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# An Employer-Sponsored Musculoskeletal Care Coordination Service Can Improve Clinical Outcomes and Self-Reported Productivity

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**Objective:** To evaluate the effects of participation with a novel musculoskeletal care coordination service on clinical outcomes, self-reported productivity, and satisfaction. **Methods:** Prospective analysis of participants using the service from January 1, 2019 to December 31, 2019. **Results:** One hundred eighty nine participants were enrolled; 54 participants completed their recommended clinical pathway. Low back pain was the most common musculoskeletal issue ( $N=86$ , 46%). 88 participants (47%) were triaged to home exercise and 59 (31%) to physical therapy. Behavioral health issues were common: 47 participants (25%) were referred to their EAP. Only 30 participants (16%) required a medical referral. Engagement was associated with improvements in pain, physical function, mood, and self-reported productivity ( $P<0.01$ ). The net promotor score for this service was 95. **Conclusions:** Employers with populations for whom musculoskeletal complaints are common might benefit from integrating a musculoskeletal care coordination service in their benefits offering.

**Keywords:** care coordination, musculoskeletal care, occupational health, physical medicine

## BACKGROUND

Approximately one third of US adults suffer from musculoskeletal complaints—one of the most common reasons for outpatient visits.<sup>1,2</sup> The direct costs associated with musculoskeletal conditions are among the highest in healthcare with costs for low back pain alone accounting for \$96B annually.<sup>3</sup> Given that musculoskeletal pain is the second leading cause of workplace absenteeism resulting in approximately 290 million lost workdays annually,<sup>3</sup>

employers bear a large share of costs associated with musculoskeletal conditions.

Thus, employers are increasingly seeking solutions that provide their employees with rapid access to high quality musculoskeletal care.<sup>4,5</sup> A potential for serving this need—especially during the COVID-19 pandemic when patients may be reluctant to receive care outside of their homes—includes early access to home exercise programs and physical therapy. Historically, early access to this care has been associated with significant improvements in clinical outcomes at lower cost (from fewer surgeries, imaging tests, and invasive procedures).<sup>6,7</sup> For patients who are not candidates for home exercise or physical therapy, triage to higher levels of care is a necessary component of a comprehensive musculoskeletal care pathway.

The purpose of this study was to evaluate a novel musculoskeletal care coordination service that attempts to engage employees in their course of musculoskeletal pain and guide them through an evidence-based, cost-effective care journey. This service has not been rigorously evaluated in the employer setting. Thus, our specific objective was to provide an evaluation of a pilot of the musculoskeletal care coordination service in an urban population of adult employees with either acute or chronic musculoskeletal complaints. We hypothesized that engagement with the service would result in improvements in three key outcomes: clinical outcomes (pain, physical function, and mood), workplace productivity, and participant satisfaction.

## METHODS

### Participants

Eligible participants were recruited by email and at employer-sponsored ergonomic and health events. We included all participants enrolled in the Rialto musculoskeletal care coordination service from January 1 to December 31, 2019. These participants were adult Comcast NBCUniversal employees and their dependents (age  $\geq 18$  y) living in the Philadelphia metropolitan area with self-identified knee, hip, back, or other musculoskeletal complaints.

### Intervention and Data Collection

The service is provided by care coordinators who are certified health and wellness coaches with at least four years of experience. Before interacting with participants, they received an intensive 6-week training on the biopsychosocial model of musculoskeletal care (which involves approaching patients' pain experience and biomechanics in a supportive environment that encourages movement and active therapy),<sup>8</sup> clinical practice guidelines for musculoskeletal care; coaching modules on topics such as goal setting, activity and sleep counseling, coping with pain, and relaxation exercises; use of the care coordination technology that structures both the patient questions and the development of the care plan; referral management processes; and follow-up protocols.

In the recruitment materials, participants were given a phone number and access to an online portal to schedule an initial

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This protocol received IRB approval (AspireIRB Protocol Number XORialto001, December 20, 2018).

