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Serious injuries and dental trauma in the line of police duty and their long-term consequences

KEYWORDS

Police
 Injuries
 Dental trauma
 Risk assessment

SUMMARY

Confrontations between police officers and citizens have become almost commonplace in today's world. The propensity for violence towards police officers is an ongoing topic. Statistics show a clear increase in violent crimes of this nature. The aim of the present study was to evaluate police officers' risk of injury including orofacial involvement in the line of duty. One hundred and sixty-eight members of a regional police corps in northwestern Switzerland were interviewed with the help of an online questionnaire. The data were kept completely anonymous. Survey questions related to the police officers' life on and off the job and focused on serious line-of-duty injuries (LODIs) that led to a loss of work time. LODIs resulting in work absences were not uncommon: 60.9% had been injured in the line of duty. During their free time, the officers showed a

moderate risk-taking behavior (mean 50, IQR 30–67.2) and a slightly higher level of perceived risk of being injured while on duty (mean 59.1, SD 20). Most line-of-duty injuries occurred during the first 15 years of service. Among the injured police officers, the level of perceived threat of violence while on duty (mean 40, IQR 20–60) was lower than among their non-injured colleagues (mean 50, IQR 21.2–60). The most commonly injured body parts were the hands (20.8%), head (14.9%) and knees (11.3%). Dental injuries were reported in only one case (0.6%). Greater work experience seems to improve the reactions and protective behavior of this occupational group in dangerous situations. Albeit the risk of being injured is high among police officers, dental trauma and orofacial involvement occurs rarely.

Introduction

Accidents and assaults commonly lead to injuries of orofacial structures such as the craniofacial bones, soft tissues, and teeth. High-risk sports, especially martial arts, bat-and-ball sports, and contact sports, are associated with a high risk of injury to the facial bones and teeth (PETROVIĆ ET AL. 2016; VIDOVIC-STESEVIC ET AL. 2015; HERSBERGER ET AL. 2012; MENZEL 2010) due to the high speed of play and powerful physical contacts during these sports.

Certain occupations are also associated with an increased risk of injury. Law enforcement officers, for example, are confronted with acts of violence while on duty on a daily basis and can themselves become victims of violence. Although the general crime rate is decreasing in Switzerland, an increase in verbal and physical assaults towards public servants and police officers has been detected (POLIZEILICHE KRIMINALSTATISTIK SCHWEIZ 2018). In particular, an increase in violent assaults can be observed at public events like demonstrations or football games (ELLRICH ET AL. 2012). From 2000 to 2017, the rate quadrupled, corresponding to more than eight crimes against police officers per day in Switzerland (POLIZEILICHE KRIMINALSTATISTIK SCHWEIZ 2018). In Germany, four out of five police officers reported being insulted or verbally abused on duty in the last six to twelve months, and one out of every five to six officers had even been physically assaulted in the line of duty (ELLRICH ET AL. 2010). Victimization of police officers has been investigated in multiple studies, whose aim was to provide a detailed description of the perpetrators, victims, situational circumstances and (long-term) consequences of violent assaults (OHLEMACHER ET AL. 2003). Studies describing the police officers' experience as victims of violence and the severity of their physical injuries, on the other hand, are scarce (BIBERSTEIN ET AL. 2017). Data on facial and dental trauma incurred from violence against police officers are practically non-existent.

The aim of the present study was to generate data on serious general injuries related to police work and work absences and orofacial injuries resulting therefrom. In addition to risk assessment, police officer equipment, injuries resulting from on-duty accidents and their consequences were also evaluated.

Materials and methods

Members of a police corps in northwestern Switzerland (N = 1,031) were asked to participate in the present study. The majority of persons contacted were uniformed police officers (approximately 700), including 250 traffic safety and patrol officers. The survey was performed in anonymous fashion, independent of influence from the employer.

The aforementioned particular police corps was selected because of its unique location on the border triangle connecting France, Germany and Switzerland. This densely populated international area is home to several small to medium-sized cities (20,000 to 25,000 inhabitants) and greater cities (e.g., Basel city, 178,000 inhabitants, and Basel canton, 200,000 inhabitants). In addition to tri-national and cantonal differences in legislation, international pharmaceutical companies based in Basel and diverse migration flows bring many languages and cultures to the region resulting in new challenges for law enforcement every day.

