

Effect van sportmaatregelen - Extract landelijk cluster register en literatuurscan

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17 November 2020

1. Bestaand RIVM advies relevant voor deze matrix

<https://lci.rivm.nl/ventilatie-en-covid-19>

<https://lci.rivm.nl/covid-19/clusters-regionale-verspreiding>

<https://www.rijksoverheid.nl/documenten/publicaties/2020/05/26/afwegingskader-binnensport>

2. Clusters binnen sport/sportactiviteiten

Samenvattend:

Vanaf begin juli worden de GGD'en verzocht alle clusters die geen thuissetting of familiecluster betreffen handmatig per mail te rapporteren aan de LCI. Deze meldingen worden opgenomen in het clusterregister.

Vanaf begin juli tot en met 8 November 2020, zijn er in totaal 1368 clusters gemeld bij de LCI. Er zijn in diezelfde periode 91 clusters met de setting "sport/sportactiviteiten" gemeld bij de LCI. Van deze clusters waren er op 9.11.2020 37 (41%) gerelateerd aan sporten die binnen beoefend worden, 42 aan (46%) sporten die buiten beoefend worden en 12 (13%) niet te onderscheiden. Het niet kunnen onderscheiden kan ofwel aan het type sport hebben gelegen (zoals korfbal dat zowel binnen als buiten wordt beoefend) of aan gebrek aan data. Daarbij vielen 58 (64%) van de 91 clusters onder contact sport. De range en mediaan van de verschillende groepen lijkt nagenoeg hetzelfde zijn.

Om de data te interpreteren zou rekening gehouden moeten worden met de tijdslijn van verschillende maatregelen die effect hebben gehad op het wel/niet uitoefenen van bepaalde sporten in de periode van begin juli tot 8 November 2020. Naast de maatregelen zullen ook andere factoren meespelen in het melden van clusters; de drukte bij GGD'en en de mogelijkheid om clusters door te geven en BCO uit te voeren, de criteria die het LCI stelt voor het melden van clusters, het eventuele contact tussen bijvoorbeeld teamgenoten dat buiten het sporten om gebeurt. Zo zijn er meerdere clusters waar bijvoorbeeld een voetbalteam een toernooi heeft gehad, of samen regelmatig naar een café gingen, of dansers die ook samen zangles hadden. Maar er zitten ook clusters tussen waar tijdens een spinning lesje besmetting plaats zou hebben gevonden. Eén cluster dat eruit springt is een kickbox les (met

20 besmettingen). Tijdens de les is alleen op de zak getraind, goed afstand gehouden, spullen tussendoor gereinigd, geventileerd, kleedkamers waren buiten gebruik en iedereen had zijn eigen spullen bij zich. De bron van besmetting is niet duidelijk.

Totaal:

Totaal gemelde clusters sport/sportactiviteiten: 91

Range clusters: 3-28

Mediaan clusters: 6

*één cluster heeft onbekend aantal besmettingen (mediaan en range is dus gebaseerd op 90 clusters)

Binnen sport:

Totaal gemelde clusters binnensport: 37

Range clusters: 3-28

Mediaan: 7

Buiten sport:

Totaal gemelde clusters buitensport: 42

Range clusters: 3-24

Mediaan clusters: 6

*één cluster heeft onbekend aantal besmettingen (mediaan en range is dus gebaseerd op 41 clusters)

Binnen/buiten sport:

Totaal gemelde clusters binnen/buitensport: 12

Range clusters: 3-23

Mediaan clusters: 5.5

Contact sport

Van de 91 clusters, vallen 58 clusters onder contact sport (64%) en 33 clusters onder geen contactsport/onbekend. Sport scholen en dansscholen zijn gecategoriseerd als geen contact/onbekend maar dit is afhankelijk van het type dans en type klasje dat gevolgd wordt, zoals in een sportschool het geval kan zijn naast individueel trainen. Ook vallen vechtsporten onder de groep geen contactsport/onbekend maar het is onbekend of alleen op een hangende zak getraind werd of dat er toch sprake is geweest van contact zoals via sparren.

Totaal gemelde clusters contact sport: 58

Range contact sport clusters: 3-24

Median contact sport clusters: 6

Totaal gemelde clusters geen contact sport: 33

Range geen contact sport/onbekend clusters: 3-28

Mediaan geen contact sport clusters: 6

Gedetailleerde clusterregister data tot 9.11.2020Binnen

- Basketbal vereniging
- Dansschool
- Openingstoemooi (17.09) en vervolgens meerdere trainingen (=volleybal)
- Sport en fitness
- Sport, yogaschool
- Sportschool
- Sportschool/vechtsportlessen – kickboxlessen
- Sportsituatie, overige contacten op sportschool (=sportschool)
- Sportvereniging (= sportschool)
- Sportvereniging studentenvereniging (=volleybalteam)
- Sportvereniging, basketbal
- Taekwondoschool
- Team uitje volleybalteam, nachtje in een vakantie huis geslagen met 7 teamleden (=volleybalteam)
- Vereniging volleybalclub
- Vereniging volleybalclub
- Vereniging, sportclub (=basketbal)
- Vereniging/sportschool
- Vriendengroep, sportvereniging, regelmatig samenkomst in café de brink (=sportschool)
- Vrijetijdsactiviteit (= dansschool)
- Vrijetijdsactiviteit, dansstudio
- Vrijetijdsbesteding, sportschool (=boksschool)
- Zaalvoetbalvereniging
- Zwembad (even checken)
- Ijs hockey
- turnvereniging

