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Pelvic Floor Muscle Weakness in Anterior Knee Pain in the Lumbopelvic-Hip-Knee Kinetic Chain: Narrative Review

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Abstract

Background : Anterior knee pain rarely originates from the knee joint alone, and hip and core weakness are established contributors to patellofemoral pain syndrome (PFPS) and dynamic knee valgus. A separate literature treats the pelvic floor as an active member of the lumbopelvic core rather than a passive continence structure, but the two literatures have developed largely independently.

Objective : To bring together anatomical, biomechanical, and clinical evidence on pelvic floor muscle function and anterior knee pain within the lumbopelvic-hip-knee kinetic chain, and to identify where a direct relationship is supported by evidence and where it is only inferred.

Findings : Cadaveric dissection shows direct fascial continuity between the pelvic floor and the obturator internus, and electromyographic studies confirm pelvic floor co-activation with the gluteal and abdominal muscles during gait. Hip and core weakness are repeatedly and independently linked to PFPS and dynamic knee valgus across adolescent, adult, and older populations. Postpartum runners, female athletes, and older women show high rates of both pelvic floor dysfunction and hip or core weakness, but no study reviewed measured pelvic floor function directly against a knee-specific outcome, and two studies testing adjacent hypotheses found either no association or evidence of antagonism between hip and pelvic floor activation.

Conclusion : A pelvic floor-knee relationship is anatomically plausible and clinically suggestive through shared core control, but it has not been directly demonstrated in the literature reviewed. A three-pathway conceptual framework and a targeted research agenda are proposed to test the relationship directly.

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Keywords: pelvic floor, anterior knee pain, patellofemoral pain syndrome, kinetic chain, core stability, dynamic knee valgus

1. Introduction

Anterior knee pain affects a wide range of people, from teenage runners to postpartum women to men and women well into their sixties, and it is rarely traced back to a single structural fault in the knee. Patellofemoral pain syndrome (PFPS) alone accounts for an estimated 25% to 40% of knee pain presentations in people younger than 45 [1], and roughly a fifth to a third of adolescents report anterior knee pain at some point, with girls affected more often than boys [2]. Clinicians have largely moved away from treating the patella in isolation. Physiotherapy research has repeatedly shown that weak hip abductors and external rotators allow the femur to rotate inward under load, producing the dynamic knee valgus pattern associated with patellofemoral joint stress

[3, 5]. This proximal control model, where a deficit above the knee produces pain at the knee, is now standard teaching in orthopaedic rehabilitation.

A parallel and largely separate body of work has reframed the pelvic floor. Rather than a passive continence structure, the pelvic floor muscles are increasingly described as active, load-bearing members of the deep core, contracting in coordination with the transversus abdominis, multifidus, and diaphragm to stabilise the lumbopelvic region before limb movement occurs [6, 7]. Cadaveric dissection has traced fascial continuity between the pelvic floor and the hip rotators, particularly the obturator internus, showing that the two structures share force through the obturator fascia [9]. If the pelvic floor is mechanically continuous with the hip, and hip weakness is mechanically linked to knee pain, then pelvic floor weakness sits logically upstream of the same chain, even though almost nobody has tested this directly.

This review asks whether that logical chain has any empirical support. Pelvic floor dysfunction and anterior knee pain are both common, and they overlap heavily in certain groups, postpartum women returning to running, female athletes, and older women, but the literature on each has developed largely without reference to the other. Sections 2 through 6 take up, in turn, the anatomical basis for pelvic floor involvement in the kinetic chain, the established hip-core-knee pain literature, evidence on pelvic floor dysfunction and altered lower-limb kinematics, the populations where these problems cluster together, and the size of the gap that remains. Tables 1 to 4 summarise the evidence for each section, and Figures 1 and 2 present the anatomical and conceptual models discussed below.

