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Effect of Severe Distal Tibia, Ankle, and Mid- to Hindfoot Trauma on Meeting Physical Activity Guidelines 18 Months After Injury

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Abstract

Objective: To examine the effect of severe lower extremity trauma on meeting Physical Activity Guidelines for Americans (PAGA) 18 months after injury and perform an exploratory analysis to identify demographic, clinical, and psychosocial factors associated with meeting PAGA.

Design: Secondary analysis of observational cohort study.

Setting: A total of 34 United States trauma centers

Participants: A total of 328 adults with severe distal tibia, ankle and mid- to hindfoot injuries treated with limb reconstruction (N=328).

Interventions: None.

Main Outcome Measures: The Paffenbarger Physical Activity Questionnaire was used to assess physical activity levels 18 months after injury. Meeting PAGA was defined as combined moderate- and vigorous-intensity activity ≥150 minutes per week or vigorous-intensity activity ≥75 minutes per week.

Results: Fewer patients engaged in moderate- or vigorous-intensity activity after injury compared with before injury (moderate: 44% vs 66%, $P<.001$; vigorous: 18% vs 29%; $P<.001$). Patients spent 404±565 minutes per week in combined moderate- to vigorous-intensity activity before injury compared with 224±453 minutes postinjury (difference: 180min per week; 95%

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confidence interval [CI], 103–256). The adjusted odds of meeting PAGA were lower for patients with depression (adjusted odds ratio [AOR], 0.45; 95% CI, 0.28–0.73), women (AOR, 0.59; 95% CI, 0.35–1.00), and Black or Hispanic patients (AOR, 0.49; 95% CI, 0.28–0.85). Patients meeting PAGA prior to injury were more likely to meet PAGA after injury (odds ratio, 2.0; 95% CI, 1.20–3.31).

Conclusions: Patients spend significantly less time in moderate- to vigorous-intensity physical activity after injury. Patients with depression are less likely to meet PAGA. Although the causal relationship is unclear, results highlight the importance of screening for depression.

Keywords

Depression; Exercise; Fractures; Orthopedics; Rehabilitation; Wound and injuries

Physical impairment and low levels of physical activity are common after lower extremity trauma.[1–5] The Lower Extremity Assessment Project, a prospective study of patients with limb threatening injuries, found that 48% of patients treated with limb reconstruction reported severe disability 7 years postinjury.[1,2] Similarly, results from studies on physical activity show that only 26%–34% of patients engage in vigorous-intensity activity after orthopedic trauma.[3–5] The Physical Activity Guidelines for Americans (PAGA) recommend at least 150 minutes of moderate-intensity activity or 75 minutes of vigorous-intensity activity per week.[6] Individuals who do not meet these recommendations are at increased risk for stroke, diabetes, and heart failure.[7–11]

Prior studies of physical activity after orthopedic trauma have focused on the effect of sports and recreational injuries, geriatric hip fractures, and low-energy ankle fractures.[4,5,12–14] Studies examining the effect of severe high-energy trauma on physical activity are limited. High-energy injuries from motor vehicle, pedestrian and industrial accidents, and falls from heights higher than standing often involve multiple fractures, lead to more complex fracture patterns, and have greater propensities for postacute complications compared with low-energy injuries. Only 1 study, conducted among active duty military personnel, examined the effect of severe, high-energy trauma on physical activity,[3] However, results are not generalizable to the civilian population with these injuries. Given that low levels of activity are associated with poor health, it is important to identify factors among this population that effect return to healthy levels of activity as targets for rehabilitation interventions. Although studies have identified risk factors for poor physical function after orthopedic trauma, there is little evidence with respect to physical activity.[1,15–19] Factors such as injury severity and clinical complications affect function and likely play a role in patients' abilities to engage in physical activity,[1,15–19] Psychosocial factors have also been shown to play important roles in functional recovery after traumatic injury and other serious health events.[17,20–23] Studies have found that symptoms of depression and posttraumatic stress disorder (PTSD) measured within 6 weeks of hospital discharge are predictive of 12-month self-reported function and physical health after orthopedic trauma.[17,20] This association may be driven in part by postacute pain, which is higher among individuals with depression and PTSD.[15,21] Currently, little is known about the effect of depression, PTSD, and pain on physical activity after severe lower extremity trauma.