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**Clinical significance:** Employees with musculoskeletal complaints have numerous care options including high-value alternatives such as home exercise and physical therapy, costly care such as specialist referrals and imaging, and invasive options such as surgery. These results suggest that a musculoskeletal care coordination service can improve pain, physical function, mood, and self-reported productivity.

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consultation with a musculoskeletal care coordinator who screened them for eligibility in the pilot. Eligible participants were then given a baseline assessment during which they were asked to provide structured data specific to their musculoskeletal complaint including site of musculoskeletal pain; duration and severity of symptoms; symptoms consistent with depression or anxiety; pain (on a Likert scale where 1 was rated as “no pain at all” and 10 was rated as “the worst pain imaginable”); impact of pain on physical functioning (on a Likert scale where 1 was rated as “no interference with general day-to-day activity” and 10 was rated as “completely unable to do day-to-day activity”). Participants were also asked about their treatment preferences (eg, willingness to engage in home exercise, seeking a recommendation for a neurosurgeon or imaging center, willingness to accept a referral to the Comcast NBCUniversal Employee Assistance Program [EAP] for behavioral health support).

The specific baseline assessment questions varied by clinical scenario and were all taken from validated questionnaires (eg, general issues were measured by questions from the validated PROMIS 10,<sup>9</sup> low back pain questions were taken from the Oswestry,<sup>10</sup> hip pain questions were taken from the HOOS, JR,<sup>11</sup> and knee pain questions were taken from the KOOS).<sup>12</sup> Participants flagged as moderate or high risk for a behavioral health issue the on the PROMIS, were asked additional behavioral health questions taken from the PHQ-9<sup>13</sup> and GAD-7<sup>14</sup> for depression and anxiety respectively. Care coordinators used the data from the baseline assessment to rule out “red flags” suggestive of a serious condition (eg, history of cancer, significant neurological findings, bowel or bladder compromise, history of surgery). If a red flag was present, participants were referred for an urgent specialist consultation.

On the basis of these data, participants were triaged into the relevant care pathway (eg, home exercise, referral for physical therapy, referral for psychiatry). Care pathways were based on well-established clinical guidelines and a rigorous review of the evidence for each clinical condition (eg, for low back pain,<sup>15–19</sup> hip pain,<sup>20–25</sup> knee pain<sup>26–32</sup>). Each participant was paired with a care coordinator who was responsible for that participant’s journey through their care plan. They followed participants at least weekly (but sometimes as often as daily) until 1 month after their graduation from their care pathway via secure text or phone to assess their progress. Condition-specific clinical status questions were asked weekly. Regardless of pathway, participants were also offered coaching for pain management, stress reduction, sleep management, cognitive reframing and coping strategies, activity pacing, relaxation exercises, weight loss, and goal setting. During each follow-up visit, care plans were updated based on clinical progress. Participants who did not engage in follow-up visits were contacted by their preferred means (telephone, text, email) three times over a two week period with encouragement to re-engage.

The outcomes of interest for each participant included: 1) engagement (measured both as the proportion of participants who adopted at least one recommended action (eg, start a home exercise program) and the proportion of participants who completed their expected care plan); 2) clinical outcomes (ie, change in pain, functional status, and mood scores); 3) productivity (measured using a single item from the Workplace Presenteeism and Absenteeism Inventory [WPAI])<sup>33,34</sup> that asked on a 0 to 10 visual analog scale: “During the past seven days, how much did your musculoskeletal pain affect your productivity while you were working?” where 0 represented “no effect on my work” and 10 represented “completely prevented me from working”; and 4) participant satisfaction (measured on a 5-point Likert scale where 1 is “completely dissatisfied” and 5 is “completely satisfied” and with a single item Net Promoter Score [NPS] that asked participants to rate, on a scale from –100 to +100, “How likely is it that you would recommend the Risalto service to a friend or colleague?”).<sup>35</sup>

## Quality Review

All participant baseline calls were reviewed by senior clinical staff within 48 hours. Additionally, participants reporting severe clinical symptoms (eg, severe pain, reporting suicidality on the PHQ9) were immediately connected to the appropriate care provider (eg, the EAP) and flagged for urgent review by senior clinical staff.

