

Perceptions of Physical Activity and the Use of Activity Monitors to Increase Activity Levels in Patients Undergoing Total Knee Replacement

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Objective. Although most total knee replacement (TKR) recipients report less pain and improved function after TKR, many remain sedentary. We aimed to understand TKR recipients' motivations for undergoing TKR, perceptions of and goals related to physical activity, and the role, if any, that activity monitors might play in their recovery.

Methods. We conducted a qualitative study, individually interviewing 27 participants who had recently undergone or were about to undergo TKR. We conducted a thematic analysis to better understand participants' views of the benefits and barriers to physical activity after TKR.

Results. We identified nine themes and one subtheme that identify patients' initial motivations for undergoing TKR and may help TKR recipients achieve increased activity levels and a perceived successful recovery. Some key messages that emerged from our work include the following: exercise is necessary for physical and mental health, pain and functional limitation interfere with daily life, tracking steps motivates individuals to increase activity levels, and different incentives (for engaging in physical exercise and using an activity monitor) are effective for different individuals.

Conclusion. Participants recognized the health benefits of physical activity, and many believed activity monitor use would help them become more active after surgery. Both external and internal factors played a role in motivating individuals to become more active and wear activity monitors.

INTRODUCTION

Physical activity (PA) offers many health benefits, including prevention and management of chronic disease, delay of functional decline and disability onset, and improved quality of life (QoL) (1–3). Despite these benefits, participation in PA is low, both within the general population (1,4) and among individuals with osteoarthritis (OA) (5). Only 44% of men and 22% of women with or at risk for knee OA in the Osteoarthritis Initiative cohort met the 2018 Centers for Disease Control and Prevention recommendation of 150 minutes/week or more of moderate to vigorous PA (MVPA), which is defined as any activity requiring three or more metabolic equivalents (1,5).

Although more than 700 000 persons nationally with symptomatic knee OA undergo total knee replacement (TKR) to address

their knee pain and regain function each year, most of them remain sedentary after surgery (6,7). Indeed, 6 months after surgery, total joint replacement (TJR) recipients showed a 0.7% increase in movement-related activity as compared with baseline, despite significant improvements in pain and function (8). These findings suggest a need for structured regimens that will promote PA and improve adherence to PA guidelines among TKR recipients.

Numerous methods can be used to measure PA levels, including questionnaires, logs/diaries, accelerometers, and pedometers (9). Notably, there is poor correlation between self-report and direct PA measures among adult populations (10) as well as TJR recipients (11,12). These findings suggest that in order to accurately determine the effect of an intervention on PA levels, direct measures of PA should be employed. Interventions using smartphone apps or activity trackers have shown promise in

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increasing PA levels (13), indicating that accelerometers such as the Fitbit may be useful to both collect PA data and motivate participants. In fact, one meta-analysis found a statistically significant increase in PA (mean difference of 1520 steps or 16 minutes/day MVPA) with the use of wearable activity trackers in patients with rheumatic and musculoskeletal diseases (14). In those with knee OA specifically, a multifaceted intervention including the use of a Fitbit resulted in an increase in daily MVPA (adjusted mean difference of 13 minutes/day MVPA) (15). However, some previous studies have demonstrated low participant compliance with wearing these devices (11).

We performed a qualitative study involving patients who either recently underwent TKR (within the past 6 weeks) or had TKR scheduled (within the next 6 weeks) to gain a better understanding of the role that PA plays in their lives. Using structured interviews, we sought to better understand the factors that influence a patient's decision to undergo TKR and their goals after TKR. We also sought to identify factors that would motivate or deter them from engaging in PA and wearing activity monitors during recovery, as intervention success relies on participant compliance. Identifying patients' priorities, goals, prior experiences with activity monitors, and beliefs about the benefits and drawbacks of activity monitors may help clinicians devise strategies to encourage greater activity levels among their patients.

PATIENTS AND METHODS

Participants and recruitment. We recruited participants from the Orthopedic and Arthritis Center at Brigham and Women's Hospital (BWH). Using the electronic medical record at BWH, we screened the schedules of eight arthroplasty surgeons. Eligibility criteria included English-speaking, age of 40 to 85 years, diagnosis of knee osteoarthritis, and TKR either being scheduled within the next 6 weeks or having occurred within 6 weeks of the date of screening. Exclusions included dementia, the presence of a health condition that precluded participation in PA, and undergoing simultaneous bilateral TKR. We sent eligible individuals a letter inviting them to participate in this qualitative study and provided them an opportunity to opt out. We phoned participants who did not opt out of the study and obtained verbal consent from all interested individuals to participate. These procedures were approved by our institutional review board.