The purpose of this study was to examine the effect of injury on meeting PAGA among patients with severe distal tibia, ankle, and/or foot trauma treated with limb reconstruction participating in a prospective multicenter study and to identify demographic, clinical, and psychosocial factors associated with meeting PAGA. Specifically, we examine factors assessed within 3 months of injury to identify opportunities for early rehabilitation interventions.

Methods

Study design

The study used data from participants enrolled in the Outcomes After Severe Distal Tibia, Ankle, and/or Foot Trauma (OUTLET) study, an Institutional Review Board–approved prospective, multicenter observational study of outcomes after limb reconstruction or amputation.[24,25] Eligible patients were 18–60 years old with open Gustilo type III B-C fracture(s) of the pilon, ankle, talus, and calcaneus and mid- to hindfoot crush or blast injuries. Patients who were nonambulatory prior to injury, had a previous foot or leg amputation, had burns on >10% of injured limb, had diagnosed psychiatric condition, had brain trauma, or had severe problems with follow-up were excluded. The goal of the OUTLET study was to compare outcomes of patients who underwent limb reconstruction with the outcomes that they would have experienced had they instead undergone an amputation. Of the 581 patients enrolled, 84% underwent limb salvage consisting of internal fixation (plates, nails, screws), or other stabilization techniques (K-wires), and 16% underwent Symes or transtibial amputation.[25] Patients were enrolled at time of hospitalization for initial treatment and completed study visits at routine intervals for 18 months. The current study examines physical activity, one of the main outcomes in the OUTLET study, in the context of meeting PAGA after limb reconstruction.

Outcome

Physical activity was measured using the Paffenbarger Physical Activity Questionnaire (PPAQ), a validated instrument that distinguishes between moderate- and vigorous-intensity activity.[26,27] This instrument has been used to examine activity among individuals with cardiovascular disease, depression, neurologic disorders, orthopedic spine conditions, and cancer.[28–33] The PPAQ was administered in person via interview by trained research coordinators at the 18-month study visit or over the phone for participants who did not return to clinic. Participants were asked to report up to 5 activities that they participated in regularly during the last 3 months. For each activity, the number of times per week and the duration of each session in minutes was recorded.

A metabolic equivalent (MET) score was assigned to each activity using the 2011 Physical Activity Compendium.[34] Activities were classified with a MET score <3 as low intensity, 3 to <6 as moderate intensity, and ≥6 as vigorous intensity.[6] Total minutes of moderate- and vigorous-intensity activity were then calculated for each patient at baseline and 18 months. Consistent with prior methodology,[35] patients with combined moderate- and vigorous-intensity activity ≥150 minutes per week or vigorous physical activity ≥75 minutes per week were classified as *meeting PAGA*. Patients with activity not meeting these criteria were categorized as *not meeting PAGA*.[35]

Key covariates

Clinical characteristics—Baseline injury and hospital characteristics were ascertained from medical chart review. Patients were classified as having a complex injury pattern if the injury required tissue flaps, involved severe articular fractures, and/or resulted in significant bone loss (>2 cm). These injury patterns are associated with poor physical function.[36–39] Overall injury severity was measured using the Injury Severity Score, an established scoring system used to classify the severity of injury in each body region.[40] Scores range from 0–75, with higher scores indicating worse injuries. A score ≥13 was used to dichotomize injury severity based on a previously established cutoff.[40] Hospital length of stay was defined as number of days hospitalized for initial injury treatment. Rehospitalizations and physical therapy attendance were assessed at the 3-month study visit by asking patients if they had stayed at least 1 night in a hospital and received any physical therapy since the baseline visit.