Buiten

- 2^e voetbalteam Pernis
- Voetbalclub
- Voetbalvereniging

- Voetbalvereniging met festiviteiten
- Vereniging voetbal
- Vereniging voetbalclub
- Training voetbal
- Topsportvereniging (=voetbal)
- Thuissetting en voetbalvereniging
- Teamuitje (=hockeyclub)
- Hockeyclub
- Hockeyclub
- Sportclub voetbal
- Sport, voetbal
- Sport, voetbalclub
- Sport, voetbalclub kantine
- Sportclub (=hockeyclub)
- lacrosse
- Roeivereniging
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Binnen en/of buiten (onduidelijk)

- Sport, korfbal (niet duidelijk of buiten of binnen was gespeeld)
- Sportvereniging, handbalteam (niet duidelijk of buiten of binnen was gespeeld)
- Binnen- en buitensport
- Vereniging handbalclub (niet duidelijk of buiten of binnen was gespeeld)
- Sportclub
- Sport (niet duidelijk of dit om de voetbalclub of het sport recreatie centrum gaat)
- Sportevenement (tennistoernooi)

Na overweging niet geïncludeerd:

- Bowling horeca (bij bowlen wordt ook hapje/drankje gedaan dus niet meegenomen)
- Hobbycentrum (zit ook kookcentra en een ouderencentra)
- Bridge club (meer voor ouderen samenkomst)
- Denksportcentrum (=bridgeclub) (meer voor ouderen samenkomst)
- Sport/vrijtijd club (=bridge) (meer voor ouderen samenkomst)
- Vrijtijdsactiviteit, kaartclub (samenkomst en niet fysieke inspanning)

- Sportvereniging, bowlen/horeca; studenten sport vereniging die is gaan bowlen dus wellicht toepasselijker om als studentenvereniging of horeca te classificeren

3. Snelle literatuurscan

Artikelen zijn weergegeven per maatregel. Indien er geen literatuur bij een bepaalde maatregel te vinden was zijn de kolommen 2, 3 en 4 leeg gelaten. Kolom 2 geeft de titel, DOI/Identificer en publicatiedatum, auteurs en journal weer.

Keywords:

- exercise, fitness, COVID-19, social distancing
- COVID-19, indoor environments, indoor hygiene
- COVID-19, speech droplet, independent action hypothesis, respiratory disease, disease transmission
- COVID19 AND sport AND social distanc*

Maatregel	Titel (doi) datum publicatie, auteurs, journal	Abstract (indien niet beschikbaar resultaten)	Lekensamenvatting
Buitensport			
Beperken groepsgroottes op sportlocaties en bij evenementen (muv sporters), volgt regels voor buiten en binnen.	Physical activity during COVID-19 induced lockdown: recommendations doi: 10.1186/s12995-020-00278-9 Datum publicatie: 12-08-2020 Auteurs: 5.1.2e Journal: <i>Journal of Occupational Medicine and Toxicology</i>	Measures aiming at containing the Coronavirus disease 2019 (COVID-19) include isolation, social distancing, and quarantine. Quarantine and other lockdown instruments show promise in reducing the number of COVID-19 infections and deaths. It is reasonable to assume that lockdown leads to general population. Potential detrimental health effects of lockdown, such as psychological distress and physical inactivity induced maladaptations must be addressed. The current review summarizes harmful effects of limited physical activity on mental and physical health due to social distancing and quarantine and highlights	Noot: dit is een expert opinion advies stuk, geen onderzoek. Sporten is belangrijk voor mentale en fysieke gezondheid. Ook tijdens een lockdown of quarantaine periode is het belangrijk dat mensen blijven bewegen. Het is wel belangrijk dat er tenminste 1.5 meter afstand van anderen wordt gehouden, ook buiten.

		the effects of simple physical activity regimes counteracting these detrimental effects, with a special emphasis on acute effects.	
Sportbeoefening is uitgezonderd van 1,5m afstand	Towards aerodynamically equivalent COVID19 1.5 m social distancing for walking and running http://www.urbanphysics.net/Social%20Distancing%20v20 White Paper.pdf Datum publicatie: Preprint, nog niet officieel gepubliceerd. Auteurs: 5.1.2e Journal: Preprint, nog niet gepubliceerd	Within a time span of only a few months, the COVID-19 virus has managed to spread to many countries in the world. Previous research has shown that the spread of this type of viruses can occur effectively by means of saliva, often in the form of micro-droplets. When a person sneezes, coughs or even exhales, he or she is emitting small droplets – often too small to see with the naked eye – that can carry the virus. The receiving persons can be infected by inhaling these droplets, or by getting these droplets on their hands and then touching their face. That is why during the COVID-19 crisis, countries world-wide have declared – sometimes by law – a “social distance” of about 1.5 m to be kept between individuals. This is considered important and effective because it is expected that most of the droplets indeed fall down and reach the floor and/or evaporate before having traveled a distance of 1.5 m. However, this social distance has been defined for persons that are standing still. It does not take into account the potential aerodynamic effects introduced by person movement, such as walking fast, running and cycling. This aerodynamics study investigates whether a first person moving nearby a second person at 1.5 m distance or beyond could cause droplet transfer to this second person. CFD simulations, previously validated and calibrated with wind tunnel measurements of droplet movement and evaporation and of airflow around a runner, are performed of the movement	Noot: dit is een aerodynamische modelleringsstudie; er is niet bestudeerd of blootstelling in de slipstream van een andere sporter daadwerkelijk leidt tot meer besmettingen. Als mensen bewegen (rennen/ wandelen/ fietsen), moet de afstand tot andere mensen vergroot worden naar 5 tot 10 meter voor de slipstream. Het vermijden van blootstelling aan kleine druppeltjes kan door: naast elkaar lopen/ rennen op 1.5 meter afstand, of door een grotere afstand te houden bij het achter elkaar lopen of rennen.