Data collection. Two nonclinician interviewers (KA and ZZ) carried out and audio-recorded the semistructured one-on-one interviews over the phone. Both interviewers followed the same interview guide (Table 1) that queried participants about their perception of the importance of PA, prior use of activity monitors, and opinions about the value of using activity monitors following TKR. Neither interviewer knew any of the participants. All participating

Table 1. Topics addressed in the interviewer guide

Topic	Questions
General perception about physical activity	<ul style="list-style-type: none"> a Before your knee began bothering you/limiting your daily activities, how physically active were you? <ul style="list-style-type: none"> How much did you need to limit these activities as a result of your knee pain? How active do you envision yourself when you are fully recovered, let's say one year from today? Do you foresee any barriers to achieving this? <ul style="list-style-type: none"> 1. How might you overcome/address these obstacles? Do you think you'll be successful? b Do you think that exercise is important in maintaining a healthy lifestyle? c Is being physically active an important part of your identity?
Perception of activity monitors	<ul style="list-style-type: none"> a Have you ever heard of a Fitbit or a similar device for measuring physical activity? b Have you ever used one of these devices? <ul style="list-style-type: none"> <i>If yes...What prompted you to wear this device?</i> <i>How did you like it/what was your experience like?</i> <i>How often did you wear it?</i> <i>What data specifically did you like to know about?</i> <i>If no...Why not? What has prevented you from wearing one?</i> <i>What about your phone? Do you check your steps or use the health app?</i> <ul style="list-style-type: none"> 1. <i>If yes...</i> 2. Ask the above questions under "if yes" category. c Do you think it is important to track your physical activity?
Increasing device-wearing compliance	<ul style="list-style-type: none"> 1. How would you feel about using an activity monitor, specifically a Fitbit or a similar device, to increase your activity levels post-surgery? <ul style="list-style-type: none"> a Would you wear it? b In what ways might it be helpful? c Can you think of any drawbacks to wearing these devices? d What would encourage you to wear a Fitbit for an extended period of time? 2. We are interested in your opinion about a second type of activity monitor called an ActiGraph. This medical-grade monitor attaches to a belt that is worn around the waist. <ul style="list-style-type: none"> a Would you wear it? b Do you see any specific advantages or drawbacks to the ActiGraph as compared to the Fitbit or a similar device? c How could we entice participants to wear this belt? <ul style="list-style-type: none"> What would make this belt more appealing to you personally? Are there specific incentives or support systems that might help you to wear this belt consistently?

individuals underwent TKR between November 1, 2020, and January 26, 2021, and were interviewed within 6 weeks of their date of surgery. They were each compensated with a \$50 gift card.

Thematic analysis. We reviewed transcript data throughout the course of data collection to ensure interviews did not drift from the original interviewer guide. We concluded the interviews after reaching thematic saturation, the point at which additional interviews did not generate new information.

We conducted an inductive, experiential thematic analysis according to the methods of Braun and Clarke (16). We came into the analysis without an established theoretical framework, and we attempted to tap into participants' experiences and perceptions of PA before and after TKR. In the first phase of data analysis, two co-authors (KA and ZZ) independently read a selection of transcripts and identified key words or phrases (codes) that related to the study's primary question ("What role does physical activity play in your life? Do you plan to increase your physical activity after TKR and how, if at all, might activity monitors help you to do so?"). These investigators then met to finalize a coding scheme, which they used to code the rest of the transcripts with Dedoose software.

In the second phase of analysis, three co-authors (KA, ZZ, and JNK) developed themes—directional statements related to the guiding question—by identifying patterns within the data and grouping together the established codes. We then met to discuss the list of themes and develop hypotheses relating each theme to the guiding question. Each statement is supported by participant quotations. Finally, we created a thematic map to illustrate

the relationship between themes (Figure 1). All co-authors agreed on the final thematic scheme and thematic map.