Psychosocial characteristics—Depression, PTSD, and pain were assessed at the 3-month study visit by interview. Depression was measured using the Patient Health Questionnaire,[41] a validated 9-item questionnaire with a score range of 0–27, with higher scores representing increased severity of depressive symptoms. Participants were classified as having minimal or no symptoms (0–4) or mild to severe symptoms (5–27). PTSD was measured using the PTSD Checklist,[42] a validated 17-item questionnaire with a score range of 17–85, where higher scores indicate more severe symptoms. A score ≥44 is used as a cutoff for a diagnosis of PTSD.[42] Pain was measured using the validated pain severity score on the Brief Pain Inventory short form.[43] Average pain severity in the last 24 hours was measured on a scale of 0–10, with 0 indicating no pain and 10 the most severe pain.

Patient characteristics—Baseline patient characteristics included age at time of hospitalization, race and ethnicity (non-Hispanic White, non-Hispanic, other races and ethnicities), and education (less than high school, high school/General Education Degree, at least some college). Body mass index (calculated as weight in kilograms divided by height in meters squared) was calculated using height and weight measurements from the medical record and was used to classify patients as underweight (<18.5), normal weight (18.5–24.9), overweight (25–29.9), or obese (≥30). Tobacco use was categorized as never smoked, formerly smoked, or currently smokes. Major comorbidities included diabetes, cardiac disease, vascular disease, pulmonary disease, and the following psychiatric conditions: depression, PTSD, anxiety, and other psychiatric conditions. Preinjury physical activity was assessed using the PPAQ administered at the baseline study visit and classified as meeting or not meeting PAGA using the criteria described above. This was collected an average of 14 days after injury.

Statistical analysis

Descriptive statistics were used to summarize time engaged in moderate-, vigorous-, and combined moderate- to vigorous-intensity physical activity. Wilcoxon signed-rank tests were used to compare average time engaged in activity before and after injury, and chi-square tests were used to compare the proportion of patients engaging in ≥1 moderate or vigorous activity. Differences were considered significant if $P<.05$.

We completed an exploratory analysis to identify differences in patient, clinical, and psychosocial characteristics by meeting or not meeting PAGA at 18 months. Beginning with univariate analysis, we used chi-square tests for categorical data and *t* tests for continuous data. Multivariable logistic regression was then used to model the association between factors that were significant in univariate analysis with meeting PAGA at 18 months. Factors with $P<.20$ in univariate analysis were entered into the initial model. Variables with $P>.10$ were removed from the model and added back 1 at a time. Our final model included 6 variables with a sample size sufficient for ≤8 variables.[44] Results are presented as unadjusted odds ratios and adjusted odds ratios (AORs) with 95% confidence intervals (CIs). Analyses were conducted using Stata version 15.1.[a]

Results

The study sample included 478 participants treated with limb reconstruction. Among these, 328 (69%) had complete data and were included in the analysis (fig 1). Participants with missing data were younger on average (36 vs 38y), were less educated (39% with some college vs 55%), had fewer hospital readmissions 3 months after injury (21.3% vs 37.2%), had lower rates of depressive symptoms (40% vs 57%), and had higher rates of PTSD (73% vs 53%). There were no appreciable differences in sex, race, preinjury health and physical activity, injury location, or pain (supplemental table S1, available online only at http://www.archives-pmr.org/).

Most included participants were male (61%), were White (69%), had at least a high school education (84%), had no major comorbidities (58%), had a body mass index ≥30 (44%), and were an average age of 38 years old (table 1). Of the injuries, 41% were pilon and ankle fractures, 75% had a complex injury pattern, and the average length of hospital stay was 13 days. Prior to injury, 57% of patients met PAGA (n=188). At 3 months, 60% had depressive symptoms, 54% had PTSD, and the average pain severity score was 3.4 (of 10) (see table 1).