An online questionnaire (generated on the Questback platform, www.unipark.com) was used to collect data from the police officers, which were kept completely anonymous and processed exclusively on University of Basel servers. Partici-

pation was voluntary. The participants' contact data were obtained from the employer, who approved the survey.

The survey period was limited to two months. Four weeks after the start date, all potential participants were sent a reminder letter encouraging them to participate in the study.

The survey was divided into three categories: general questions (age, sex, years of service and job title), leisure-time-related questions (risk-taking behavior in recreational activities) and job-related questions (perceived risk of being injured while on duty, perceived inhibition threshold for assaults on police officers, number of line-of-duty injuries [LODIs] sustained, parts of the body [e.g., head, neck, teeth] injured, and satisfaction with police training and equipment). Survey items used for this purpose included closed questions with a single response (yes or no) or multiple responses as well as questions to be rated on a visual analog scale (VAS), consisting of a 10 cm line with each level measured in millimeters (Tab. I).

The number of questions to be answered varied because police officers who had sustained on-duty injuries were asked to

Tab. I Online questionnaire sent to potential study participants

Please indicate your age range.		Please indicate your sex.	
<input type="checkbox"/> 20–30 years	<input type="checkbox"/> 31–40 years	<input type="checkbox"/> Male	<input type="checkbox"/> Female
<input type="checkbox"/> 41–50 years	<input type="checkbox"/> 51–60 years		
<input type="checkbox"/> 61 years and older			
How long have you worked as a police officer (years of service)?			
<input type="checkbox"/> 0–5 years	<input type="checkbox"/> 6–10 years	<input type="checkbox"/> 11–15 years	<input type="checkbox"/> 16–25 years
		<input type="checkbox"/> 26–40 years	<input type="checkbox"/> 41 years or more
Which best fits your job description?			
<input type="checkbox"/> Police officer	<input type="checkbox"/> Civilian employee	<input type="checkbox"/> Traffic police	
Does your current or previous police work require direct contact with the public?			
<input type="checkbox"/> Yes		<input type="checkbox"/> No	
Please indicate your tendency to take risks (risk-taking behavior) using the slider.			
-----		-----	
Not willing to take risks		Very willing to take risks	
Have you ever been injured in the line of police duty?			
Only answer "Yes" if the work-related injury resulted in sick leave or absence from work.			
<input type="checkbox"/> Yes		<input type="checkbox"/> No	
Which body parts were injured?			
Multiple selections are possible.			
<input type="checkbox"/> Head	<input type="checkbox"/> Neck	<input type="checkbox"/> Shoulder	<input type="checkbox"/> Stomach
<input type="checkbox"/> Back	<input type="checkbox"/> Upper arm	<input type="checkbox"/> Forearm	<input type="checkbox"/> Buttocks
<input type="checkbox"/> Thigh	<input type="checkbox"/> Lower leg	<input type="checkbox"/> Feet	<input type="checkbox"/> Multiple injuries
	<input type="checkbox"/> Knee	<input type="checkbox"/> Dental injuries	
Did you have prior martial arts training before starting police training?			
<input type="checkbox"/> Yes		<input type="checkbox"/> No	
How high is your risk of being injured in the line of duty? (Please use the slider to indicate.)			
-----		-----	
No risk		High risk	

Tab. I Online questionnaire sent to potential study participants

continued

How long was your longest absence from work due to a work-related injury?

- 1 day 1 week
 2 days 2 weeks
 3 days 3 weeks
 4 days 1 month
 Several months

Do you still feel at all restricted or impaired because of the injury?

- Yes No

Please rate the extent to which you feel threatened on the job.

Not threatened Very threatened

With the resources at your disposal, how well equipped are you to defend yourself if attacked on duty? Please use the slider to indicate.

Pepper spray, TASER, baton, service weapon, etc.

Not enough resources Too many resources

With the training you have received, how well prepared are you to handle violence situations?

Not enough training Excellent training

give more precise information about these injuries, and those who had not skipped this section and only answered the general questions.