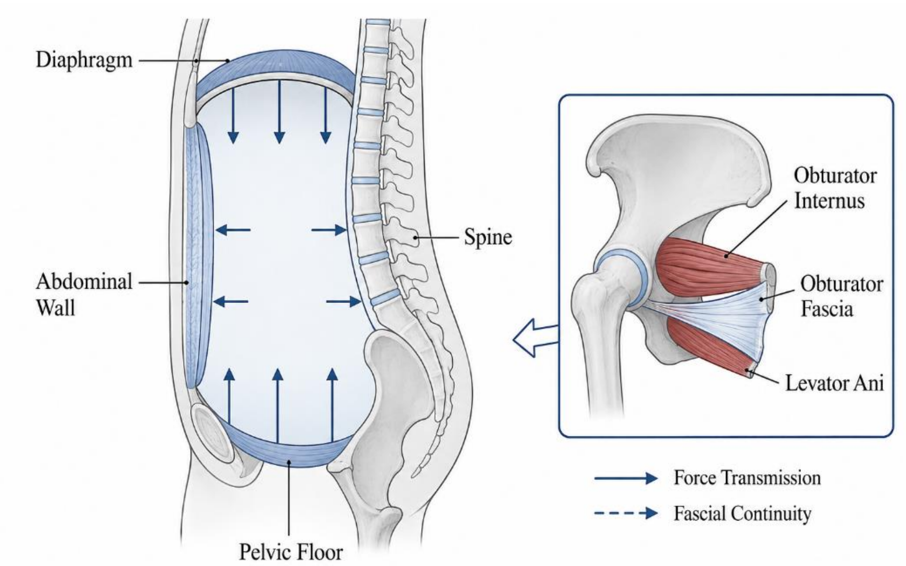
2. Anatomical and Biomechanical Basis Connecting Pelvic Floor Function to Lumbopelvic-Hip-Knee Stability

2.1. The Pelvic Floor as an Active Structural Unit

The pelvic floor is often taught as a hammock of muscle closing the pelvic outlet, useful for continence and little else. Detailed anatomical work complicates that picture. Using macroscopic dissection, immunohistology, and 3D reconstruction, anatomical studies have shown that the skeletal muscles of the pelvic outlet form three continuous slings around the anal canal and share muscle bundles with one another, while an extensive layer of smooth muscle in the same region transfers force from the levator ani to the pelvic viscera [8]. Their central finding, that skeletal and smooth muscle in the pelvic floor coordinate the direction and force of contraction rather than acting independently, matters for a kinetic-chain argument because it means the pelvic floor behaves as a tunable structural element rather than a fixed diaphragm.

2.2. Fascial and Functional Continuity with the Hip

More directly relevant is the anatomical link to the hip. In a dissection study of 23 cadavers, broad planar contact, averaging 24.6 mm in height, was demonstrated between the obturator internus (a hip external rotator) and the levator ani through the obturator fascia, with histological confirmation that the fascia provides attachment for several muscle layers of the levator ani [9]. The conclusion that obturator internus movement creates the mechanical foundation for levator ani function gives an anatomical basis for expecting that hip rotator weakness could degrade pelvic floor mechanics, or the reverse. A related systems-level concept describes a cuboid model of trunk stability: the diaphragm as roof, the spine as posterior wall, the abdominal fascia as anterior and lateral walls, and the pelvic floor as the floor of a single mechanical box, where a disturbance on any face is transmitted to the others [10] (Figure 1). It is a useful heuristic, though it should be read as a conceptual model drawn from clinical observation rather than a finding derived from biomechanical testing.



Note. Left panel: the trunk-pelvis cuboid model (diaphragm, spine, abdominal wall, pelvic floor) after Ackerman and Wise-Fuchs (2026) [10]. Right panel: the obturator internus-levator ani fascial connection after Muro, Nimura, *et al*. (2023) [9]. To be generated as an image and inserted at this location.

Fig 1: Anatomical Basis for Pelvic Floor Integration into the Lumbopelvic-Hip-Knee Kinetic Chain

Clinical studies add a further layer of support beyond cadaveric anatomy. In 42 women with stress urinary incontinence, hip extensor strength correlated with a validated pelvic floor and sexual function score (r = 0.484), similar in magnitude to pelvic floor muscle strength itself (r = 0.387), with hip abductor and adductor strength also independently correlated across sub-domains [11]. A related study reported that pelvic floor strength correlated with desire, arousal, and satisfaction domains (r = 0.315 to 0.397) in a comparable population [12]. These correlations do not establish which structure drives which, but they show hip and pelvic floor function moving together in a measurable way, not merely as an anatomical hypothesis drawn from cadavers. Adding gluteus muscle and hip adductor strengthening to standard pelvic floor training produced a significantly greater reduction in daily urine-loss frequency than pelvic floor training alone, an effect echoed in a mobile-app-delivered programme combining the same two muscle groups [13, 14], though perineometry and quality-of-life scores did not differ significantly between groups in either trial.

