Vape shops on the way to school: Geographical analysis of the proximity of specialist vape retailers to New Zealand schools

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Abstract

Objectives: This study aimed to investigate the proximity of existing specialist vape retailers to schools in New Zealand.

Methods: Specialist vape retailers were mapped, and accessibility to them from schools was calculated across New Zealand.

Results: Thirteen percent of New Zealand's schools have at least one specialist vape retailer within 300 m. Forty-four percent of New Zealand's schools have at least one specialist vape retailer within 1 km. This means that almost half of schools had a specialist vape retailer within a 10-minute walking distance.

Conclusions: There is a high density of specialist vape retailers around New Zealand schools, where children are likely to see the stores and window displays on their journey to and from school.

Implications for Public Health: Vaping products have a wide accessibility to many school students in New Zealand. The high exposure to specialist vape retailers on the way to and from school needs to be regulated to minimise youth uptake of vaping.

Key words: e-cigarette, e-cigarette retail outlet, vape shop, specialist vape retailer, schools, youth

Introduction

Electronic nicotine delivery systems, commonly known as "e-cigarettes" or "vapes", are increasingly used by school-aged youth in New Zealand.[1] Ministry of Health statistics showed that the number of young people aged 15–17 years who vaped every day quadrupled in three years to 8% in 2021-22.[2] In 2021, 26% of secondary school students reported having vaped in the previous week.[3]

In June 2023, the New Zealand Government announced new regulations on vaping products and vaping outlets aimed at decreasing the uptake of vaping by school-aged children. These include restricting the descriptions on product flavours, mandated child safety mechanisms and new specialist vape retailers (SVRs) not being allowed to open within 300 m of schools and marae (meeting place for indigenous Māori).[4] However, existing SVRs and general vape retailers, such as convenience stores and petrol stations that sell a limited range of e-cigarettes, are still allowed to operate.

Studies point to the possibility of a variety of adverse health effects from using vaping products. Recent studies have noted that current and past use of e-cigarettes by youth correlates to increased asthma diagnoses, school absences due to asthma and respiratory symptoms.[5] Despite a research gap in studying, the cardiovascular effects of e-cigarette use on adolescents, e-cigarettes have been shown to be associated with inflammation, oxidative stress and haemodynamic imbalance in young adults, leading to an increased risk of cardiovascular disease.[5]

Emission of metallic nanoparticles have also been noted in e-cigarettes,[6] which is a known cause of increased respiratory tract infections, lung injury and a risk of lung cancer in other settings.[7]

A New Zealand qualitative analysis of underage vape product access in 16- to 17-year olds found that nearly all participants knew of commercial retailers who sold nicotine vaping products to underage youth, with many reporting that they purchased vaping products from retailers that did not ask them to present an ID.[8]

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Regulations to protect school-aged children from vaping are the responsibility of the Ministry of Health's Vaping Regulatory Authority.[9] This responsibility obligates rigorous surveillance and regulation of the marketing and sales practices of e-cigarette retailers, including SVRs and other outlets like convenience stores and supermarkets. However, the Ministry of Health did not have any data on the number of existing SVRs within 300 m of schools allowed to continue operating under the new regulations.[10] This study aimed to quantify the number of SVRs within the new 300-m boundary and within 1 km (approximately 10 minutes walking) of New Zealand's schools.

Materials and methods

Data sources and procedures

Geographic area

This study was conducted in New Zealand, a country with an estimated resident population of 5.22 million people in June 2023.[11]

Specialist vape retailers

The analysis was restricted to vape outlets classified as SVRs. Retailers can apply to become SVRs if they meet the following criteria:

(i) they sell vaping products (e-cigarettes, pods and liquid for refilling tank systems) from at least one retail premise;

(ii) the retail premises is a fixed, permanent structure;

(iii) the proportion of their sales from vaping products from their retail premises is at least 70% (or at least 60% if the Vaping Regulatory Authority is satisfied that the lower sales threshold is appropriate in the circumstances). The list of SVRs was provided by the Health Advisory and Regulatory Platform (HARP). After the removal of all invalid retailers (i.e. retailers with an expired licence), the search yielded a total of 989 SVRs. The number of general vape retailers (largely convenience stores, petrol stations and supermarkets) is unknown.

School data

School longitude and latitude data were obtained from the New Zealand Schools Directory database, a nightly updated government list of New Zealand schools, and mapped, as shown in **Figure 1** later in the text.

