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Prevalence and impact of work-related musculoskeletal disorders among food delivery riders in Eastern Peninsular Malaysia

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Abstract

Work-related Musculoskeletal Disorders (WMSDs) are currently a matter of concern in the occupational world, where it is the leading cause of disability among workers. Food delivery riders were among the neglected workers even though they were highly exposed to the WMSDs. Thus, this study aims to quantify the magnitude of WMSDs among the riders and the impact on their work. This was a cross-sectional study involving 191 food delivery riders in Eastern Peninsular Malaysia. The Standardized Nordic Musculoskeletal Questionnaire (M-SNMQ), which was self-administered and validated for Malay translation, was used to quantify the prevalence of WMSDS based on various specific body regions. WMSD prevalence over a 12-month period was 74.9%. Upper back pain (UBP) (55.6%) and lower back pain (LBP) (73.3%) were the two most common body regions to experience WMSD symptoms. The least-complained body regions were thighs and feet, with a prevalence of 2.6% and 3.1%, respectively. The affected body regions that caused the highest daily life disturbance were the shoulders and knees, while those with shoulders symptom were more likely to be absent from work. Finally, LBP was the highest body region with at least a moderate pain score. In general, the findings should be a matter of concern among health authorities and others to improve the quality of life among the riders. To lower the prevalence of WMSDs among this understudied group, additional interventional research should be built on the findings of this study.

Keywords: Food delivery rider, Impact, Prevalence, Work-related musculoskeletal disorders.

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1. Introduction

Musculoskeletal disorders (MSDs) are terms to describe the degenerative and inflammatory conditions that affect musculoskeletal systems, including muscles, nerves, tendons, joints, cartilage, and spinal discs. MSDs commonly affect the lower back, shoulders, and arms and give rise to many medical conditions, such as sprains, strains and Carpal Tunnel Syndrome. Work-Related Musculoskeletal Disorders (WMSDs) are conditions in which the work environment and performance of work contribute significantly to the condition, and/or the condition is made worse or persists longer due to work conditions [1]. Although WMSDs are not exclusively caused by work, they account for a large fraction of all job-related illnesses that are registered and eligible for compensation in many countries. In fact, it is the most common disorder in the whole industrial world [2].

WMSDs currently become a matter of concern as they are the leading occupational health issue in developed countries such as Korea and Japan [3]. Malaysia is on the same page where WMSDs were the highest occupational disease reported in 2019. In-depth, from the total of 1369 reported cases, 447 cases were compensated financially by the Malaysian Social Security Organization (SOCSO) [4]. In comparison, 1151 cases of WMSDs were reported in 2018, and 328 cases were compensated financially by SOCSO [5]. This increasing trend is significantly suggestive that action must be taken immediately to prevent WMSDs from becoming a further threat in the occupational world among workers in Malaysia. WMSDs caused a major drawback in global economics as workers with WMSDs tend to be absent from work, thus it is causing a reduction in productivity among the workers. In addition, workers with WMSD symptoms also were found to have lower performance at the workplace, which caused a significant reduction in the productivity of certain organizations [6].

Motorcyclists are among the occupational groups that are highly exposed to MSDs due to their ergonomic posture while riding the motorcycle [7]. Many other factors also contributed to the development of MSDs among motorcyclists, such as Body Mass Index (BMI), age, gender, riding time, riding mileage, and having Hands-Arm Vibration Syndrome [8-10]. However, the incidence of WMSDs among occupational motorcyclists was far greater than among non-occupational motorcyclists due to longer exposure to static posture and vibration, as they had a longer riding time [9]. In 2011, a study on risk factors among motorcyclists in Malaysia revealed that Occupational Motorcyclists had a higher prevalence of MSDs (82.3%) compared to Non-Occupational Motorcyclists (62.8%). The high prevalence of MSDs was significantly associated with riding time, posture score, smoking status, and past accident exposure [8]. However, the food delivery rider was not included as the respondent in that study, as food delivery services were introduced in Malaysia in 2013.