The Ethics Committee of Northwestern and Central Switzerland confirmed that the study complies with the general principles of the Swiss Federal Act on Research Involving Human Beings (Human Research Act, HRA) and the provisions of Article 51, paragraph 2 HRA, and that it is ethically sound (Number EKNZ Req-2018-00001).

Statistical analysis and potential interactions

After data collection, relevant variables such as age, years of police service, sex, line-of-duty injury, resources, training and risk were comparatively analyzed to test for statistical differences between groups and potential interactions. Logistic regression models were used to estimate adjusted odds ratios (OR) with the corresponding 95% confidence intervals (CI) and p-values. In order to control for confounding of the effects, the variables were analyzed stepwise. All regression models were adjusted for the sex of the subject and other relevant variables. When there was no significant interaction effect, $p < 0.05$ was defined as statistically significant. Adjustment of significance levels for multiple comparisons was omitted because of the descriptive nature of the study. All analyses were performed with the R statistical data analysis environment, R version 3.5.1 (R CORE TEAM 2018). Results are expressed as the mean with standard deviation (SD) or median with interquartile range (IQR), depending on the distribution of the variables. The IQR is the range where the middle 50% of the data is located.

Results

A total of 168 (corresponding a response rate of 16.8%) data sets were generated for the present study. The participants were police officers, traffic safety officers and civilian personnel. Twelve respondents (including six civilian employees without public contact) had to be excluded from the analysis, yielding a final sample size of 37 female (23.7%) and 119 male (76.3%) police officers. Other demographic characteristics such as age, years of service, how well-trained they felt they were to handle violent incidents, duration of their longest work absence due to a line-of-duty accident or injury, and whether they had prior martial arts training are summarized in Table II.

Line-of-duty injuries that led to work absences are evenly distributed across the respective groups for age and years of service. The reported duration of LODI-related work absence was most commonly one day, three days or two weeks, but

Tab. II Characteristics of the sample (descriptive statistics for “Have you experienced a line-of-duty injury, yes or no?”)

	No		Yes		Total		p-value
	Number	%	Number	%	Number	%	
Age							0.006
20–30 years	30	81.1	7	18.9	37	100	
31–40 years	23	47.9	25	52.1	48	100	
41–50 years	14	45.2	17	54.8	31	100	
>50 years	21	52.5	19	47.5	40	100	
Years of service							0.011
0–5 years	24	80	6	20	30	100	
6–10 years	21	65.6	11	34.4	32	100	
11–15 years	10	45.5	12	54.5	22	100	
16–25 years	22	50	22	50	44	100	
26 years or more	11	39.3	17	60.7	28	100	
Preparation for violence							0.181
Median (IQR)	65.5	40–80	70	50–80	70	50–80	

Tab. II Characteristics of the sample (descriptive statistics for “Have you experienced a line-of-duty injury, yes or no?”) continued