The database included the following organisation types: Composite (years 1–10), Composite (years 1–15), Contributing (years 1–6), Correspondence School, Full Primary (years 1–8), Intermediate (years 7 and 8), Restricted Composite (years 7–10), Secondary (years 11–15), Secondary (years 7–10), Secondary (year 7-15), Special School, Teen Parent Unit and Activity Centre.

Some organisation types, such as Activity Centres, lacked longitude and latitude data and were excluded (n=37), resulting in a total of 2533 schools included in this study.

Data analysis

A spatial approach was used to quantify the number of SVRs that operated within 300 m and 1 km of schools. The schools from the Directory database and the SVRs from the HARP database were both overlaid onto the map of New Zealand.

Quantifying SVRs within radii and driving distance of schools

The total number of SVRs that operated within 300-m and 1-km distance buffers surrounding a school were calculated.

Using the road network dataset produced by GeoHealth Lab, an origin-destination matrix was calculated between the schools and SVRs for all of New Zealand.

Four schools could not be located on the road network; therefore, the results for the network analysis were calculated using a slightly smaller Schools dataset than using Euclidean distance buffers (n=2,529). A map showing the schools within the Auckland District Health Board zone is shown in **Figure 2** in the following.

The schools were then stratified by the quintile rankings of the 2018 New Zealand Index of Multiple Deprivation (IMD18).

The count and percentage of schools within each quintile ranking that had at least one SVR accessible within 300 m and 1 km were calculated, according to both the Euclidean radial distance buffers and a network (road/driving) analysis.

Results

A total of 989 SVRs were identified and geocoded. Of the 2533 geocoded schools, 320 (12.6%) had at least one SVR within a 300-m radius. Some schools had more than one SVR in the buffer, the highest being one school with seven SVRs within 300 m. Nationally, there were 334 SVRs within 300 m of a school.

A total of 1111 schools (43.7%) had at least one SVR within 1 km.

The school with the highest number of outlets in its buffer had 34 SVRs within 1 km.

There were 133 schools (5.3%) that had at least one SVR within a 300-m driving distance and 791 schools (31.3%) that had at least one SVR within an 800-m driving distance.

Stratifying these results by the Index of Multiple Deprivation's multifactorial deprivation quintiles, with 1 being the least deprived and 5 being the most deprived, revealed a considerable socioeconomic gradient in the distribution and proximity of vape retailers to New Zealand schools.

Schools with higher quintiles (i.e. more deprived) were more likely to have SVRs within 300 m and 1000 m of the school grounds, both by radial and network (road/driving) distances, as shown in Tables 1 and 2 in the following.

Around 7% of schools in quintile 1 areas had a vape retailer within 300 m, in contrast to around 40% of schools in quintile 5 areas.

Similarly, 6% of schools in quintile 1 areas were within 300-m driving distance of a vape retailer, which rose to 41% for quintile 5 schools.

Discussion

The results show that around 13% of schools had at least one SVR within 300 m, whilst nearly 44% of schools had at least one SVR within 1 km. A total of 320 schools had at least one SVR within a 300-m radius. Over 1000 schools had an SVR within a 1-km radius, just a 10-minute walk from the schools.

These proportions are smaller when looking at the driving distance: 5.3% of schools had at least one SVR within a 300-m driving distance, and 31.3% had at least one SVR within an 800-m driving distance.

Figure 1: A map showing the schools and specialist vape retailers used in this study.

