

Summer Scrapes and Autumn Concussions: Pediatric Head Injuries Show Distinct Seasonal Trends

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Last updated July 16, 2026 • Check for updates at EpicResearch.org

Key Findings:

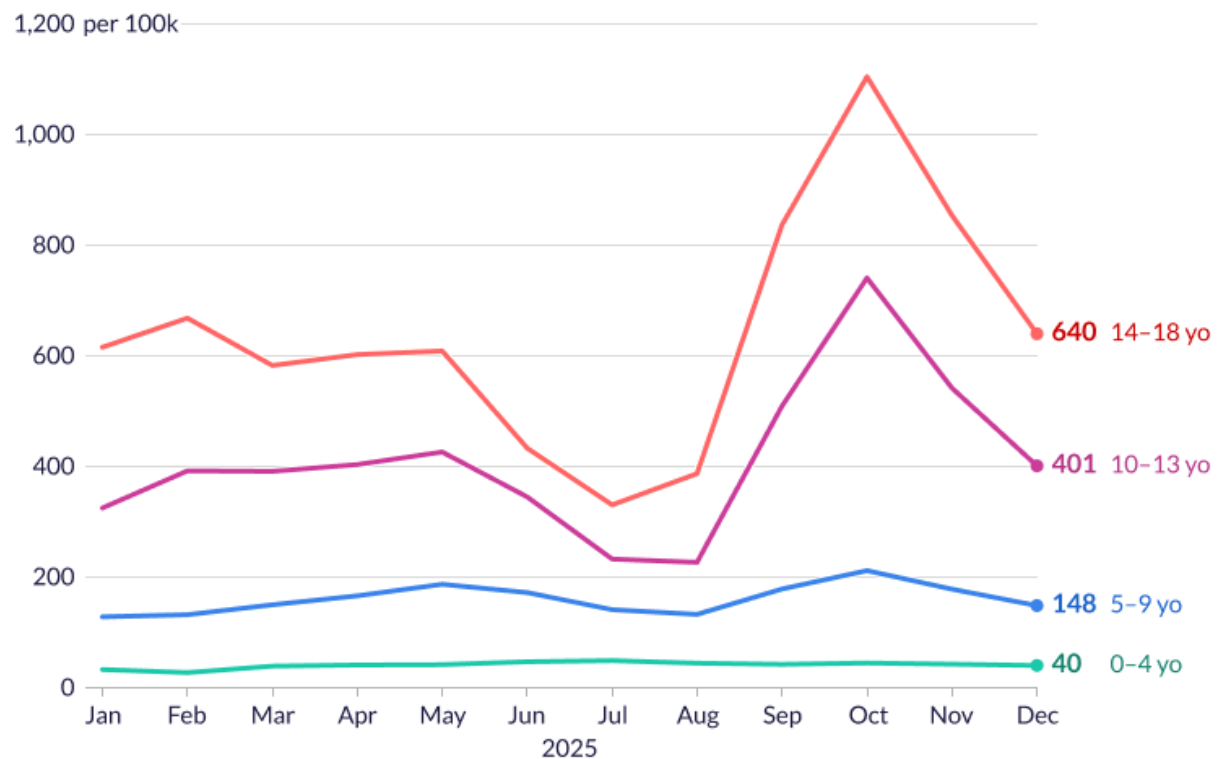
- Concussion diagnoses among children show a strong seasonal pattern that is most pronounced in older adolescent age groups. Among children aged 14–18, the 2025 monthly rate peaked in October at 1,105 per 100,000 compared to 331 per 100,000 in July.
- Superficial head injuries followed a different seasonal cycle, peaking in late spring and early summer rather than fall, and were most common in the youngest children. In 2025, rates among children aged 0–4 peaked in July at 1,211 per 100,000, the highest of any group.
- Males were consistently diagnosed with both concussions and superficial head injuries more often than females in most periods studied.

A concussion is a mild traumatic brain injury caused by a blow or jolt to the head that can affect how the brain functions, and it's a particularly common injury among children who participate in sports.¹ Superficial head injuries, such as cuts and abrasions to the scalp and face, are also a common reason children seek care.² Prior work has described seasonal variation in pediatric injuries and a concentration of sports-related concussions during the academic year,³ but less is known about how the timing and magnitude of these patterns differ across pediatric age groups, between injury types, and by sex. Understanding when different head injuries cluster across the year can help health systems anticipate demand and target prevention and counseling efforts.