## Cost to Participants

Participants did not incur incremental costs associated with the care coordination service and did not receive any incentives for study participation. The home exercise program and coaching by care coordinators were provided at no cost to participants. Participants used their healthcare benefits for physical therapy, imaging, and specialist visits (for participants in their deductible or co-insurance phases of their benefits, this would have resulted in out-of-pocket expenses).

## Statistical Methods

We used univariate analyses to describe the outcomes of interest for participants in each of the care pathways. We compared outcomes at baseline and graduation with paired *t*-tests and considered *P* values < 0.05 to be statistically significant. To evaluate the association among the outcomes of interest we calculated Pearson correlation coefficients and MANOVA. This protocol received IRB approval (AspireIRB Protocol Number XORisalto001, December 20, 2018). We conducted all statistical analyses in Excel v16.37.

## RESULTS

Two hundred sixty-nine participants were screened and 189 met inclusion criteria and completed their baseline assessment. Table 1 presents the demographic and clinical characteristics of these 189 participants. Participants’ mean age was 43.1 years (SD

**TABLE 1.** Participant Characteristics and Program Participation

Characteristic	Mean (SD) or % (N)
Age (y)	43.1 (10.7)
Engagement stage at end of evaluation period	
Still on care pathway	22.2% (N = 42)
Completed care plan	28.6% (N = 54)
Withdrew	2.6% (N = 5)
Ineligible for Risalto service (primary workplace injury, referred to workers’ compensation program)	2.1% (N = 4)
Lost to follow-up (some progress confirmed)*	23.8% (N = 45)
Lost to follow-up	20.6% (N = 39)
Body part affected	
Low back	45.5% (N = 86)
Knee	18.5% (N = 35)
Neck	11.6% (N = 22)
Hip	7.9% (N = 15)
Shoulder	5.3% (N = 10)
Other	11.1% (N = 21)
Weeks to graduation from care pathway	
Neck	13.8 (SD 12.9) (N = 8)
Low back	10.5 (SD 9.0) (N = 19)
Knee	13.8 (SD 9.1) (N = 16)
Other	11.0 (SD 6.4) (N = 6)
Hip	10.4 (SD 5.1) (N = 5)
Overall	12.0 (SD 9.0) (N = 54)

\*Some participants who were lost to follow-up had progressed on their care plan (eg, accepted a referral to a specialist).

**TABLE 2.** Care Pathway by Body Part Affected

Initial Care Pathway	Overall Population (N = 189)	Lower Back (N = 86)	Knee (N = 35)	Neck (N = 22)	Hip (N = 15)	Shoulder (N = 10)	Other (N = 21)
Home exercise	46.6% (N = 88)	41.9% (N = 36)	54.3% (N = 19)	54.5% (N = 12)	66.7% (N = 10)	40.0% (N = 4)	33.3% (N = 7)
Physical therapy	31.2% (N = 59)	38.4% (N = 33)	28.6% (N = 10)	18.2% (N = 4)	26.7% (N = 4)	30.0% (N = 3)	23.8% (N = 5)
Orthopedic referral	5.2% (N = 10)	1.2% (N = 1)	14.3% (N = 5)	4.5% (N = 1)	0.0% (N = 0)	10.0% (N = 1)	9.5% (N = 2)
Primary care referral	2.1% (N = 4)	2.3% (N = 2)	0.0% (N = 0)	4.5% (N = 1)	0.0% (N = 0)	0.0% (N = 0)	4.8% (N = 1)
Physical medicine referral	8.5% (N = 16)	16.3% (N = 14)	2.9% (N = 1)	0.0% (N = 0)	0.0% (N = 0)	10.0% (N = 1)	0.0% (N = 0)
Additional behavioral health referral to EAP*	24.9% (N = 47)	27.9% (N = 24)	20.0% (N = 7)	31.8% (N = 7)	20.0% (N = 3)	50.0% (N = 5)	4.8% (N = 1)
Exception†	2.1% (N = 4)	0.0% (N = 0)	0.0% (N = 0)	18.2% (N = 4)	0.0% (N = 0)	0.0% (N = 0)	0.0% (N = 0)
Other‡	4.2% (N = 8)	0.0% (N = 0)	0.0% (N = 0)	0.0% (N = 0)	6.7% (N = 1)	10.0% (N = 1)	28.6% (N = 6)

EAP, employee assistance program.