RESULTS

Sample composition. We sent recruitment letters to 65 patients who passed our initial screening; 34 (52%) patients expressed interest, and 28 were eligible. We were unable to reach one of these individuals, leaving 27 participants (16 women and 11 men) undergoing TKR by one of eight participating arthroplasty surgeons. Ten participants were interviewed prior to undergoing TKR, whereas the remaining 17 were interviewed after surgery. The mean age of this sample was 66 (SD 8.8) years; 7% were Black, 89% were white, and 4% declined to provide race. Each individual participated in a one-on-one semistructured interview. Our thematic analysis brought forth nine themes (I through IX) and one subtheme, as described below. A comprehensive list of supporting quotations can be found in Table 2.

Theme I: exercise is necessary for physical and mental health. Participants stated that they perceive exercise, a planned and structured form of PA carried out for fitness purposes, as crucial to maintaining physical health. Many cited exercise and diet as necessary tools to augment weight loss and improve overall physical health. Participants also highlighted the importance of exercise in maintaining good mental health ("I think you have to have a balance, to have good mental health, you need to have good physical health.").

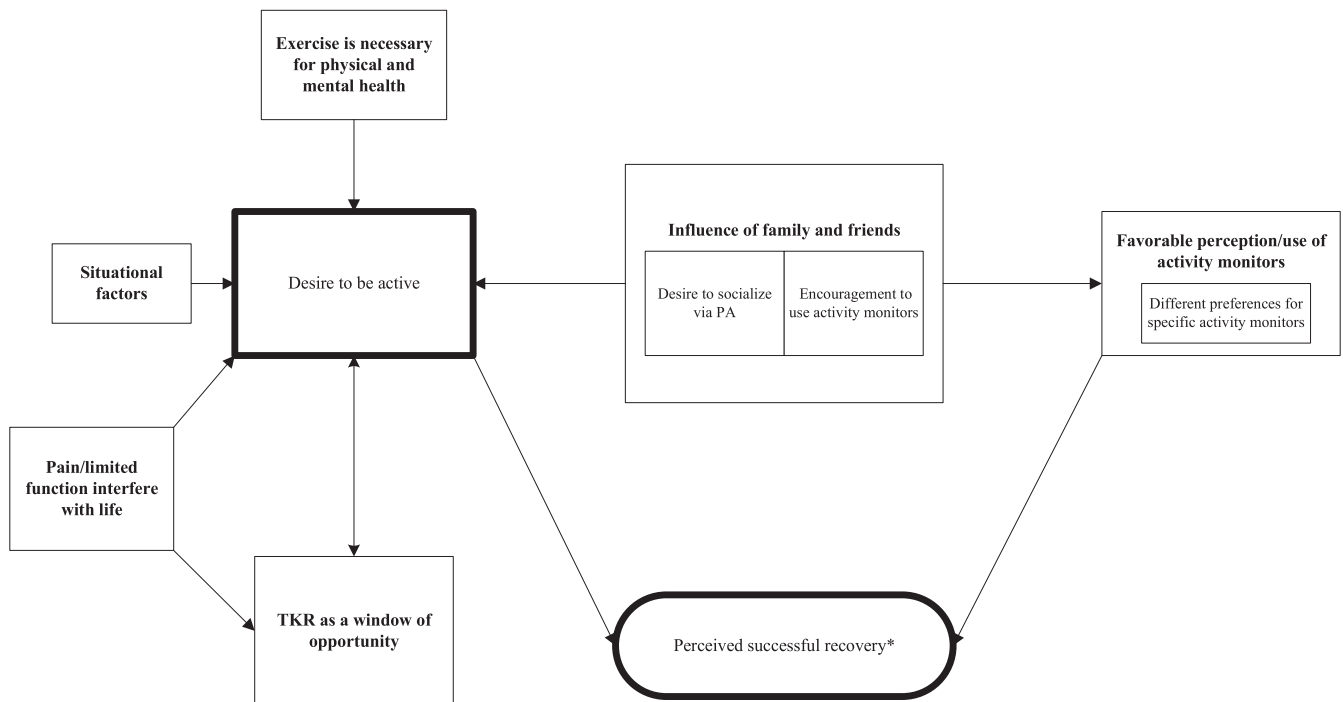


Figure 1. Thematic map of relationship between themes. PA, physical activity; TKR, total knee replacement.