We studied more than 58 million pediatric patients with visits between January 2017 and February 2026 to understand patterns in visits for concussions and superficial head injuries. To avoid counting the same injury more than once, additional concussion-related diagnoses within 90 days of an initial event were treated as part of the same event.

In 2025, children aged 14–18 had the most pronounced pattern, with the monthly rate climbing to 1,105 per 100,000 in October compared to 331 per 100,000 in July, as shown in Figure 1. Children aged 10–13 followed a similar seasonal trend in concussion diagnoses, while the two youngest groups account for a much smaller proportion and varied far less across the year. The concentration of older-child concussions in the fall is consistent with prior reports linking pediatric concussion to the academic and athletic calendar.³

Concussions per One Hundred Thousand Pediatric Patients by Age in 2025



N=25,372,150 pediatric patients

"Concussions per One Hundred Thousand Pediatric Patients by Age in 2025," 2026. EpicResearch.org

Figure 1. The rate of concussion diagnoses per 100,000 patients by age group in 2025.

The seasonal timing of concussion was similar for males and females, but males were diagnosed at consistently higher rates, especially at the seasonal peak. Both sexes peaked in October and reached their lowest rates in midsummer, indicating a shared underlying cycle. The average October peak for males between 2017 and 2025 reached about 591 per 100,000 compared to about 355 per 100,000 for females, a gap that narrowed during the summer when the two rates were nearly equal. The widening of the male-female difference specifically at the fall peak suggests that the activities driving the seasonal surge are more common among, or carry higher concussion risk for, male children.