2.3. Coordination During Locomotion and Postural Control

Functional studies support the idea that the pelvic floor is recruited alongside the rest of the core during whole-body tasks rather than in isolation. Using electromyography during treadmill running at 6, 9, and 11 km/h in 51 nulliparous women, pelvic floor activity was recorded alongside the gluteus maximus, internal oblique, and lumbar erector spinae, and the gluteus maximus and internal oblique carried the highest activation regardless of speed or footwear [15]. The pelvic floor was active but was not the dominant stabiliser during running gait and, notably, showed no significant correlation with age or BMI, unlike the other muscles measured. Tibial nerve stimulation also produced measurable corticospinal excitability changes in both the abductor hallucis and the pelvic floor muscles, consistent with a shared postural and locomotor control network [16].

Core coordination has also been examined directly. In a four-week core-strength programme that trained the transverse abdominis, multifidus, diaphragm, and pelvic floor together, healthy adults showed improved postural stability during a sudden perturbation task, evidenced by a shorter centre-of-pressure trajectory [6]. The pelvic floor was trained as one part of a package, so the study cannot isolate its individual contribution, but it does show that pelvic floor training changes whole-body stability outcomes measurably.

Table 1 summarises this evidence. Read together, these findings establish that the pelvic floor is fascially continuous with the hip rotators, correlates with hip muscle function in clinical samples, and is functionally active during locomotion and postural challenge. What they do not establish is a magnitude of contribution relative to the hip and core muscles already known to matter for knee mechanics; the pelvic floor appears to be a minor but real contributor to a shared stabilising system, not a dominant one.

Table 1: Anatomical and Functional Evidence for Pelvic Floor Integration into the Lumbopelvic-Hip-Knee Kinetic Chain

Study	Design	Key Finding	Relevance to Kinetic Chain
Muro & Akita (2023) [8]	Cadaveric/imaging anatomical study	Pelvic floor skeletal and smooth muscle form continuous, coordinated slings; smooth muscle transfers levator ani force to pelvic viscera.	Pelvic floor is a dynamic, tunable structure rather than a static sling.
Muro, Nimura, *et al*. (2023) [9]	Cadaveric dissection (n = 23)	Obturator internus and levator ani share about 24.6 mm of fascial contact; the obturator fascia anchors several levator ani muscle layers.	Direct anatomical link between a hip external rotator and the pelvic floor.
Ackerman & Wise-Fuchs (2026) [10]	Clinical/conceptual review	Proposes a cuboid model in which the diaphragm, spine, abdominal wall, and pelvic floor act as one mechanical unit.	Conceptual framework for shared load transfer across trunk and pelvis; not empirically tested.
Hwang *et al*. (2021) [11]; Hwang & Lee (2023) [12]	Cross-sectional correlational studies (n = 42)	Hip extensor strength correlated with pelvic floor/sexual function score (r = 0.484); pelvic floor strength correlated with desire, arousal, and satisfaction (r = 0.315–0.397).	First quantitative evidence that hip and pelvic floor function move together, not just anatomically plausible.
Marques *et al*. (2020) [13]; Tang *et al*. (2025) [14]	RCT and clinical trial	Adding hip/gluteal strengthening to pelvic floor training reduced urine-loss frequency more than pelvic floor training alone.	Trainable, clinically measurable hip-pelvic floor relationship.
García-Arrabé *et al*. (2025) [15]	EMG crossover trial (n = 51)	Pelvic floor active during running, but gluteus maximus and internal oblique dominate; no correlation with age or BMI.	Confirms pelvic floor co-activation during locomotion, though as a minor contributor.
Eginyan *et al*. (2023) [16]	Neurophysiological study	Tibial nerve stimulation altered corticospinal excitability in both abductor hallucis and pelvic floor muscles.	Suggests a shared neural control network for pelvic floor and lower-limb muscles.
Hsu *et al*. (2018) [6]	Interventional study	Four-week core training including the pelvic floor improved postural stability under sudden perturbation.	Pelvic floor training changes whole-body stability, though not isolated from other core muscles.

