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Systematic Review

Lumbar facet joint steroid injection versus Radiofrequency denervation for chronic low back pain: systematic review

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Abstract

Study aim: The study aimed to compare the clinical efficacy and safety of radiofrequency denervation versus corticosteroid injection for chronic low back pain originating from the lumbar facet joints. **Methods:** According to PRISMA 2020 guidelines we searched PubMed, Web of Science, Scopus, CENTRAL, and Embase from inception to 2025. Eligible studies included adults with chronic lumbar facet mediated pain treated with RFD or corticosteroid-based facet interventions. Pain reduction was the primary outcome; disability, treatment success, and adverse events were secondary outcomes. **Results:** We include 16 primary studies involving more than 1,900 participants, with follow-up from 3 to 24 months. Both interventions reduced pain, and corticosteroid injections produced faster short-term relief, whereas radiofrequency techniques showed more durable pain control and better long-term functional improvement in several comparative studies. Sham-controlled trials and the MINT trials did not show clinically important advance of routine radiofrequency over control strategies, which indicate that patient selection, diagnostic rigor, and procedural technique impact outcomes. Both treatments were safe, with minor adverse events reported. **Conclusion:** Facet steroid injection is useful for early symptom control, whereas RFD provide longer-lasting benefit in carefully selected patients with confirmed facetogenic pain.

Keywords: chronic low back pain; lumbar facet joint; corticosteroid injection; radiofrequency denervation; facetogenic pain; systematic review

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Introduction

Low back pain is one of the most common musculoskeletal disorders worldwide and is the leading cause of disability in populations. In most patients a precise nociceptive source cannot be identified clinically, which is why many cases are initially classified as non-specific low back pain. Among the recognized structural pain generators, the lumbar facet joints are a well-established source of chronic axial low back pain, with controlled diagnostic studies indicate that facet-mediated pain account for a proportion of chronic cases. This makes lumbar facet pain important, because untreated or recurrent symptoms lead to functional limitation, reduced Qol, and repeated healthcare use [1–3].

Lumbar facet joint pain is difficult to diagnose accurately, previous studies have shown that patient history, pain distribution, and physical examination findings are not sufficiently reliable to distinguish facetogenic pain from other causes of chronic low back pain. Imaging shows degenerative facet changes, but structural abnormalities do not correlate with symptoms. Diagnostic medial branch blocks or intra-articular blocks become the principal methods for confirming the facet joint as the pain source, although false-positive responses are a recognized limitation. Current consensus guidance emphasizes careful patient selection, with medial branch blocks considered more predictive of response to radiofrequency treatment than intra-articular injections [2,4].

Corticosteroid injections and Radiofrequency denervation (RFD) are the most commonly used interventional options for lumbar facet-mediated pain. Facet steroid injections are intended to suppress local inflammation and provide relatively rapid symptom relief, whereas RFD targets the medial branch nerves to produce longer-lasting analgesia by interrupting nociceptive transmission. Lakemeier et al reported similar short- to mid-term improvements after intra-articular steroid injection and RFD, while Do et al found that corticosteroid injection produced better early pain relief, with outcomes becoming comparable by later follow-up. The Cochrane review by Maas et al found pain advantage for radiofrequency over steroid injection, but show that the evidence was low and that robust trials were still lacking [5–7].

The MINT randomized clinical trials did not show important benefit of adding RFD to a standardized exercise program in a broader chronic low back pain population, whereas McCormick et al. [8] showed better outcomes for cooled radiofrequency ablation (RFA) compared with facet joint steroid injection in carefully selected patients with dual medial branch block-confirmed lumbar facet pain. These findings indicate that treatment efficacy depend on the intervention itself, diagnostic rigor, technical approach, and follow-up duration [4,8,9]. This systematic review compares lumbar facet joint steroid injection with RFD.

Methods

Study design

This systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement. The review aimed to compare the clinical efficacy and safety of RFD against corticosteroid injections for the management of CLBP originating from the lumbar facet joints.