Patients meeting PAGA at 18 months were younger (mean age, 37 vs 39y) than patients not meeting PAGA and were more were college educated (61.9% vs 51.4%); more met PAGA prior to injury (69.5% vs 50.5%); fewer were female (28.8% vs 44.8%); fewer were non-White or Hispanic (22.9% vs 35.7%); fewer were obese (36.4% vs 48.6%); fewer had ≥1 major comorbidities (32.2% vs 48.1%), a pilon or ankle injury (36% vs 43%), or a complex injury pattern (67% vs 76%,); and fewer reported mild-severe depressive symptoms (44.9% vs 64.3%). Patients meeting PAGA also reported lower pain (3.1 vs 3.6) (see table 1).

Moderate-intensity activities reported most frequently included walking, exercise at a health club, and playing with children. Vigorous-intensity activities included basketball, bicycling, running, and hiking (supplemental table S2,:available online only at http://www.archives-pmr.org/). Fewer patients after injury reported engaging in ≥1 moderate-intensity activity (3 to <6 MET score) compared with before injury (44% vs 66%) (table 2). Similarly, fewer patients reported ≥1 vigorous-intensity activity (≥6 MET score) after injury (18% vs 29%). There was a significant decline in average minutes of moderate-intensity activity (116 fewer minutes; 95% CI, 45–187), vigorous-intensity activity (64 fewer minutes, 95% CI, 33–94), and combined moderate- to vigorous-intensity activity (180 fewer minutes; 95% CI, 103–256). There was a shift in the ratio of moderate- to vigorous-intensity activity after injury. Prior to injury, 74% of the combined minutes of moderate- to vigorous-intensity activity were attributed to moderate activity and 26% to vigorous activity compared with 82% of combined minutes of activity attributed to moderate-intensity and 18% to vigorous-intensity activity after injury.

The adjusted odds of meeting PAGA were 54% lower (AOR, 0.46; 95% CI, 0.28–0.74) for patients with mild-severe depressive symptoms. Women were less likely (AOR, 0.58; 95% CI, 0.34–0.98) than men to meet PAGA at 18 months, as were non-White or Hispanic patients compared with non-Hispanic White patients (AOR, 0.50; 95% CI, 0.29–0.87). Patients meeting PAGA prior to injury were significantly more likely (95% CI, 1.22–3.35) to meet PAGA at 18 months (table 3).

Discussion

This study is the first to examine the effect of severe, high-energy orthopedic trauma on meeting PAGA. Only 44% of patients meeting PAGA prior to injury met PAGA 18 months after injury. Patients spent less time engaging in moderate to vigorous activity overall, with a shift in ratio toward moderate-intensity activity and a proportional decrease in vigorous-intensity activities. We found that patients with depressive symptoms at 3 months were significantly less likely to meet PAGA at 18 months independent of clinical factors and pre injury activity, underscoring the importance of certain psychosocial factors on recovery.

These results are consistent with findings from a subset of 324 service members with lower limb injuries participating in the Military Extremity Trauma Amputation/Limb Salvage (METALS) study,[3] which also used the PPAQ to assess physical activity. In the METALS cohort, 26% of patients treated with limb salvage reported participating in at least 1 vigorous activity, which is higher than the 18% we observed in our cohort. Differences may be partially explained by a longer average follow-up period in METALS (37.5mo), which may have allowed for additional recovery. Additionally, the METALS cohort was entirely composed of United States service members with higher than average preinjury activity levels.

Patients reporting depressive symptoms at 3-months were less likely to meet PAGA at 18-months, which is consistent with studies that found negative associations between depression and physical activity among healthy individuals and those with chronic health conditions.[45–50] Although we cannot determine the causal pathway between depression and physical activity, our results highlight the importance of screening for depression early in the recovery period to identify patients at risk of poor physical activity outcomes. Nonpharmacologic interventions such as exercise and cognitive behavioral therapy have been shown to improve depressive symptoms in healthy adults and those with chronic illness.[51–53] However, research is needed to determine if treating depression during the postacute phase of recovery has an effect on long-term physical activity levels.