3. Hip and Core Muscle Weakness as Established Contributors to Anterior Knee Pain and Patellofemoral Pain Syndrome

3.1. Evidence in Adolescents and Young Adults

The evidence linking hip and core weakness to anterior knee pain is considerably more mature than the pelvic floor literature, and it is worth setting out clearly before returning to the pelvic floor question, because it is this body of work that gives the kinetic-chain hypothesis its plausibility.

A survey of adolescent students with physician-verified anterior knee pain found that poor muscular strength, poor flexibility, and poor motor control clustered as intrinsic risk factors, with anterior knee pain affecting an estimated 20% to 30% of adolescents and causing significant disability in 13% of cases [2]. The review notes that most detailed biomechanical work on this topic has been done in adults, leaving the adolescent mechanism comparatively under-studied.

At the muscular level, the hip abductors, external rotators, and vastus medialis obliquus are the structures most consistently implicated. In a randomised controlled trial of 60 recreational sprinters with unilateral PFPS, weakness or delayed activation of the hip abductors, hip external rotators, and vastus medialis obliquus was implicated in the underlying pathomechanics; these deficits together fail to control femoral internal rotation and allow dynamic knee valgus and patellar maltracking to develop under load [3]. Dynamic proprioceptive training produced a substantially greater improvement in single-leg hop performance than conventional strengthening alone (mean difference 35.84 mm), suggesting that neuromuscular control, not just raw strength, is the more useful target. A neurodynamic study approached the same population from the nerve side: in 71 patients with chronic PFPS, altered femoral nerve mechanosensitivity was identified, with the possibility that this neural irritation contributes to reflex inhibition of the quadriceps and hip muscles; adding neurodynamic mobilisation to standard physiotherapy produced significantly greater pain reductions during squatting, stair climbing, kneeling, and sitting than physiotherapy alone [4].

3.2 Structural and Biomechanical Contributors

Structural and biomechanical studies extend this picture to the tibia and hip jointly. Radiographic and anatomic analysis showed that tibial extorsion increases the foot progression angle, which the body compensates for with hip internal rotation, producing the dynamic valgus alignment that loads the lateral patellofemoral joint [5]. A study of adolescents with patellofemoral pain during running confirmed that femoral internal rotation significantly influences patellofemoral joint forces regardless of footwear [31]. A systematic review of blood flow restriction training for PFPS identified quadriceps weakness and pain-related inhibition as core contributors that limit tolerable training load [32].

3.3 Older Adults and Patellofemoral Osteoarthritis

Older adults are not exempt from this pattern, though the literature shifts from PFPS to patellofemoral osteoarthritis. A retrospective cohort undergoing total knee arthroplasty for patellofemoral compartment osteoarthritis noted that postoperative anterior knee pain and patellar crepitus were related to muscular imbalance and patellar maltracking, though the study did not assess pelvic or hip-complex parameters, a gap acknowledged directly [30].

None of the studies in Table 2 measured pelvic floor function. They are included because they define the mechanism, hip and proximal weakness producing distal knee pain through altered kinematics, that the pelvic floor hypothesis depends on. This literature also exposes the weakness of the pelvic floor literature by comparison: the hip-knee pain relationship rests on randomised trials and biomechanical modelling, while the pelvic floor-knee relationship currently has none of that.

Table 2: Evidence Linking Hip and Core Muscle Weakness to Anterior Knee Pain and Patellofemoral Pain Syndrome