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Search strategy

A systematic literature search was performed in five major electronic databases: PubMed, Web of Science (WoS), Scopus, the Cochrane Central Register of Controlled Trials (CENTRAL), and Embase. The search period was from database inception to 2025. The search strategy utilized a combination of Medical Subject Headings (MeSH) and free-text keywords related to the condition and interventions. Key search terms included: "lumbar facet joint," "zygapophysial joint," "RFD," "RFA," "medial branch neurotomy," "steroid injection," and "corticosteroid.". The reference lists of retrieved articles and previous systematic reviews were screened to identify missed primary studies.

Eligibility criteria

We include studies conducted in adult patients (≥18 years) diagnosed with CLBP (duration >3 months) specifically attributed to lumbar facet joint syndrome or degeneration; any form of RFD, including conventional radiofrequency ablation (RFA), pulsed radiofrequency (PRF), or cooled RFA; intra-articular or medial branch corticosteroid injections (CSI/FJI). Studies comparing RF to sham procedures, local anesthetics, or exercise programs were also included to provide a broader context of efficacy; the primary outcome was pain intensity reduction, measured using the Visual Analog Scale (VAS) or Numeric Rating Scale (NRS). Secondary outcomes included functional disability improvements (measured by the Oswestry Disability Index [ODI] or Roland-Morris Questionnaire [RMQ]), treatment success rates, and the incidence of adverse events. The study design should be Randomized controlled trials (RCTs), prospective clinical trials, and comparative observational studies. We exclude review articles, editorials, case reports, and study protocols without results were excluded.

Study selection

Following the initial search, duplicate citations were removed. Two reviewers screened titles and abstracts for the eligibility criteria. The full-text versions of relevant studies were retrieved and assessed for final inclusion. Disagreements between reviewers during the screening or selection process were resolved through discussion or by consultation with a third reviewer.

Data extraction

Data from the included studies were extracted using a standardized data extraction form. Which include; study characteristics; participant demographics; intervention details; comparison details; follow-up intervals and primary/secondary outcomes; key conclusions and safety data.

Data synthesis

We performed qualitative data analysis. Results were categorized by outcome measure and follow-up duration to facilitate a comparison between RFD and steroid-based interventions.

Results

The literature search and screening identified 16 primary research studies evaluating the efficacy of interventional treatments for chronic lumbar facet joint pain, our study encompasses a diverse range of study designs, including 11 randomized controlled trials (RCTs), prospective clinical studies, retrospective cohort analyses, and one longitudinal case series. The included studies were conducted from 1975 to 2025. Characteristics of the included

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studies and main findings presented In Table 1 and Table 2 respectively.

The total number of participants in the identified primary studies more than 1,900 individuals. Sample sizes in the individual trials ranged from smaller cohorts of 50 patients [10] to large-scale multicenter trials included 681 participants [9]. The study populations consisted of adult patients with CLBP attributed to lumbar facet joint (LFJ) syndrome or degeneration, often confirmed by positive responses to diagnostic medial branch blocks or intra articular test infiltrations. Follow up durations ranged from short-term assessments at 3 months to long-term evaluations extending to 24 months [11].

The primary outcome of pain reduction, measured though the Visual Analog Scale (VAS) or Numeric Rating Scale (NRS), revealed a distinction between the duration of relief provided by radiofrequency (RF) denervation compared to corticosteroid injections (CSI).

In head-to-head comparisons, several trials show the superiority of RF techniques for long-term pain control [12], RFA and methylprednisolone injection reduced VAS scores, the RFA group exhibited lower pain levels at the 6 and 12-month marks ($P<0.01$). Toubar and Dawood (2018) [13] observed that the therapeutic benefits of facet joint steroid injections regress within 6 months, whereas the pain relief achieved through RF facet neurotomy is sustained throughout the same period. Zhou et al. [14], found that an improved X-ray guided RF denervation was more effective than a combination of betamethasone and lidocaine at the 6-month follow-up.

