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Abstract

The aim of this study is to document the crash incidence rate for cyclists when cycling on five different types of cycling infrastructure in two cities in France. A questionnaire was carried out in 2021 with commuter cyclists in Lyon-Villeurbanne (n=780) and Marseille-Aix-en-Provence (n=404). Respondents provided data on their regular cycling trip and on crashes they have experienced. Using a Geographical Information System, the exposure of cyclists on each type of infrastructure was determined. By relating the number of crashes to the number of kilometres travelled, crash rates (per kilometre travelled) and the 95 percent confidence interval were estimated. This study shows that in the two cities studied, the crash incidence rate is significantly higher on contraflow cycle lanes than on the road. On the contrary, shared-use paths (greenways) are associated with a lower crash incidence rate compared to the road. Results for the other types of cycling infrastructure are unclear. Recommendations are discussed. Further studies are required to improve the design of cycling infrastructure and the broader transport policy to support safe cycling.

Key findings

- Crash incidence rate for cyclists on five different types of cycling infrastructure was studied
- The use of contraflow cycle lanes is associated with a higher incidence rate for cyclists
- Riding on shared-use paths (greenways) is associated with a lower incidence rate, at least in Lyon
- The results concerning the other types of cycling infrastructure are unclear

Introduction

The use of bicycles and active modes of transport, have a beneficial effect on public and individual health (De Hartog et al., 2010; Mueller et al., 2015). However, cyclists are vulnerable road users, due the fragility of the human body and the lack of protection (Wegman et al., 2012). Indeed, a cyclist is unprotected in a crash or fall where protection by wearing a helmet is the only exception. It is also accepted that the risk of injury per kilometre travelled for cyclists is significantly higher than for car drivers as observed in many countries (Elvik et al., 2009)

In order to reduce this risk and also improve perceived risk (Bosen et al., 2023; Gössling & McRae, 2022; Winters et al., 2012), the local authorities have been implementing cycling infrastructure, separated to a greater or lesser degree from the traffic. Among the tools available to cities to develop their cycling network, we make the distinction between: one-way or two-way cycle paths, shared-use paths, cycle lanes, contraflow cycle lanes and shared bus lanes. Figure 1 illustrates the main categories of cycling infrastructures implemented in France. The effect of these different cycling infrastructure on the incidence rate for cyclists is not clear.

Certain studies suggest, for example, that one-way cycle paths would appear to increase cyclists' safety (Adams & Aldred, 2020; Ling et al., 2020; Teschke et al., 2012). In contrast, two-way cycle paths may increase the risk, in particular at intersections (Cicchino et al., 2020; Goodno et al., 2013; Johannsen & Jänsch, 2017; Summala et al., 1996).

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Figure 1. Main categories of cycling infrastructures implemented in France

Source: Author images (Pillonnet)

Regarding cycle lanes, no significant change in crash risk has been observed following their introduction (Chen et al., 2012; Kapousizis et al., 2021; Kondo et al., 2018). Finally, it is not certain that cycling along a contraflow cycle lanes (Tait et al., 2023; Vandenbulcke et al., 2014) and a shared bus lane is safer than cycling on a road without cycling infrastructure (Adams & Aldred, 2020; De Ceunynck et al., 2017; Kapousizis et al., 2021; Tait et al., 2023; Teschke et al., 2012). No studies have been carried out in France on the impact of cycling infrastructure on cyclists' safety. Based on a questionnaire among several hundred cyclists, the present study seeks to estimate the incidence rate for cyclists when using cycling infrastructure in two major French cities: Lyon and Marseille. The study

follows questionnaires carried out in other countries, including Finland (Leden, 1989), Canada (Aultman-Hall & Hall, 1998) and Australia (Poulos et al., 2015). These studies measured the incidence rate on cycling infrastructure in general, without taking into account the wide variety of cycling infrastructure. In the present study, we distinguished the incidence rate on the main categories of cycling infrastructure (cycle path (one-way and two-way), cycle lane, shared-use path (greenway), contraflow cycle lane and shared bus lane).

