Supplementary file S5. Summary of key findings from the included studies.

Author	Level of amputation	Comparison	Key findings	Study limitations	Conclusions
Amputation Level: Toe/Great Toe					
Ademoglu et al 2000	Great toe	Successful replanted toe vs. failed replantation	↓ MTP and IP ROM in replanted toes. No significant difference in navicular index, cuboid index, height of first MT head, interMT angles, sesamoid migration. ↑ loading of 2^{nd}-5^{th} MT heads and laterally displaced CoP.	Small sample size. Only one female participant. Limited explanation of statistical analysis.	Amputation of great toe does not appear to effect gait compared to replantation, but changes pressure distribution in foot.
Beyaert et al 2003	Second toe	Operated vs. non-operated contralateral foot	↓ balance duration and ↑ rate of CoP displacement and sway in standing. ↑ gait speed and cadence. Normal kinematics, stride length and single-stance time.	Only includes participants under 13 years. No detail on treatment in first 5 years post-surgery. Both feet operated on in 8/15 so no comparisons with non-operated foot.	Removal of second toe ↓ balance but has no apparent effect on gait.
Chen et al 1991	Second, third and fourth toe	Operated vs non-operated contralateral foot	No significant difference in weightbearing and walking.	Single case study, no quantitative data, measurement device not described, non-operated foot damaged by trauma.	Despite removal of three toes and original transverse arch collapse, ability to walk/run, walk upstairs and stand on one foot remain.
Lavery et al 1995	Great toe (and partial first MT)	Operated vs. non-operated contralateral foot	Peak pressure ↑ under MT heads and 2^{nd}-5^{th} toes. ↑ peak pressure under contralateral heel.	Comparison with contralateral foot only. Diabetic participants only.	Pressure distribution changes ↑ complications including ulceration risk.
Lipton et al 1987	Great toe	Pre-operative vs. post-amputation gait	↓ velocity post-amputation, due to ↓ stride length/cadence. ↓ step length of non-operated foot. Average velocity, cadence, step length of the operated foot, and single/double limb stance times, and step width did not significantly change. No change in EMG activity post-surgery.	High number of male participants. Wide range in time since surgery.	Gait changes following great toe replantation were mild.
Mann et al 1988	Great toe	Operated vs. non-operated contralateral foot	↑ pressure under 3^{rd} MT head on operated side and ↓ velocity of movement of CoP (↑ loading). CoP progression noted beneath 3^{rd} MT head on operated side, instead of medially and distally towards first web space.	High number of male participants. Gait analysis performed in only 7/10 participants, EMG in 3/10.	Hallux removal at MTP joint causes medial instability due to loss of windlass mechanism, ↑ pressure at MT heads and ↓ gait speed.
Poppen et al 1981	Great toe	Operated vs. non-operated contralateral foot	Second MT joint in 8° varus. ↑ dorsiflexion of 2^{nd} MTP joint. ↓ Navicular and cuboid index. ↑ pressure under 2^{nd}/3^{rd} MT heads. No change in gait pattern.	Small sample size. Large range in time since amputation. No detail on gait analysis techniques.	Pressure distribution changes (2^{nd} and 3^{rd} MT heads) but gait unchanged with unilateral great toe amputation.
Amputation Level: Metatarsophalangeal [MTP]					