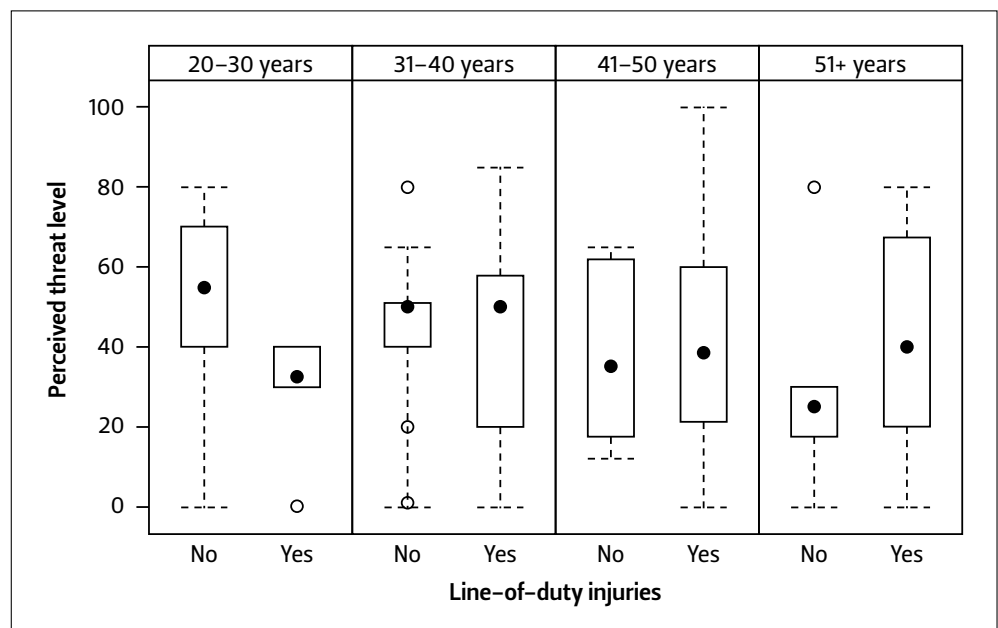
Work-absence duration	No		Yes		Total		p-value	
	Number	%	Number	%	Number	%		
1 day	2	2.3	11	16.2	13	8.3	< 0.001	
2 days	2	2.3	5	7.4	7	4.5		
3 days	4	4.5	11	16.2	15	9.6		
4 days	2	2.3	2	2.9	4	2.6		
1 week	1	1.1	8	11.8	9	5.8		
2 weeks	3	3.4	10	14.7	13	8.3		
3 weeks	2	2.3	5	7.4	7	4.5		
1 month	3	3.4	4	5.9	7	4.5		
Several months	6	6.8	10	14.7	16	10.3		
Not specified	63	71.6	2	2.9	65	41.7		
Total	88	100	68	100	156	100		
Prior martial arts training	Number	%	Number	%	Number	%		0.796
No	46	54.1	38	57.6	84	53.8		
Yes	39	45.9	28	42.4	67	42.9		
Not specified					5	3.2		

absences of up to several months were also reported. Most police officers surveyed rated their preparedness training for violent incidents as “good”. Moreover, 42.9% of participants had prior martial arts training before starting police training.

During their free time, the officers had a moderate risk-taking behavior (mean 50, IQR 30–67.2) and a slightly higher level of perceived risk of being injured in the line of duty (mean 59.1, SD 20). Actual line-of-duty injuries were not uncommon (60.9%).

Perceived threat of violence levels did not differ considerably between police officers who had sustained injuries in the line of duty (mean 40, IQR 20–60) and their colleagues who had not (mean 50, IQR 21.2–60).

In the youngest age group (age 20–30 years), perceived threat levels were significantly lower in individuals who had sustained line-of-duty injuries than in those who had not (Fig. 1). Younger officers differed significantly from their older colleagues in this respect: Perceived threat levels were higher among older

Fig. 1 Police officers' perceived risk of suffering injury while on duty

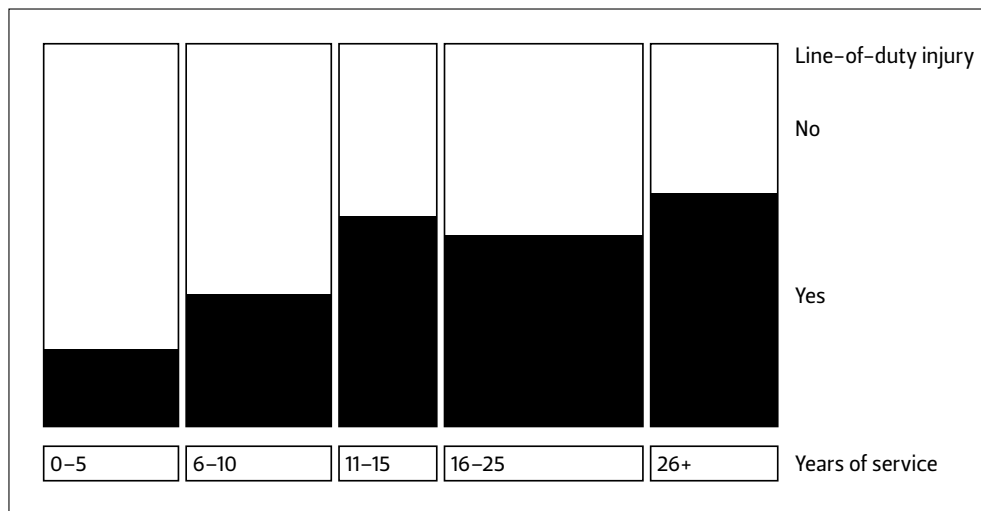


Fig. 2 Line-of-duty injuries by years of service (column width corresponds to group size)

officers with duty-related injuries than in those without injuries. The 41–50-year-old age group was the only cohort where a history of on-duty injury did not influence the level of perceived threat.