\*Participants who reported behavioral health symptoms were referred to their EAP in addition to their primary musculoskeletal pathway.

†Exception refers to those participants who were not eligible for Rialto services and referred out for other care.

‡Other refers to a non-standard care pathway (eg, for ankle or other body part for which there was not a standard pathway).

10.7 y, range from 23 to 66 y). Low back pain was the most common musculoskeletal issue (86 [46%] participants). Overall, 88 (47% of) participants were triaged to home exercise and 59 (31%) were triaged to physical therapy; although the types of care differed by body part (Table 2). Only 30 (16%) participants required a medical referral and more than half of those were to psychiatry. Notably, although participants could only be on one care pathway at a time, some participants with multiple musculoskeletal issues were on more than one care pathway during the pilot.

**Engagement**

Of the 189 participants who completed their baseline evaluation, 54 (29%) participants completed their care plan. Among those who completed their care plans, the average call duration with a care coordinator was 16 minutes per call (Fig. 1) with initial calls averaging 31 minutes and subsequent calls averaging 8 minutes. On average, participants texted 18 times with the service. The specific engagement modality used (text vs call) was based on participant preference and the content of the calls and texts was identical.

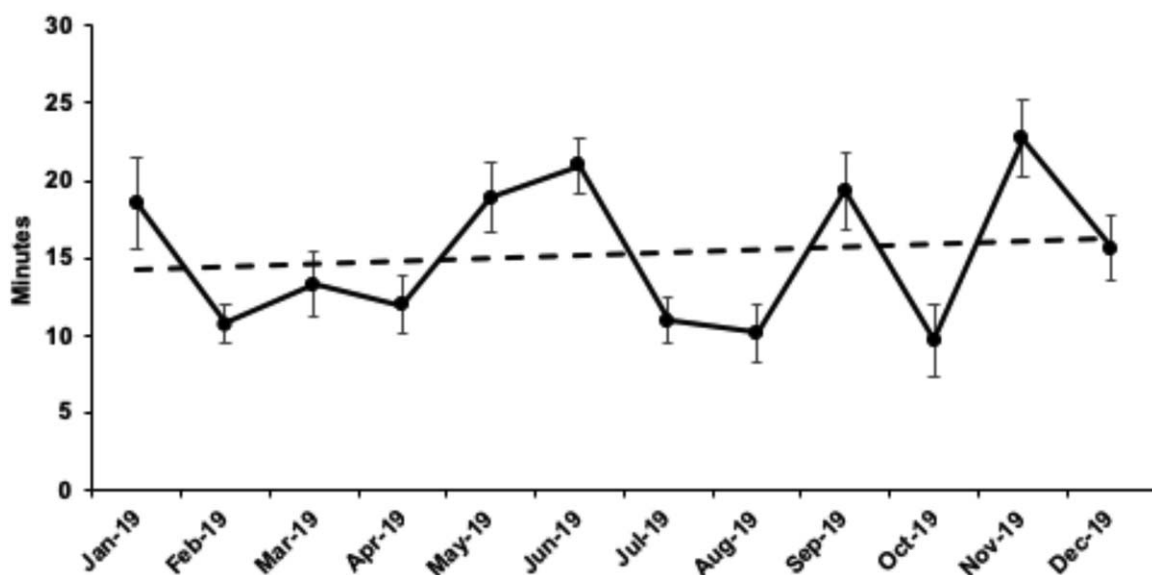
The vast majority of participants (95%) took at least one recommendation made by their care coordinator. Among those participants who did not take a recommended action, many reported that they would schedule an appointment with a recommended provider themselves; however, the extent to which that happened could not be verified.