In December 2019, the world was startled by the outbreak of a contagious virus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The World Health Organization (WHO) then declared a global pandemic in March 2020 as the disease had quickly spread worldwide [11]. Since then, the COVID-19 pandemic has caused a massive burden on the socioeconomic status of people worldwide. Many people had lost their job, and they started looking for alternative jobs to survive during this challenging time. In Malaysia, one of the best options was becoming food delivery riders. Even though food delivery services have been introduced in Malaysia since 2013, a sudden surge in the number of food delivery riders was reported in 2020. This exponential increment was due to an increase in demand for food delivery services in Malaysia as the first Movement Control Order (MCO) was implemented on 18 March 2020 to control the spread of Covid-19 in Malaysia. During a series of MCOs, all restaurants were closed as dine-in was prohibited. Additionally, food delivery services were identified as one of the key services under MCO [12], making this the preferred job for Malaysians at the time.

In Malaysia, there were more than ten food delivery service companies registered with the Malaysian Ministry of Transport (MOT). Malaysian citizens with driving licenses can apply to be food delivery riders, and currently, they are classified as independent contractors as they are not fully bound to the mother company. Thus, the riders can choose to either become full-time food delivery riders or part-timers, where they can have their own working schedule making the working time flexible.

However, with the increasing number of people becoming food delivery riders, more Road Traffic Accidents (RTA) have been recorded involving food delivery riders, especially during the series of MCOs. In Malaysia, there were 1242 cases of RTA reported involving food delivery riders from 2018 until May 2019 which constitute 1,048 light injuries, 82 serious injuries, and 112 deaths [13]. Unfortunately, the trend keeps increasing; where in 2021, out of 2576 RTA mortality cases among motorcyclists in Malaysia, 1700 mortalities were RTA cases among food delivery riders, and more than 70% of food delivery riders were caught doing traffic misconduct during the MCOs, such as speeding and violating traffic lights [14].

Studies worldwide have suggested that many factors have contributed to the occurrence of RTA and mortalities among motorcyclists, which can be categorized into three main factors, namely human factor, environmental factor, and motorcycle factor [15-18]. In-depth, human factors such as fatigue, inappropriate driving, and psychological distress have been studied to be strongly associated with the occurrence of RTA [19, 20]. Additionally, Michael, et al. [21] demonstrated that psychological distress among motorcyclists predisposed them to inappropriate driving attitudes, particularly speeding, which predisposed them to be involved in RTA. As a result, WMSDs were among the major contributing factors of fatiguability and psychological distress among motorcyclists. So, the purpose of this study is to determine the prevalence of WMSDs among food delivery riders and how they affect their ability to do their jobs in Malaysia.

2. Material and Method

2.1. Study Site

This study was conducted in Eastern Peninsular Malaysia. According to the Department of Statistics Malaysia, there was an estimation of 1.1 million of total population in this area in 2021. In addition, this area has eight districts that cover almost 13000 km2 [22], and according to pre-survey data, there were more than 1000 food delivery riders registered with more than five delivery companies available in this area.

2.2. Study Design

A cross-sectional study was conducted among 191 food delivery riders in Eastern Peninsular Malaysia. The riders were led by a leader called "Captain Rider". The captain rider was the one who prepared the working schedule among the registered riders to avoid pooling of riders at the same time, which would affect their daily income. All riders were identified as "Independent Contractors" as they were not totally bound to the mother company, where they could choose to either be a full-timer or part-timer, and they could choose their own time to do this job.

A total of 191 riders were randomly selected from a food delivery company of this area using the snowball sampling method. All riders were selected based on study criteria, and the "Captain Rider" was the seed. A single company was used as a preference in this study to ensure homogeneity of the working condition and working shifts among food delivery riders selected. A comprehensive explanation was given to the riders regarding the background, setting, objectives, and benefits of the study before the study took place. In addition, all selected riders were given a written consent form prior to the study. This study was conducted between July 2021 and August 2022. All full-time, registered food delivery drivers who have been employed for more than six months met the inclusion criteria, and participants with congenital musculoskeletal diseases were excluded from the study.

2.3. Data Collection

A self-administered questionnaire was used in this study, which consisted of two sections. The first section was designed to obtain the demographic information of the respondent, which contains age, gender, educational status, marital status, height, weight, work days per week, work hours per day, and average trip per day. BMI was then calculated using the formula weight/height squared (kg/m2) [23].