Do et al. [7] found that intra-articular corticosteroid injections (ICI) were more effective than PRF in the immediate post treatment phase. By the 3 and 6-month assessments, the pain-relieving effects of ICI and PRF became comparable, which suggest that steroids offer a faster onset of relief but lack the durability of neurolytic procedures. The multicenter RCTs by van Tilburg et al. [15] and van Wijk et al. [16] reported that percutaneous RF treatment was not superior to sham procedures at a 3-month evaluation. The large-scale "Mint" trials [9] indicated that adding RF denervation to a standardized exercise program did not result in a important difference in pain intensity compared to exercise alone, although the differences were statistically significant.

Functional improvement mirrored the pain relief findings, with RF denervation yielding better long-term results. Civelek et al. [12] found that ODI scores in the RFA group were lower than those in the methylprednisolone group at the 12-month interval. Li et al. found that RFD (RD) provided better functional outcomes and pain control at 12 months compared to PRF. Tekin et al. [17] found that conventional and pulsed RF were more effective than local anesthetic controls in reducing disability scores at 6 and 12 months. RFA and cryoablation are effective and safe, providing comparable and significant improvements in both ODI and VAS scores over a 24-month follow-up period [11]. The degree of degeneration observed on MRI did not impact the efficacy of the steroid injection, as all groups showed significant pain reduction up to 6 months [10]. In a series of 207 patients, a 79% success rate was achieved in previously unoperated patients, whereas success rates dropped to 41% for those with prior laminectomies and 27% for those with previous spinal fusions [18].

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RFD and steroid injections were reported as safe procedures with no major neurological complications or permanent deficits reported in the clinical trials. Minor side effects included transient localized pain at the injection site, minor bruising, and temporary sensory changes, all of which resolved without significant intervention [8,19].

Discussion

We found that lumbar facet steroid injection and radiofrequency-based interventions reduce pain in patients with chronic low back pain of facet origin, but the durability of benefit differ. in the comparative evidence, corticosteroid injection provides rapid early analgesia, whereas radiofrequency techniques show improvement at medium- and longer-term follow-up. This pattern is consistent with the direction of the higher-quality comparative trials and supports the interpretation that radiofrequency offer greater durability when pain is facet mediated [5,7,8,20].

Intra-articular corticosteroid injection primarily suppresses local inflammation and produce earlier symptom relief, but it does not interrupt nociceptive transmission in the same manner as radiofrequency lesioning of the medial branch nerves. RFD is designed to disrupt pain signaling and achieve longer-lasting analgesia when patient selection and lesion placement are appropriate. The strongest recent direct comparison showed higher responder rates for cooled RFA than for facet joint steroid injection in pain and functional domains over 12 months, while another randomized study found no significant difference between steroid injection and denervation at 6 months [5,8].

Corticosteroid injection produced significantly better pain relief than pulsed radiofrequency during the first weeks after treatment, although outcomes became similar by 3 and 6 months. There is a meaningful pain reduction after intra-articular steroid injection regardless of MRI severity of facet joint arthritis, mainly when rapid relief is desired or when a less destructive intervention is preferred. These findings are compatible with the our review, in which steroid injection is useful for early symptom control but less convincing for sustained benefit [7,10].

A large multicenter trial did not show important advantage for adding RFD to a standardized exercise program in a broader chronic low back pain population, and sham-controlled trials also failed to find clear advance of routinely performed radiofrequency over sham procedures at early follow-up. These reflect differences in diagnostic rigor, inclusion criteria, comparator groups, and technical execution rather than a simple absence of treatment effect. Studies show that diagnostic blocks are more useful as prognostic tools than as therapeutic procedures and that stricter selection methods improve the probability of benefit from denervation [1,4,9,15,16].

Comparative data indicate that conventional denervation produce more durable relief than pulsed radiofrequency, and newer cooled techniques also improve lesion geometry and clinical response.