We did not see an association between early assessments of pain or PTSD with meeting PAGA at 18 months. Nevertheless, it may be important to examine the relationship between pain, depression, and PTSD in future studies, particularly because these may change over the course of recovery. For example, pain may explain some of the relationship between depression and activity. Previous studies have found that pain is predictive of depression at various stages of recovery for those with traumatic lower extremity injuries.[15,21] Indeed, patients with severe depressive symptoms had higher pain severity scores in this study; however, the average pain severity scores were low (3.4 of 10). Although fewer patients with PTSD met PAGA at 18 months, differences were not statistically significant. Of note, 147 (84%) patients with PTSD had at least mild depressive symptoms, suggesting overlap between these conditions.

Meeting PAGA prior to injury was associated with meeting PAGA after injury. However, consistent with the general United States population,[35] only 57% of participants were meeting PAGA preinjury. This is important because even in the absence of injury, it is unlikely that some individuals will ever meet recommendations. Therefore, promoting healthy levels of activity after injury may require recalibrating expectations and focusing on activities most meaningful to patients. For example, patients in this study reported walking, fishing, playing with children, and health club exercise multiple times per week. Increasing the frequency or duration of these moderate-intensity activities may help to meet guidelines after injury.

Compared with men, women were less likely to meet PAGA postinjury, even after accounting for depression and preinjury activity. One possible explanation is that women have worse physical function after trauma,[2], which results in less activity. We also found that compared with patients who are White, patients who are not White were less likely to meet PAGA. Previous studies have shown that patients who are not White have worse functional outcomes after injury, which may explain differences in activity levels.[1,16] It is also possible that low levels of activity are associated with disparities in access to rehabilitation services, which have been previously reported.[54–56] We found no sex or race differences in participant-reported physical therapy attendance; however, it is possible that differences in rehabilitation interventions and visit frequency may explain observed differences in physical activity. Future research should examine sex and race differences and the effect of rehabilitation services on recovery of physical activity.

Strengths of this study include rigorously analyzed prospectively collected data at 32 trauma centers on over 300 patients using a validated measure of activity that allowed us to determine the proportion of patients meeting PAGA, a clinically relevant outcome.

Study limitations

There are also limitations. First, by focusing on early predictors we fail to identify time varying relationships between clinical and psychosocial factors and factors more proximal to the outcome that may affect 18-month physical activity levels. Second, physical activity may be affected by other factors such as kinesiophobia, pain catastrophizing, and resilience, which were not measured. Third, some of the moderate-intensity activities reported were related to household work or employment, which do not reflect the recreational and leisure activities that the PPAQ was intended to capture. Fourth, participant reported physical activity is prone to recall bias and may overestimate minutes of moderate to vigorous activity. Studies have shown that self-reported assessments often overestimate physical activity compared with activity tracked by accelerometry, and it is possible that this method of measurement may have yielded different results.[35,57] Fifth, patients not included in our analysis because of missing data differed in ways that may bias our estimates. For example, patients with missing data had lower rates of depression. Because patients with depression are less likely to meet PAGA, the proportion of patients meeting guidelines after injury may be higher than reported. Finally, our results may not be generalizable to trauma proximal to the ankle, older patients, or patients treated with amputation.

Conclusions

Patients with severe distal tibia, ankle, and mid- to hindfoot injuries with limb reconstruction spent significantly less time in moderate- to vigorous-intensity physical activity after injury. Women, ethnic minorities, and patients with depression were less likely to meet physical activity guidelines recommended to achieve health benefits. Research is needed to better understand sex and race differences as well as to determine if treating depression increases physical activity.

