understanding of the relationship between thoughts, mood and pain	<p><i>“Well, I guess my thought process was how I dealt with pain. That to me was enlightening. Then when I went to the talking session, I found that useful with we sort of talked about relaxation and anxieties and questions that may have come up. So that was useful and I think that’s something that I’ve kept with me when I’ve been in pain about being more</i></p>

		<p>Misunderstandings about when the CBT should/did occur (perception that therapy should have been provided after surgery)</p> <p>Understanding of CBT (CBT as a common sense, e.g. having a bit of a chat)</p> <p>Concerns about what benefit it might offer</p>	<p><i>relaxed.</i>" (Interview 13, F, telephone, intervention group)</p> <p><i>"And then a nurse [research nurse] came and took all my details then and then [therapist] came pretty quickly after, probably only just over a week, I think it was less than a fortnight I went on the programme, so I suppose I was a bit early really, cos obviously there was no operation date mentioned and I'd have finished the programme well before the operation. And I did say to [therapist] at the time when I did it, I felt it [therapy] would have been more useful afterwards, after the operation but obviously you don't do that at the moment."</i> (Interview 6, F, face to face, intervention group)</p> <p><i>"[...] 'cause it's – that's nice, when somebody will come out and have a chat with you about things like this [referring to the content of the CBT sessions]. I think that's very, very good. [...] Instead of just going into it [surgery]. That does actually help. It [session with therapist] gives you a bit of...how can I put it? It gives you a bit of gall. It mean – what I'm trying to say is that chat helped me to go and actually get it [surgery] done"</i> (Interview 20, F, face to face, intervention group)</p>
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		<p>Disagreement with the thoughts-mood-pain interaction</p>	<p><i>“I found it [therapy sessions] a bit deep if anything because I don’t see how you can manage pain when you don’t know what is going to happen. I mean it’s alright saying you can manage pain, but you can’t manage pain unless you’ve got some form of medication.”</i> (Interview 10, M, telephone, intervention group)</p> <p><i>“[...] to me, the pain I’ve suffered with my knees, I find it difficult to accept that a lot of it’s in your mind, sort of thing, like – you know. [...] It [therapy] was saying ‘mind over matter’. Your brain sends a signal and it’s the brain telling you that you’re in pain and all that sort of thing. And I can understand that, but it don’t help you when you’re in pain in my opinion, like, anyway. And a lot of it can be mind over matter, but it depends how much pain you’ve got.”</i> (Interview 14, M, face to face, intervention group)</p>
	<p>Perceived benefits of CBT</p>	<p>Example benefits: Reassurance, relaxation, calmness, positive thoughts, thinking differently, having more realistic expectations</p>	<p><i>“Sometimes I’m finding myself walking and I’m really tense so I say to myself ‘relax, relax’ and I’ve found that that helps. So I guess that’s something that I’ve taken away with me from doing one of the sessions [...] Right, OK. Well, I guess my thought process was how I dealt with pain. That to me was enlightening. Then when I went to the talking session, I found that useful with we sort of</i></p>

		<p>No perceived benefit of CBT</p> <p>Need for post-surgery reminders to help remember what they learned during the sessions</p>	<p><i>talked about relaxation and anxieties and questions that may have come up. So that was useful and I think that's something that I've kept with me when I've been in pain about being more relaxed."</i> (Interview 13, F, telephone, intervention group)</p> <p><i>"I thought it [CBT] was different to what it is [...] I don't know. [...] I've had two sessions of physiotherapy – by that I mean I've met the physiotherapist and she's taught me different exercises, and I've found that more helpful [...] Yeah, I found that more useful – more – even though, when I do the exercises, I do know that I've done them, but I've found that is – at least I know I'm getting somewhere, or I think I'm getting somewhere."</i> (Interview 22, F, telephone, intervention group)</p> <p><i>"What about a tape or something that you could just put on and think, 'Oh, I'll just refresh my mind and everything with that'? That's only a thought. That's only me. [...] Yeah, when I last saw [therapist], I definitely – I'm not saying everything worked 'cause, I mean, we're all individuals, but I did start and think of more positive things, and I did, when I went to the hospital, think, 'Now—' you know, 'cause it's a little bit daunting. It's early in the morning, blah, blah, and I did think, 'Now,</i></p>
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			<p><i>don't forget what you've been told. Relax and....' And I did. You know. But since I've been home and I'd – there aren't been many positive thoughts. I have thought, occasionally, when it's been a bit easier, 'Oh, well, you're on the mend', but then I've had a set-back and the good thoughts get pushed really, really back. But if we've got something to jog our memories. You know: don't be negative; be positive.” (Interview 19, M, telephone, intervention group)</i></p>
	<p>Perceived mediators of change</p>	<p>CBT-specific input (e.g., relaxation and distraction techniques)</p> <p>General therapy/therapist factors (e.g., personalisation of therapy, reassurance of an expert voice)</p>	<p><i>“I mean for me the main thing [benefit of therapy] was the relaxation and having a positive outlook [...] The relaxation [...] was about centring [sic] on your breathing and not tensing, especially when walking, not hunching your shoulders and it talked about being in a darkened room and moving through and centring on your breathing and releasing the pain from your body.” (Interview 13, F, telephone, intervention group)</i></p> <p><i>“No it was all helpful. But saying that it may be because looking back I perhaps steered [therapist] to what was happening to me at that time. So [therapist] gave me advice personal to me in a way that was like the time management and pacing and breaking things down, to do things when, the physical stuff perhaps when the pain was less and then do</i></p>

		<p>Other factors (e.g. information provision, sign-posting)</p>	<p><i>my crafts when it was quite painful because it would wear off if I'm doing something else, obviously, so not to have too much of a set pattern was useful, just different ways of looking at how I was doing things."</i> (Interview 6, F, face to face, intervention group)</p> <p><i>"I enjoyed having the one to one sessions. [...] it was a good way to prepare and get a mindset of having a big operation. And I felt there was a little bit of extra support there as well, apart from obviously just having the consultant, but I felt by going to the sessions if there was something I was worried about, somebody would say 'oh, you can ask the physio'. It was nice having that little bit of extra support."</i> (Interview 13, F, telephone, intervention group)</p>
	<p>Format of treatment sessions</p>	<p>Home or hospital setting (home for pragmatic reasons [time, transport and mobility issues] &amp; hospital for work obligations [easier to attend during the day])</p> <p>Group vs. individual treatment delivery</p>	<p><i>"I would have gone to the hospital, but it's just, well, driving – you're not too keen on driving on motorways and dual carriageways, so it's better at home, for me."</i> (Interview 12, M, face to face, intervention group)</p> <p><i>"Possibly but I think sometimes you can get intimidated, if you know what I mean, some people kind of demand the stage, if you know what I mean [...] And then other people who need to ask questions don't because they're frightened of being thought to be stupid or</i></p>

			<p><i>something, you know. So I think it really depends and obviously you will always get a mixture of patients so you're going to get this mixture of somebody who's really bombastic and then somebody who's very timid."</i>  (Interview 9, F, face to face, intervention)</p> <p><i>"I probably think it [therapy] would be better in a group [...] To be honest because I think, like I say, different people have got a different way of interpreting things and I think as a group you could probably talk about it and get more out of it that way."</i> (Interview 10, M, telephone, intervention group)</p>
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Note. Quotes are followed by a description of interview number, gender of the participant (M or F), whether the interview was conducted face-to-face or over the telephone, and whether the participant was allocated to the intervention or control group.