The second section consisted of a validated Malay-translated Standardized Nordic Musculoskeletal Disorders questionnaire (M-SNMQ) [24]. Strong kappa agreement values of at least 0.75 were shown by the test-retest validity. The M-SNMQ was a self-administered survey with 11 questions with binary responses of either "Yes" or "No" for eight distinct body regions, including the neck, shoulders, upper back, lower back, arms/elbow, thighs, knees, and feet, according to four periods of prevalence: lifetime, 12-months, 1-month, and 7 days. The study time was preceded by the issuance of a letter of authorization. The initial version of the Standardized Nordic Musculoskeletal Disorders Questionnaire (NMQ) was developed by Kuorinka, et al. [25] to quantify the prevalence of MSDs based on specific body regions. The questionnaire was designed to be completed within 30 minutes and did not disturb their daily job as it was done during their leisure time.

Table 1.
Characteristics of food delivery riders in eastern peninsular Malaysia (n=191).

Variables	n	Percentage (%)	Mean (SD)
Sex			
Male	177	92.7	
Female	14	7.3	
Age			27.6 (5.76)
Race			
Malay	191	100.0	
Marital status			
Unmarried	112	58.6	
Married	72	37.7	
Divorced/Widow	7	3.7	
Education			
Non-formal	5	2.6	
Primary school	4	2.1	
Secondary school	84	44.0	
Form 6/STAM/Diploma	76	39.8	
Degree/Master/PHD	22	11.5	
Smoking			
Yes	103	53.9	
No	88	46.1	
Height (CM)			166.1 (14.08)
Weight (KG)			73.2 (20.62)
BMI			26.01 (6.54)

Note: * n: Number of respondents, STAM: Sijil Tinggi Agama Malaysia, PhD: Doctor of Philosophy, CM: Centimeter, KG: Kilogram

2.4. Statistical Analysis

All data was analyzed using SPSS 20.0. Descriptive statistics were used to summaries the socio-demographic, occupational characteristics, and impact of WMSDs among the respondents. Numerical data were presented as mean (Standard Deviation (SD)) or median (Inter-quartile Range (IQR)) based on their normality distribution, and categorical data were presented as frequency (percentage).

3. Results

3.1. Characteristics of the Respondents

A total of 191 respondents were selected among the food delivery riders in this study, where the majority were male riders (92.7%) and unmarried (58.6%). The mean (SD) age of the riders was 27.6 (5.76) years. In addition, all respondents were of Malay ethnicity. In terms of education status, almost all of the respondents underwent a formal education system, while only 2.6% had no formal education. Furthermore, more than half of the riders were active smokers. The mean height of the respondent was 166cm, while the mean weight was 73.2kg. Meanwhile, the mean (SD) Body Mass Index (BMI) of the respondents was 26 (6.54). The summary of the characteristic of the respondents is shown in Table 1.

3.2. Working Characteristics

This study included only those who worked for more than six months as food delivery riders. Nearly the same percentage of riders worked for less than one year and more than one year. The mean (SD) average trip per day was 18.9 (6.16) trip per day. In addition, the mean (SD) working hours among the respondents was 10.2 (2.33) hours. While the mean (SD) average working days per week was 6 (1.03) days per week. The majority of respondents (83.8%) say they don't exercise in any way before going to work. Table 2 summarized the above findings.

Table 2.
Working characteristics of food delivery riders in eastern peninsular Malaysia (n=191).

Variables	n	Percentage (%)	Mean (SD)
Working experience			
6-12 Months	92	48.2	
> 12 Months	99	51.8	
Average trip/Day			18.9 (6.16)
Working hours/Day			10.2 (2.33)
Average working day/Week			6.1 (1.03)
Exercise before work			
No	160	83.8	
Yes	31	16.2	

3.3. Prevalence of Work-Related Musculoskeletal Disorders Among Respondents

Table 3 shows the prevalence of WMSDs among food delivery riders in Terengganu based on eight body regions, including the neck, shoulders, lower back, upper back, thighs, knees, arms, and feet. In general, 145 respondents complained of WMSD symptoms affecting either one or more body regions, and only 48 respondents had never experienced any WMSDs in their lifetime. In-depth, the majority of the respondents claimed the most commonly affected body regions were the lower back (73.8%), upper back (57.6%), and neck (24.1%). In contrast, the least reported affected body regions were the feet (4.7%) and thighs (3.7%).