Concussions per One Hundred Thousand Pediatric Patients by Sex

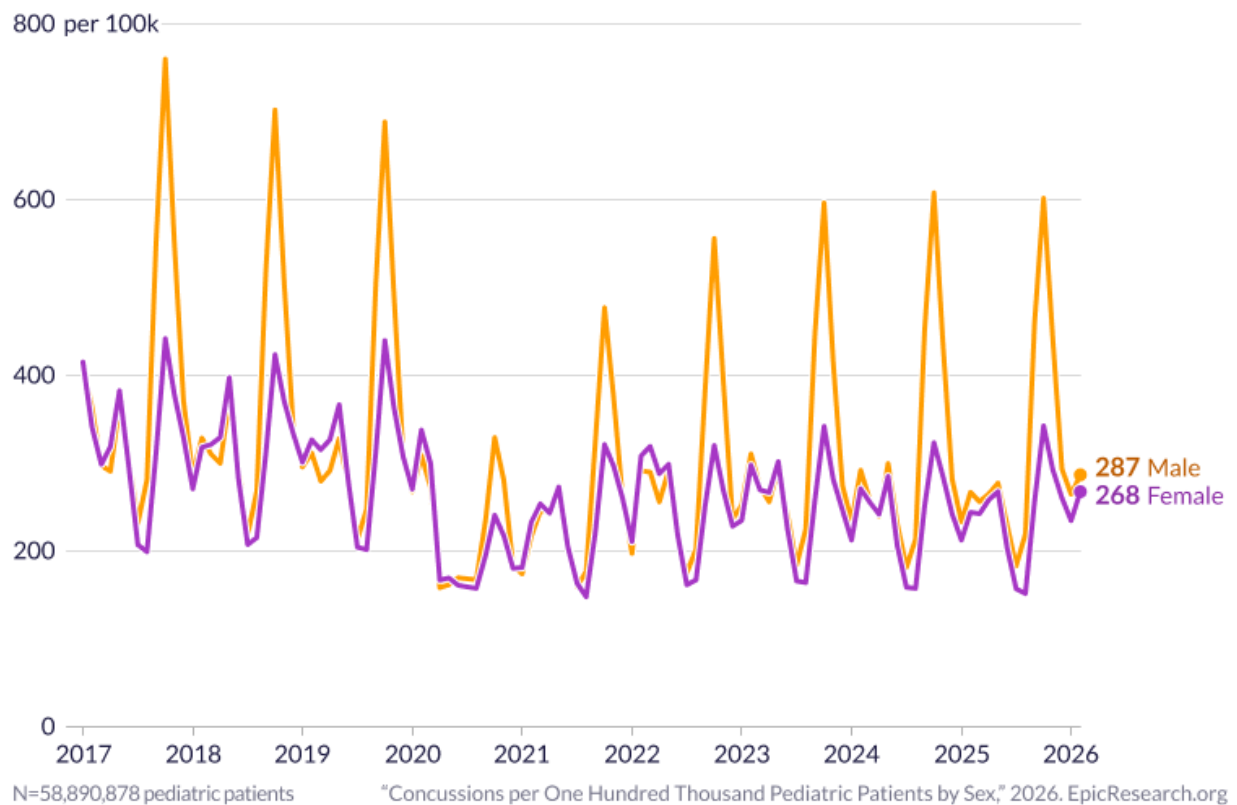
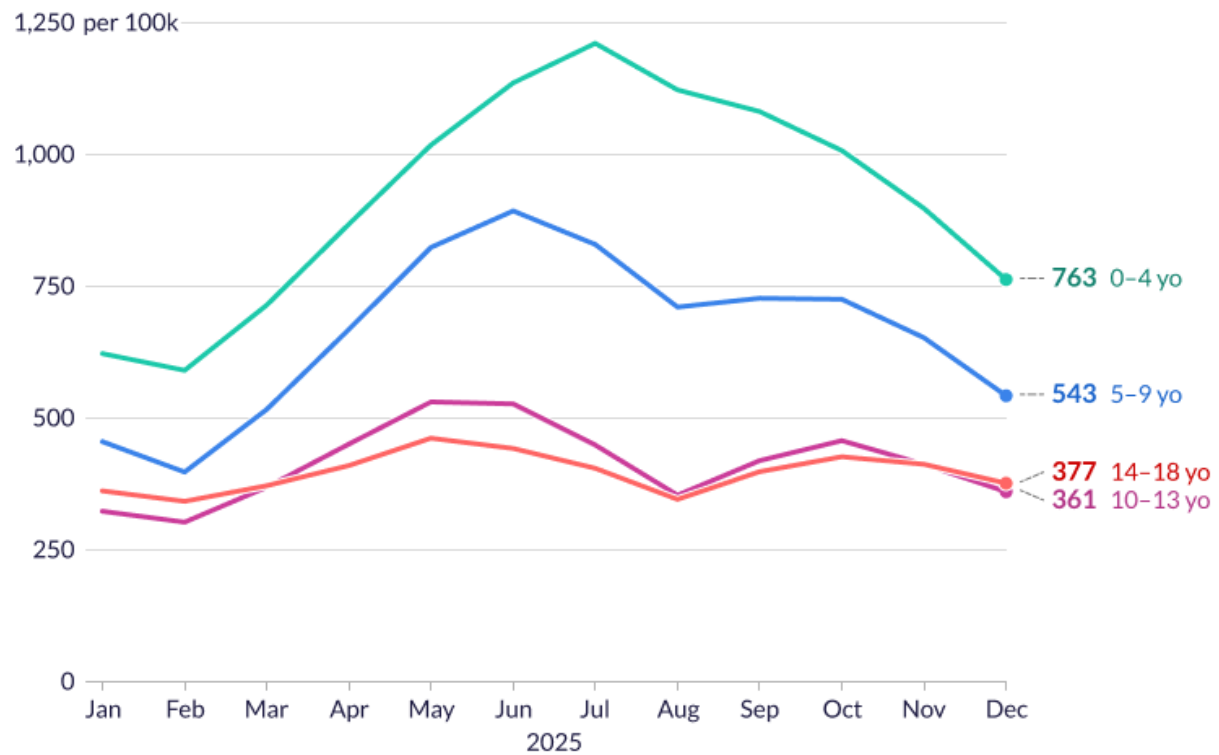


Figure 2. The rate of concussion diagnoses for patients aged 0–18 per 100,000 patients stratified by patient sex.

In contrast, superficial head injuries were most common in the early summer months and in the youngest age groups, reaching a peak of 1,211 per 100,000 among children aged 0–4 in July 2025.