On average, participants completed their care pathway in 16.9 (SD 9.9) weeks (Table 1). Hip pain patients tended to graduate from their care pathways most quickly and the neck and low back pain patients required longer treatment periods.

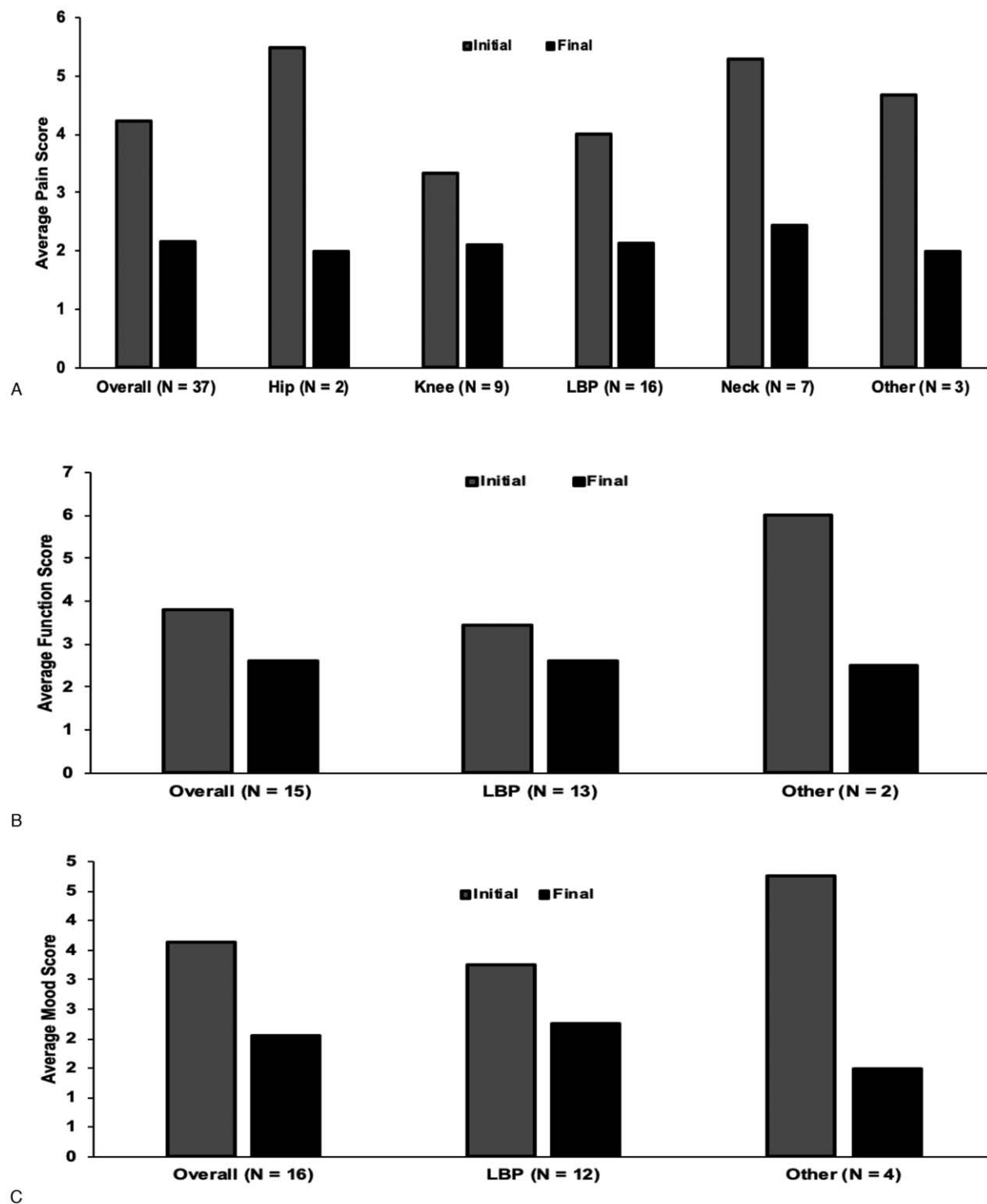
**Clinical Outcomes**

**Pain**

Among the 54 participants who completed their care plan, 37 provided both baseline and final pain assessments (range 1–10; a change of greater than 1 can be considered to be clinically relevant). Their baseline pain score decreased from 4.2 (SD 1.4) to 2.2 (SD 1.9) (Fig. 2A). Thirty-one participants (84%) had a change in their



**FIGURE 1.** Average call duration with the care coordination service (min). Describes average call duration in minutes during the evaluation period.