Supplier

a. Stata version 15.1; StataCorp.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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List of abbreviations:

AOR	adjusted odds ratio
CI	confidence intervals
METALS	Military Extremity Trauma Amputation/Limb Salvage
MET	metabolic equivalent
OUTLET	Outcomes After Severe Distal Tibia, Ankle, and/or Foot Trauma
PAGA	Physical Activity Guidelines for Americans
PPAQ	Paffenbarger Physical Activity Questionnaire
PTSD	posttraumatic stress disorder

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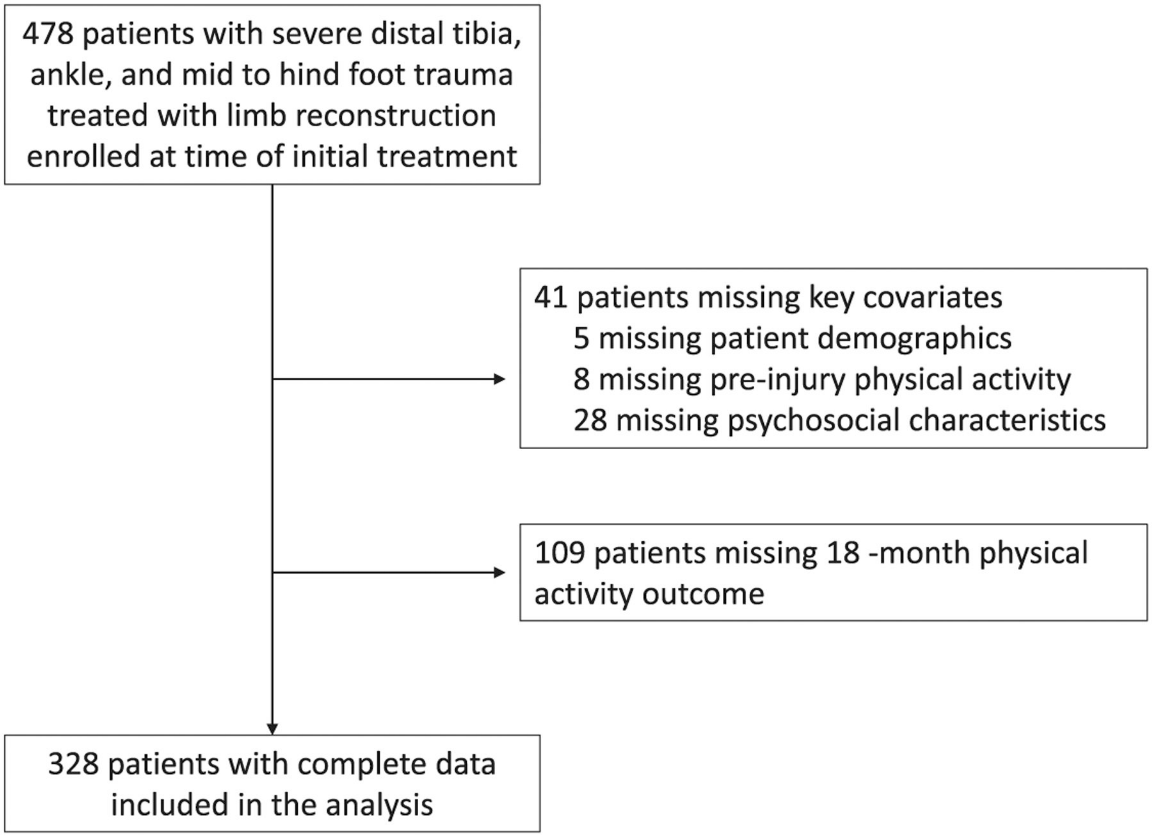

Fig 1.
Flow chart of patients included analysis. Paffenbarger Physical Activity Questionnaire.

Table 1

Baseline patient, clinical, and psychosocial characteristics by PAGA) status 18 months postinjury