Method

Questionnaire

Between 22 July 2021 and 28 October 2021, 4,660 questionnaires were distributed to cyclists or placed on bicycles parked in the city centre of Lyon and Marseille. The urban areas of Lyon and Marseille are the two most extensive urban areas in France after Paris. According to Mignot et al. (2013), the urban area of Lyon is monocentric in form. The questionnaires (n=3,000) were therefore distributed in the central part of the urban area constituted of the cities of Lyon and Villeurbanne (respectively 522,250 and 156,928 inhabitants in 2021 (Insee, 2023b, 2023d)). The Marseille urban area is dicentric in form (Mignot et al., 2013). The questionnaires (n=1,660) were therefore distributed in the two major centres which are Marseille and Aix-en-Provence (respectively 873,076 and 147,478,928 inhabitants in 2021 (Insee, 2023a, 2023c)). The questionnaires were distributed in proximity to traffic hotspots, such as train stations, universities, business centres or shopping areas.

The questionnaire package consisted of a postage-paid return envelope and a 4-page questionnaire including a map. The questionnaire was in three parts. The first part asked about commuting habits and demographic characteristics (e.g., age, sex, profession). The second part focused on the most frequent bicycle trip, notably the reason for the trip, how long the respondents have been making this trip and how often they make this trip (from once a week to 7 times a week[1]). Only respondents aged 18 years or over and travelling for a specific purpose (e.g., going to work, in particular going to a school or university) were included. These trips have the advantages of frequency, repetition and were made in the same time period, so the study period temporal conditions were homogeneous.

Responders were also asked to draw their regular route on the map and specify the places where they cycle on the road, on a cycle infrastructure, on the footpath (sidewalk) or on a pedestrian street. Five main cycling infrastructure categories were studied: cycle path (one-way and two-way), cycle lane, shared-use path (greenway), contraflow cycle lane and shared bus lane. To help respondents identify the cycling infrastructures they used, photos were provided with the questionnaire. In all, 5 different maps were provided, depending on the place of distribution. These maps covered respectively 50 km² at Lyon-Villeurbanne and 105 km^2 at Marseille-Aix-en-Provence. These items were used to estimate the total distance for the most frequent trip for each respondent. We used satellite images (BD ORTHO® of the Institut Géographique National), Google Street View images and maps of cycling infrastructure of the cities studied to verify the cycling infrastructure that each respondent declared having used on their trip. Distances covered on cycling infrastructure and outside cycling infrastructure were measured with an open source Geographical Information System (software QGIS 3.26.1). It should be noted that when part of the trip was situated off the printed map provided to participants, only the trip section on the map was included. In Lyon-Villeurbanne, the road network includes 1,099 km of road and 438 km of cycling infrastructure. In Marseille-Aix-en-Provence, the road network includes 3,423 km of road and 293 km of cycling infrastructure.

The third part of the questionnaire focused on crash or crashes each respondent was involved in on the most frequent bicycle trip in the previous 24 months. We made a distinction between collisions and falls. A collision was defined as an event in which a cyclist hits or is hit by another road user. On the other hand, a fall only involved the cyclist and was defined as an event without a collision with a road user, where the cyclist and/or bicycle lands on the ground. Three levels of severity were distinguished: crash with no injury, crash with minor injuries (not requiring hospitalisation) and crash with major injuries (requiring hospitalisation). Respondents were also asked to localise their crash on the map with a dot for collisions and a cross for falls. Each respondent could also describe in writing the circumstances of the crash.

Estimation of crash rates

The crash rate (per kilometre travelled) and the corresponding 95 percent confidence interval (CI) were calculated by relating the number of crashes to the number of kilometres travelled, for the whole sample of cyclists and according to the different categories of cyclist. Similarly, the crash rates (and 95% CI) for the different categories of cycling infrastructure were calculated by relating the number of crashes recorded for each type of cycling infrastructure to the number of kilometres travelled for each type of cycling infrastructure. Five main categories of crashes were studied: collisions, falls, crash without injury, crash with minor injuries and crash with major injuries. However, because of the rarity of each type of crash on the different types of cycling infrastructure studied, crashes of all types (collisions + falls) and all degrees of severity were taken into account. The crash rates (and 95% CI) were then adjusted for the different characteristics of cyclists that might

1 The total amount of trips carried out annually by each respondent was then calculated by multiplying the number of trips declared per week by the number of days actually worked excluding public holidays, days off and vacations.