Table 2. Themes/subthemes identified in the thematic analysis

Theme/Subtheme	Hypotheses	Supporting Text from Transcripts
Exercise is necessary for physical and mental health.	Participants recognize the positive effects physical activity has on mental health; these benefits encourage individuals to exercise.	"Oh, absolutely. I'm convinced of it. It helps not only with your physical health, it helps with your mental health."
	Participants understand the importance of exercise in maintaining their physical health.	"...I just wanna make sure I'm doin' a regimen and not sittin' in the house and gettin' old. You know what I mean? Not sittin' in the house and let my bones brittle because I say, oh, I'm old."
	Individuals rely on exercise, in combination with a healthy diet, to lose weight/improve their health	"... 'cause I know it's good for you, along with watching what you eat." "My weight is a big thing. It's like Catch-22. Walk more, you'll lose weight. You can't walk because you're too heavy, you know?"
Pain/limited function interfere with life.	Knee pain/functional limitation is frustrating for participants, as it prevents them from pursuing their hobbies.	"Physical activity's always been part of my life and that's one reason I'm having this. The knee replacement was to make sure that I will remain [clears throat] completely active physically for as long as I possibly can because we like—my wife and I like to travel."
	Knee pain/functional limitation interferes with activities of daily life.	"I couldn't clean the house. I couldn't cook. I'm a good cook. I enjoy it, time in my kitchen. [I] was... very limited." "I had reached the point where I was getting sharp pains in my knee every time I took a step, and I couldn't mow my lawn anymore. When I went to a box store, I had to use one of those electronic carts to drive myself around..." "I could do that, but then I lost my ability to do that, so all I could do is walk around the yard. I lost my ability to walk. Right now that's what I really want to do the most."
	Knee pain/functional limitation prevents individuals from carrying out activities at work.	"Yeah. My primary reason is actually I'm strugglin' at work, just walkin' around. I work for the railroad, so it's a demanding job. I work for the railroad in Boston, the commuter rail."
	Knee pain/functional limitation hinders participants' ability to socialize with family and friends.	"Well, I have great-grandkids, and it limited me to have a good time with them. I... I couldn't run around the backyard all that much to play with them."
	Pain is a significant contributor in the decision to undergo TKR.	"Yes, but I need to get rid of the pain." "Because it locks when--it hurts like hell when I wake up in the morning and I straighten my leg."
TKR is a window of opportunity.	The opportunity to resume these activities plays a key role in the decision to undergo TKR.	
	Patients are often optimistic about their recovery and feel confident that TKR will allow them to resume their old lifestyles.	
	Setting goals helps participants to recover and achieve these "old lifestyles;" activity monitors may aid with this process.	
Prior activity levels influence post-TKR activity goals.	TKR recipients express a desire to achieve or exceed their previous activity levels (before they began experiencing knee problems) post-surgery.	"Definitely getting back to walking at least the distances that I was doing, at least get back to that." "I'm gonna be more active than I've been in a long time"
Other factors contribute to the likelihood to engage in physical activity.	Factors out of an individual's control such as the pandemic and weather can influence their activity levels.	"In the summertime, when it's warmer, I'm more active with that where I'm out with the dogs probably five out of seven days." "Obviously, lately, my gym has been closed. I stopped going to the gym. Before COVID, I used to go to the gym a few times a week, mostly for spin classes and also a couple of times a week to play racquetball."
Friends/family often inspire and facilitate use of Fitbit.	Participants are inspired to wear the Fitbit device because their friends/family members have had prior positive experiences.	"My wife has one. We're both Apple people, and she's got a watch. She's got an Apple Watch and she does a lot with that in connection with her walking as to how far she's going, how many steps, what have you. I think that would be a really good thing to have."
	Family/friends initially motivate participant to wear the activity monitor by purchasing the device.	"My girlfriend actually got them [Fitbits]. She got herself one, and she got me one two years ago." "My son bought it... [he] was trying to get me to be aware of number of steps I was taking during the course of a day."

