

## Tattooing in Finland: A Survey in a Tattoo Convention

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**Objectives.** Tattoos are increasingly popular in Northern Europe. There are currently very limited data about the features of tattoos and complications in Finland. We aimed to assess the demographic of tattooed individuals and the rate of complications on tattoos in a tattoo convention in Finland.

**Study design.** An observational anonymous self-reported 15-question survey was performed among the visitors of a tattoo convention in Hämeenlinna, Finland.

**Results.** Of the 46 tattooed respondents, 61% were women and the mean age was 33 years old. The mean number of tattoos was 4.8; for a tattooed body surface of 14%. The tattoos were multicoloured in 56% of the cases (mean number of colour 2.8). Twenty percent reported at least one amateur tattoo and 6.5% only home-tattoos and 28% were still minor (< 18 years) when receiving their first tattoo. An acute local adverse “tattoo reaction” was reported 8.6% that necessitated a medical consultation and treatment in 75% of the cases, but without any severe consequences. No chronic reaction or other complication was here reported.

**Conclusion.** Despite limitations due to a small sample size and the selection bias, the profile of the “tattooed Finn” is similar to other studies in Europe or in the USA. *Key words:* tattooing, epidemiology, allergy, tattoo pigment, tattoo reaction.

### Introduction

Approximately 10 to 20% of the general population in western countries is currently tattooed (1). Even though the overall number of complications remain rare compared to the millions of tattooed individuals throughout the world, there is still concern regarding the possible health issues related to tattooing (2). In Finland, the 2009 youth barometer found a prevalence of 15% among the 20–30 years old (3). According to the Finnish tattoo union (Suomen Tatuoitijyhdistys), there would be approximately 300 to 400 “professional” tattooists in Finland, i.e. one tattooist for 13,500 inhabitants. The extent of home tattooing in Finland is unknown. Overall, there is a lack of data regarding tattooing epidemiology in Finland. To address this issue, we administered a survey about tattooing and adverse tattoo reactions to visitors of a tattoo convention (Unique Art Tattoo Festival, UATF) that took place in Hämeenlinna during summer 2015.

### Materials and methods

#### Design

This anonymous survey was designed for Finnish-speaking individuals. Anyone tattooed or not could answer the survey. If a participant was not tattooed, he was only asked to write his sex, age and whether or not he was considering getting a tattoo within the next year. For the tattooed participants, the survey consisted of 15 questions inquiring about age, sex, features of the tattoo(s): number of tattoos, colours, localization on the body, approximation of the tattooed body surface, the year when the first and the last tattoo were performed and whether the tattoos were performed in a tattoo studio, a convention or at home/in amateur conditions). To help them to assess correctly the tattooed body surface, we provided in the questionnaire the “rule of palm” (1 palm + hand = 1% of the body surface) for small areas and the “Wallace rule of 9” for larger areas. We also inquired about past history of allergies (food, medicines or contact allergy) and lastly the participants could mark whether they had experienced an adverse tattoo reaction on one of their tattoos. An adverse tattoo reaction was defined on the survey as the following: “any skin sign or symptom that differs from what you would consider a normal part of tattooing or tattoo healing. This can include, but is not limited to, persistent redness, itching, rash, irritation, swelling, scarring, infection, disfigurement, raising, and photosensitivity which you consider beyond the normal expectations for tattooing and tattoo healing”. The survey was given upon registration at the tattoo convention during the 2 days of the convention on July the 24<sup>th</sup> and the 25<sup>th</sup> 2015. No incentive was given in exchange of answering the questionnaire. The participants had no time restriction and could be free to fill the form and bring it back in a box at the registration desk. No institutional review board approval was sought for this study.

#### Statistical analysis

The statistical analysis was conducted with SPSS version 22.0. Survey participants’ characteristics are presented as means  $\pm$  standard deviations (SD) for continuous variables and as frequencies and proportions for categorical variables. The characteristics were compared using the  $\chi^2$  test for categorical variables and Mann-Whitney *U*-test for continuous ones. Spearman’s rank correlation coefficient was applied for age, number of tattoos and number of colours, multi-coloured or black tattoos, tattooed body surface, and the occurrence of a tattoo reaction. Statistical threshold was set at  $p < 0.05$ .

## Results

According to the organizers of the UTAF, approximately 1,500 individuals came to attend this event during those 2 days. Fifty-two answers were returned (response rate 3.5%). Five participants were not tattooed (3 women, mean  $\pm$  SD age  $25 \pm 8.4$  years). Only one of them (20%) was considering getting a tattoo within the forthcoming year. One questionnaire of a tattooed participant was excluded because of missing parts, so that overall 46 questionnaires were analyzed for this study.

### Features of the tattooed cohort

The general characteristics of the population are summarized in Table I. The cohort consisted of 28 women and 18 men (sex ratio W:M 1.55). The mean  $\pm$  SD age of the respondents was  $33.3 \pm 9.2$  years (range 20–53). The mean  $\pm$  SD age at first tattoo was  $22.6 \pm 7.8$  years (range 15–47). Nine participants (25%, 9/36) were <18 years old when they received their first tattoo (age range 14–17 years).