Table 1. Respondents' characteristics by location

Variables	Lyon-Villeurbanne		Marseille-Aix-en-Provence	
	n	%	n	%
Men	380	48.7	200	49.5
Women	400	51.3	204	50.5
Age (years)				
< 26	73	9.4	64	15.8
26-49	558	71.5	226	55.9
> 49	149	19.1	114	28.2
Trip length				
< 2 km	182	23.3	110	27.2
2-< 5 km	502	64.4	212	52.5
⩾ 5 km	96	12.3	82	20.3
Average length of one-way trip	3.25 km		3.55 km	

potentially cause confusion (age, sex, length of trip, in particular). To compare the types of cycling infrastructure and the incidence rates observed with those on the road, incidence rate ratios (IRR) and their 95 percent CI were calculated. The following formula shows an example of IRR:

$$IRR = \frac{\frac{Number\ of\ crashes\ declared\ on\ cycling\ lane}{Declared\ number\ of\ kilometres\ travelled\ on\ lane}}{\frac{Number\ of\ crashes\ declared\ on\ the\ road}{Declared\ number\ of\ kilometres\ travelled\ on\ the\ road}}$$

A value of 1.10, for example, signifies that the incidence rate for a cyclist of having a crash on the cycle lane is higher than 10 percent of that for a cyclist riding on the road. The different relative rates of crash (and 95% CI) were calculated using a general linear regression model (Poisson regression) (Allain & Brenac, 2001; McCullagh & Nelder, 1989). The dependent variable was the number of crashes Y_i (random discrete variable according to a Poisson distribution) conditioned by explanatory variables X_j. The number of kilometres travelled constitutes the variable of exposure to risk for the different cases (type of cycling infrastructure or characteristics of cyclists). All the calculations were performed using the software XLS Stat (Version 2021.3).

Results

In all, 1,429 questionnaires were returned (Lyon-Villeurbanne: n=865, Marseille-Aix-en-Provence: n=564), or 31 percent of the questionnaires distributed. Only fully completed questionnaires were retained. In all, the study concerned 780 commuters in Lyon-Villeurbanne and 404 in Marseille-Aix-en-Provence. Table 1 lists the main cyclists' characteristics at Lyon-Villeurbanne and Marseille-Aix-en-Provence.

Travel exposure on each infrastructure in the two cities is reported in Table 2. In total, the Lyon-Villeurbanne commuter cyclists travelled 764,633 km, including 73 percent on cycling infrastructure. The Marseille-Aix-en-Provence cyclists travelled 402,039 km, including, 40 percent on cycling infrastructure. The difference in the proportion of trips on cycling infrastructure can be explained by the cycling network which is less developed in Marseille-Aix-en-Provence (see above).

At Lyon-Villeurbanne, cyclists were involved in 274 crashes, with 188 collisions and 86 falls. In Marseille-Aix-en-Provence, cyclists were involved in 211 crashes, with 107 collisions and 104 falls. Table 3 shows that most collisions and falls occurred on cycling infrastructure in Lyon-Villeurbanne. In contrast, at Marseille-Aix-en-Provence, falls occurred proportionately more frequently on the road.

Overall, the crash rate per 100,000 kilometres cycled was 35.83 in Lyon-Villeurbanne (95% CI: 31.83 to 40.33) and 52.48 in Marseille-Aix-en-Provence (95% CI: 45.86 to 60.06). This means that a crash occurred every 2,791 km cycled in Lyon-Villeurbanne and every 1,905 km in Marseille-Aix-en-Provence. Table 4 provides the IRR (unadjusted and adjusted) and CI for all bicycle infrastructure at Lyon-Villeurbanne and Marseille-Aix-en-Provence.

The incidence rate on cycling infrastructure does not differ significantly from that observed on the road. This is observed at Lyon-Villeurbanne (IRR = 1.24, 95% CI: 0.92 to 1.67) and at Marseille-Aix-en-Provence (IRR = 1.15, 95% CI: 0.87 to 1.53). The incidence rate observed on contraflow cycle lanes at Lyon-Villeurbanne (IRR = 1.65, 95% CI: 1.04 to 2.60) and at Marseille-Aix-en-Provence (IRR = 3.25, 95% CI: 1.70 to 6.23) is significantly higher than the incidence rate observed on the road. The incidence rate on the cycle lanes is significantly higher than that observed on the road at Lyon-Villeurbanne (IRR = 1.50, 95% CI: 1.04 to 2.18), but not at Marseille-Aix-en-Provence (IRR = 1.34, 95% CI: 0.72 to 2.49). No difference was noted for the cycle paths and the shared bus lanes. The incidence rate observed on the shared-use paths (greenways) is significantly lower at Lyon-Villeurbanne (IRR = 0.46, 95% CI: 0.24 to 0.91). At Marseille-Aix-en-Provence, no conclusion could be drawn because of a lack of respondents who used this infrastructure. The incidence rate on the footpath is higher compared to the road at Marseille-Aix-en-Provence (IRR = 3.00, 95% CI:

Table 2. Respondents travel exposure on each infrastructure type by location

Exposure type (last 2 years)	Total exposure (x100 000 km)			
	Lyon-Villeurbanne		Marseille-Aix-en-Provence	
		%		%
Total	7.65	100	4.02	100
On-road	1.75	23	2.18	54
On bicycle infrastructure	5.64	73	1.60	40
On cycle path	2.09	27	0.82	20
On cycle lane	1.27	17	0.17	4
On contraflow cycle lane	0.56	7	0.07	2
On shared bus lane	1.15	15	0.40	10
On shared-use path (greenway)	0.55	7	0.14	3
On footpath (sidewalk)	0.12	2	0.11	3
On pedestrian street	0.13	2	0.13	3

Table 3. Reported collisions and falls in previous two years at infrastructure type by location

Location	Lyon-Villeurbanne		Marseille-Aix-en-Provence	
	Collisions reported	Falls reported	Collisions reported	Falls reported
Total	188	86	107	104
On-road	31	22	47	56
On bicycle infrastructure	153	56	53	34
On cycle path	41	26	26	22
On cycle lane	48	10	5	6
On contraflow cycle lane	22	6	8	2
On shared bus lane	35	11	14	4
On shared-use path (greenway)	7	3	0	0
On footpath (sidewalk)	3	2	5	11
On pedestrian street	1	6	2	3

1.77 to 5.07). At Lyon-Villeurbanne, this excess risk is not significant (IRR = 1.33, 95% CI: 0.53 to 3.34). Finally, with regard to pedestrian streets, no difference was noted with the road, for either of the two cities.

Discussion

This study shows that the crash rate for cyclists when they use cycling infrastructure is not significantly different from the incidence rate observed on the road. These results were observed at Lyon-Villeurbanne and at Marseille-Aix-en-Provence. This result is consistent with rates observed in Canada (Ottawa-Carleton (Aultman-Hall & Hall, 1998), Toronto (Aultman-Hall & Kaltenecker, 1999)), Australia (Poulos et al., 2015) and Finland (Leden, 1989). However, this global result masks a number of disparities between different categories of cycling infrastructure. Some cycling infrastructure types seem to be associated with a higher or similar incidence rate compared to the road, whereas others appear to have a protective effect.

The use of contraflow cycle lanes appears to be associated with an excess incidence rate compared to the road. This has been observed at Lyon-Villeurbanne (IRR = 1.64, 95% CI: 1.04 to 2.60) and at Marseille-Aix-en-Provence (IRR = 3.25, 95% CI: 1.70 to 6.23). Tait et al. (2023) observed that the incidence rate for cyclists on a contraflow cycle lane is higher at intersections. This kind of infrastructure, where the cyclist travels in the opposite direction to the general traffic may contribute to confusion on the road as drivers misunderstanding and misinterpreting how cyclists may navigate the infrastructure at intersections. In-depth crash investigations would be useful to test this hypothesis.

It also appears that cyclists travelling on cycle lanes is associated with a higher incidence rate, at least at Lyon-Villeurbanne. Several reasons might explain this observation. Firstly, in high density areas, the cycle lanes are often installed alongside parallel parked vehicles. This configuration leads the cyclists to ride very close to the parked vehicles and exposes them to the risk of car doors being opened. In the absence of a cycle lane, cyclists may ride away from the parked cars, towards the middle of the road lane. Sec-

Table 4. Incidence rate ratios (IRR) (unadjusted and adjusted) on different infrastructure types by location