(Continued)

Table 2. (Cont'd)

Theme/Subtheme	Hypotheses	Supporting Text from Transcripts
	Active friends/family members serve as motivators for participants to become more physically active; this inspires use of an activity monitor.	<p>“Yeah, my wife, she walks every day too. She exercises a lot. Most of my friends, there’s a group of us that a lot of us taught together and then some other friends, some of us who played against each other in high school and so forth. Now, seeing that we can’t play football and basketball, we try to kill each other on the golf course.”</p> <p>“Oh, yeah. My cousin Debbie. She walks all around the place. I don’t like goin’ walkin’ with her because she leaves me ‘cause I’m too slow. Maybe this time I’ll be able to catch up with her, and we’ll both be at the same pace.”</p> <p>The reason I started wearin’ it was my sister had bought one for my mother, and my mother, at the time she was 75 or 76, and she wears it. She does her 10,000, 15,000 every day. I said to myself, “Wow. I wonder if she does that many, what can I do?”</p>
	Non-tech-savvy participants are more comfortable with using an activity monitor when they have friends/family who can offer tech support.	<p>“Both my son and daughter and daughter-in-law and son-in-law and my grandkids would—they would get me up to date very quickly.”</p>
Tracking steps motivates participants to move and set new goals.	Participants are motivated by the desire to increase the number of steps they take over time; tracking steps promotes physical activity.	<p>“Yes. Then I can add up my weekly totals and I can see that I’m advancing so much each week and it helps me feel like I’m progressing.”</p> <p>“You find that you’re motivated to do something that you wouldn’t normally do because you only have a little bit more to go.”</p> <p>“You can see how many steps you do every day and how you improve every day in your steps. It encourages you to move more.”</p>
Different incentives (eg, financial, self-motivation, reminders, pleasing clinicians) are effective for different individuals.	<p>For many, financial incentives would not be the primary motivator to wear activity monitors or engage in physical activity.</p> <p>Those who participate in research studies feel an obligation to abide by study protocols to please researchers/clinicians and contribute to the greater good.</p>	<p>“For me, I do it basically to help the study out. I don’t need the money. Probably, I’ll end up donating it anyway.”</p> <p>“If someone’s gonna pay me to wear somethin’, I’d say, “Geez, why would they be doin’ that?” or anything like that. I don’t think the financial part of it would do anything for me.”</p> <p>“If you asked me to do it for the study, I would wear it.”</p> <p>“Probably would be less likely to wear it unless the doctor really would thought it was something I should do. I’m kind of a rule follower, so if the doctor was ditching them off I probably would.”</p>
TKR recipients often have favorable perception of activity tracking.	TKR recipients believe that tracking different physical activity metrics can be beneficial to them; it can help with monitoring/increasing activity levels and recovering after surgery.	<p>“It’s been my Fitbit, and I use it now ... more as a motivational tool to see how much further I can walk with my knee replacement. When I started, it was a quarter of a mile. Then, it was half a mile. Then, it was three-quarters of a mile...”</p> <p>“Oh, absolutely. I wear the Apple watch all the time. It’s always counting my steps and that kind of stuff and calculating the calories as best it can do.”</p>
Subtheme: Participants prefer different activity monitors (Apple, Garmin, ActiGraph, Fitbit).	<p>Participants prefer the Apple Watch over the Fitbit because of its appealing features.</p> <p>Participants are less inclined to wear the ActiGraph because they perceive it as less useful to them than the Fitbit and difficult to wear.</p>	<p>“Yeah. I think that if you’re more familiar with the things of the Apple Watch, the data that the Apple Watch collects then you can think about that as well. They’re pretty similar devices. The Apple Watch I think is just a little bit better for getting your notifications from your phone and things like that.”</p> <p>“I don’t know that much about a Fitbit. I don’t think Fitbit has—I think the Apple watch is much superior product as a Fitbit.”</p> <p>“Okay, I don’t think I’d wanna wear a belt around my waist. I’d be more comfortable with the Fitbit.”</p> <p>“Probably I wouldn’t wear [the ActiGraph]. If I was more stationary and it didn’t impact my profession, then I would wear it. I recognize that the information could be more accurate, but a watch, everyone’s gonna wear a watch.”</p>

Abbreviation: COVID, coronavirus disease; TKR, total knee replacement.

Theme II: Pain and limited function interfere with daily life. Knee pain and functional limitations drove participants’ decisions to undergo TKR. Pain and functional limitations prevented participants from pursuing their hobbies, interfered with activities of daily life (stair-climbing, cleaning, and shopping) and hindered participants’ ability to socialize with family and friends (“I had reached the point where I was getting sharp pains in my knee every time I took a step, and I couldn’t mow my lawn anymore.

When I went to a box store, I had to use one of those electronic carts to drive myself around...”).