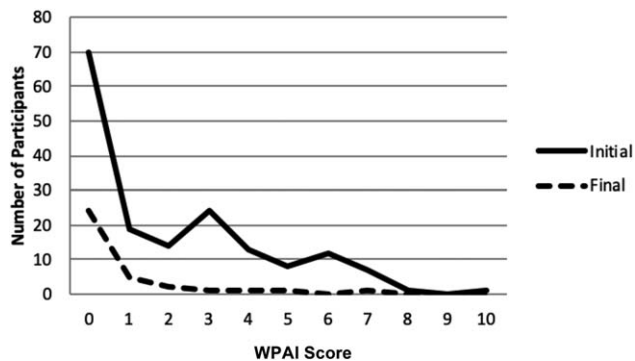
**FIGURE 2.** Clinical outcomes among participants who completed their care plan. (A) Change in average pain scores from baseline to program completion by care pathway. (B) Change in average physical function scores from baseline to program completion by care pathway. (C) Change in average mood scores from baseline to program completion by care pathway.

pain score of 1 or more. Three participants (8%) had no change in their pain scores. Three participants (8%) had higher final pain scores than at baseline but reported qualitative improvement, considered the pain to be well controlled, and requested that they be graduated from the program.

**Physical Function**

Among the 54 participants who completed their care plan, 15 provided both baseline and final physical functioning scores (range 1–10; a change of greater than 1 can be considered to be clinically relevant). Their average physical functioning score improved from





**FIGURE 3.** Change in Productivity. The WPAI<sup>33,34</sup> asks on a 0 to 10 visual analog scale: “During the past seven days, how much did your musculoskeletal pain affect your productivity while you were working?” where 0 represents “no effect on my work” and 10 represents “completely prevented me from working.” WPAI, workplace presenteeism and absenteeism inventory.

3.8 (SD 2.5) at baseline to 2.6 (SD 2.6) at graduation (Fig. 2B). Ten participants (67%) had a change in their pain impact score of 1 or more. Five participants (33%) reported their pain had a greater impact on daily activity at their final measurement but requested that they be graduated from the program.

**Behavioral Health**

Behavioral health issues were common among participants: 47 (25%) participants were referred to their EAP (Table 2). Of these, 32 participants accepted this referral. Among the 54 participants who completed their care plan, 16 (30%) provided both baseline and final mood impact scores (range 1–10; a change of greater than 1 can be considered to be clinically relevant). Their average score improved from a baseline of 3.6 (SD 2.6) to 2.1 (SD 2.2) at plan completion (Fig. 2C). Eleven participants (69%) had a change in their mood impact score of 1 or more. Five participants (31%) reported worse mood scores at their final measurement than at baseline.

**Productivity**

At baseline, 70 participants (out of 169, 41.4%) reported that their musculoskeletal issue did not affect their productivity (ie, WPAI score of 0) (Fig. 3). Among the 54 participants who completed their care plan, 35 (65%) provided both baseline and final WPAI scores. Their average baseline WPAI was 2.71 (SD 2.6) which improved to 1.8 (SD 2.0) ( $P > 0.05$  for change). Five participants were fully productive (WPAI score = 0) upon completion of their care plan and five other participants indicated some improvement in productivity scores. Six participants reported greater impairment to productivity at their final assessment (including four participants who had a baseline score of 0).