	Lyon-Villeurbanne		Marseille - Aix-en-Provence	
Relative rate for travel on...	**Unadjusted IRR (95% CI)**	**Adjusted IRR (95% CI)**	**Unadjusted IRR (95% CI)**	**Adjusted IRR (95% CI)**
bicycle infrastructure to travel on road	1.24 (0.92 – 1.67)	1.20 (0.90 – 1.61)	1.15 (0.87 – 1.53)	1.24 (0.94 – 1.63)
cycle path to travel on road	1.15 (0.80 – 1.08)	1.17 (0.83 – 1.64)	1.24 (0.88 – 1.74)	1.36 (0.98 – 1.89)
cycle lane to travel road	1.50* (1.04 – 2.18)	1.44* (1.01 – 2.07)	1.34 (0.72 – 2.49)	-
contraflow cycle lane to travel on road	1.65* (1.04 – 2.60)	1.79* (1.16 – 2.75)	3.25** (1.70 – 6.23)	-
shared bus lane to travel on road	1.32 (0.89 – 1.96)	1.35 (0.94 – 1.95)	0.95 (0.58 – 1.57)	1.13 (0.73 – 1.76)
shared-use paths (greenway) to travel on road	0.46 (0.24 – 0.91)*	-	-	-
footpath (sidewalk) to travel on road	1.33 (0.53 – 3.34)	-	3.00** (1.77 – 5.07)	-
pedestrian street to travel on road	1.75 (0.80 – 3.86)	-	0.83 (0.34 – 2.03)	-

* : significant at p<0.005
** : significant at p<0.01
- : number of respondents too low to calculate adjusted IRR

ondly, where there is a cycle lane, motor vehicle drivers may tend to drive closer to cyclists when they overtake than when there is no cycle lane (Beck et al., 2019; Parkin & Meyers, 2010). Finally, during a period of traffic congestion, a kerbside cycle lane provides cyclists space to continue travelling, pass stationary vehicles on the kerb side. However, this reduces the visibility of cyclists to motorists or pedestrians crossing the street.

With regard to cycle paths, no difference in IRR was observed compared to the road. This observation may be explained by the fact that we did not distinguish one-way paths, which appear to have a protective effect (Adams & Aldred, 2020; Ling et al., 2020; Teschke et al., 2012), and two-way paths that seem to have a negative effect[2] (Cicchino et al., 2020; Goodno et al., 2013; Summala et al., 1996). This may be because two-way cycle paths can be particularly challenging for drivers turning right (note, in France road users travel in the right lane). According to Summala et al. (1996), drivers turning right (i.e., close to the kerb), scanned the right leg of the intersection less frequently than drivers turning left (i.e., across the intersection). Another reason for the lack of difference may be the gaps in the cycle paths in the two study areas, giving rise to the risk of collision between cyclists and motor vehicles engaging in turning manoeuvres (Li et al., 2017; Ling et al., 2020).

Similarly, shared bus lanes had no significant difference with roads. Previous studies have reported crashes in bus lanes between buses and cyclists are relatively rare (Pignot & Chadal, 2007; Tait et al., 2023). Unlike cycle lanes, shared bus lanes are often wider with physical separators that afford more protection to cyclists and keep them away from motor traffic and parked vehicles. On the other hand, as for cycle lanes, shared bus lanes are regularly crossed by drivers turning right. The crash scenario where a driver is turning right and does not see a cyclist riding behind on their right side in a shared bus lane is one of the most frequent types of crash occurring in a bus lane (Clabaux et al., 2021).

Shared-use paths (greenways) had a significantly lower incidence rate compared to the roads in Lyon-Villeurbanne. This is consistent with findings from Teschke et al. (2012) in Canada (Toronto and Vancouver), and of Cicchino et al. (2020) in the United States of America (New York, Portland and Washington). This type of continuous infrastructure is constructed on a separate dedicated route, away from the road network. Shared-use paths (greenways) are generally installed alongside a river or stream or transport infrastructure (road or rail), thus limiting the number of intersections and interactions with motor vehicle users.

It emerges from the present study that footpaths[3] are associated with a higher incidence rate, in particular in Mar-

2 The protection offered for cyclists' safety on one-way cycle paths would appear to be compensated by the rather negative effect of two-way cycle paths.

3 In France, cyclists are not permitted to ride on footpaths excepted for children, below eight years old (Article R412-34, Code de la Route; https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000006842157/1990-01-01/; access the 3th October 2024).

seille-Aix-en-Provence. This is in agreement with previous studies (Aultman-Hall & Adams, 1998; Aultman-Hall & Hall, 1998; Aultman-Hall & Kaltenecker, 1999). At Toronto in particular, the authors observed a collision, fall and injury incidence rate respectively 2.9 and 6.4 times higher than incidence rate observed for cyclists on the road (Aultman-Hall & Kaltenecker, 1999). Cyclists use the footpaths to avoid riding on the road with motor vehicles, particularly on major roads (Aultman-Hall & Adams, 1998). The fact that the IRR is particularly high at Marseille-Aix-en-Provence (IRR = 3.00, 95% CI: 1.77 to 5.07) might be due to the limited length of the cycling network (3,423 km of roads open to traffic and 293 km of cycling infrastructure), forcing cyclists to use the footpaths more and to interact more frequently with pedestrians in a space where they are the least expected. The uneven ground and the presence of numerous obstacles might also contribute to some extent to this higher incidence rate.