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Table 1: characteristics of the included studies

Study (author, year)	Study design	Participants (n, condition)	Intervention(s)	Comparison / control	Follow-up
Yilmaz & Kucukbingoz (2025) [11]	Retrospective Cohort	120 (LFJ Degeneration)	Radiofrequency Ablation (RFA)	Cryoablation	24 Months
McCormick et al. (2023) [8]	Pragmatic RCT	Lumbar Facet Syndrome	Cooled RF Ablation	Facet Steroid Injection (FJI)	12 Months
Li et al. (2023) [20]	Randomized Allocation	142 (Lumbar Facet Pain)	RFD (RD)	Pulsed RF (PRF)	12 Months
Kwak et al. (2019) [10]	Prospective Clinical	50 (Facet-origin LBP)		IA Steroid Injection	6 Months
Toubar & Dawood (2018) [13]	Randomized Clinical	58 (Chronic Facet Arthropathy)	RF Facet Neurotomy	Facet Joint Steroid Injection	6 Months
Civelek et al. (2018) [12]	Prospective Randomized	100 (Facet Joint Syndrome)	RFA	Methylprednisolone Injection	12 Months
Cetin & Yektas (2018) [21]	Comparative Research	Lumbar Facet Pain	Pulsed and Conventional RF	Medial Branch Block	
Juch et al. (2017) [9]	Multicenter RCT	681 (Chronic LBP)	RF Denervation + Exercise	Exercise Alone	12 Months
Do et al. (2017) [9]	Randomized Controlled	60 (Lumbar Facet Pain)	IA Pulsed RF (PRF)	IA Steroid Injection (ICI)	6 Months
van Tilburg et al. (2016) [15]	Randomized Sham-RCT	81 (Lumbar Facet Pain)	Percutaneous RF Treatment	Sham Treatment	3 Months
Zhou et al. (2016) [14]	Randomized Controlled	80 (Lumbar Facet Syndrome)	Improved X-ray-guided RF	Betamethasone & Lidocaine	6 Months
Lakemeier et al. (2013) [5]	Randomized Controlled	Chronic LBP	RF Denervation	IA Steroid Injection	6 Months

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Study (author, year)	Study design	Participants (n, condition)	Intervention(s)	Comparison / control	Follow-up
Wolter et al. (2011) [19]	Retrospective Obs.	91 (Facet Syndrome)	Cryoneurolysis		3 Months
Tekin et al. (2007) [17]	Randomized Clinical	60 (Chronic Facet Pain)	Conventional vs. Pulsed RF	Local Anesthetic (Control)	12 Months
van Wijk et al. (2005) [16]	Randomized Sham-RCT	81 (Chronic LBP)	RF Denervation	Sham Lesion	3 Months
Shealy (1975) [18]	Retrospective Series	207 (Back Pain & Sciatica)	RF Denervation		13 Months

Table 2: main findings

Study (author, year)	Pain outcomes (VAS/NRS)	Disability and functional outcomes	Key conclusion for RF vs. Steroids and control
Yilmaz & Kucukbingoz (2025)	Sig. reduction in both RFA and Cryo	Significant ODI improvement	Both RFA and Cryo provide safe, durable relief for up to 2 years.
McCormick et al. (2023)	Cooled RFA durable over 12m	Improved functional recovery	Cooled RF is more effective than steroid injections at 12-month follow-up.
Li et al. (2023)	RD group lower VAS at 12m (2.37)	Better ODI scores in RD group	RFD is superior to pulsed RF for long-term control.
Kwak et al. (2019)	Significant VAS reduction		Steroid efficacy is independent of the radiological severity of facet arthritis.
Toubar & Dawood (2018)	RF relief sustained at 6m	Superior functional recovery	RF neurotomy provides longer relief than intra-articular steroid injections.
Civelek et al. (2018)	RF sig. lower than steroids at 12m	RF sig. lower ODI at 12m	RF ablation is more effective than methylprednisolone for long-term pain.

