COVID-19: Daily Fluctuations, a Weekly Cycle, and a Negative Trend

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Examination of the daily fluctuations in new confirmed cases of coronavirus disease 2019 (COVID-19) in the United States, as reported by the Johns Hopkins University Coronavirus Resource Center through the user content section of GitHub, reveals a weekly cycle by day of the week.[1] All days of available data were reviewed through May 11, 2020, considering only complete weeks, since the new case plateau began on March 29, 2020, through May 2, 2020.

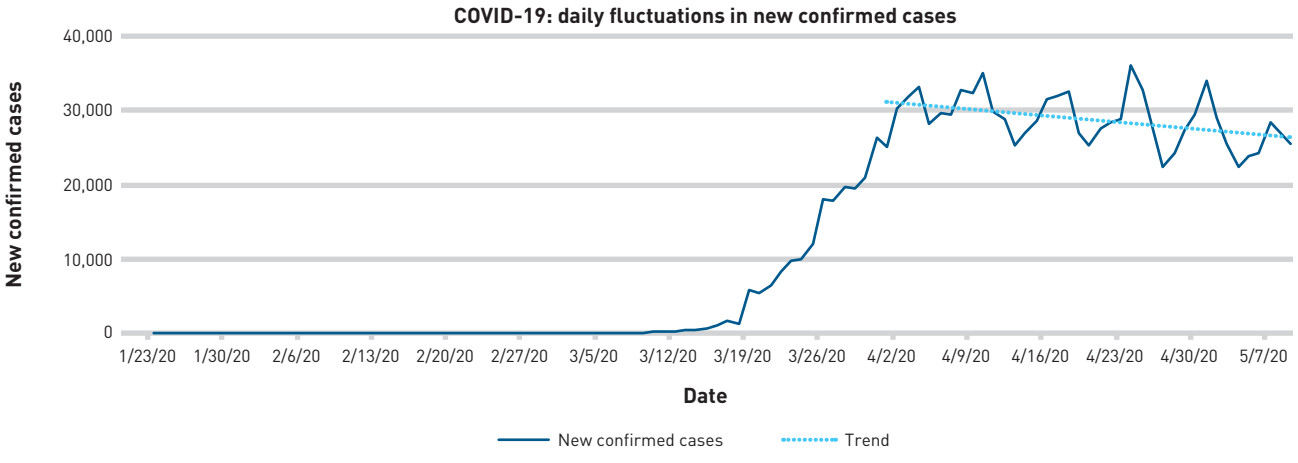
New cases were calculated by taking the difference between cumulative confirmed cases on successive days. A graph of new cases shows weekly cycles beginning March 29 (**Figure 1**) and continuing through the sixth complete week that ended on May 10. The weekly cycle begins with Monday having the lowest average number of cases at 24,695; the daily average increases each day, peaks on Friday at 33,838, and then declines Saturday and Sunday to 26,220. The relative risk of new confirmed cases by day of the week for the 5 complete weeks is 0.850 (95% CI, 0.850-0.860) for Monday, increasing significantly each day to 1.171 (95% CI, 1.166-1.177) on Friday (**Table** and **Figure 2**). The risk falls on Saturday and Sunday

TAKEAWAY POINTS

New confirmed cases of coronavirus disease 2019 occur in a weekly cycle, with increasing risk from Monday through Friday.

- Risk of infection is lowest on Monday and greatest on Friday.
- The risk increases significantly each weekday.
- Risk declines from a peak on Friday through Saturday and Sunday to begin a new cycle on Monday.
- The overall trend of new confirmed cases is negative since April 1, 2020.

FIGURE 1. Daily Fluctuation in New Confirmed Cases of COVID-19 Viral Infection[a]



Abbreviation: COVID-19, coronavirus disease 2019.

[a]New confirmed cases of COVID-19 viral infections in the United States. The number of new cases (vertical axis) is shown by date on the horizontal axis. The number of new cases starts to plateau about March 29 and continues through May 2. The plateau shows daily fluctuations that cycle weekly. The trend of new confirmed cases from April 1 through May 9 is negative, with an R_0 of 0.996 (P <.0005).

to begin the weekly pattern over again on Monday. The trend of new confirmed cases was tested using a Poisson regression, confirming a negative trend and an aggregate level effective reproductive number of $R_0 = 0.996$ ($P < .0005$). Stata version 16.1 was used for the analyses.[2]

This analysis shows an example of the effect of greater exposure on the risk of COVID-19 infection through the workweek. Although the overall trend over the 39 days has been negative, consideration of the workweek effect may be helpful. ■

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2. *Stata/MP 16.1 for Windows*. Version 16.1 (64-bit x86-64). StataCorp; 2020.

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TABLE. Relative Risk of New Confirmed Cases of COVID-19 by Day of Week for 5 Weeks[a]

		95% CI		
Weekday	IRR	LCL	UCL	Total cases
Sunday	0.910[b]	0.900	0.910	131,098
Monday	0.850[b]	0.850	0.860	123,477
Tuesday	0.930[b]	0.930	0.941	134,872
Wednesday	0.985[b]	0.980	0.991	142,391
Thursday	1.056[c]	1.050	1.061	152,528
Friday	1.171[c]	1.166	1.177	169,190
Saturday	1.090[c]	1.085	1.096	157,518
Crude	1.000	0.998	1.002	1,011,074

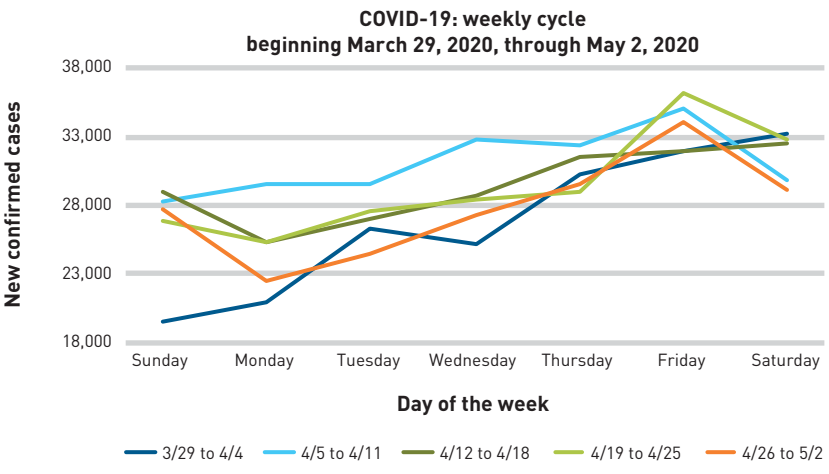
Abbreviations: COVID-19, coronavirus disease 2019; IRR, incident rate ratio; LCL, lower confidence limit; UCL, upper confidence limit.

[a]The relative risk of COVID-19 infection is lowest on Monday and increases each day, becoming highest on Friday.

[b]Significantly ($P < .05$) less than average.

[c]Significantly ($P < .05$) greater than average.

FIGURE 2. Day of the Week Pattern by Week of New Confirmed Cases of COVID-19 Viral Infection[a]



Abbreviation: COVID-19, coronavirus disease 2019.

[a]New confirmed cases of COVID-19 on the vertical axis versus day of the week on the horizontal axis. The new confirmed case count is plotted separately by week for 5 consecutive weeks from March 29, 2020, through May 2, 2020. The weekly pattern is an increasing volume of cases from Monday through Friday of each week, declining Saturday and Sunday.