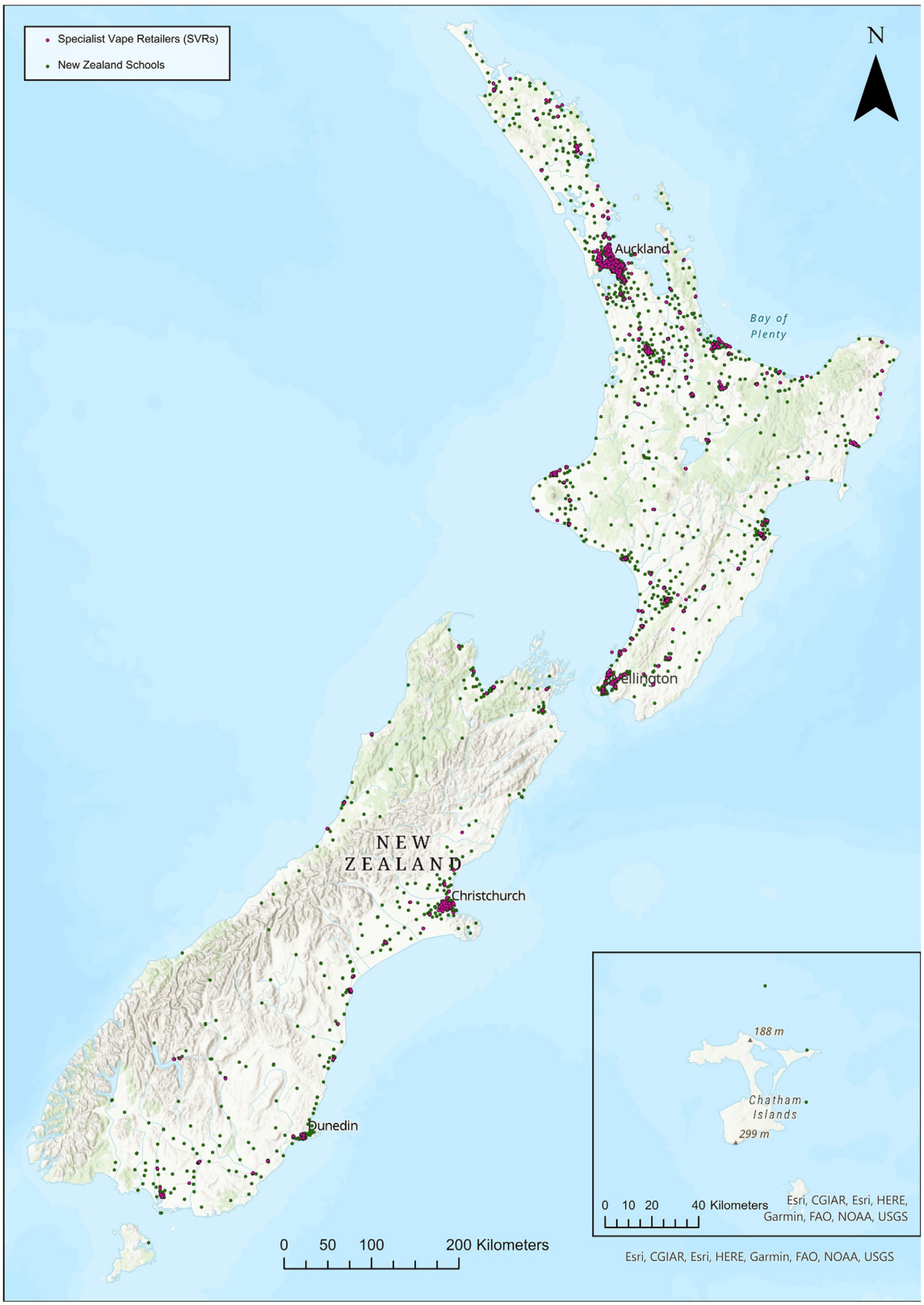

Figure 2: A map showing the distribution of New Zealand Schools with 300-m buffers, within the zone of Auckland District Health Board (DHB) (after recent reforms, DHB zones have been disestablished; the zone shown is no longer an operational DHB locality).