Study	Design/Population	Key Finding
Borschneck *et al*. (2021) [2]	Cross-sectional, adolescents	Poor strength, flexibility, and motor control linked to anterior knee pain; prevalence 20%–30%, disabling in 13% of cases.
B *et al*. (2026) [3]	RCT, 60 sprinters with PFPS	Hip abductor, external rotator, and vastus medialis obliquus weakness linked to dynamic valgus and patellar maltracking; proprioceptive training outperformed conventional strengthening.
Gerami *et al*. (2026) [4]	RCT, 71 patients with PFPS	Femoral nerve mechanosensitivity linked to quadriceps and hip inhibition; neurodynamic mobilisation reduced pain more than physiotherapy alone.
Haikal *et al*. (2026) [5]	Retrospective anatomic/radiographic study	Tibial extorsion, compensated by hip internal rotation, produces dynamic valgus and patellofemoral loading.
Kayll *et al*. (2026) [31]	Biomechanical crossover trial, adolescents with PFP	Femoral internal rotation significantly influences patellofemoral joint forces during running.
Hou *et al*. (2026) [32]	Systematic review and meta-analysis	Quadriceps weakness and pain-related inhibition limit tolerable training loads in PFPS.
Jia *et al*. (2026) [30]	Retrospective cohort, TKA patients	Muscular imbalance linked to postoperative anterior knee pain; pelvic and hip-complex parameters not assessed (acknowledged gap).

4. Pelvic Floor Dysfunction and Altered Lower-Limb Kinematics, Including Dynamic Knee Valgus and Lumbopelvic Control Deficits

4.1. Evidence from Postpartum Runners

This is the section where the review's central hypothesis is most directly tested, and it is also where the evidence is thinnest and most indirect.

The strongest indirect support comes from postpartum runners. An international Delphi survey with 41 physiotherapy experts in women's health and running reached formal consensus (agreement of 75% or higher) that postpartum runners commonly present with pelvic floor weakness alongside abdominal, hip abductor, and hip extensor weakness, and separately reached consensus that dynamic knee valgus, a Trendelenburg sign, and poor lumbopelvic control are common findings in the same population [17]. Pelvic floor weakness reached 97.56% consensus and poor lumbopelvic control reached 100% consensus as a pain risk factor. The study cannot show that any individual runner's pelvic floor weakness caused their dynamic valgus; it shows that expert clinicians see the two problems co-occurring often enough to agree on it, a lower bar than a measured association but not a trivial one.

A more mechanistic study fitted pelvic compression garments to 13 postpartum runners with self-reported pelvic floor dysfunction and measured running biomechanics before and after. The garment reduced peak pelvic jerk and pelvic shock attenuation and increased trunk-to-pelvis rotation separation, changes interpreted as evidence that impaired pelvic floor and trunk force closure alters how load is absorbed through the pelvis during running [18]. Lower-limb kinematics specifically did not differ between conditions, so while the study supports a pelvis-level mechanical effect, it does not extend that effect down to the knee.

4.2. Case-Level Evidence

A single case report offers the most direct, if lowest-quality, evidence for a pelvic floor-to-knee pathway. A 31-year-old woman with postpartum pelvic organ prolapse and mixed urinary incontinence was treated using a movement-system approach combining pelvic floor, abdominal, and hip strengthening with postural correction. Alongside resolution of her prolapse and incontinence symptoms, correction of femoral adduction-medial rotation syndrome and knee hyperextension during standing, ambulation, and exercise was documented [19]. This is one patient, so it cannot establish causation, but it is the only source identified here that reports a knee-level kinematic outcome changing alongside pelvic floor rehabilitation in the same person.

4.3. Null and Contradictory Findings

Two studies testing closely related hypotheses found no significant association, and both deserve to be reported plainly rather than downplayed. Ultrasound-based assessment of transversus abdominis thickness in 34 nulliparous female rugby players found no significant prediction of urinary leakage; training hours, years of practice, and BMI were also not significant predictors [20]. Another study, assessing pelvic floor contraction efficiency by ultrasound in 19 healthy women under different lower-limb and peri-hip positions, found that adding hip abduction or adduction co-contraction to a supine kneeling posture significantly reduced bladder base elevation compared with the position alone, meaning peri-hip muscle activation can interfere with, rather than assist, pelvic floor contraction [21]. That finding runs against a simple everything-co-activates-together version of the kinetic-chain idea and suggests the hip-pelvic floor relationship may be task-dependent and sometimes competitive rather than uniformly synergistic.

Table 3 lists the kinematic evidence gathered here. Read together, it shows a real association between poor lumbopelvic control and pelvic floor dysfunction, a real pelvis-level biomechanical effect of pelvic floor dysfunction during running, and one case-level report of knee kinematic change alongside pelvic floor treatment. It does not show, in any of the sources reviewed, a measured statistical relationship between pelvic floor muscle strength or activity and dynamic knee valgus or knee pain specifically.