		of droplets emitted by an exhaling walking or running person nearby another walking or running person. External wind is considered absent and different person configurations are analyzed, side by side, inline and staggered, and the exposure of the second person to the droplets emitted by the first person is assessed. The results indicate that the largest exposure of the trailing person to droplets of the leading person for walking and running is obtained when this trailing person is in line behind the leading person, i.e. positioned in the slipstream. The exposure increases as the distance between leading and trailing person decreases. This suggests that avoiding substantial droplet exposure in the conditions of this study and in a way equivalent to the 1.5 m for people standing still can be achieved by one of two actions: either by avoiding to walk or run in the slipstream of the leading person and keeping the 1.5 m distance in staggered or side by side arrangement, or by keeping larger social distances, where the distances increase with the walking or running speed.	
Beperken groepsgroottes op sportlocaties en bij evenementen (muv sporters), volgt regels voor binnen en buiten (30/40)/ Beperken van publiek bij sportwedstrijden	Excess Risk of COVID-19 to University Populations Resulting from In-Person Sporting Events doi: https://doi.org/10.1101/2020.09.27.20202499 Source: Medrxiv Terms: Covid Sports Datum publicatie: 26-09-2020 Auteurs: 5.1.2e 5.1.2e Journal: geen, via medRxiv	Background: One of the consequences of COVID-19 has been the cancelation of in-person collegiate sporting events. We explore the impact of having in-person sports on COVID-19 transmission on a college campus, specifically the excess cases within the campus community can be anticipated. Methods: Using a stochastic compartmental model representing the interactions between the university community, we model the impact of transient influxes of visitors attending sporting events and ancillary activities (bars, dining out, etc.). We consider a number of scenarios, varying the extent	Sport evenementen met publiek vormen een risico voor COVID-19 transmissie. Modellerings studie, waarbij een lage prevalentie van COVID bij publiek en een gecontroleerde uitbraak op een studenten campus, alsnog leidde tot 113 nieuwe COVID-19 gevallen.

		to which visitors interact with the campus, the number of infectious visitors, and the extent to which the campus has controlled COVID-19 absent events. We also conducted a sensitivity analysis, exploring the model's outcomes over a wide range of uncertainty. Results: Events caused an increase in the number of cases among the campus community, ranging from a 25% increase in a scenario where the campus already had an uncontrolled COVID-19 outbreak and visitors had a low prevalence of COVID-19 and mixed lightly with the campus community to an 822% increase where the campus had controlled their COVID-19 outbreak and visitors had both a high prevalence of COVID-19 and mixed heavily with the campus community. The model was insensitive to parameter uncertainty, save for the duration a symptomatic individual was infectious. Conclusion: In-person sporting events represent a threat to the health of the campus community. This is the case even in circumstances where COVID-19 seems controlled both on-campus and among the larger population visitors are drawn from.	
Possible indirect transmission of COVID-19 at a squash court, Slovenia, March 2020: case report PMID: 32600479 Database: Litcovid Search term: training venues AND Sport Datum publicatie: 19-06-2020 Auteurs: 5.1.2e Journal: <i>Epidemiology and Infection</i>		Since the beginning of the COVID-19 epidemic, there is an ongoing debate and research regarding the possible ways of virus transmission. We conducted an epidemiological investigation which revealed a cluster of five COVID-19 cases, linked to playing squash at a sports venue in Maribor, Slovenia. Acquired data raises possibility that the transmission occurred indirectly through contaminated objects in changing room or squash hall or via aerosolisation in squash hall.	Dit is een studie naar een cluster van besmettingen gelinkt aan een squash baan. Indirecte transmissie is mogelijk door met COVID-19 besmette objecten in de kleedkamers of squashbaan (deurknop, kledingrekken) of door virus aerosolisatie in de squash hall.
Infection risk in gyms during physical exercise https://doi.org/10.1007/s11356-018-1822-8		This study aimed to analyze the risk of Infection (Influenza and tuberculosis) for	Noot: Deze studie gaat niet specifiek over