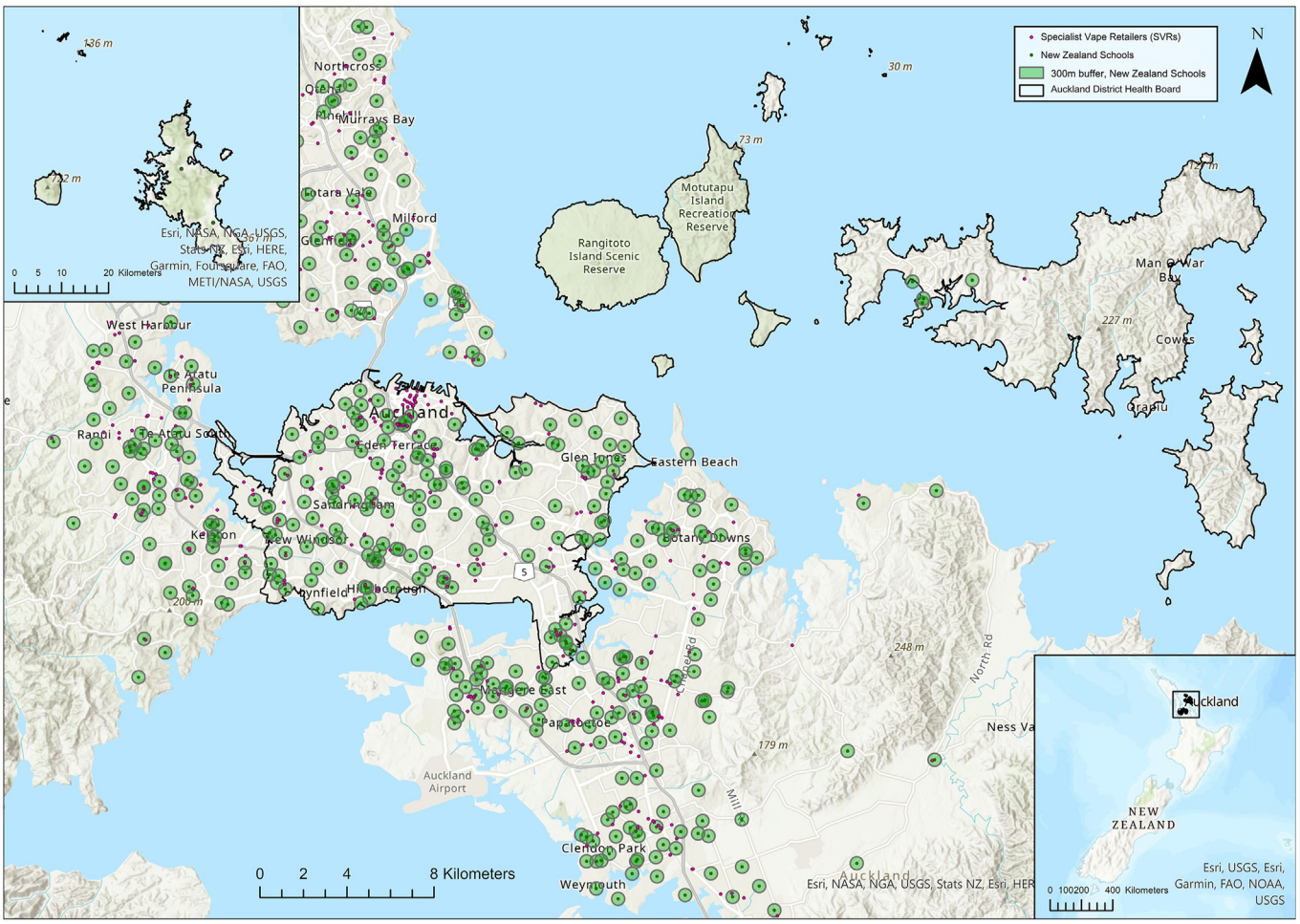

Table 1: Proximity of schools to specialist vape retailers by deprivation quintile.

Deprivation: IMD18 quintile	Number of schools with SVR/SVRs within a 300-m radius	Percentage of schools with SVR/SVRs within a 300-m radius	Number of schools with SVR/SVRs within a 1000-m radius	Percentage of schools with SVR/SVRs within a 1000-m radius
1	15	6.91	100	9.00
2	29	13.36	140	12.60
3	28	12.90	203	18.27
4	59	27.19	289	26.01
5	86	39.63	375	33.75

IMD = Index of Multiple Deprivation; SVR = specialist vape retailer.

Table 2: Driving distance of schools to specialist vape retailers by deprivation quintile.

Deprivation: IMD18 quintile	Number of schools with SVR/SVRs within a 300-m driving distance	Percentage of schools with SVR/SVRs within a 300-m driving distance	Number of schools with SVR/SVRs within a 1000-m driving distance	Percentage of schools with SVR/SVRs within a 1000-m driving distance
1	8	6.02	68	8.60
2	17	12.79	93	11.76
3	16	12.03	133	16.81
4	37	27.82	216	27.31
5	55	41.35	278	35.15

IMD = Index of Multiple Deprivation; SVR = specialist vape retailer.

These findings reflect past New Zealand research, which suggests that a significant minority of New Zealand schools have SVRs within walking distances.[12] A New Zealand study published in 2023 using the HARP SVR registry found that 32.8% of schools had a vape retailer within 1 km.[8] This growing proportion may be explained by the rising total number of SVRs in New Zealand, resulting in an increase to 43.7% of schools having at least one SVR within 1 km from the data used in this study.

A study in Austin, Texas, obtained similar results, finding that 40% of vape shops were located within 0.5 miles (0.8 km) of a middle or high school.[13] However, that study did not calculate the proportions of schools that had SVRs within geographical ranges and was conducted within a single city, rather than a nationwide level. That study was also able to investigate the quantities of vape retailers in census tracts by ethnicity in central Texas. In the New Zealand context, the relationship of vape retailer density to socioeconomic status, deprivation and ethnicity is an area that needs further investigation.

Socioeconomic disparities exist in the e-cigarette retail environment. Stratifying our results by deprivation quintile, with 1 being the least deprived to 5 being the most deprived, demonstrated considerable socioeconomic disparities in the proximity of schools to local vape retailers.