Table 3: Evidence on Pelvic Floor Dysfunction and Altered Lower-Limb or Lumbopelvic Kinematics

Study	Design/Population	Key Finding	Direction of Evidence
Christopher *et al.* (2020) [17]	Delphi consensus, 41 experts	Pelvic floor and hip weakness, dynamic knee valgus, and poor lumbopelvic control reached consensus as co-occurring in postpartum runners.	Supportive (expert consensus, not a measured association)
Donnelly *et al.* (2026) [18]	Crossover trial, 13 postpartum runners	Pelvic compression reduced pelvic shock and jerk; no change in lower-limb kinematics.	Partially supportive (pelvis-level only)
Kurz & Borello-France (2017) [19]	Case report, 1 postpartum woman	Knee hyperextension and femoral adduction-medial rotation resolved alongside pelvic floor and hip rehabilitation.	Supportive (case-level only)
Fernández García *et al.* (2026) [20]	Cross-sectional, 34 rugby players	No significant association between transversus abdominis thickness and urinary leakage.	Null finding
Sato *et al.* (2025) [21]	Experimental study, 19 women	Hip abduction/adduction co-contraction reduced pelvic floor contraction efficiency.	Contradicts simple synergy model

5. Populations Where Pelvic Floor Dysfunction and Anterior Knee Pain Plausibly Co-Occur

5.1. Postpartum Women

Even without a direct mechanistic study, three populations show high rates of both problems, which is where a clinician's suspicion of a shared pathway usually starts.

Postpartum women returning to running are the most studied group. Pregnancy and vaginal delivery stretch and can tear the pelvic floor, and a mixed-methods study surveying 503 postpartum women and conducting running focus groups with a further 17 participants found that 91% of postpartum musculoskeletal pain on return to running was located in the lumbopelvic region and that nearly half of women resumed running by six weeks postpartum, sooner than typical connective tissue healing timelines [22]. Stress urinary incontinence affected around 30% of the runners surveyed. A review of return-to-running guidance for elite and sub-elite postpartum athletes treats pelvic floor and core function as inseparable from safe reloading of the musculoskeletal system, though the paper carries a Strength of Recommendation Taxonomy grade of C, reflecting how thin the underlying evidence base remains even among specialists [23]. Supporting trial evidence from the antenatal side showed that, in pregnant women with lumbar and pelvic girdle pain, adding core stabilisation exercises targeting the pelvic floor and deep abdominal muscles to usual prenatal care produced significantly better pain, disability, and quality-of-life outcomes than usual care alone through six weeks postpartum [24]. The consensus and compression-garment studies discussed earlier belong to this same population.

5.2 Female Athletes

Female athletes more broadly show a similar overlap without the postpartum trigger. A lifespan review of the active female recommends that adolescent and adult female athletes be screened for pelvic floor dysfunction and the female athlete triad at the same visit where patellofemoral pain syndrome, iliotibial band syndrome, and stress fractures are assessed, treating them as a cluster of concerns for the same population rather than unrelated diagnoses [25]. A comparable review adds that postpartum exercise focused on core and pelvic floor strengthening improves pelvic floor dysfunction and that supervised strength and balance programmes reduce falls in older women, which bridges into the third population [26]. Sports with sustained trunk stabilisation demands, including dance, yoga, and Pilates, place particular load on the pelvic floor, and pelvic floor symptoms in athletes are likely under-recognised because they are mistaken for ordinary musculoskeletal pain [27].

5.3. Older Women

Older women represent the third overlap, though through a different mechanism, tissue atrophy rather than birth trauma. Finite element modelling built from a 70-year-old woman's pelvic imaging found that improving the material properties of the levator ani, pelvic floor, rectus abdominis, erector spinae, and hip muscles together, not the pelvic floor alone, produced the largest improvement in simulated urinary and faecal control [28]. The conclusion that rehabilitation targeting the hip muscles alongside the pelvic floor outperforms pelvic floor training in isolation is directly relevant here even though the outcome measure was continence rather than knee pain. Given that knee osteoarthritis affects more than 30% of adults over 45 and 45% by age 85 [1], and that patellofemoral degeneration and pelvic floor weakness both climb steeply with age, the same hip and core deficits could plausibly be shared risk factors, though no study reviewed here tested older women for both conditions at once.