Furthermore, this study also confirms that 74.9% of the food delivery riders in Terengganu experienced WMSD symptoms in either one or more body regions within one year prior to the study. Legs and feet had the lowest 12-month prevalence of reported WMSDs among the respondents, at 2.6% and 3.1%, respectively. The highest 12-month prevalence of WMSDs was still confined to the lower back region (73.3%). Lower back pain remains the highest reported body region affected in one month and seven days, with a prevalence of 71.7% and 64.6%, respectively. In addition, the lowest one-month prevalence of WMSDs by body region was feet (1.1%), while thighs were the least affected body region in seven days with the same prevalence of 1.1%.

Table 3.
Prevalence of WMSDs among food delivery riders in eastern peninsular Malaysia (n=191).

Body regions	Prevalence, n (%)			
	Lifetime	12-Months	1-Month	7-Days
Neck	46 (24.08)	31 (16.23)	34 (17.80)	27 (14.14)
Shoulders	32 (16.75)	35 (18.32)	14 (7.33)	9 (4.71)
Upper back	110 (57.59)	106 (55.50)	93 (48.69)	45 (23.56)
Arms/Wrist	13 (6.81)	10 (5.24)	15 (7.85)	5 (2.62)
Lower back	141 (73.82)	140 (73.30)	137 (71.73)	124 (64.92)
Thighs	7 (3.66)	5 (2.62)	3 (1.57)	2 (1.05)
Knees	12 (6.28)	11 (5.76)	7 (3.66)	4 (2.09)
Feet	9 (4.71)	6 (3.14)	2 (1.05)	5 (2.62)

This present study also revealed that for the past 12 months, more than half (58.6%) of the respondents complained about WMSD symptoms in more than one body region. Of these, the majority of them (45.5%) complained of WMSD symptoms affecting two body regions. In addition, the maximum number of body locations afflicted among the riders was five, with a prevalence of 0.5%. In contrast, 31 (16.0%) respondents complained of WMSD symptoms at only one anatomical site, as shown in Figure 1.

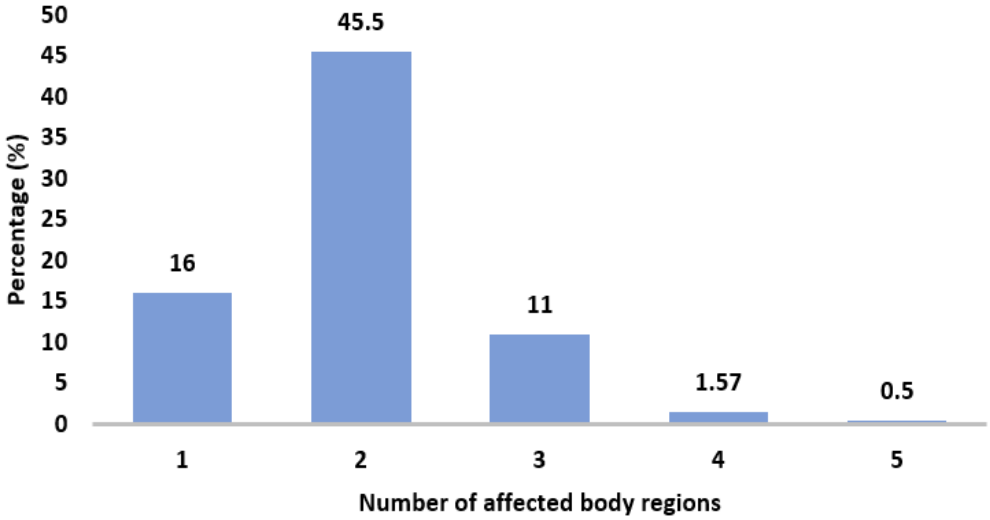

Figure 1.
12-month prevalence of WMSDs among food delivery riders in eastern peninsular Malaysia according to number of affected body regions (n=191).