Superficial Head Injuries per One Hundred Thousand Pediatric Patients by Age in 2025



N=25,372,150 ped patients "Superficial Head Injuries per One Hundred Thousand Pediatric Patients by Age in 2025," 2026. EpicResearch.org

Figure 3. The rate of superficial head injury diagnoses per 100,000 patients by age group in 2025.

Like concussion diagnoses, males were more commonly diagnosed with superficial head injuries than females, but this trend remained more consistent throughout the year.

Superficial Head Injuries per One Hundred Thousand Pediatric Patients by Sex

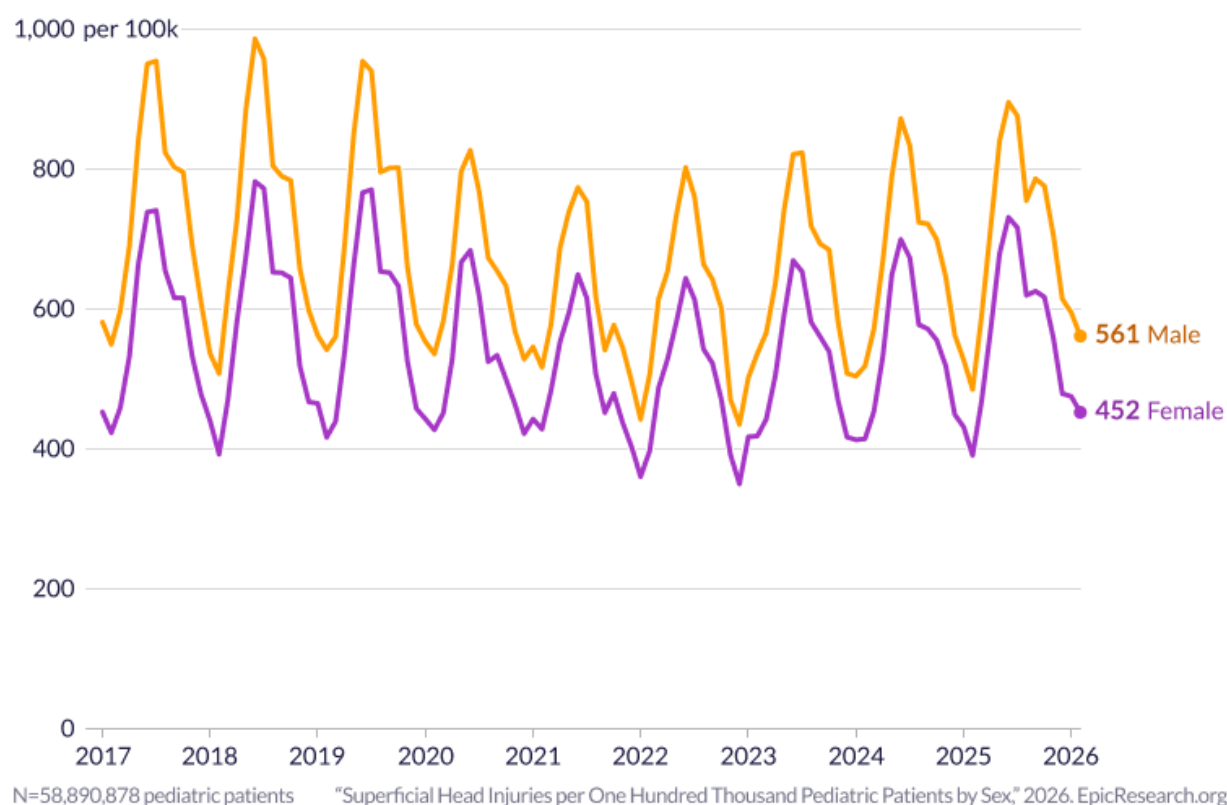


Figure 4. The rate of superficial head injury diagnoses for patients aged 0–18 per 100,000 patients stratified by patient sex.

These data come from Cosmos, a dataset created in collaboration with a community of Epic health systems representing more than 307 million patient records from 2,000 hospitals and more than 49,000 clinics from all 50 U.S. states, Canada, Lebanon, and Saudi Arabia. This study was completed by two teams that worked independently, each composed of a clinician and research scientist. The two teams came to similar conclusions. Graphics by Brian Olson.