Table 4 summarises the population-level overlap. The pattern across all three groups is consistent: hip and core weakness, poor lumbopelvic control, and pelvic floor dysfunction cluster together. But the studies establishing this are almost entirely descriptive, cross-sectional, or expert-consensus in design. None used a cohort that tracked both pelvic floor status and knee outcomes over time in the same participants.

Table 4: Population-Level Co-Occurrence of Pelvic Floor Dysfunction and Anterior Knee/Lower-Limb Risk Factors

Population	Study	Relevant Finding
Postpartum runners	James *et al*. (2026) [22]	91% of postpartum running pain is lumbopelvic in location; about 30% report stress urinary incontinence; return to running often precedes tissue healing.
Postpartum women (antenatal)	Mamipour *et al*. (2023) [24]	Core stabilisation exercises targeting the pelvic floor and deep abdominals improved pain, disability, and quality of life through six weeks postpartum.
Postpartum athletes (elite)	Woodroffe *et al*. (2025) [23]	Recommends integrated pelvic floor and core reloading in return-to-sport programming (Level 4 evidence, SORT grade C).
Female athletes (general)	Joy *et al*. (2009) [25]	Recommends combined screening for PFPS, the female athlete triad, and pelvic floor dysfunction in the same population.
Female athletes (trunk-loading sports)	Bortolami & Rossettini (2026) [27]	High-trunk-demand sports load the pelvic floor; symptoms are likely under-recognised in this group.
Older women	Wang *et al*. (2025) [28]	Finite element modelling shows combined hip and pelvic floor rehabilitation outperforms pelvic floor training alone for continence outcomes.
Older adults (general)	Knee Pain in Adults and Adolescents (2026) [1]	Knee osteoarthritis affects over 30% of adults above 45, rising to 45% by age 85, alongside age-related pelvic floor decline.

6. The Evidence Gap: Toward a Conceptual Framework and Research Agenda

6.1. What the Current Evidence Does Not Show

Setting the five preceding sections side by side makes the shape of the gap clear. The hip-to-knee pain pathway is well established, with randomised trials, biomechanical modelling, and consistent effect sizes across age groups. The pelvic floor's anatomical and functional integration into the same kinetic chain is also reasonably well established, through cadaveric fascial studies, correlational clinical data, and electromyography during gait. What is missing is the middle link: no study identified in this review measured pelvic floor strength, endurance, or activation pattern against a knee-specific outcome, whether dynamic valgus angle, PFPS symptom severity, or diagnosed anterior knee pain. The two studies that came closest, Fernández García *et al*. (2026) [20] and Sato *et al*. (2025) [21], either found no significant association or evidence of antagonism rather than synergy between hip and pelvic floor activation. A relevant data point from a different pain site showed that combining pelvic floor and core stability exercise produced a significantly greater reduction in urinary leakage among women with coexisting chronic low back pain than pelvic floor exercise alone [29]. This shows that shared lumbopelvic dysfunction can connect the pelvic floor to musculoskeletal pain elsewhere in the chain, even if that chain has not yet been traced as far as the knee. A narrative built on plausibility, shared populations, and one case report is not the same as a demonstrated relationship.