Most of the respondents had more than one tattoo (88.6%). Eight (18.2%) had more than 10 tattoos. The mean number of tattoo per respondent was  $4.8 \pm 3.6$ . There was no statistical difference between sex (Mann Whitney *U*-test,  $p > 0.05$ ). The

mean tattooed body surface was estimated to 14%. Men had statistically larger tattooed body surface than women (Mann Whitney *U*-test  $p = 0.027$ ). An older age did not correlated with a higher tattooed body surface (Spearman's  $r = 0.142$ ,  $p = 0.381$ ), but was associated with having multicoloured tattoos (Spearman's  $r = 0.335$ ,  $p = 0.026$ ). We did not find and significant sex difference between the tattoo localization. Only a trend among women was observed regarding tattoos of the head and neck area without reaching statistical significance (25% versus 5%,  $\chi^2$  test  $p = 0.07$ ). Men favoured tattoos on the arm (77%), shoulder (61%) and leg (50%), while women had more often tattoos on the arm (75%), back (46%) and feet (43%) (Fig. 1).

In our cohort, only 44% had tattoos in black or gray. The mean number of colour used was 2.8 (range 1–10). We did not consider “gray” as a distinct colour from black in this study. A part from black, the colours the most often reported were red (69%), blue (62%) and green, yellow and white (56%). Even though women tended to have more coloured tattoos, there was no significant difference according to sex in the choice of the colours. Spearman correlation showed a statistical positive correlation between the number of tattoos and the tattooed body surface ( $r = 0.767$ ,  $p < 0.01$ ).

Ten participants acknowledged that they had at least one amateur tattoo (21.7%), and 3 reported only home tattoos (6.5%). Twenty-eight percent were minor when they had their first tattoo. None were minor when they received their last one. Thirteen participants (28%) reported a past history of allergies: antibiotics ( $n = 5$ ), food allergy ( $n = 4$ ), nickel ( $n = 1$ ), allergy type was unspecified in 2 cases. An additional patient mentioned a past history of photosensitivity to sun light without further precision. The detailed characteristics are summarized in Table II.

### Features of the tattoo reactions

Four participants (3 men, 1 women; 8.9% of the respondents) reported experiencing an acute tattoo reaction that occurred within a few days after tattooing. Tattoos were located on the leg ( $n = 2$ ) or the shoulder ( $n = 1$ ). They involved the red colour ( $n = 1$ ) or the white and black ( $n = 1$ ). Those 4 had greater tattooed body area surface compared to those with no complication:  $40 \pm 25.8\%$  (range 10–70%) versus  $11.6 \pm 15.5\%$  (range 1–69%, Mann-Whitney *U*-test  $p = 0.015$ ). They had a significantly higher number of tattoos ( $9.7 \pm 2.5$  versus  $4.3 \pm 3.3$ , Mann Whitney *U*-test  $p = 0.009$ ). A positive correlation was confirmed between a tattoo reaction and the tattooed body surface (Spearman's  $r = 0.396$   $p = 0.013$ ) and the number of tattoos (Spearman's  $r = 0.398$   $p = 0.007$ ). They also had higher mean number of tattooed colors  $6 \pm 4.2$  versus  $2.45 \pm 2.6$ , but without statistical correlation with a tattoo complication (Mann

Table 1. Characteristics of the study population ( $n = 46$ )

Age, years, mean $\pm$ SD	33.3 $\pm$ 9.2
Gender, $n$ (%)	
Men	18 (39)
Women	28 (61)
Type of tattoo colour (n/a: $n = 1$ ), $n$ (%)	
Black, gray	20 (44)
Multicoloured	25 (56)
Number of colour (n/a: $n = 11$ ), $n$ (%)	
1	20 (57.1)
2	4 (11.4)
3 to 10	11 (31.5)
Number of colours, mean $\pm$ SD	2.8 $\pm$ 2.8
Men	2.8 $\pm$ 3.0
Women	2.9 $\pm$ 2.8
Percentage body surface (n/a: $n = 6$ ), mean $\pm$ SD	14.4 $\pm$ 18.3
Men	20.8 $\pm$ 21.8*
Women	9.7 $\pm$ 14
Number of tattoo (n/a: $n = 2$ ), $n$ (%)	
One	5 (11.4)
Multiple	39 (88.6)
Number of tattoo (n/a: $n = 2$ ), mean $\pm$ SD	4.8 $\pm$ 3.6
Men	5.4 $\pm$ 3.8
Women	4.4 $\pm$ 3.4
Tattoos performed by, $n$ (%)	
Professional tattooist	43 (93.5)
At least one amateur/home tattoo	10 (21.7)
Amateur/home tattooing only	3 (6.5)
Tattoo reaction (n/a: $n = 1$ ), $n$ (%)	4 (8.9)

\* $p = 0.027$

n/a: not answered; SD: standard deviation.