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Study (author, year)	Pain outcomes (VAS/NRS)	Disability and functional outcomes	Key conclusion for RF vs. Steroids and control
Do et al. (2017)	ICI better at 1m; PRF/ICI equal at 6m	Sustained reduction in both groups	Steroids have a better short-term effect; long-term effects are comparable.
Zhou et al. (2016)	RF sig. lower than steroids (6m)	High therapeutic efficiency	Improved X-ray-guided RF is more effective than steroid/lidocaine combinations.
van Tilburg et al. (2016)	No difference between RF and Sham	No significant difference	RF was not superior to sham treatment at the 3-month evaluation.
van Wijk et al. (2005)	No sig. difference (RF vs. Sham)	No diff. in physical activities	No evidence for RF efficacy over sham as routinely performed.
Tekin et al. (2007)	RF better than control at 12m	Lower ODI in RF groups	Both PRF and CRF are superior to local anesthetic controls.
Juch et al. (2017)	No clinically important difference	No diff. in disability (ODI)	RF denervation did not significantly improve outcomes over exercise programs.
Wolter et al. (2011)	Pain dropped 7.70 to 4.22 at 3m	Reduced pain-related impairment	Cryoneurolysis is effective for short-to-medium term relief.
Shealy (1975)	79% of unoperated patients achieved relief	Lower success in post-op spine	Early evidence supports percutaneous RF for spinal facet denervation.

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conclusions about radiofrequency should be interpreted cautiously unless the exact method is specified. Data supports that steroid injection is useful for early pain relief and in selected patients who are not ideal candidates for denervation, whereas radiofrequency is more favorable when the clinical goal is longer-lasting improvement in carefully selected patients with confirmed facetogenic pain [4,8,17].

Conclusion

Lumbar facet joint steroid injection and radiofrequency based interventions reduce pain in chronic facet-mediated low back pain, and their benefits differ over time. Steroid injection is more useful for rapid short-term symptom relief, mainly when immediate improvement or a less destructive option is preferred. Radiofrequency denervation in carefully selected patients with confirmed facetogenic pain provide more durable pain reduction and functional improvement. Inconsistent sham-controlled and pragmatic trial findings indicate that outcomes depend strongly on patient selection, diagnostic block rigor, and procedural technique.

References

[1] Hartvigsen J, Hancock MJ, Kongsted A, Louw Q, Ferreira ML, Genevay S, et al. What low back pain is and why we need to pay attention. The Lancet 2018;391:2356–67. https://doi.org/10.1016/S0140-6736(18)30480-X.

[2] Schwarzer AC, Wang SC, Bogduk N, McNaught PJ, Laurent R. Prevalence and clinical features of lumbar zygapophysial joint pain: a study in an Australian population with chronic low back pain. Ann Rheum Dis 1995;54:100–6. https://doi.org/10.1136/ard.54.2.100.

[3] Cohen SP, Raja SN. Pathogenesis, Diagnosis, and Treatment of Lumbar Zygapophysial (Facet) Joint Pain. Anesthesiology 2007;106:591–614. https://doi.org/10.1097/00000542-200703000-00024.

[4] Cohen SP, Bhaskar A, Bhatia A, Buvanendran A, Deer T, Garg S, et al. Consensus practice guidelines on interventions for lumbar facet joint pain from a multispecialty, international working group. Reg Anesth Pain Med 2020;45:424–67. https://doi.org/10.1136/rapm-2019-101243.

[5] Lakemeier S, Lind M, Schultz W, Fuchs-Winkelmann S, Timmesfeld N, Foelsch C, et al. A comparison of intraarticular lumbar facet joint steroid injections and lumbar facet joint RADIOFREQUENCY DENERVATION in the treatment of low back pain: A randomized, controlled, double-blind trial. Anesth Analg 2013;117:228–35. https://doi.org/10.1213/ANE.0b013e3182910c4d.

[6] Maas ET, Ostelo RW, Niemisto L, Jousimaa J, Hurri H, Malmivaara A, et al. RADIOFREQUENCY DENERVATION for chronic low back pain. Cochrane Database of Systematic Reviews 2015;2015. https://doi.org/10.1002/14651858.CD008572.pub2.

[7] Do KH, Ahn SH, Cho YW, Chang MC. Comparison of intra-articular lumbar facet joint pulsed radiofrequency and intra-articular lumbar facet joint corticosteroid injection for management of lumbar facet joint pain: A randomized controlled

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trial. Medicine (United States) 2017;96. https://doi.org/10.1097/MD.0000000000006524.