Patient Characteristics	Overall (N=328)	Not Meeting PAGA 18 Mo Pos0074injury* (n=210)	Meeting PAGA 18 Mo Postinjury* (n=118)	*P* Value
Age (y), mean ± SD	38.3±12.0	39.1±12.1	36.9±11.9	.055
Female, n (%)	128 (39.0)	94 (44.8)	34 (28.8)	.004
Race and ethnicity, n (%)				
Non-Hispanic White	226 (68.9)	135 (64.3)	91 (77.1)	.016
Hispanic or Non-White†	102 (31.1)	75 (35.7)	27 (22.9)	
Education, n (%)				
<High school	52 (15.8)	36 (17.1)	16 (13.6)	.189
High school/General Education Degree	95 (29.0)	66 (31.4)	29 (24.6)	
Some College	181 (55.2)	108 (51.4)	73 (61.9)	
BMI, n (%)‡				
Underweight-normal (BMI<25)	95 (29.0)	51 (24.3)	44 (37.3)	
Overweight (BMI=25–29.9)	88 (26.8)	57 (27.1)	31 (26.3)	
Obese (BMI≥30)	145 (44.2)	102 (48.6)	43 (36.4)	.031
Tobacco use, n (%)				
Never smoked	135 (41.2)	87 (41.4)	48 (40.7)	.93
Formerly smoked	74 (22.6)	46 (21.9)	28 (23.7)	
Currently smokes	121 (36.3)	77 (36.7)	42 (35.6)	
≥1 Major comorbidities, n (%)§	139 (42.4)	101 (48.1)	38 (32.2)	.005
Diabetes‖	26 (18.7)	16 (7.6)	10 (8.5)	
Cardiac disease‖	57 (17.4)	40 (19.0)	17 (14.4)	
Vascular disease‖	8 (5.8)	4 (1.9)	4 (3.4)	
Pulmonary disease‖	24 (7.3)	17 (8.1)	7 (5.9)	
Psychiatric disease‖	58 (17.7)	45 (21.4)	13 (11.0)	
Depression¶	36 (62.1)	29 (64.4)	7 (53.8)	
PTSD¶	6 (10.3)	4 (8.9)	2 (15.4)	

Patient Characteristics	Overall (N=328)	Not Meeting PAGA 18 Mo Pos0074injury* (n=210)	Meeting PAGA 18 Mo Postinjury* (n=118)	*P* Value
Anxiety¶	23 (39.7)	16 (35.6)	7 (53.8)	
Other¶	9 (15.5)	6 (13.3)	3 (23.1)	
Meeting PAGA prior to injury, n (%)				
Not meeting PAGA*	140 (42.7)	104 (49.5)	36 (30.5)	.001
Meeting PAGA*	188 (57.3)	106 (50.5)	82 (69.5)	
Clinical characteristics				
Complex injury pattern, n (%)#	241 (73.5)	160 (76.2)	81 (68.6)	.137
Injury Severity Score ≥13, n (%)	87 (26.5)	60 (28.6)	27 (22.9)	.263
Injury location				
Open pilon/ankle	134 (40.8)	91 (43.3)	43 (36.4)	.047
Open calcaneus/talus	75 (22.9)	53 (25.2)	22 (18.6)	
Other foot	119 (36.3)	66 (31.4)	53 (44.9)	
Hospital length of stay (d), mean ± SD	13.2±13.0	14.0±14.6	12.1±9.7	.210
≥1 Hospital readmission 3 mo after injury, n (%)	122 (37.2)	80 (38.1)	42 (35.6)	.653
≥1 Physical therapy visit 3 mo after injury, n (%)**	137 (41.8)	91 (43.3)	46 (39.0)	.443
Psychosocial characteristics				
Depression, n (%)††				
None or minimal	140 (42.7)	75 (35.7)	65 (55.1)	.001
Mild, moderate, or severe	188 (57.3)	135 (64.3)	53 (44.9)	
PTSD, n (%)‡‡				
None	152 (46.3)	92 (43.8)	60 (50.8)	.220
PTSD	176 (53.7)	118 (56.2)	58 (49.2)	
Pain severity score, mean ± SD§§	3.4±2.4	3.6±2.4	3.1±2.3	.098

Abbreviation: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared).

*Meeting PAGA is defined as performing ≥150 minutes of combined moderate activities (≥3 to <6 MET score) and vigorous activities (≥6 MET score) or ≥75 minutes of vigorous activity.

†Patients who are Hispanic or Non-White include patients that identified as Hispanic (n=33), Black (n=65), or other (n=4).

‡Underweight (BMI<18.5) and normal (BMI=18.5–24.9) combined because of low counts of underweight participants.