Theme III: TKR is a window of opportunity. TKR offered participants the chance to resume activities they valued (pursuing hobbies, socializing with family and friends, etc.) (“Generally I do want to maintain my activity and that’s why I’m doin’ this ... knee replacement.”).

Many participants expressed a desire to achieve or exceed their pre-development of advanced OA activity levels after TKR (“Definitely getting back to walking at least the distances that I was doing, at least get back to that.”).

Theme IV: situational factors contribute to the likelihood to engage in PA. Participants noted that factors beyond an individual’s control may influence activity levels. Specifically, participants cited the COVID-19 pandemic, weather, other health factors, and free time as obstacles to exercise (“In the summertime, when it’s warmer, I’m more active... I’m out with the dogs probably five out of seven days.”).

Theme V: friends and family often inspire and facilitate use of activity monitors. Friends and family both directly and indirectly inspired participants to use activity monitors. They directly encouraged activity monitor use by sharing their own positive experiences, and in some instances, by purchasing an activity monitor for the participant (“My son bought it...[he] was trying to get me to be aware of the number of steps I was taking during the course of a day.”). Active friends and family members motivated participants to become more physically active, which indirectly inspired participants to use an activity monitor to achieve their goals (“My cousin Debbie. She walks all around the place. I don’t like goin’ walkin’ with her because she leaves me ‘cause I’m too slow. Maybe this time I’ll be able to catch up with her...”). Furthermore, participants who were less tech savvy expressed greater willingness to use an activity monitor when they had friends and family who could help them set up the activity monitor.

Theme VI: favorable perception of activity tracking. TKR recipients stated that tracking various PA metrics (steps, heart rate, calories, active minutes, etc.) could help achieve a perceived successful recovery after surgery; however, their sources of motivation differed. Some participants stated that extrinsic motivators, such as financial incentives, would increase their likelihood of consistently wearing an activity monitor and engaging in PA, whereas others were intrinsically motivated by setting increasingly challenging goals as their recovery progressed (“You can see how many steps you do every day and how you improve every day in your steps. It encourages you to move more.”). Some also described feeling obliged to abide by study protocols to appease researchers and clinicians.

Different preferences for specific activity monitors. Given differences in lifestyle and specific activity goals, some participants found certain activity monitors more appealing than others. Many preferred Garmin or the Apple Watch over the Fitbit because of their additional features and were less inclined to wear the more cumbersome ActiGraph (“They’re pretty similar devices. The Apple Watch I think is just a little bit better for getting your notifications from your phone and things like that.”).

DISCUSSION

We performed a qualitative study in which we interviewed 27 participants who had just undergone or were about to undergo TKR. Our goal was to understand the role that PA plays in participants’ lives and whether they plan to become more active following TKR. We also sought to identify factors that affect a participant’s willingness to engage in PA and wear activity monitors.

As is represented in Figure 1, the majority of participants expressed an overarching desire to be physically active and to achieve a perceived successful recovery. Participants described knee pain and limited function as interfering with their daily lives, and TKR offered an opportunity to resume valued activities. The desire to be active was also fed by an understanding of the benefits of exercise on overall health and prior high levels of activity. Active family members and friends encourage participants to become more active and to use activity monitors to reach their goals. Most participants had a favorable perception of activity monitors or had used them previously. However, participants prefer different types of activity monitors and find certain metrics to be more or less useful for tracking progress and setting goals.

Participants understood the importance of PA for a perceived successful recovery and emphasized that PA is necessary for physical and mental health. These results are consistent with prior literature in which TJR recipients describe PA as a means to enjoy life and recognize the opportunity that TJR provides to increase their activity levels (17).

Our participants were generally optimistic about recovery and saw few, if any, barriers to achieving postoperative goals, regardless of whether they were interviewed preoperatively or postoperatively. In previous studies, TJR recipients have identified lack of information on recovery and fear of damaging the implant as barriers to engagement in PA (18). It is possible that our participants were more educated on TKR and what to expect during recovery and therefore did not encounter these barriers.