3.4. Impact of WMSDs and Severity

This study also revealed the impact of WMSD symptoms faced by the riders, which affected their daily life. Shoulder regions show the highest prevalence (45.7%) of body regions affecting their daily activities in the past year. Even though lower back pain was the most common WMSD complaint in the past 12 months, only 18.6% claimed that lower back pain had affected their daily activities. Furthermore, riders with knee symptoms mostly tend to seek medical treatment or physiotherapies compared to other body region symptoms, with a prevalence of 36.4%. In contrast, those with upper back symptoms tend not to seek medical treatment, with a prevalence of 7.6% for the past year. In addition, the common body regions that cause the riders to take medication were thighs, feet, neck, and upper back, with a prevalence of 80.0%, 66.7%, 61.3%, and 57.5%, respectively. WMSDs also caused riders to not work for the past 12 months due to the pain. Shoulders symptoms were the commonest site (54.3%) that caused them to skip their work, followed by feet symptoms (50.0%). However, in terms of severity, lower back pain was the highest body region with at least a moderate pain score which constituted about 82.9%. On the contrary, WMSDs with knee symptoms were the highest body region with a complaint of a mild pain score for the past 12 months. The impact of WMSDs and the severity of the pain are shown in Table 4.

Table 4.
Impact of WMSDs and pain score among food delivery riders in eastern peninsular Malaysia in 12 months (n=191).

Body regions	n	During past 12 months, n (%)				
		Affected daily activities	Seek doctor/ Physio	Need medication	Absent from work	At least moderate
Neck	31	2 (6.45)	4 (12.90)	19 (61.29)	2 (6.45)	13 (41.94)
Shoulders	35	16 (45.71)	10 (28.57)	13 (37.14)	19 (54.29)	11 (31.43)
Upper back	106	31 (29.25)	8 (7.55)	61 (57.55)	18 (16.98)	73 (68.87)
Lower back	140	26 (18.57)	17 (12.14)	52 (37.14)	12 (8.57)	116 (82.86)
Arms/Wrist	10	3 (30.00)	2 (20.00)	5 (50.00)	2 (20.00)	2 (20.00)
Thighs	5	1 (20.00)	2 (40.00)	4 (80.00)	1 (20.00)	3 (60.00)
Knees	11	5 (45.45)	4 (36.36)	6 (54.55)	1 (9.09)	2 (18.18)
Feet	6	1 (16.67)	0 (0.00)	4 (66.67)	3 (50.00)	4 (66.67)

4. Discussion

In numerous occupational sectors, WMSDs have been shown to be the biggest difficulty for both employees and employers. [26]. As the world moves through Industrial Revolution 4.0 (IR4.0), the human workforce fills a major role in massive production to meet the needs of the world population. The exponential increase of WMSDs among workers caused several backlashes toward the productivity of the major industrial players. Punnett and Wegman [27] revealed that WMSDs in certain occupations and industries occurred three to four-fold higher than in the general population. However, the magnitude of WMSDs among food delivery riders in Malaysia was still of unknown status before, even though they were at

very high risk for developing WMSDs due to the nature of their work. Thus, this study was conducted to obtain the burden of WMSDs among this neglected occupational group.

This study found that within the previous 12 months, 74.9% of food delivery riders in Eastern Peninsular Malaysia had WMSDs. This high prevalence of WMSDs also has been reported in many other occupations in various sectors, such as nurses, office workers, hairdressers, and others [24, 28, 29]. In comparison with other occupational motorcyclists, Jaiyesinmi, et al. [10] have reported a prevalence of 92.6% of WMSDs among commercial motorcyclists in Ibadan, Nigeria. The higher prevalence of WMSDs in Nigeria, as compared to this study, could be due to other biomechanical and ergonomic risk factors, such as road conditions and driving attitudes that exposed the motorcyclist to the WMSDs [30, 31]. However, a lower prevalence (67.9%) was seen in a study conducted by Diyana, et al. [9] among male traffic policemen using high-powered motorcycles in Malaysia. Differences in ergonomic posture and mean working hours could be the reason why there was a lower prevalence among male police traffic and food delivery riders in Malaysia. The mean working hours in this study were 10.2 hours per day as opposed to 5.6 hours per day, more than double the mean working hours in that study. In addition, a study by Mirbod, et al. [32] concluded people who ride a motorcycle for more than five hours per day are predisposed to overexposure to WMSDs.