	Datum publicatie: 07-05-2018 Auteurs: 5.1.2e 5.1.2e Journal: <i>Environmental Science and Pollution Research</i>	individuals participating in physical exercise. This was achieved by assessment of carbon dioxide (CO₂) concentrations, and examination of the physical characteristics of a number of gyms to determine whether there was a relationship to CO₂ levels. This study was performed in three different gyms ventilated with either split system or central system air conditioners. The risk of airborne infection (percent of susceptible persons infected) was estimated for each gym using the Wells-Riley model. The risk of infection increased during periods of peak occupancy where the ventilation required by occupants was greater. In each gym, the highest risk of infection occurred during the evening where occupancy and CO₂ levels were high. The infection risk for influenza was high in all situations due to the high quantum generation rate for this agent. This study suggests that inefficient ventilation in gyms is a significant problem, with high CO₂ concentrations resulting in impaired air quality and high health risks to users, including increased risk of infections such as influenza and tuberculosis.	Covid19. Er is gemeten wat CO₂ concentraties zijn in 3 verschillende sportscholen. CO₂ concentraties meten de uitademingsactiviteit van sporters. Vervolgens is middels mathematische modellering bepaald hoe deze concentraties samenhangen met infectierisico voor twee andere respiratoire infecties, namelijk griep en tbc. Een goed werkend ventilatie systeem is van belang om het risico in het verspreiden van ziekten zo klein mogelijk te houden (algemeen voor infectieziekten). De CO₂ concentraties waren het hoogst in de sportschool met een laag plafond en in de sportschool waar de airco alleen binnenlucht aanzog. Voor iedere sportschool gold: hoe meer mensen er samen komen hoe groter de toename in risico om geïnfecteerd te raken, in de gemeten sportscholen was dat met name in de avonden het geval.
Beperken openingstijden van horeca op en bij sportgelegenheden			
Sluiten van kleedkamers bij sportclubs en	Possible indirect transmission of COVID-19 at a squash court, March 2020: case report PMID: 32600479	Since the beginning of the COVID-19 epidemic, there is an ongoing debate and research regarding the possible	Indirecte transmissie is mogelijk door met COVID-19 besmette

verenigingen	Database: Litcovid Search term: training venues AND Sport Datum publicatie: 19-06-2020 Auteurs: 5.1.2e Journal: <i>Epidemiology and Infection</i>	ways of virus transmission. We conducted an epidemiological investigation which revealed a cluster of five COVID-19 cases, linked to playing squash at a sports venue in Maribor, Slovenia. Acquired data raises possibility that the transmission occurred indirectly through contaminated objects in changing room or squash hall or via aerosolisation in squash hall.	objecten in de kleedkamers of squashbaan (deurknop, kledingrekken) of door virus aerosolisatie in de squash hall.
Beperken van publiek bij sportwedstrijden			
Sluiten van sportkantines			
Verbieden van publiek bij sportwedstrijden			
Verbieden van sportwedstrijden voor volwassenen, trainen wel toegestaan			
Verbieden van sportwedstrijden voor jeugd, trainen wel toegestaan	COVID-19 In Youth Soccer doi: https://doi.org/10.1101/2020.09.25.20201616 Database: Medrxiv Search terms: COVID AND Sports AND Youth Datum publicatie: 27-09-2020 Auteurs: 5.1.2e 5.1.2e Journal: geen, via medRxiv	Purpose: The purpose of this study was to determine the case and incidence rates of COVID-19 among youth soccer players and evaluate the relationship with background COVID-19 risk and phase of return to play. Methods: Surveys were distributed to soccer clubs throughout the country regarding their phase of return to soccer (individual only, group non-contact, group contact) and date of reinitiation, number of players, cases of COVID-19, and risk reduction procedures that were being implemented. Overall case and incidence rates were compared to national pediatric data and county data from the prior 10 weeks where available. Finally, a negative binomial regression model was developed to predict club COVID-19 cases with local incidence rate and phase of return as	Analyse uit de US waarbij bepaald is of opheffen van restricties op jeugdvoetbal wedstrijden leidde tot meer infecties. De achtergrond incidentie in de bevolking was de belangrijkste voorspeller voor het risico op infectie onder jeugd voetballers. Deelname van jongeren aan voetbal (zowel training als wedstrijd) in de zomer van 2020 (na opheffen maatregelen) was niet gerelateerd aan het risico op COVID-19

		covariates and the log of club player-days as an offset. Results: 129 clubs responded, of whom 124 had reinitiated soccer, representing 91,007 players with a median duration of 73 days (IQR: 53-83 days) since restarting. Of the 119 that had progressed to group activities, 218 cases of COVID-19 were reported among 85,861 players. Youth soccer players had a lower case rate and incidence rate than the national rate for children in the US (254 v. 477 cases per 100,000; IRR = 0.511, 95% CI = [0.40-0.57], $p < 0.001$) and the general population from the counties in which soccer clubs were based where data was available (268 v. 864 cases per 100,000; IRR = 0.202 [0.19-0.21], $p < 0.001$). After adjusting for local COVID-19 incidence, there was no relationship between club COVID-19 incidence and phase of return (non-contact: $\beta = 0.35 \pm 0.67$, $p = 0.61$; contact: $\beta = 0.18 \pm 0.67$, $p = 0.79$). No cases were reported to have resulted in hospitalization or death. 100% of clubs reported having a plan in place to reduce the risk of COVID-19 and utilizing multiple different risk reduction procedures (median 8, IQR 6-10). Conclusions: The incidence of COVID-19 among youth soccer athletes is relatively low when compared to the background incidence among children in the United States and the local general population. No relationship was identified between club COVID-19 incidence and phase of return to soccer. Youth soccer clubs universally report implementing a number of risk reduction procedures.	infecties onder jeugdspelers. Alle clubs namen wel de gewone hygiëne maatregelen in acht
Betaald voetbal en topsporters met status mogen wel wedstrijden spelen	Impact of the COVID-19 pandemic on sports and exercise DOI: 10.1016/j.asmart.2020.07.006	Background COVID-19 is a droplet-transmitted potentially fatal coronavirus pandemic affecting the world in 2020. The WHO	Studie waarin middels video-observaties risicocontacten tussen profvoetballers geanalyseerd zijn, en