When asked about the long-term impact of being assaulted and injured in the line of duty on their daily life, 29.7% of the surveyed officers stated that they had permanent impairments after the injury, and 8.2% gave no response.

Dental injuries were reported in only one case (0.6%). The most commonly injured body parts were the hands (20.8%), head (14.9%) and knees (11.3%).

A continuous increase in the number of violent injuries that led to work absences among police officers occurred during the first 15 years of service. In the following years, the number remained constant or increased slightly and, apparently, hardly any new injuries occurred (Fig. 2).

Discussion

The aim of the present study was to evaluate serious injuries suffered by police officers in a Swiss police corps in the line of duty. Another goal was to identify individual factors that might influence the risk of injury.

168 out of 1,031 potential study participants returned completed questionnaire data sets. By comparison, similar studies had response rates of 47.2% and 54% (ELLRICH ET AL. 2010; BIBERSTEIN ET AL. 2017). The response rate in the present study was lower, presumably due to the voluntary nature of participation and the fact that the study was not initiated by a police or political supervisory authority. Nevertheless, the demographic characteristics (gender distribution, reported age and years of service) of this population are comparable to those of similar studies (VIOLANTI ET AL. 2013).

Various group dynamic factors may have influenced the number of participants. For example, conversations among colleagues about participating (or not participating) in the study can affect one's own participation behavior. Another reason is that some police officers who have been victims of violence may not participate in the survey because they do not want to show any signs of weakness. Thirdly, because of the title of the study ("Serious injuries in the line of police duty and their long-term consequences"), many police officers who do not work in direct contact with the public may have felt that the study did not apply to them and did not participate for that reason.

The number of serious physical injuries increased continuously during the first 15 years of service. One reason for this could be that police officers with more years of service often move on to supervisory, organizational or desk jobs and thus have less contact with the public. Secondly, law enforcement agencies refrain from assigning older officers to security duty if possible. Another study showed that 60% of police officers strive for more self-protection after being injured in the line of duty (JAGER ET AL. 2013). Evidently, increased experience in police work is associated with increased precaution on the part of the individual law enforcement officers, which means more protection on duty.

Confrontations between the police and citizens can occur, especially at public events such as football games and demonstrations. Despite the many-fold increase in these incidents in recent years (POLIZEILICHE KRIMINALSTATISTIK SCHWEIZ 2018), this evidently is not associated with an increased risk of injury for police officers (BIBERSTEIN ET AL. 2017).

Police officers who have not experienced violent assaults on duty tend to over- or underestimate the risk and danger of injury. Prior experience with violence in the line of duty evidently leads to better appraisal of future and dangerous situations.

Close to 30% (29.7%) of police officers surveyed in this study still had health impairments related to a line-of-duty injury. This may be an indication that the intensity of assault has increased. Our results on the diversity and severity of injuries and the length of work absences related to them support this assumption. Questions investigated in this survey study focused mainly on the incidence of physical injuries and less on psychological stress. However, one study on this topic described how psychological stress is also increasing due to the continuous increase in public scrutiny of the police (GASCH ET AL. 2017). Cell phone and other recordings of police actions are drawing increasing media attention to law enforcement, which can increase the psychological pressure associated with police work. Future studies should look deeper into this phenomenon.

In conclusion police officers are aware of their risk of work-related injury. Moreover, with the training and continuing education they had received, they felt that by and large they were well-prepared to de-escalate potential conflict situations and resolve them in the most peaceful way possible.

The number of assaults and injuries incurred during active police duty is increasing, but police officers' perceived threat

of violence is still relatively low. However, long-term physical consequences of line-of-duty injuries are not uncommon. Overall, oral and dental injuries in the line of police duty are rare compared to head injuries.