This study also elicited the 12-month prevalence of WMSDs based on specific body regions. Lower back problems had the highest prevalence of WMSDs symptoms, with 73.3% of respondents reporting experiencing symptoms there during the previous 12 months. Even though there was a high prevalence of WMSDs among many other occupations in many studies, the specific anatomical locations with WMSD symptoms were quite different. For example, the highest prevalence (80.0%) of WMSDs among goldsmiths in India and software professionals was in the neck region [33, 34]. The different distribution of WMSDs among different occupational groups was due to the different causal relationships, such as ergonomic posture requirement, nature of work, and biomechanical factors on that specific job [35]. On the other hand, a similar result was obtained by Jaiyesinmi, et al. [10], where lower back pain was the commonest reported WMSD symptom among commercial motorcyclists in Ibadan, Nigeria. Back pain was very prominent among motorcyclists because the riders had unsupported back areas while riding, and they were unable to maintain the proper ergonomic posture while riding the motorcycle [36]. The situation worsened for occupational motorcyclists when the riding time was longer with an improper static position. This tendency was also seen in a study by Hafzi, et al. [8], which found that occupational motorcyclists were more likely to experience Lower Back Pain (LBP) than non-occupational motorcyclists, with a prevalence of 82.3% as opposed to 62.8%. On top of that, among food delivery riders who presented with WMSD symptoms in two body regions, the highest combination was in the upper back and lower back body regions.

In this present study, the least reported WMSD symptoms were confined to the leg regions, with a prevalence of 2.62% on thighs, 3.14% on feet, and 6.28% on knees. The same trend was discovered in a study among occupational motorcyclists in Peshawar, Pakistan, where knees, hips, and ankle regions were among the lowest reported WMSD symptoms by the riders, with a prevalence of 2%, 3%, and 18%, respectively [37]. This was explained by the dynamic position of the lower part of the body while riding the motorcycle makes them less likely to develop MSDs in this area as compared to the prolonged static position on the upper part of the body, especially the unsupported back. However, in a working environment that requires long amounts of standing activity, the prevalence of WMSDs involving lower extremities would rise. For example, Amin, et al. [38] elicited a higher prevalence of WMSD symptoms in the ankle/feet area among nurses as compared to back regions, thus proving that the nature of work plays an important role in determining the specific body regions that might be affected during working.

WMSDs also have been proved to cause a reduction in productivity among the affected workers due to performance reduction and absenteeism [39]. In this present study, WMSD symptoms with knee and shoulder involvement were the highest daily activity disruptors, with a prevalence of more than 40%. In contrast, the lower back area of WMSDs had the highest prevalence, symptoms affecting the neck and lower back were the least talked about body parts that interfered with daily activities. The same finding was revealed in a study among professional dentists in Saudi Arabia, where a high percentage of dentists with WMSDs had their living activities affected and even forced them to change their work settings sometimes [40]. The extension of this further caused them to seek medical treatment or physiotherapy. This shows that the WMSDs that affected knees and shoulders were more severe compared to other parts of the body. According to the findings of this study, food delivery riders had a significant prevalence of seeking medical attention and needing medication to manage WMSDs. They may experience psychological distress and financial strain as a result of this event, which may ultimately affect their ability to work and the number of hours they put in.

In return, these will lead to psychological distress, which will later cause another episode of WMSDs in many ways, such as alteration in higher cognitive function, alteration in muscle tension, and endocrine disturbance [41]. This cycle will continue to repeat, which will finally cause absenteeism among them. This cyclical phenomenon was proven by the findings of this study, where a high prevalence of absenteeism was elicited among the respondents. The highest prevalence was elicited among those who complained of WMSDs for the shoulders and knee regions, where more than half of the respondents could not go to work due to these problems. Even though they were independent contractors who did not have fixed working hours, still it will result in a reduction of their income, and this will further result in a reduction of the company's gain, as the company's income mostly depends on the commissions gained by each rider. A reduction in their income will cause them to have a lower purchasing power, which later will affect their money flow and decrease the purchasing power parity among the workers [42].

5. Conclusions

In general, with the high prevalence of WMSDs among food delivery riders revealed in this study, major changes should be made to reduce the prevalence of WMSDs among them. A multisectoral strategy is essential to enhancing riders' productivity, which will enhance the local economy by enhancing their well-being. Additionally, other interventional research to enhance the working environment for motorcyclists should build on the findings of this study.

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