References

1. About Mild TBI and Concussion. U.S. Centers for Disease Control and Prevention. <https://www.cdc.gov/traumatic-brain-injury/about/index.html>. Accessed June 10, 2026.
2. Zogg CK, Haring RS, Xu L, et al. The Epidemiology of Pediatric Head Injury Treated Outside of Hospital Emergency Departments. *Epidemiology*. 2018;29(2):269-279. doi:10.1097/EDE.0000000000000791
3. Bryan MA, Rowhani-Rahbar A, Comstock RD, Rivara F; Seattle Sports Concussion Research Collaborative. Sports- and Recreation-Related Concussions in US Youth. *Pediatrics*. 2016;138(1):e20154635. doi:10.1542/peds.2015-4635

Data Definitions

Term	Definition
Study period	January 2017 to February 2026
Study population: inclusion	Pediatric patients aged 0–18 with a qualifying encounter during the study period in a department in the U.S.

Censoring / event deduplication	90-day washout: additional concussion-related diagnoses occurring within 90 days of an index event are considered part of the same episode and not counted as a new event
Outcomes	Concussion: ICD-10-CM code S06.0* or SNOMED code 110030002 Superficial head injury: ICD-10-CM code S00*
Stratifications	Age group: 0–4, 5–9, 10–13, 14–18 Evaluated sex
Model specifications	Monthly rate, encounter-based denominator
Qualifying encounter	Encounters with a type of emergency department, office visit, urgent care, or telehealth
Limitations	Difficulty differentiating truly unique concussion events; the 90-day washout mitigates but does not eliminate double-counting of the same injury across encounters. 7th-character ICD-10 coding (initial/subsequent/sequela) is inconsistently applied across care settings, limiting reliable identification of index events by 7th character alone. Coding practices and healthcare-access patterns shifted substantially over the study period, particularly during COVID-19; observed rate changes may reflect changes in care-seeking rather than in underlying incidence. Electronic health record data capture only healthcare-seeking care; true population incidence is undercounted because many pediatric concussions and superficial head injuries might never present for care.

Table 1. Concussions per One Hundred Thousand Pediatric Patients by Age in 2025

Month	0–4 yo	5–9 yo	10–13 yo	14–18 yo
Jan	32.97	128.35	325.00	615.46
Feb	27.49	132.00	392.01	668.35
Mar	38.99	150.04	391.25	582.79
Apr	41.21	166.15	403.65	602.21
May	41.71	187.16	426.17	608.74
Jun	47.14	172.15	344.89	433.15
Jul	49.14	141.11	232.79	330.56
Aug	44.30	132.73	226.62	386.94
Sep	42.39	178.57	509.17	836.75
Oct	44.57	211.64	740.82	1104.74
Nov	42.59	178.20	541.64	853.87
Dec	40.23	148.46	401.07	639.89

Table 2. Concussions per One Hundred Thousand Pediatric Patients by Sex

Year	Month	Female	Male
2017	Jan 2017	415.16	414.55
	Feb 2017	340.97	362.90
	Mar 2017	298.95	297.29
	Apr 2017	318.92	290.97
	May 2017	382.50	365.55
	Jun 2017	296.59	310.00
	Jul 2017	207.20	231.40

	Aug 2017	199.27	280.84
	Sep 2017	311.70	550.41
	Oct 2017	441.89	760.12
	Nov 2017	377.95	549.74
	Dec 2017	329.19	371.19
2018	Jan 2018	270.91	286.53
	Feb 2018	318.19	328.77
	Mar 2018	321.27	310.36
	Apr 2018	329.53	299.73
	May 2018	397.41	373.60
	Jun 2018	282.45	297.37
	Jul 2018	207.33	218.77
	Aug 2018	215.45	268.12
	Sep 2018	311.54	519.52
	Oct 2018	423.65	702.08
	Nov 2018	370.02	504.16
	Dec 2018	333.16	337.65
2019	Jan 2019	301.20	295.67
	Feb 2019	326.68	311.63
	Mar 2019	315.29	279.58
	Apr 2019	326.89	291.43
	May 2019	366.62	328.06
	Jun 2019	279.86	274.10
	Jul 2019	204.51	213.13
	Aug 2019	201.66	247.84
	Sep 2019	311.62	501.96
	Oct 2019	439.64	688.58
	Nov 2019	363.40	492.01
	Dec 2019	307.28	308.12
2020	Jan 2020	270.55	267.79
	Feb 2020	337.75	308.94
	Mar 2020	299.44	272.40
	Apr 2020	166.98	158.34
	May 2020	169.50	161.60
	Jun 2020	161.08	169.65
	Jul 2020	159.34	168.52
	Aug 2020	157.60	167.47
	Sep 2020	195.07	235.65
	Oct 2020	241.02	329.26
	Nov 2020	217.43	280.73
	Dec 2020	180.37	183.15
2021	Jan 2021	181.26	174.08
	Feb 2021	232.99	216.61
	Mar 2021	253.86	245.54
	Apr 2021	243.36	245.71
	May 2021	273.00	268.63