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Zusammenfassung

Einleitung

Die Ausübung spezifischer Berufe kann mit einem erhöhten Risiko für Unfälle und Verletzungen einhergehen. Eine Berufsgruppe, die im Dienstalltag mit Tötlichkeiten konfrontiert und selbst Opfer von Gewalt werden kann, ist die Polizei. Auseinandersetzungen zwischen Polizisten und Bürgern stellen in der heutigen Zeit ein fast alltägliches Problem dar. Obwohl die Zahl der allgemeinen Straftaten insgesamt rückläufig ist, ist bei verbalen und physischen Gewaltdelikten gegen Behörden und Beamte ein Anstieg zu erkennen.

Das Ziel der vorliegenden Untersuchung war die Erfassung gravierender allgemeiner Verletzungen, die zu einem Arbeitsausfall führten, sowie in diesem Zusammenhang auftretende Verletzungen orofazialer Strukturen im aktiven Polizeidienst. Daten zu Traumata im Bereich des Gesichtes und Zahnverletzungen aufgrund von Gewalt gegen Polizisten sind praktisch nicht verfügbar.

Material und Methoden

Für die vorliegende Untersuchung wurde ein Polizeikorps der Nordwestschweiz (N = 1031) befragt. Ein Grossteil der Kontaktierten waren etwa 700 uniformierte Beamte, davon 250 Sicherheits-/Patrouillenpolizisten. Die Daten wurden anhand eines Onlinefragebogens (generiert auf der Plattform Questback, www.unipark.com) erhoben, vollständig anonymisiert und ausschliesslich auf den Servern der Universität Basel bearbeitet. Die Umfrage wurde in drei Kategorien eingeteilt: allgemeine Fragen (Alter, Geschlecht, Anzahl Dienstjahre, Funktion), die Freizeit betreffende Fragen (Risikofreudigkeit in der Freizeit) und berufsbezogene Fragen (subjektiv empfundenes Risiko, eine Verletzung zu erleiden, Einschätzung der Hemmschwelle für Übergriffe gegenüber Polizisten, Anzahl erlittener Verletzungen im Dienst sowie deren Lokalisation, Zufriedenheit mit der polizeilichen Ausbildung sowie mit der Ausrüstung). Ein besonderes Augenmerk lag auf den erlittenen gravierenden Verletzungen, die zu einem Arbeitsausfall führten.

Resultate

Für die vorliegende Studie konnten insgesamt 168 Datensätze generiert werden. Die Teilnehmer waren Polizisten, Verkehrs-sicherheitsangestellte und zivile Mitarbeiter. Verletzungen im Berufsalltag von Polizistinnen und Polizisten, die zu einem Arbeitsausfall führten, traten nicht selten auf: 60,9% der Befragten berichteten von Verletzungen im Dienst. In der Freizeit zeigten die Befragten ein mittleres Risikoverhalten (mean 50, IQR 30–67,2) und eine leicht erhöhte Wahrnehmung für das Risiko, eine Verletzung im Berufsalltag zu erleiden (mean 59.1, SD 20). Ein Grossteil der Verletzungen passierte in den ersten 15 Dienstjahren.

Beamte, die bereits eine Verletzung erlitten hatten, schätzten die Bedrohung im Berufsalltag niedriger ein (mean 40,

IQR 20–60) als ihre Kollegen ohne Verletzung (mean 50, IQR 21,2–60). Am häufigsten waren die Hände betroffen (20,8%), gefolgt vom Kopf (14,9%) und von den Knien (11,3%). Lediglich ein Teilnehmer gab an, eine Zahnverletzung erlitten zu haben (0,6%). Nach einer tätlichen Verletzung fühlten sich 29,7% der Verletzten in ihrem beruflichen Alltag eingeschränkt.

