Table 1. Overview of various aspects of the biomechanics of gait after partial amputation of the foot

Author, year	Study population (sample size)	Reason for amputation	Age	Study design	Outcomes
Aprile, 2018 [1]	Subjects with ray amputation (RA; n=6), diabetes mellitus (DP; n=6) and control group (C; n=6)	Diabetes mellitus	RA: 75 DP: 68.2 C: 67.5	Gait analysis during a 6m level surface at preferred speed using the Smart D500 stereophotogrammetric system (barefooted), QoL assessment with SF-36 and NASS questionnaire	RA < DP and C gait speed, step length RA > DP and C step width $RA^{sound} \approx RA^{amputation}$ joint kinematics RA < DP and C peak hip extension (RA: 14.0 ± 10.7° vs DP: -2.6° ± 4.0 vs C: -4.0° ± 5.6) RA < C peak knee flexion (RA: 42.6 ± 15.5° vs C: 61.5 ± 10.0°) RA ≈ DP peak knee flexion (RA: 42.6 ± 15.5° vs DP: 57.5 ± 6.5°) RA < C ankle ROM (RA: 15.7 ± 8.2° vs C: 28.0 ± 4.0°) RA ≈ DP ankle ROM (RA: 15.7 ± 8.2° vs DP: 21.5 ± 5.3°) RA ≈ DP ≈ C hip ROM, knee ROM, peak hip flexion, peak knee extension, peak ankle dorsiflexion, peak ankle plantarflexion RA < DP QoL (most of the SF-36 items) RA > DP (neuropathic) pain
Burger, 2009 [3]	Subjects with chopart amputation (n=4)	Injury	Range 18 - 55	Instrumented gait analysis during a 10 m-gait laboratory walkway at preferred speed (barefooted (BF) and barefooted and wearing silicon prosthesis (BFS))	BF < BFS gait speed (BF: .89 ± .19 vs BFS: 1.18 ± .2 m/s) BF < BFS step length amputated side (BF: .55 ± .1 vs BFS: .66 ± .1 m) BF ≈ BFS step length non-amputated side (BF: .52 ± .1 vs BFS: .55 ± .1 m) BF ≈ BFS step frequency amputated side (BF: 102.2 ± 8.1 vs BFS: 106 ± 13.1 steps/min) and non-amputated side (BF: 101.5 ± 7.6 vs BFS: 105.8 ± 12.2 steps/min) BF < BFS pelvis angle lateral (BF: 1.23 ± 2.9° vs BFS: 3.56 ± 3.7°) BF < BFS hip adduction/abduction (BF: -1 ± 8.2° vs BFS: 3.8 ± 7.8°) BF < BFS ankle dorsi/plantarflexion (BF: 7.8 ± 3.0° vs BFS: 18.6 ± 5.6°) BF ≈ BFS hip abduction moment (BF: .54 ± .49 vs BFS: .83 ± .36 Nm/kg) BF < BFS ankle plantarflexion moment (BF: .18 ± .13 vs BFS: .52 ± .08 Nm/kg) BF < BFS ankle power (BF: .06 ± .02 vs BFS: .52 ± .22 W/kg)