We found a marked social gradient in the distribution of vape retailers. Schools in more deprived areas were consistently more likely to be closer to vape retailers, both by radius and driving distance. The proportion of schools with vape retailers in close proximity rose most significantly between quintile 3 (average deprivation) and quintiles 4 and 5 (most deprived).

Research in the United States has found that exposure to e-cigarette marketing via retail stores increased the likelihood of ever and current use of e-cigarettes amongst middle and high school students.[14] Exposure to advertising from outlets was also associated with susceptibility to use of e-cigarettes amongst current nonusers. A nationally representative study of youth in 2013 found that increased tobacco retail outlet density was significantly associated with a higher likelihood of initiating noncombustible tobacco product use.[15] A New Jersey study found that e-cigarette retailer density around schools was positively associated with ever and past-month use of e-cigarettes amongst high-school students.[16] Limitations to that study could include the confounding effect of disproportionate advertising volume in low socioeconomic status neighbourhoods that may distort the relationship; however, the study did control for covariates and the clustered nature of collected data. These trends suggest that students attending schools with a greater proximity to SVRs are likely to experience higher rates of e-cigarette use. With the marked social disparities in SVR distribution observed in our findings, there is likely to be a disproportionate risk of vaping uptake for students attending schools in more deprived areas.

Given our findings that vape retailers are disproportionately within walking distance for schools located in more deprived areas, further investigation is needed to examine how this inequitable distribution impacts e-cigarette usage, addiction and adverse health outcomes amongst underserved adolescent populations, including socioeconomically deprived, indigenous/Māori, and refugee/migrant youth.

Since 2020, the sale of vapes to people under 18 years of age has been illegal in New Zealand.[17] Smokefree Enforcement Officers conduct operations to identify noncompliance and are able to require identifying information from any person they believe has sold notifiable products to a person under the age of 18 years.[9]

However, under the June 2023 regulations, all the SVRs currently operating within 300 m of a school will be allowed to continue operating. The thousands of SVRs within a 10-minute walk (1 km) of New Zealand's schools are similarly unaffected by the new regulations. Notably, the 2023 regulations do not impact the advertising and sale of vapes by convenience stores, petrol stations and supermarkets, despite research demonstrating that convenience stores are the most common source of vapes for school children.[3] New regulations coming into place in June of 2025 aim to address the prevalence of vape product marketing by restricting the visibility of vape products and packaging from outside vape retailer stores, general retailers, and online on internet seller's websites.

This was the first ever study to analyse the proximity of vape retailers to schools for all of New Zealand by deprivation quintile and to quantify the number of existing SVRs within 300 m of schools which will be allowed to continue to operate after implementation of the new regulations.

The findings of this study have implications for policymakers seeking to reduce the uptake of vaping by youth. Legislation is needed to regulate the high exposure of schoolchildren to SVRs within a walking distance of schools.

Further research using person-level data is needed to examine how the proximity of these vape shops to schools influences vape use behaviours amongst school-age children.

Analysis of just SVRs is also insufficient to gather a complete picture of the availability and exposure of vaping products to youth. Further research is needed to examine the prevalence of general vape retailers near schools, online vape distributors and the impact of internet vape marketing.

Limitations

This study had several potential limitations. The HARP database is composed exclusively of SVRs and thus does not provide a complete representation of overall availability of vape products. Further research is needed on the proximity and access of vaping products by young people via other distributors, such as online retailers, convenience stores or social sources, such as friends and students.[3] Additionally, the HARP database was refreshed on February 8th, 2023, and the population of SVRs in New Zealand may have changed since then. The HARP database is a snapshot in a point of time, so the data used may be out-of-date due to various retailers entering and exiting the market.

Additionally, the proposed ban on the establishment of new SVRs within 300 m of schools was announced by the previous government on June 6 2023. With a new New Zealand Government in place since November 27, 2023, it is unknown how these regulations will change. Further research will be needed to analyse the efficacy of any new policies that the government proposes or implements.

Conclusion

There is a nationwide proliferation of vape retailers around schools—with the number of SVRs within 1 km of schools now outnumbering the total number of New Zealand's schools. These findings show that the Government's current regulations leave

hundreds of existing SVRs to operate within 300 m of schools and over a thousand within 1 km of schools. These regulations also place no restrictions on the ability of dairies and other general retailers to sell vapes within any distance of schools, despite being the primary source of vaping products for students.

More research is needed to investigate the risk posed to school-aged children by the gaps in these regulations, but these oversights suggest the need for more extensive vaping policy to reduce all-too-easy access by children and youth.

Conflicts of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Ethics

Not needed for this study.

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