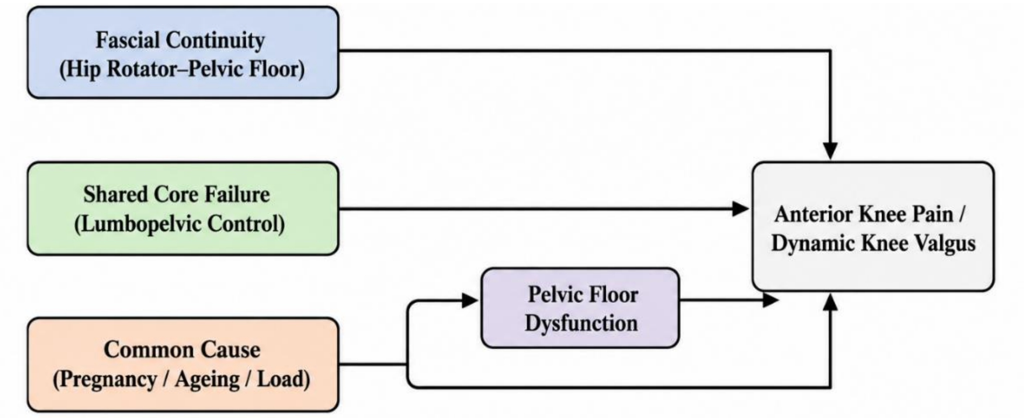
6.2. A Proposed Conceptual Framework

A conceptual framework can still be useful for organising future work, provided it is presented as hypothesis rather than finding. Three pathways seem worth separating out rather than treating as one mechanism, and Figure 2 sets them out schematically. The first is direct fascial and neuromuscular continuity, the obturator internus-levator ani connection described in anatomical research [9], through which hip rotator weakness could plausibly alter pelvic floor loading and vice versa. The second is shared core failure, where poor coordination of the deep stabilisers as a group degrades lumbopelvic control generally, which then manifests distally as dynamic knee valgus through the mechanism already established in the PFPS literature, without requiring the pelvic floor itself to act on the knee directly. The third is a common-cause pathway, where pregnancy, ageing, or high training load independently damage both the pelvic floor and the hip and core musculature, producing correlation without causation. These three pathways need different study designs to distinguish, and conflating them is likely part of why the current literature has not converged on an answer.

6.3. A Targeted Research Agenda

A useful next study would recruit a population with documented overlap. Postpartum runners are the obvious first choice given the existing infrastructure of Delphi and cohort work already built around them, and the study would need to measure pelvic floor strength and endurance objectively, through perineometry or transperineal ultrasound rather than self-report, alongside hip abductor and external rotator strength and knee kinematics during a standardised dynamic task such as a single-leg squat or drop landing, in the same participants, followed longitudinally where possible. Evidence that hip co-contraction can reduce pelvic floor efficiency suggests any such study should also record the position and loading condition under which measurements are taken, since the relationship may not hold uniformly across tasks [21]. Older women and female athletes would be reasonable second and third cohorts once a signal is established in the postpartum group.

Until that work exists, clinicians treating anterior knee pain in postpartum women, athletes with heavy trunk-stabilisation training loads, or older women with existing pelvic floor complaints have a reasonable, evidence-informed reason to screen for pelvic floor and hip function as part of a standard kinetic-chain assessment, but this should be presented to patients as a plausible contributing factor worth checking, not an established cause.



Note. Three non-exclusive pathways are proposed: (1) direct fascial and neuromuscular continuity between the pelvic floor and hip rotators, (2) shared core failure degrading lumbopelvic control generally, and (3) a common-cause pathway in which pregnancy, ageing, or training load independently affect both structures. To be generated as an image and inserted at this location.

Fig 2: Proposed Conceptual Framework Linking Pelvic Floor Dysfunction to Anterior Knee Pain

7. Conclusion

Anterior knee pain and pelvic floor dysfunction are each common on their own, and the populations in which they most often appear, postpartum runners, female athletes with high trunk-stabilisation training loads, and older women, overlap substantially. The anatomical case for a connection is reasonably solid: the pelvic floor shares fascia with the hip rotators, correlates with hip muscle strength in clinical samples, and co-activates with the gluteal and abdominal muscles during locomotion and postural challenge. The mechanistic case for hip and core weakness producing anterior knee pain and dynamic knee valgus is even stronger, backed by randomised trials and biomechanical modelling across age groups, as summarised in Tables 1 and 2. What connects those two literatures directly, a measured relationship between pelvic floor function and knee outcomes, does not yet exist in the published evidence reviewed here (Tables 3 and 4), and two studies testing adjacent questions found either no association or a competitive rather than cooperative relationship between hip and pelvic floor activation [20,21]. This review proposes that the relationship, if it exists, likely runs through shared core control and common risk factors rather than a single direct mechanical pathway, and it sets out three testable pathways (Figure 2) along with the kind of cohort study needed to separate them. Until that evidence is collected, pelvic floor assessment can reasonably be added to a kinetic-chain workup for anterior knee pain in high-risk populations as a clinically sensible precaution grounded in anatomy and shared risk factors, but it should not be presented to patients, or to the literature, as a confirmed cause of their knee pain.

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