[§] Major comorbidities included diabetes, cardiac disease, vascular disease, pulmonary disease, or psychiatric conditions.

[//] Refers to the proportion of patients with specific comorbidities among those with ≥1 major comorbidity at baseline.

[¶] Refers to the proportion of patients with specific psychiatric disorders among those with ≥1 psychiatric disorder at baseline.

[#] Complex injury pattern defined as injuries requiring a flap and/or severe articular fractures and/or significant bone loss (>2 cm).

[**] Missing data on physical therapy attendance from 2 patients.

[††] Depression defined as Patient Health Questionnaire scores ≥5, which includes individuals with mild to severe symptoms.

[‡‡] PTSD diagnosis defined as score >44 on the PTSD Checklist-Specific.

[§§] Pain severity score measured using the Brief Pain Inventory; scores range from 0 (no pain) to 10 (most severe pain).

Table 2

Minutes of moderate- and vigorous-intensity activity before and after injury (N=328)

Variables	Before Injury	18 Mo After Injury	Difference*	*P* Value
Patients reporting ≥1 moderate-intensity activity, n (%)	215 (65.6)	145 (44.2)	70 (21.4)	<.001
Minutes of moderate-intensity activity†				
Mean ± SD	299±504	183±432	116 (45–187)	<.001
Median (IQR)	73 (0–382)	0 (0–218)		
Range	0–3360	0–3420		
Patients reporting ≥1 vigorous-intensity activity, n (%)	94 (28.7)	59 (18.0)	35 (10.7)	<.001
Minutes of vigorous-intensity activity‡				
Mean ± SD	105±271	41±140	64	<.001
Median (IQR)	0 (0–60)	0 (0–0)	(33–94)	
Range	0–2400	0–1560		
Combined minutes of moderate- and vigorous-intensity activity				<.001
Mean ± SD	404±565	224±453	180 (103, 256)	
Median (IQR)	210 (0–570)	0 (0–275)		
Range	0–3360	0–3420		

Abbreviation: IQR, interquartile range.

* Values in parentheses indicate percentages for categorical data and 95% CIs for continuous data.

† Moderate-intensity activity defined as activity with a MET score ≥3 and <6.

‡ Vigorous-intensity activity defined as activity with a MET score ≥6.

Table 3

Odds of meeting PAGA* 18 months after injury

Variables	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Female, n (%)	0.50 (0.31–0.81)	0.58 (0.34–0.98)
Race and ethnicity, n (%)		
Non-Hispanic White	Referent	Referent
Hispanic or non-White	0.53 (0.32–0.89)	0.50 (0.29–0.87)
BMI, n (%)		
Underweight-normal (BMI<25)†	Referent	Referent
Overweight (BMI=25–29.9)	0.63 (0.35–1.14)	0.60 (0.31–1.15)
Obese (BMI≥30)	0.49 (0.28–0.84)	0.60 (0.34–1.08)
Injury type		
Open pilon/ankle	Referent	Referent
Open calcaneus/talus	0.88 (0.47–1.62)	0.76 (0.39–1.47)
Other foot	1.70 (1.02–2.84)	1.64 (0.94–2.85)
Meeting PAGA prior to injury, n (%)		
Not meeting PAGA	Referent	Referent
Meeting PAGA	2.23 (1.39–3.60)	2.02 (1.22–3.35)
Depression (3 mo postinjury)‡		
None or minimal	Referent	Referent
Mild, moderate, or severe	0.45 (0.29–0.72)	0.46 (0.28–0.74)

Abbreviation: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); OR, odds ratio.

*Meeting PAGA is defined as performing ≥150 minutes of combined moderate activities (≥3 to <6 MET score) and vigorous activities (≥6 MET score) or ≥75 minutes of vigorous activity.

†Underweight (BMI<18.5) and normal (BMI=18.5–24.9) combined because of low counts of underweight participants.

‡Depression categories based on Patient Health Questionnaire scores of 0–4 (none or minimal), 5–9 (mild), 10–27 (moderate-to-severe).