	Datum publicatie: 28-07-2020 Auteurs: 5.1.2e 5.1.2e Journal: <i>Asia-Pacific Journal of Sports Medicine, Arthroscopy, Rehabilitation and Technology</i>	recommended social distancing and human-to-human contact was discouraged to control the transmission. It has put many countries in a state of lockdown and sporting events (including the 2020 Olympics) have been affected. Participation in sports and exercise, typically regarded as healthy activities, were also debated. The local professional football leagues, governed by the Hong Kong Football Association, ultimately postponed all matches after much deliberation on the transmission risk for the spectators and on-field players. Large spectating crowds are well-known to be infectious hazards, but the infection risk for on-field players is less recognized. Aside from watching professionals exercise, many people opted to hike in the countryside during the weekends to avoid city crowds. This led to a widespread discussion on the issue of wearing a facemask during outdoor activities. Methods A small sample of video footage of professional football players were analysed to track each players' time of close body contact and frequency of infection-risky behaviours to investigate the risk of virus transmission during football games. To investigate the physiological effect of wearing a facemask during exercise, we conducted a controlled laboratory, within-subject, repeated measures study of 23 healthy volunteers of various sporting backgrounds. They underwent graded treadmill walking at 4 km per hour for 6 min with and without wearing a surgical mask in a randomized order with sufficient resting time in between trials. The heart rate	ook het effect van dragen van neusmondmasker op hartslag en ademhalingsfrequentie van sporters met uiteenlopende achtergrond. Risico op virustransmissie tijdens een wedstrijd is groot voor profvoetballers, en is het hoogst voor middenvelders. De beslissing of sportevenementen door moeten gaan hangt af van het lokale aantal cases in een regio en het testen van sporters. Mondmaskers verhogen de hartslag en ademhalingsfrequentie van sporters en de belasting van het lichaam. Dit is niet wenselijk.
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		and the rate of perceived exertion (RPE) were recorded. Results In a 90 min match, the average duration of close contact between professional football players was 19 min and each player performed an average of 52 episodes of infection-risky behaviours. The heart rate and RPE of subjects wearing a facemask was 128 beats per minute and 12.7 respectively. In those without a facemask, the results were a heart rate of 124 beats per minute and a RPE of 10.8. Conclusion This suggests that the infection risk was high for the players, even without spectators. The laboratory study to investigate the physiological effect of wearing a facemask found that it significantly elevated heart rate and perceived exertion. Those participating in exercise need to be aware that facemasks increase the physiological burden of the body, especially in those with multiple underlying comorbidities. Elite athletes, especially those training for the upcoming Olympics, need to balance and reschedule their training regime to balance the risk of deconditioning versus the risk of infection. The multiple infection-control measures imposed by the Hong Kong national team training centre was highlighted to help strike this balance. Amidst a global pandemic affecting millions; staying active is good, but staying safe is paramount.	
	Can Tracking Data Help in Assessing Interpersonal Contact Exposure in Team Sports during the COVID-19 Pandemic? DOI: https://doi.org/10.3390/s20216163	During the COVID-19 pandemic, the temporary closure of physical activity and sports facilities, and the generalized cancellation or postponement of sports	Voetbal is een sport met de meeste atleten wereldwijd. Het heeft ook een grote impact op

	Datum publicatie: 29-10-2020 5.1.2e Journal: <i>Sensors</i>	events have a massive impact on social and economic development. In this study, we explored the feasibility of using tracking data from a football match to assess interpersonal contact between individuals by calculating two measures of respiratory exposure. The dynamic tracking positioning of all players and referees during one international football match was analyzed. For each individual, two measures of respiratory exposure were calculated, based on the 2 m interpersonal distance recommendations for contact tracing for COVID-19 control. Overall, individuals spent a median of 0.12 mm:ss (IQR = 0.45 mm:ss) exposed to interpersonal contact of fewer than 2 m from others. The highest value of exposure was observed between two players of opposing teams (6.35 mm:ss). The results suggest that tracking data can be used to assess respiratory exposure to interpersonal contact in team sports, such as football. The measures of exposure calculated can be used to the prompt identification of high-risk contacts of COVID-19 cases during a match or a training session, but also the risk stratification of different sports and physical activities.	de wereldwijde economie. Voetbal is wel een contactsport, waardoor het houden van fysieke afstand niet mogelijk is. Door het tracken van atleten tijdens de wedstrijd is te meten hoeveel hoog risico contact er heeft plaatsgevonden en tussen welke spelers. Als een van de spelers achteraf COVID-19 blijkt te hebben, kunnen de spelers die in direct contact zijn geweest met degene in quarantaine.
Binnensport			
Sluiten binnensport, fitness en zwembaden	Swimming Pool safety and prevention at the time of Covid-19: a consensus document from GSMS-SiTi Doi: 10.7416/ai.2020.2368 Source: PubMed Terms: Sport AND COVID-19 AND social distanc* Datum publicatie: 1-9-2020 5.1.2e Journal: <i>Annali di igiene: medicina preventiva e di comunita</i>	Public health measures to cope with the Covid-19 pandemic, imposed also a shutdown of sports facilities and swimming pools. Safety issues related to recreational waters were emerging during the lockdown, rising concerns on how and when reopening pools and on how improve their management while SARS-CoV-2 is circulating in the population. The GSMS-SiTi, Working Group on Movement Sciences for Health of the Italian Society of Hygiene Preventive Medicine and Public Health,	Noot: Dit is een expert opinion advies stuk, geen onderzoek Er is geen bewijs dat COVID-19 zich verspreidt door water. Het verspreid zich vooral door ademhalingsdruppels. Hierdoor zou het zwemmen zelf geen hoger risico geven op de