Burnfield, 1998 [4]	Subjects with transmetatarsal amputation (TMA; n=7), toe amputation (TA; n=7) and control group (C; n=7)	Diabetes mellitus	TMA: 54.1 ± 5.9 TA: 54.4 ± 5.7 C: 63.4 ± 3.7	Gait analysis during a 10m walkway with a Kistler piezoelectric force plate at preferred speed	TMA < C gait speed, cadence and step length TA < C gait speed, cadence and step length TMA^{sound} > $TMA^{amputation}$ peak load force and isometric plantarflexion torque TA^{sound} ≈ $TA^{amputation}$ peak load force and isometric plantarflexion torque TMA ≈ TA ≈ C peak vertical ground reaction forces
Garbalosa, 1996 [7]	Subjects with transmetatarsal amputation (TMA; n=10)	Diabetes mellitus	58.3 ± 17.2	Gait analysis using a Novel EMED platform and three video cameras	TMA^{sound} < $TMA^{amputation}$ peak mean plantar pressure ↓ mean peak heel pressures of the amputated feet compared to medial, central, and lateral forefoot regions of the same feet TMA^{sound} > $TMA^{amputation}$ ankle dorsiflexion ROM
Kanade, 2006 [8]	Subjects with transmetatarsal (n=5), ray (n=4), hallux (n=5) and toe amputation (n=2) (AMP) and control group with diabetes mellitus (C; n=23)	Diabetes mellitus	AMP: 62.1 ± 8.8 C: 64.5 ± 5.8	Gait analysis using video cameras and pedar in-shoe pressure measurement across 12m at preferred speed with shoes with toe-filler	AMP < C gait speed (AMP: 0.9 ± 0.2 vs C: 1.1 ± 0.2 m/s) AMP < C peak plantar pressure
Kelly, 2000 [9]	Subjects with transmetatarsal amputation (TMA; n=12) and control group (C; n=12)	Diabetes mellitus	TMA: 58.4 ± 12.1 C: 62.3 ± 8.4	Gait analysis with an in-shoe pressure measurement system with toe-filler	TMA < C gait speed (TMA: 50.6 ± 18.4 vs C: 75 ± 9.2 m/min) TMA < C percentage of stance of peak force (TMA: 66.2 ± 5.7; contralateral side TMA: 66.8 ± 7.2 vs C: 72.5 ± 6.6) TMA ≈ C percentage of stance of peak plantar pressure, peak plantar pressure (kPa), peak force (N) and area in contact at peak plantar pressure (cm^2)
Mueller, 1998 [10]	Subjects with transmetatarsal amputation (TMA; n=15) and control group (C; n=15)	Diabetes mellitus	TMA: 61.8 ± 10.3 C: 62.9 ± 9.2	Computer assisted video as subjects walked across a 6.8m force platform with shoes with toe-filler	TMA < C gait speed (TMA: 0.86 ± 0.22 vs C: 1.26 ± 0.16 m/s) TMA < C step length (TMA: 0.43 ± 0.12 vs C: 0.57 ± 0.07 m) TMA < C hip ROM (TMA: 12.5 ± 7° vs C: 20.5 ± 6°) TMA < C knee ROM (TMA: 52.0 ± 11.7° vs C: 63.6 ± 3.7°) TMA ≈ C peak hip moments, peak hip power, peak knee moments TMA < C peak plantar flexion (TMA: −3.7 ± 9.7° vs C: 5.9 ± 5.9°) TMA < C peak plantar flexion moment (TMA: 0.93 ± 0.46 vs C: 1.37 ± 0.20 Nm/kg) TMA < C peak plantar flexion power (TMA: 0.43 ± 0.42 vs C: 1.75 ± 0.36 W/kg)

					TMA < C earlier onset of the hip flexion moment (TMA: 46.5 ± 18 vs C: 60.9 ± 13%)
Pinzur, 1992 [11]	Subjects with midfoot amputation (exact level of amputation was not clearly stated) (MA; n=5) and control group with the same vascular insufficiency (C; n=5)	Diabetes mellitus	MA: 57.8 C: 54.5	Gait analysis during a 25m walkway at preferred and maximum speed with shoes with toe-filler	MA ≈ C gait speed preferred (MA: 51.7 vs C: 52.5 m/min) MA < C gait speed maximum (MA: 68.7 vs C: 80.6)
Poppen, 1981 [12]	Subjects with metatarso-phalangeal disarticulation (n=4)	Reimplantation of the great toe to create a thumb	NR	Gait analysis and Harris mat impression of both feet	No alteration in the percentage of stance phase, heel rise, or step length when comparing the operative to the nonoperative foot. Concentration of weight bearing beneath the second and third metatarsal heads, as well as under the tips of the second and third toes.
Note. NASS = North American Spine Society; NR = not reported; SF-36 = Short-Form 36-item Health Survey; ROM = range of motion					