Study strengths and limitations

This is the first study to consider the IRR by different categories of cycling infrastructure type in France. This extends previous research by examining the variation of protection offered to cyclists across the different infrastructure and clearly demonstrates that not all cycle lanes are protective.

However, we also acknowledge limitations of the study. Our cohort reported very few serious crashes, therefore our IRR are only applicable to minor injury crashes. Further research is required to know if these rates are consistent for serious injury or fatality crashes. Our findings are also limited to by location. Both Lyon-Villeurbanne and at Marseille-Aix-en-Provence are dense built-up areas where cyclists are particularly numerous. Further research is needed to determine if this has a protective effect that impacts number of cyclist crashes. The two cities also differed in terms of the maturity of their cycling network. The level of bicycle use and the urban form of the two cities are notably different. Furthermore, the survey was only focused on commuter cyclists and it is not known if it applies to cyclists travelling for other trip purposes. Also, all the data collected were self-reported, which does not rule out errors by the cyclists regarding the classification of the cycling infrastructure or estimations of their use of the bicycle.

In the present study, we did not distinguish between the one-way and two-way cycle paths due to low frequency of use of these infrastructures by the cohort. Nevertheless, previous literature has shown that the effect on cyclists' safety would appear to be quite different between these two types of cycling infrastructure (see notably OECD, 2013; Cicchino et al., 2020). Therefore, future studies should consider using purposive sampling strategies to recruit a cohort that uses these infrastructure types to investigate the incidence rate on one-way and two-way cycling paths.

Recommendations

Given the differences between Lyon and Marseille, different approaches may be needed to improve cycling networks. First, increasing the length and connection of shared-use paths (greenways), which are completely separated from motor vehicle traffic, is likely to improve cyclists' safety. In Marseille, where greenways are absent, the development of shared use paths should be a priority. In contrast, contraflow cycle lanes require a review of design, particularly at junctions and we recommend that local transport authorities in Lyon and Marseille reconsider how these lanes intersect with the road network before installing any more contraflow cycle lanes. Speed-reduction gives everyone more time to react and can change drivers' visual search patterns more favourably for the cyclists coming from the left. The positive effect of these measures was partly confirmed by Summala et al. (1996). Where cycle lanes are alongside parking spaces, a buffer zone needs to be installed between the parked vehicles and the cycle lane. Studies have shown that the buffer zones were an effective measure to prevent crashes caused by driver and passengers unexpectedly opening car doors in front of a cyclist (Duthie et al., 2010; Schimek, 2018).Traffic calming, combined with the development of cycle networks, is also part of the solution to improving cyclists' safety (Isaksson-Hellman & Töreki, 2019). Finally, further studies are necessary for a better design of the cycling infrastructures and needs to be a main priority for transport policy in French cities.

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Author contributions

Pierre-Jean Pillonnet: Ideas; formulation of overarching research goals and aims. Conducting a research and investigation process, specifically performing the experiments. Development of methodology. Creation and presentation of the published work, specifically writing the initial draft. Nicolas Clabaux: Conducting a research and investigation process, specifically performing the experiments. Development of methodology. Creation of the published work, specifically writing the initial draft. Jean-Yves Fournier: Application of statistical techniques to analyse study data. Frédérique Hernandez: Acquisition of the financial support for the project. Oversight and leadership responsibility for the research activity planning and execution.

All authors have read and agreed to the published version of the manuscript.

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Human Research Ethics Review

The full questionnaire was approved by the research ethics committee of the Université Gustave Eiffel on the 9th of June 2021 and the data processing was assessed as compliant with the European General Data Protection Regulation.

Data availability statement

Provide a clear statement about the availability, on request, of all materials, data and protocols associated with the publication of your manuscript. Details regarding where data supporting reported results can be found should be provided, including links to publicly archived datasets analysed or generated during the study.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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