		discussed and summarized some indications for a suitable preventive approach. Several measures are highlighted, including social distancing, optimized water management, airflow and microclimatic parameters in the pool as well in the annexed rooms, verification of sanitation procedures. The GSMS-SitI underlines that prevention should be based on monitoring of the local epidemiological situation and on the constant collaboration with the local health authority and the national health service.	verspreiding van COVID-19. Social distancing in en naast het bad is wel belangrijk. De ruimtes voor gemengd gebruik (als de receptie, horeca, toiletten, kleedkamers) hebben een hoger risico op besmetting dan het zwembad zelf. Verder zijn aanvullende hygiëne maatregelen nodig, dienen er looproutes te worden opgesteld en dient het water te worden gecontroleerd en gedesinfecteerd. Ook moet de luchtkwaliteit in binnenzwembaden worden gereguleerd (goede luchtcirculatie: geen recirculatie). Ook een restrictie van het aantal mensen dat gebruik mag maken van het zwembad kan helpen.
	The resumption of sports competitions after COVID-19 lockdown: The case of the Spanish football league https://doi.org/10.1016/j.chaos.2020.109964 Datum publicatie: 04-06-2020 Auteurs: 5.1.2e Journal: <i>Chaos, Solitons & Fractals</i>	In this work, we present a stochastic discrete-time <i>SEIR Susceptible-Exposed-Infectious-Recovered</i> model adapted to describe the propagation of COVID-19 during a football tournament. Specifically, we are concerned about the re-start of the Spanish national football league, <i>La Liga</i>, which is currently -May 2020- stopped with 11 fixtures remaining. Our model includes two additional states of an individual, confined and quarantined, which are reached when an individual presents COVID-19 symptoms or has undergone a virus test with a positive result. The model also accounts for the interaction dynamics of players, considering three different sources of infection: the player	Modelerings studie die laat zien dat het testen van spelers (elke week) en meer dagen tussen verschillende wedstrijden kan het risico op besmetting onder spelers mogelijk verlagen.

		social circle, the contact with his/her team colleagues during training sessions, and the interaction with rivals during a match. Our results highlight the influence of the days between matches, the frequency of virus tests and their sensitivity on the number of players infected at the end of the season. Following our findings, we finally propose a variety of strategies to minimise the probability that COVID-19 propagates in case the season of La Liga was re-started after the current lockdown.	
Traineren voor volwassenen (binnen en buiten) op 1,5m afstand en in groepen van 4 personen	Towards aerodynamically equivalent COVID19 1.5 m social distancing for walking and running http://www.urbanphysics.net/Social%20Distancing%20v20_White_Paper.pdf Datum publicatie: Preprint, nog niet officieel gepubliceerd. Auteurs: 5.1.2e Journal: Preprint, nog niet gepubliceerd	Within a time span of only a few months, the COVID-19 virus has managed to spread to many countries in the world. Previous research has shown that the spread of this type of viruses can occur effectively by means of saliva, often in the form of micro-droplets. When a person sneezes, coughs or even exhales, he or she is emitting small droplets – often too small to see with the naked eye – that can carry the virus. The receiving persons can be infected by inhaling these droplets, or by getting these droplets on their hands and then touching their face. That is why during the COVID-19 crisis, countries world-wide have declared – sometimes by law – a “social distance” of about 1.5 m to be kept between individuals. This is considered important and effective because it is expected that most of the droplets indeed fall down and reach the floor and/or evaporate before having traveled a distance of 1.5 m. However, this social distance has been defined for persons that are standing still. It does not take into account the potential aerodynamic effects introduced by person movement, such as walking fast, running and cycling. This aerodynamics study investigates whether a first person	Het houden van 1.5 meter afstand heeft alleen zin bij sporten op de plaats, als in sportscholen.

		moving nearby a second person at 1.5 m distance or beyond could cause droplet transfer to this second person. CFD simulations, previously validated and calibrated with wind tunnel measurements of droplet movement and evaporation and of airflow around a runner, are performed of the movement of droplets emitted by an exhaling walking or running person nearby another walking or running person. External wind is considered absent and different person configurations are analyzed, side by side, inline and staggered, and the exposure of the second person to the droplets emitted by the first person is assessed. The results indicate that the largest exposure of the trailing person to droplets of the leading person for walking and running is obtained when this trailing person is in line behind the leading person, i.e. positioned in the slipstream. The exposure increases as the distance between leading and trailing person decreases. This suggests that avoiding substantial droplet exposure in the conditions of this study and in a way equivalent to the 1.5 m for people standing still can be achieved by one of two actions: either by avoiding to walk or run in the slipstream of the leading person and keeping the 1.5 m distance in staggered or side by side arrangement, or by keeping larger social distances, where the distances increase with the walking or running speed.	
	Can indoor sports centers be allowed to re-open during the COVID-19 pandemic based on a certificate of equivalence? Doi: 10.1016/j.buildenv.2020.107022 Scopus, zoekterm: COVID-19 AND Exercise AND Social distanc* Datum publicatie: 31-05-2020	Within a time span of only a few months, the SARS-CoV-2 virus has managed to spread across the world. This virus can spread by close contact, which includes large droplet spray and inhalation of microscopic droplets, and by indirect contact via contaminated objects. While in most countries,	De ventilatie van sportscholen moet voldoende zijn om de transmissie voor luchtdeeltjes tegen te gaan. Ventilatie moet plaatsvinden via displacement