	Jun 2021	205.01	211.06
	Jul 2021	163.32	159.41
	Aug 2021	148.01	176.85
	Sep 2021	220.53	323.38
	Oct 2021	321.30	477.08
	Nov 2021	296.73	374.57
	Dec 2021	259.30	258.06
2022	Jan 2022	210.91	197.37
	Feb 2022	308.59	291.49
	Mar 2022	319.15	289.79
	Apr 2022	288.20	255.97
	May 2022	298.94	291.67
	Jun 2022	218.32	223.13
	Jul 2022	161.73	174.73
	Aug 2022	166.96	202.53
	Sep 2022	251.62	383.45
	Oct 2022	320.19	555.90
	Nov 2022	268.50	390.32
	Dec 2022	228.31	236.42
2023	Jan 2023	234.74	252.16
	Feb 2023	297.75	310.52
	Mar 2023	269.65	273.34
	Apr 2023	266.90	256.08
	May 2023	301.86	293.99
	Jun 2023	225.03	242.14
	Jul 2023	165.99	183.90
	Aug 2023	164.07	225.03
	Sep 2023	258.98	448.22
	Oct 2023	342.10	596.27
	Nov 2023	281.83	415.38
	Dec 2023	246.67	274.93
2024	Jan 2024	212.58	233.76
	Feb 2024	270.94	292.07
	Mar 2024	255.41	257.65
	Apr 2024	242.11	239.71
	May 2024	285.09	299.55
	Jun 2024	206.41	231.23
	Jul 2024	158.74	181.54
	Aug 2024	157.63	213.48
	Sep 2024	251.74	452.46
	Oct 2024	323.36	607.73
	Nov 2024	284.71	434.62
	Dec 2024	242.28	282.20
2025	Jan 2025	212.56	233.54
	Feb 2025	244.09	266.82
	Mar 2025	242.66	256.21

	Apr 2025	258.38	265.11
	May 2025	267.81	277.47
	Jun 2025	204.15	229.97
	Jul 2025	157.00	183.07
	Aug 2025	151.74	219.40
	Sep 2025	256.16	459.04
	Oct 2025	342.51	601.59
	Nov 2025	292.21	439.90
	Dec 2025	260.34	293.26
2026	Jan 2026	234.66	264.84
	Feb 2026	267.56	286.81

Table 3. Superficial Head Injuries per One Hundred Thousand Pediatric Patients by Age in 2025

Month	0-4 yo	5-9 yo	10-13 yo	14-18 yo
Jan	622.49	455.52	323.40	362.01
Feb	590.61	397.85	302.92	342.34
Mar	714.52	516.78	369.27	371.87
Apr	868.14	668.50	451.07	410.26
May	1018.11	824.15	530.90	461.90
Jun	1136.19	893.32	527.05	442.62
Jul	1211.15	829.78	449.12	404.85
Aug	1122.98	710.87	354.08	346.05
Sep	1081.78	727.54	419.48	398.37
Oct	1007.61	725.65	457.55	426.75
Nov	898.26	652.72	412.78	412.72
Dec	762.85	542.53	360.59	376.63

Table 4. Superficial Head Injuries per One Hundred Thousand Pediatric Patients by Sex