Forczek et al 2014	MTP (bilateral)	Barefoot walking vs shod walking	Walking velocity ↑ during shod walking than barefoot. Step frequency/length ↓ during gait without shoes. Single/double support and step time similar. Larger ROM used during shod walking.	Single case study. Bilateral amputation, precluding comparison with non-operated foot.	Changes in gait from forefoot amputation are ↓ when walking shod compared to barefoot. Walking shod utilises larger ROM.
Amputation Level: Transmetatarsal [TMT]					
Andersen et al 1987	TMT	Pre-post surgery	Walking distance improved after surgery in 4 out of 5 patients; they achieved almost normal heel-toe gait. None complained of imbalance.	Sex not reported, small study. No objective gait analysis. 3 out of 5 bilateral amputations, precluding comparison with non-operated foot.	TMT amputation to reduce pain and improve walking distance recommended in patients with deformed feet due to RA.
Czerniecki et al 2012	TMT	Pre-post surgery	Ambulation improved after surgery but did not return to premorbid levels. Little difference in ambulation outcome between TT and TMT amputees.	Sex not reported, final numbers with partial amputation that finished study not reported.	Importance of salvaging the TMT amputation level to preserve ambulation questioned in situations where revascularisation is required to enable healing.
Friedmann et al 1987	TMT	Operated vs. non-operated contralateral foot	Single-stance duration ↓ on amputated and non-amputated foot, compared with non-amputated reference. ↓ heelstrike to forefoot contact, ↑ midstance and ↓ propulsive phase in amputated feet, with ↑ contralateral swing phase. ↑ pressure in MT heads compared to non-amputated feet.	Low response rate and few participants fully assessed. No age data. Absolute pressure levels not included. No SD or CIs. Persons with diabetes compared to healthy population, no controls.	TMA leads to lateral, forefoot and midfoot instability and compromised propulsion through the amputated foot.
Garbalosa et al 1996	TMT	Operated vs. non-operated contralateral foot	↑ peak mean plantar pressure, ↓ heel and ↑ forefoot peak plantar pressure in the amputated feet Significantly ↑ maximum dynamic dorsiflexion (90% vs 70%) and similar static ankle ROM in intact feet.	No control group. Heterogeneity in the relative lengths of the residual MTs did not allow any further insight into the issue of the optimal contour of the residual MTs.	↓ heel and ↑ forefoot peak plantar pressure in TMA feet due to lack of dynamic dorsiflexion ROM causing heel to not be fully loaded ("functional equinus").
Kelly et al 2000	TMT	Participants with TMA vs controls	Persons with diabetes and TMA walked more slowly than controls. Peak Plantar Pressure and timing were similar. Peak force occurred earlier on amputated side and gait speed significantly ↓. No difference in peak force between groups.	Diabetes may be a confounding factor. Large range of time since amputation. Different walking speeds ↓ ability to compare peak plantar pressures.	Participants with TMA walk more slowly than non-amputated participants and may explain similar peak pressures between groups.
Mueller et al 1997a	TMT	Comparison between five different footwear combinations	Experimental footwear combinations produced ↓ peak plantar pressure on amputated foot compared with regular shoe with toe-filler. No differences in peak plantar pressure between experimental footwear conditions found.	No control group used. Only forefoot measurements were gathered. Large range of time since last amputation (2-132 months).	Therapeutic footwear ↓peak plantar pressure compared to normal shoes. Total contact area of footwear with foot appears important for ↓ peak plantar pressure.

			Long shoe with rigid rocker bottom sole, and both short shoe combinations produced faster walking speeds than normal shoes with toe filler.		
Mueller et al 1997b	TMT	Participants with TMA vs controls	↓ functional reach scores, and Physical Performance Test scores versus controls (walking with a turn, picking up a penny and climbing stairs). Participants with amputation walked at 68% speed of controls.	Presence of diabetes itself may be a confounding factor. High presence of neuropathy in amputation group.	Participants with TMA showed deficits in functional tasks versus controls, due to shortened foot length or co-morbidities.
Mueller et al 1998	TMT	Participants with TMA vs control participants	↓ plantar flexion ROM, peak plantar flexor moment, and peak plantar flexor power in the late stance phase after amputation. Hip flexor moment initiated earlier in stance phase and slower gait speeds and step lengths noted compared to controls.	Presence of diabetes may be a confounding factor. High presence of neuropathy in amputation group. Only assessed sagittal plane movement.	Participants with diabetes and TMA had ↓ contribution to gait from plantar flexors and hip compensation may be used to advance the leg.
Pinzur et al 1992	Midfoot(5), Syme(5), BKA(5), TKA(5), AKA(5)	Midfoot amputation vs. Syme amputation vs. BKA vs. TKA vs AKA vs. diabetic participants without amputation	Walking speed, stride length and cadence ↓ with more proximal amputation. Metabolic cost of walking ↑ with more proximal amputation and at ↑ energy demand than non-amputated controls.	No testing for statistical significance of results, or significance of difference between groups.	Walking capacity related to level of amputation, therefore preservation of limb via more distal amputation levels may lead to better function.
Pinzur et al 1997	Midfoot(5), Syme(6)	Midfoot amputation vs. participants with Syme amputation	Syme amputation linked to initial loading through centre of prosthetic heel, progressing along midline of prosthetic foot. GRF corresponded with push off. Midfoot amputation had similar early CoP distribution to healthy participants and initial floor contact at lateral border of heel, with CoP moving to midline before progressing distally, then moving medially to area under the residual first MT.	No numerical data given. Presence of diabetes and severe peripheral vascular disease may be confounding factors. Does not report control subject data.	Pressure data may explain ↑ energy cost of walking with midfoot amputation due to shortened lever versus rigid complete prosthetic foot. Level of walking and function should be considered when selecting amputation level.
Salsich et al 1997	TMT	None	Hip extension strength correlated with walking speed and physical performance scores. Functional reach correlated with hip extension, flexion and abduction. Physical test scores correlated with hip flexion, knee flexion and extension and ankle dorsiflexion. Walking speed correlated with hip flexion, abduction, knee flexion and extension and ankle dorsiflexion.	Does not detail testing position for strength testing. No controls, therefore unable to say if correlations are different in amputated population.	Hip extension strength is important in controlling gait speed as well as other functional tasks after TMA. There is a correlation with lower limb muscle strength and gait speed / function.
Tang et al 2004	TMT	(1) Participants with amputation vs control	Participants with amputation did not differ from controls in walking velocity and step	Only males included. Adequate control group (healthy	TMA significantly ↓ plantar flexion power during gait. Use