To our knowledge, this is the first study to specifically address TKR recipients’ perceptions of and attitudes toward activity monitors. Some participants appeared self-motivated, stating that they would not need incentives to engage in PA or wear activity monitors, whereas others were motivated by extrinsic factors such as monetary rewards and pleasing clinicians. Regardless of their motivation to become more physically active, many participants agreed that tracking their activity levels with a wearable device could help them to become more active after surgery. Previous research on adult populations has also shown that people believe tracking their activity levels will encourage them to become more active (19). A qualitative evidence synthesis conducted to understand the perceptions of those with arthritis about wearable activity trackers found that participants who wore an activity tracker for research or as a part of self-management generally felt positive about their experience and did not find that these devices interfered with their day-to-day lives (20). Although

participant preference for activity monitor type varied, most said they would wear one. They noted that financial incentives and reminder messages might help them comply with wearing the device. Given the range of factors that motivate participants to engage in PA and wear activity monitors, it may be useful to develop personalized incentives and strategies to engage TKR recipients in greater levels of activity after surgery.

Participants commented in detail on their motivations for seeking TKR. Their reasoning pivoted around a wish to resume valued activities. Individuals often tolerated symptoms for years until they finally reached a “tipping point,” which is also described in previous literature (21–23), when knee problems seemed to control their life and prevented them from engaging in meaningful activities, ultimately prompting them to undergo TKR. Participants described difficulty with work duties, hobbies and leisure activities, and everyday tasks such as cooking, cleaning, or going up and down stairs. Many participants expressed a desire to return to the “normal” life they experienced before developing knee OA, when they were able to ski, socialize, play with grandchildren, or take long walks with their dogs. This is a consistent theme throughout the literature; TJR recipients hope to return to the level of activity they enjoyed before developing symptomatic knee OA after surgery (18,24).

Although participants expressed a desire for increased activity and tended to set ambitious post-TKR goals, several studies indicate that TJR recipients often do not become more active following surgery (6,12). Harding et al found that although most TJR recipients were not more physically active than they had been before surgery, they were content with their PA levels 6 months after surgery (17). Our findings, in combination with those of Harding et al, suggest that patients may enter TJR with ambitious goals for their recovery and fail to achieve them. This underscores the importance of developing strategies to ameliorate the discordance between what TKR recipients say they will do and what they actually do. More research is needed to determine how goals change throughout the course of TKR recovery, as well as to evaluate the utility of activity monitors for helping individuals achieve their goals after surgery. These insights might help plan interventions to incentivize TKR recipients to remain faithful to their earlier, more ambitious PA goals.

Many participants described themselves to be “highly active” or “very active” prior to surgery. TKR recipients who are less active may benefit the most from PA interventions (25), yet they may not have been well represented in our sample. We do not have objective data to determine participant PA levels, which is a limitation of our study. Moreover, we interviewed participants who scheduled their TKR at a single tertiary medical center, so our sample may not be representative of the general population. Another limitation of our study is that we did not specifically ask participants about environmental or systemic barriers to exercise. Future research could examine this topic with specific prompts and shed light on possible systemic changes that could be made to help TKR recipients become more physically active.

The findings of this study have implications for both clinicians and researchers. During the interviews, participants expressed various preferences, goals, and values. Some have had prior experience with activity monitors and are relatively “tech savvy,” whereas others are not but have friends or family members who could assist with the setup and use of these devices. Some may be self-motivated, whereas others may need encouragement and incentives to participate in PA and track their activity levels. Tailoring interventions to each patient and offering various options for engaging in and tracking PA may help optimize adherence to physical activity recommendations.

In conclusion, individuals who undergo TKR are motivated in large part by an inability to engage in valued activities because of knee pain and impaired function. TKR recipients express a desire to become more active after surgery and return to or exceed the level of PA they engaged in before developing knee OA. Although some TKR recipients appear to be intrinsically motivated to become more active, others are extrinsically motivated and would likely benefit from financial or other incentives. Many TKR recipients have a favorable perception of activity monitors such as Fitbit and Apple Watch and believe that these devices would be helpful during their recovery. Future research should investigate whether providing patients with activity monitors before and after surgery could help them set realistic goals, monitor their progress, and increase their PA levels. Lastly, clinicians and researchers may consider personalizing interventions, including the type of PA monitor, based on patient preferences, goals, and values.

AUTHOR CONTRIBUTIONS

All authors were involved in drafting the article or revising it critically for important intellectual content, and all authors approved the final version to be published. Dr. Katz had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study conception and design. Arant, Zimmerman, Losina, Katz.

Acquisition of data. Arant, Zimmerman.

Analysis and interpretation of data. Arant, Zimmerman, Bensen, Katz.

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