[8] McCormick ZL, Conger A, Kendall R, Wagner G, Henrie AM, Littell M, et al. A pragmatic randomized prospective trial of cooled radiofrequency ablation of the medial branch nerves versus facet joint injection of corticosteroid for the treatment of lumbar facet syndrome: 12 month outcomes. Pain Medicine 2023;24:1318–31. https://doi.org/10.1093/pm/pnad107.

[9] Juch JNS, Maas ET, Ostelo RWJG, George Groeneweg J, Kallewaard JW, Koes BW, et al. Effect of RADIOFREQUENCY DENERVATION on pain intensity among patients with chronic lowback pain the mint randomized clinical trials. JAMA - Journal of the American Medical Association 2017;318:68–81. https://doi.org/10.1001/jama.2017.7918.

[10] Kwak D, Kwak S, Lee A, Chang M. Outcome of intra-articular lumbar facet joint corticosteroid injection according to the severity of facet joint arthritis. Exp Ther Med 2019. https://doi.org/10.3892/etm.2019.8031.

[11] Yilmaz A, Kucukbingoz C. Comparative Outcomes and Safety of Radiofrequency Ablation and Cryoablation for Lumbar Facet Joint Degeneration: A Single-Center Retrospective Cohort Study with 24-Month Follow-Up. J Clin Med 2025;14. https://doi.org/10.3390/jcm14207408.

[12] Civelek E, Cansever T, Kabatas S, Kircelli AK, Yilmaz C, Musluman M, et al. Comparison of effectiveness of facet joint injection and RADIOFREQUENCY DENERVATION in chronic low back pain. Turk Neurosurg 2012;22:200–6. https://doi.org/10.5137/1019-5149.JTN.5207-11.1.

[13] Toubar A, Dawood O. Facet Joint Injection versus Radiofrequency Facet Neurotomy for Treatment of Lumbar Facet Joint Arthropathy. Egyptian Spine Journal 2018;28:25–31. https://doi.org/10.21608/esj.2019.4725.1057.

[14] Zhou Q, Zhou F, Wang L, Liu K. An investigation on the effect of improved X-rays-guided radiofrequency thermocoagulation denervation on lumbar facet joint syndrome. Clin Neurol Neurosurg 2016;148:115–20. https://doi.org/10.1016/j.clineuro.2016.07.018.

[15] Van Tilburg CWJ, Stronks DL, Groeneweg JG, Huygen FJPM, Van Tilburg ν C W J. Randomised sham-controlled double-blind multicentre clinical trial to ascertain the effect of percutaneous radiofrequency treatment for lumbar facet joint pain n.d. https://doi.org/10.1302/0301-620X.98B11.

[16] Van Wijk RMAW, Jos †, Geurts WM, Wynne HJ, Hammink E, Buskens E, et al. RADIOFREQUENCY DENERVATION of Lumbar Facet Joints in the Treatment of Chronic Low Back Pain A Randomized, Double-Blind, Sham Lesion-Controlled Trial. n.d.

[17] Tekin I, Mirzai H, Ok G, Erbuyun K, Vatansever D. A Comparison of Conventional and Pulsed RADIOFREQUENCY DENERVATION in the Treatment of Chronic Facet Joint Pain. 2007.

[18] Shealy CN. Percutaneous RADIOFREQUENCY DENERVATION of spinal facets Treatment for chronic back pain and sciatica. n.d.

[19] Wolter T, Deininger M, Hubbe U, Mohadjer M, Knoeller S. Cryoneurolysis for zygapophyseal joint pain: A retrospective analysis of 117 interventions. Acta Neurochir (Wien)

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2011;153:1011–9. https://doi.org/10.1007/s00701-011-0966-9.

[20] Li SJ, Zhang SL, Feng D. A comparison of pulsed radiofrequency and RADIOFREQUENCY DENERVATION for lumbar facet joint pain. J Orthop Surg Res 2023;18. https://doi.org/10.1186/s13018-023-03814-5.

[21] Çetin A, Yektaş A. Evaluation of the Short- and Long-Term Effectiveness of Pulsed Radiofrequency and Conventional Radiofrequency Performed for Medial Branch Block in Patients with Lumbar Facet Joint Pain. Pain Res Manag 2018;2018. https://doi.org/10.1155/2018/7492753.

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