		participants; (2) amputated foot vs non-amputated foot; (3) barefoot vs walking with shoe vs walking with prosthesis	length. Walking barefoot ↓ ankle ROM compared with walking with footwear or prosthesis. Better gait symmetry was achieved with prosthesis than when barefoot. Ankle power ↓ versus controls, and lower when barefoot than shod.	participants with traumatic amputation vs healthy controls)	of footwear can improve this but reductions may still exist and be more pronounced during high demand activities.
Amputation Level: Chopart					
Burger et al 2009	Chopart	Barefoot vs. silicone prosthesis vs. footwear with conventional prosthesis vs. footwear with silicone prosthesis	Use of a silicone prosthesis ↑ step length of amputated foot and gait velocity when compared to barefoot walking. Cadence and step length of the intact foot were ↑ but not significantly. Use of silicone prosthesis when wearing footwear ↑ all parameters compared to conventional foot prostheses. Silicone prosthesis ↑ ankle ROM, hip ab/adduction ankle moment and ankle power compared to barefoot walking.	Small sample size. No control group for comparison of results to normal data.	Use of a silicone prosthesis ↑ gait speed, step length, ankle range and ankle power as well as other parameters compared to barefoot walking or conventional prosthesis.
Amputation Level: Ray					
Aprile et al 2018	First Ray	Participants with diabetes and amputation vs. participants with diabetes and no amputation vs. healthy controls	Amputated participants with diabetes showed ↓ quality of life, ↓ ROM, ↑ pain scores versus diabetic participants, greater variability in, and shorter step length, larger step width, and slower walking speeds than non-amputated participants with diabetes or healthy participants.	Small sample size per group.	First ray amputation leads to negative changes in gait parameters compared to healthy subjects and those with diabetes without amputation.
Ramseier et al 2004	Ray	Operated vs. non-operated foot of participants	All participants show almost normal gait, with the centre of pressure shifting laterally in the foot in two of the four cases.	Small sample size. Wide age range in participants. Lack of justification as to how 'normal gait' was defined.	Ray resection causes mild changes to pressure distribution during gait, but functionally has little effect on gait.
Amputation Level: Mixed					
Burnfield et al 1998	Toe, TMT	Participants with toe amputation vs. participants with TMA vs. healthy participants	Participants with TMA showed ↑ peak load forces for non-amputated foot, and ↓ isometric plantar flexion torque for amputated foot. Participants with toe amputation had no differences in peak load force or isometric plantar flexion torque. Both amputated groups had ↓ walking velocities, cadence and stride length compared to healthy control.	Data not provided as absolute values but as percentages. Presence of diabetes could be a confounding factor when control group consisted of healthy subjects without diabetes.	Forefoot rocker preservation may ↓ limb loading and ↓ risk of skin breakdown.
Dillon et al 2006a	MTP(1), TMT(1), Lisfranc(4), Chopart(2)	Participants with partial foot amputation vs. healthy participants	In participants with MT head amputation, power generation was negligible in affected limbs. This was compensated for	High variability in terms of amputation level and small sample size. Wide variance in	Amputation that preserves the MT heads does not affect power generation at ankle