**Participant Satisfaction**

Overall participant satisfaction was high across all programs and pathways with an average score of 4.98 (on a scale from 1–5). Participants were highly likely to recommend the care coordination service to others (NPS 95; on a scale from –100 to +100). When asked to identify their favorite aspects of the program, 31% of participants cited the tailored care, 31% the relationship with their care coordinator, and 36% the convenience and overall service. When asked for their least favorite aspects of the program were, 5% of participants cited the questionnaires, 5% the calls during work hours, and 3% that there was no video interaction.

Overall, the clinical outcomes were highly correlated: improvement in pain was associated with improvement in physical function ( $r = 0.50, P < 0.01$ ), in mood ( $r = 0.64, P < 0.01$ ), and in

productivity ( $r = -0.39, P = 0.03$ ). Taken together, we found that older age, increased engagement (as measured by the number of SMS messages sent to their coach); improvement in overall pain, physical function, and mood were all highly associated (ANOVA  $P = 6.3E-58$ ) (Table 3).

**DISCUSSION**

Increasingly, large employers are implementing care navigation services to help employees and their families maximize their health benefits and find high-quality, evidence-based care.<sup>4</sup> Most of these services are general in nature (ie, not condition-specific) and handle a wide variety of employee questions (eg, benefits coverage issues, medical bill reconciliation, finding a provider). This study, the first of a novel, employer-sponsored musculoskeletal-specific care coordination service, has four key findings: First, employee populations with musculoskeletal issues are willing to engage with a service aimed at directing them to evidence-based care. Moreover, a remarkable 78% of participants were willing to do home exercises or physical therapy rather than seeking more expensive specialist referrals and imaging tests. Although an economic analysis of the effects of steering to lower intensity services was outside the scope of this study, we recommend that it be included in a future analysis.

Second, participants experienced improvements in pain and physical function. We speculate that the standardization of care for patients with musculoskeletal pain through the use of the care pathways was a key driver of the observed clinical improvements. Others have found that evidence-based, standardized care pathways have been associated with cost savings and improved outcomes, including pain reduction and improved patient satisfaction.<sup>36</sup>

Third, access to this musculoskeletal care coordination service was associated with improvements in self-reported workplace productivity. Not surprisingly productivity improved in concert with improvements in pain, physical function, and mood. This finding warrants further exploration both with more detailed self-reported absenteeism and presenteeism measures and with direct measurement of workplace productivity.

Finally, participants were highly satisfied with their care. The NPS of 95 compares highly favorably with other healthcare entities (eg, CVS Health [–10], Cigna [–1], Walgreens [25], Kaiser Healthcare).<sup>37</sup> All participants included in this evaluation chose to work with their employer-sponsored care coordinator. This self-selection may have contributed to the excellent reported satisfaction with their experience.

The limitations of this evaluation include relatively small sample sizes for some of the care pathways, especially among those

**TABLE 3.** ANOVA of Outcomes of Interest

SUMMARY						
Groups	Count	Sum	Average	Variance		
Age	49	2,013.9	41.1	114.8		
Total SMS sent to coach	49	1,151	23.5	403.6		
Change in pain	45	–76	–1.7	3.4		
Change in mood	21	–25	–1.2	11.3		
Change in physical function	21	–18	–0.9	12.6		
Change in productivity	34	–15	–0.4	4.1		
ANOVA						
Source of Variation	SS	df	MS	F	P-Value	F crit
Between groups	68,039.8	5	13,608.0	113.0	<0.01	2.3
Within groups	25,648.2	213	120.4			
Total	93,688.0	218				

completing the program. Moreover, the rate of loss to follow-up was relatively high, potentially skewing the results in favor of the coordination service. Although the clinical outcomes were all based on items from validated instruments, the lack of data from complete scales prevented comparisons to outcomes previously reported in the literature. We recommend that a future evaluation of this program use validated instruments in their entirety, at least for a selected population (eg, low back pain patients) using the service. In addition, claims-based analyses might facilitate a more complete understanding of whether participants took the referral recommendations made by this service.

These results suggest that employers with populations in whom musculoskeletal complaints are common might benefit from integrating a musculoskeletal care coordination service in their benefits offering.

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