	Auteurs: 5.1.2e 5.1.2e Journal: <i>Building and Environment</i>	supermarkets have remained open, due to the COVID-19 pandemic, authorities have ordered many other shops, restaurants, bars, music theaters and indoor sports centers to be closed. As part of COVID-19 (semi)lock-down exit strategies, many government authorities are now (May-June 2020) allowing a gradual re-opening, where sometimes indoor sport centers are last in line to be permitted to re-open. This technical note discusses the challenges in safely re-opening these facilities and the measures already suggested by others to partly tackle these challenges. It also elaborates three potential additional measures and based on these additional measures, it suggests the concept of a certificate of equivalence that could allow indoor sports centers with such a certificate to re-open safely and more rapidly. It also attempts to stimulate increased preparedness of indoor sports centers that should allow them to remain open safely during potential next waves of SARS-CoV-2 as well as future pandemics. It is concluded that fighting situations such as the COVID-19 pandemic and limiting economic damage requires increased collaboration and research by virologists, epidemiologists, microbiologists, aerosol scientists, building physicists, building services engineers and sports scientists.	ventilation'. Nieuwe lucht moet van onderaf aangevoerd worden, en naar bovenaf afgevoerd. Als mensen zich dan niet verplaatsen tijdens het sporten komen ze niet met luchtdeeltjes van anderen in contact.
	SARS-CoV-2 transmission during team-sport: Do players develop COVID-19 after participating in rugby league matches with SARS-CoV-2 positive players? Doi: https://doi.org/10.1101/2020.11.03.20225284 Bron: WHO COVID-19 database Zoekterm: Sport Datum beschikbaarheid preprint (nog niet officieel gepubliceerd): 04-11-2020	Objectives Evaluate the interactions between SARS-CoV-2 positive players and other players during rugby league matches, to determine the risk of in-game SARS-CoV-2 transmission. Design Observational. Setting Super League rugby league during four matches in which SARS-CoV-2 positive players were retrospectively found to have participated (2nd August and 4th October 2020).	Bij het spelen van een rugbywedstrijd (contactsport) is de transmissie van COVID-19 gemeten aan de hand van het volgen van contacten met een achteraf positief geteste speler. De transmissie tijdens de sportwedstrijd blijkt mee te vallen.

	Auteurs: 5.1.2e 5.1.2e Journal: geen, via MedRxiv	Participants 136 male elite rugby league players: eight SARS-CoV-2 positive participants, 28 identified close contacts and 100 other players who participated in any of the four matches. Main Outcome measures Close contacts were defined by analysis of video footage for player interactions and microtechnology (GPS) data for proximity analysis. Close contacts and other players involved in the matches becoming positive for SARS-CoV-2 by RT-PCR within 14 days of the match were reported. Results The eight SARS-CoV-2 positive players were involved in up to 14 tackles with other individual players. SARS-CoV-2 positive players were within a 2 m proximity of other players for up to 316 secs, from 60 interactions. One identified contact returned a positive SARS-CoV-2 result within 14 days of the match (subsequently linked to an outbreak within their club environment, rather than in-match transmission), whereas the other 27 identified contacts returned negative SARS-CoV-2 follow up tests and no one developed COVID-19 symptoms. Ninety-five players returned negative and five players returned positive SARS-CoV-2 RT-PCR routine tests within 14 days of the match. Sources of transmission in the five cases were linked to internal club COVID-19 outbreaks and wider-community transmission. Conclusion Despite a high number of tackle involvements and close proximity interactions between SARS-CoV-2 positive players and players on the same and opposition teams during a rugby league match, these data suggest that in-game SARS-CoV-2 transmission is limited during these types of team sport activities played outdoors.	Transmissie vond vooral binnen het team (leden van dezelfde club) plaats.
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Topsporters mogen wel trainen binnen 1,5m tijdens sportbeoefening	DOI: https://doi.org/10.1177/1941738120918876 Datum publicatie: 06-04-2020 Auteurs: 5.1.2e Journal: <i>Sports Health</i>	Hand hygiene: General guidelines include washing hands often with soap and water for at least 20 seconds or using hand sanitizer (at least 60% alcohol) if soap and water are not available. As the virus can survive for days on surfaces, frequently touched objects and surfaces should be regularly cleaned and disinfected. Social distancing: The Centers for Disease Control and Prevention (CDC) describes social distancing as remaining out of congregate settings, avoiding mass gatherings, and maintaining distance (approximately 6 feet) from others when possible.⁹ This practice is being advocated by governments and promoted by professional athletes as well. Travel: To slow transmission, many countries have imposed travel restrictions. Measures have ranged from suspending flights, to banning travelers from affected countries, to in-home isolation for 14 days after returning from specific destinations. Countries are also performing entry screening, including measuring body temperature and assessing for signs and symptoms of COVID-19. Domestic travel has become challenging as busy airports can be a common site of person-to-person spread. However, as a result of the sweeping suspensions and cancellations of sports leagues and tournaments, many athletes are not needing to travel beyond returning home from where they were training or competing. Face mask: Asymptomatic athletes should not be advised to wear a mask to prevent becoming infected with COVID-19 in the community setting or while traveling since it does not significantly reduce the risk of infection.⁸ Inappropriate use of masks can affect supply and demand to the	
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		point where health care workers will have inadequate protection, as we are currently seeing. Training Modification Prolonged and strenuous training has been suggested to be associated with temporary immune system depression lasting hours to days.²¹ A conservative approach would be to advise athletes to limit training sessions to <60 minutes and to <80% of maximum ability during this time to prevent COVID-19. However, this "open window" theory of infection susceptibility that follows a bout of vigorous exercise has been challenged.⁵ Immunization Vaccines are in the early stages of development but are unlikely to be available until early to mid-2021.	
Trainen voor jeugd alleen op 1,5m en in groepen van maximaal 4 personen			
Alle sportbeoefening verboden	Closed environments facilitate secondary transmission of coronavirus disease 2019 https://doi.org/10.1101/2020.02.28.20029272 Datum beschikbaarheid preprint (nog niet officieel gepubliceerd): 16-04-2020 Auteurs: 5.1.2e 5.1.2e Journal: via MedRxiv	Objective: To identify common features of cases with novel coronavirus disease (COVID-19) so as to better understand what factors promote secondary transmission including superspreading events. Methods: A total of 110 cases were examined among eleven clusters and sporadic cases, and investigated who acquired infection from whom. The clusters included four in Tokyo and one each in Aichi, Fukuoka, Hokkaido, Ishikawa, Kanagawa and Wakayama prefectures. The number of secondary cases generated by each primary case was calculated using contact tracing data. Results: Of the 110 cases examined, 27 (24.6%) were primary cases who generated secondary cases. The odds that a primary case	Kleine Japanse studie van vroeg in de pandemie onder 11 clusters en sporadische cases die liet zien dat transmissie risico indoor (inclusief in een sportschool) bijna 19 keer zo hoog was als buiten.