Diskussion

Zunehmende Berufserfahrung geht mit erhöhten Vorsichtsmassnahmen der einzelnen Polizistinnen und Polizisten einher. Dies scheint das Reaktions- und Schutzverhalten in heiklen Situationen zu verbessern, was sich tendenziell schützend auswirkt. Das Risiko für Verletzungen ist sehr präsent im Dienstalltag von Polizisten, und auch Verletzungen des Kopfes treten nicht selten auf. Jedoch werden orofaziale Strukturen seltener verwundet, und es kommt nur in sehr seltenen Fällen zu Zahnverletzungen im Polizeidienst.

Résumé

Introduction

L'exercice de certaines professions peut être associé à un risque accru d'accidents et de blessures. La police fait partie des groupes professionnels dont les membres peuvent être confrontés à des agressions et être eux-mêmes victimes de violence dans leur travail quotidien. Les altercations entre policiers et citoyens constituent un problème presque quotidien dans le monde d'aujourd'hui. Bien que le nombre des infractions générales soit globalement en baisse, on constate une augmentation des violences verbales et physiques à l'encontre des autorités et des agents de la fonction publique.

L'objectif de la présente étude était d'enregistrer, dans les services de police actifs, les blessures générales sérieuses ayant entraîné un arrêt de travail, ainsi que les blessures impliquant des structures oro-faciales. Les données relatives aux traumatismes faciaux et aux lésions dentaires imputables à des actes de violence à l'encontre de policiers sont pratiquement inaccessibles.

Matériel et méthodes

Pour réaliser cette étude, les membres d'un corps de police de la Suisse du Nord-Ouest (N = 1031) ont été interrogés. La plus grande partie des personnes contactées était composée d'environ 700 agents en uniforme, dont 250 étaient des agents de sécurité et de patrouille. Les données ont été collectées au moyen d'un questionnaire en ligne (généré sur la plateforme Questback, www.unipark.com), complètement anonymisées et traitées exclusivement sur les serveurs de l'Université de Bâle. L'enquête était divisée en trois catégories: les questions générales (âge, sexe, nombre d'années de service, fonction), les questions relatives aux loisirs (plaisir à prendre des risques pendant les loisirs), et les questions relatives au travail (perception subjective du risque de subir une blessure, évaluation du seuil d'inhibition relatif aux agressions à l'encontre de policiers, nombre et localisation des blessures subies en service, satisfaction à l'égard de la formation et de l'équipement des policiers). Une attention particulière a été accordée aux blessures graves ayant entraîné un arrêt de travail.

Résultats

Au total, 168 ensembles de données ont été générés dans le cadre de la présente étude. Les participants étaient des policiers, des employés de la sécurité routière et des collaborateurs civils. Les blessures survenant dans la vie professionnelle quotidienne des

policiers et entraînant un arrêt de travail ne sont pas rares : 60,9 % des personnes interrogées ont rapporté avoir subi en service une blessure de ce type. Pendant leurs loisirs, les répondants ont rapporté un comportement à risque correspondant à la moyenne (moyenne 50, écart interquartile [EI] 30–67,2), et une perception légèrement accrue du risque de subir une blessure dans le cadre de leur travail quotidien (59,1 en moyenne, déviation standard [DS] 20). Une grande partie des blessures se sont produites au cours des 15 premières années de service.

Les agents ayant déjà subi une blessure ont évalué cette menace dans leur vie professionnelle quotidienne à un niveau inférieur (moyenne 40, EI 20–60) par rapport à leurs collègues sans blessure (moyenne 50, EI 21,2–60). Les mains sont atteintes le plus souvent (20,8 %), puis la tête (14,9 %) et les genoux (11,3 %).

Un seul participant a indiqué avoir subi une lésion dentaire

(0,6 %). Après une agression physique ayant provoqué une blessure, 29,7 % des personnes blessées se sont senties limitées dans leur vie professionnelle quotidienne.

Discussion

L'augmentation de l'expérience professionnelle des agents de police s'accompagne d'une amélioration des mesures de précaution dont ils s'entourent. Dans les situations délicates, leur comportement en matière de réaction et de protection semble se bonifier, ce qui a tendance à diminuer les risques. Le risque de lésions traumatiques est très présent dans le travail quotidien des policiers, et les blessures au niveau de la tête ne sont pas rares. Cependant, les structures oro-faciales sont plus rarement atteintes, et les lésions dentaires en service de police restent exceptionnelles.

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