Year	Month	Female	Male
2017	Jan 2017	452.75	581.22
	Feb 2017	423.16	549.64
	Mar 2017	459.13	597.53
	Apr 2017	532.40	690.21
	May 2017	663.87	841.12
	Jun 2017	738.69	950.36
	Jul 2017	741.00	954.70
	Aug 2017	655.37	823.68
	Sep 2017	616.16	802.85
	Oct 2017	615.83	795.80
	Nov 2017	533.17	691.68
	Dec 2017	478.24	609.61
2018	Jan 2018	440.60	536.77
	Feb 2018	392.49	507.89
	Mar 2018	471.74	623.67
	Apr 2018	582.31	728.09

	May 2018	674.99	884.80
	Jun 2018	782.34	986.31
	Jul 2018	772.30	957.39
	Aug 2018	652.64	804.55
	Sep 2018	651.81	789.67
	Oct 2018	644.42	783.99
	Nov 2018	518.54	657.80
	Dec 2018	467.15	597.97
2019	Jan 2019	465.15	562.37
	Feb 2019	416.68	541.77
	Mar 2019	439.38	560.16
	Apr 2019	539.60	693.21
	May 2019	661.87	848.84
	Jun 2019	766.45	954.53
	Jul 2019	770.70	940.20
	Aug 2019	653.69	795.74
	Sep 2019	652.18	801.65
	Oct 2019	632.83	802.02
	Nov 2019	525.39	659.98
	Dec 2019	457.59	578.08
2020	Jan 2020	443.10	553.52
	Feb 2020	427.54	535.86
	Mar 2020	451.56	583.11
	Apr 2020	529.18	664.08
	May 2020	667.08	796.73
	Jun 2020	684.03	826.99
	Jul 2020	618.48	766.97
	Aug 2020	524.70	673.56
	Sep 2020	534.03	654.50
	Oct 2020	499.40	633.20
	Nov 2020	463.12	567.26
	Dec 2020	421.80	528.31
2021	Jan 2021	442.77	545.81
	Feb 2021	428.38	516.83
	Mar 2021	482.90	577.13
	Apr 2021	552.97	687.62
	May 2021	594.92	739.48
	Jun 2021	649.29	773.78
	Jul 2021	615.53	753.38
	Aug 2021	507.67	617.77
	Sep 2021	451.87	541.28
	Oct 2021	479.41	577.09
	Nov 2021	437.22	544.69
	Dec 2021	402.55	496.10
2022	Jan 2022	360.54	442.27
	Feb 2022	397.53	506.68
	Mar 2022	487.68	615.14
	Apr 2022	528.71	653.92
	May 2022	582.31	735.56
	Jun 2022	644.05	802.36
	Jul 2022	613.65	760.54

	Aug 2022	542.85	664.29
	Sep 2022	522.47	642.38
	Oct 2022	470.55	601.05
	Nov 2022	391.66	471.03
	Dec 2022	349.91	435.15
2023	Jan 2023	417.46	502.06
	Feb 2023	418.39	536.21
	Mar 2023	442.28	566.07
	Apr 2023	504.67	635.95
	May 2023	593.31	743.04
	Jun 2023	669.38	821.44
	Jul 2023	653.53	823.40
	Aug 2023	581.47	718.78
	Sep 2023	560.54	693.34
	Oct 2023	539.29	684.65
	Nov 2023	469.15	581.55
	Dec 2023	416.88	508.02
2024	Jan 2024	412.92	503.89
	Feb 2024	414.45	518.49
	Mar 2024	453.94	572.15
	Apr 2024	532.84	669.48
	May 2024	648.89	789.85
	Jun 2024	699.45	872.23
	Jul 2024	673.11	833.27
	Aug 2024	577.64	724.01
	Sep 2024	571.66	721.79
	Oct 2024	555.66	699.54
	Nov 2024	518.71	645.78
	Dec 2024	449.37	563.09
2025	Jan 2025	431.48	527.10
	Feb 2025	390.99	485.09
	Mar 2025	467.73	589.75
	Apr 2025	570.07	716.36
	May 2025	679.12	840.57
	Jun 2025	731.23	895.52
	Jul 2025	716.32	875.86
	Aug 2025	619.51	754.92
	Sep 2025	625.54	786.24
	Oct 2025	617.24	775.75
	Nov 2025	558.89	705.91
	Dec 2025	479.18	614.41
2026	Jan 2026	475.07	595.23
	Feb 2026	452.36	561.28