		transmitted COVID-19 in a closed environment was 18.7 times greater compared to an open-air environment (95% confidence interval [CI]: 6.0, 57.9). Conclusions: It is plausible that closed environments contribute to secondary transmission of COVID-19 and promote superspreading events. Our findings are also consistent with the declining incidence of COVID-19 cases in China, as gathering in closed environments was prohibited in the wake of the rapid spread of the disease.	
	Infection risk in gyms during physical exercise https://doi.org/10.1007/s11356-018-1822-8 Datum publicatie: 07-05-2018 Auteurs: 5.1.2e 5.1.2e Journal: <i>Environmental Science and Pollution Research</i> volume	This study aimed to analyze the risk of infection (influenza and tuberculosis) for individuals participating in physical exercise. This was achieved by assessment of carbon dioxide (CO₂) concentrations, and examination of the physical characteristics of a number of gyms to determine whether there was a relationship to CO₂ levels. The risk of infection increased during periods of peak occupancy where the ventilation required by occupants was greater. In each gym, the highest risk of infection occurred during the evening where occupancy and CO₂ levels were high. The infection risk for influenza was high in all situations due to the high quantum generation rate for this agent. This study suggests that inefficient ventilation in gyms is a significant problem, with high CO₂ concentrations resulting in impaired air quality and high health risks to users, including increased risk of infections such as influenza and tuberculosis.	Noot: Deze studie gaat niet specifiek over Covid19. Er is gemeten wat CO₂ concentraties zijn in 3 verschillende sportscholen. CO₂ concentraties meten de uitademingsactiviteit van sporters. Vervolgens is middels mathematische modellering bepaald hoe deze concentraties samenhangen met infectierisico voor twee andere respiratoire infecties, namelijk griep en tbc. Een goed werkend ventilatie systeem is van belang om het risico in het verspreiden van ziekten zo klein mogelijk te houden (algemeen voor infectieziekten). De CO₂ concentraties waren het hoogst in de sportschool met een laag plafond en in de sportschool waar de airco alleen binnenlucht aanzoog. Voor iedere sportschool gold: hoe

			meer mensen er samen komen hoe groter de toename in risico om geïnfecteerd te raken, in de gemeten sportscholen was dat met name in de avonden het geval.
	Indoor transmission of SARS-CoV-2 https://doi.org/10.1101/2020.04.04.20053058 Datum publicatie: 07-04-2020 Auteurs: 5.1.2e Journal: geen, MedRxiv	Background: By early April 2020, the COVID-19 pandemic had infected nearly one million people and had spread to nearly all countries worldwide. It is essential to understand where and how SARS-CoV-2 is transmitted. Methods: Case reports were extracted from the local Municipal Health Commissions of 320 prefectural cities (municipalities) in China, not including Hubei province, between 4 January and 11 February 2020. We identified all outbreaks involving three or more cases and reviewed the major characteristics of the enclosed spaces in which the outbreaks were reported and associated indoor environmental issues. Results: Three hundred and eighteen outbreaks with three or more cases were identified, involving 1245 confirmed cases in 120 prefectural cities. We divided the venues in which the outbreaks occurred into six categories: homes, transport, food, entertainment, shopping, and miscellaneous. Among the identified outbreaks, 53.8% involved three cases, 26.4% involved four cases, and only 1.6% involved ten or more cases. Home outbreaks were the dominant category (254 of 318 outbreaks; 79.9%), followed by transport (108; 34.0%; note that many outbreaks involved more than one venue category). Most home outbreaks involved three to five cases. We identified only a single outbreak in an outdoor environment, which involved two cases. Conclusions: All identified outbreaks of three or more cases	Studie van 318 clusters in China (buiten Hubei provincie) die liet zien dat het delen van binnenruimtes, zoals sportscholen is een risicofactor voor COVID-19 infectie.

		occurred in an indoor environment, which confirms that sharing indoor space is a major SARS-CoV-2 infection risk.	
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