			by ↑ hip force generation. Participants with preserved MT heads did not demonstrate differences in power at ankle compared to non-amputated controls.	years since amputation. Gait of evaluated while wearing prosthetic replacement. Type of prosthetic may be confounding factor.	compared to non-amputated gait. With MT heads amputated, power generation at ankle was negligible regardless of foot length.
Dillon et al 2006b	MTP(1), TMT(1), Lisfranc (4), Chopart (2)	Participants with partial foot amputation vs. healthy participants	In participants with MTP, TMT and Lisfranc amputation, CoP progressed in intact foot at initial swing phase. After loading, CoP did not progress distally. In TMT and Lisfranc amputated feet, GRF did not continue along length of foot but at distal end through stance phase. Chopart amputation allowed progression of CoP similar to intact foot.	Variable amputation levels and small sample size. Wide variance in years since amputation. Gait evaluated while wearing prosthetic replacement. Type of prosthetic may be confounding factor.	Participants with TMA and Lisfranc amputation are unable to effectively utilise forefoot prosthetics to restore normal gait parameters.
Dillon et al 2008	MTP(1), TMT(1), Lisfranc (3), Chopart (2)	Partial foot amputation vs. healthy participants	Significant ↓ in walking velocity observed in subjects with amputation (TMT and Chopart). No change noted in gait cycle duration compared to controls. With MTP amputation there was delay in progression of CoP following midstance, and ↓peak ankle moments during late stance.	Variable amputation level. Small sample size. Variance in years since amputation. Number of controls not provided. Gait evaluated while wearing their prosthetic replacement. Type of prosthetic may be confounding factor.	TMT/ Lisfranc amputation and toe fillers/slipper sockets linked to inability to progress CoP beyond end of residuum commensurate with peak GRF or generate ankle power. Despite effective forefoot length, with Chopart amputation and clamshell devices power generation negligible at ankle.
Greene et al 1982	Ray, TMT, midtarsal, Lisfranc, Chopart, Syme	Ray or TMA vs. participants with Lisfranc, midtarsal & Chopart amputations vs. participants with Chopart amputations with equinus contracture vs. participants with Syme amputation	Syme amputations linked to ↑ function and mild gait alterations at pelvis and knee. TMT or ray amputations had ↑ function with prolonged knee extension at heel off and ↑ knee flexion at toe off. Lisfranc, midtarsal or Chopart amputations demonstrated acceptable gait mechanics but ↓ co-ordination and gait smoothness. Chopart amputation with equinus contracture had ↓ functional activity, and gait speed compared to other groups.	No control group. One participant with Lisfranc amputation in group 1 not group 2. No analysis. Gait analysis via subjective methods.	Conversion to Syme may benefit patients with Chopart amputation with equinus contracture but is unlikely to benefit those without equinus contracture or more distal amputation.
Kanade et al 2006	First two toes(1), all five toes(1), great toe(5), ray(1), TMT(5)	Diabetic neuropathy and no ulcer vs. participants with diabetic foot ulcer vs. participants with diabetes and partial foot amputation vs. participants with diabetes	Total HBI as an indicator of energy expenditure showed an ↑ across groups from participants with diabetes but without ulcer, to trans-tibial amputation. Daily strides and gait velocity ↓ suggesting lower activity levels. Participants with partial foot amputation showed ↑ plantar pressure than	Cross-sectional design rather than longitudinal study. Groups were matched; however, the distribution of type 1 and type 2 diabetes does not appear matched.	Measures of energy expenditure, daily activity, walking speed and peak pressure show less desirable outcomes as participants with diabetes progress from neuropathy alone, through ulceration, partial foot

	and trans-tibial amputation	participants with neuropathy and active ulceration.		amputation and trans-tibial amputation.

AKA: Above Knee Amputation; BKA: Below knee Amputation; CIs: Confidence Intervals; CoP: Centre of pressure; EMG: Electromyography; GRF: Ground Reaction Force; HBI: Heart Beat Index; IP: Interphalangeal; MT: Metatarsal; MTP: Metatarsophalangeal; RA: Rheumatoid Arthritis; ROM: Range of Motion; SD: Standard Deviation; TKA: Through Knee Amputation; TMA: Transmetatarsal amputation; TMT: Transmetatarsal; TT: Transtibial.