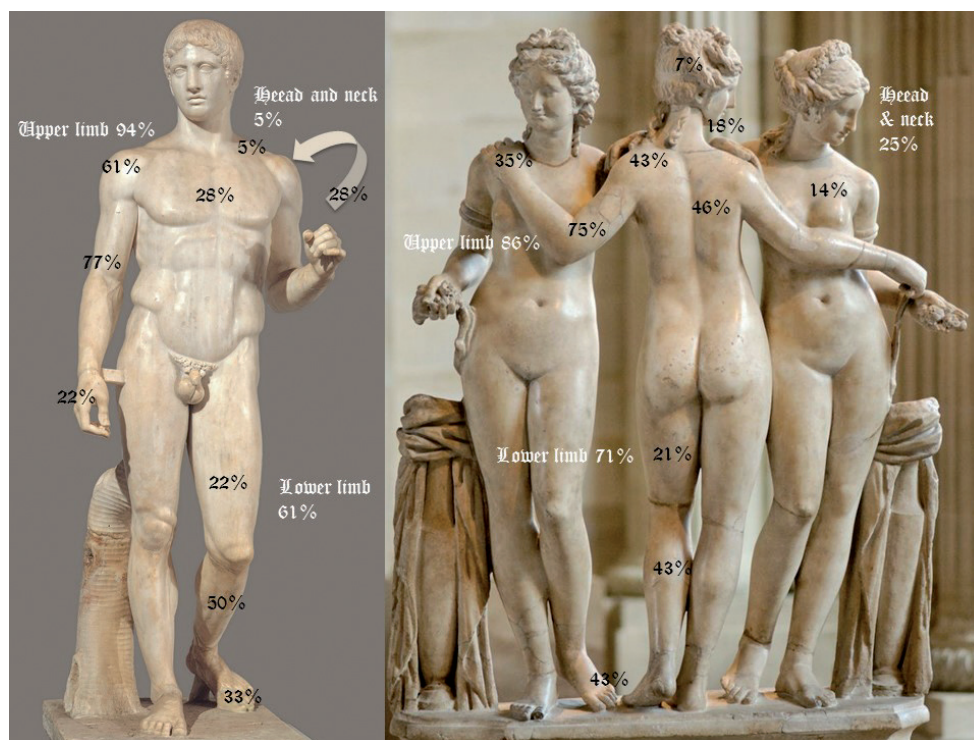


Fig. 1. Distribution of the tattoos on the body according to gender.

Whitney *U*-test  $p > 0.05$ , Spearman's  $r = 0.331$ ,  $p = 0.052$ ). The reaction was described as an inflammation or a swelling of the tattoo area. In 3 cases, the participants all warned their tattooist about the reaction and sought for medical advices to a physician. A medical treatment was prescribed in those 3 cases, including antibiotics and the symptoms alleviated. In a fourth case, the participant did not seek advice and reported abnormal scarring process as a complication of tattoo. No one report any chronic reaction, nor other complication on their tattoos. None of them had any past allergies.

## Discussion

We report here the first study on tattooed individuals in Finland. We do not have the knowledge of any recent study in Northern Europe across the Baltic Sea. In Scandinavia, only our colleagues from Copenhagen University Hospital, in Denmark are currently active on this topic (4, 5). Other studies have been performed mainly in Germany (6) and in the United States (7–9). Our main aim was to investigate the tattoo features in Finland and possibly try to estimate the prevalence of tattoo reactions. We choose to perform this study in a tattoo convention, which is a meeting and exhibition for tattoo enthusiasts and tattooists for a few days, usually during a week-end.

Most of the characteristics of our tattooed cohort here is consistent with previously published data. Indeed, we observed a

female predominance in our cohort (6, 8, 9). The mean number of tattoos and tattooed colours (Table I) was similar as in other recent studies (8, 9). Men tended to have larger tattoos in size as assessed by the tattooed body surface, but not by number of tattoos compared to women. It confirms the usual “trend” that women prefer small tattoos than men in general (6, 7). The number of tattoos was correlated with the body surface, but not to the number of colours. The number of participants that had a least one home-tattoo was quite elevated (21.7%). Three of them (6.5%) reported only home-tattoos. This number is higher than previously reported elsewhere (6). Another surprising results was the high prevalence of first tattoo done when under 18 (28%), especially among women (32%). Seven of them were aged 17, and 3 aged between 14 and 16. Those numbers are higher than those reported by Klügl et al. in Germany (6). Both results should however be confirmed by larger studies in Finland as it may reflect the convenience sample and a small-size effect.

Eight percent of the cohort reported an acute adverse reaction after tattooing, but no chronic reaction was reported here. No participants with any allergy reported any local complication as opposite to other studies (8). Three of them had acknowledged home-tattooing in the past, but none mentioned whether home tattooing was the culprit. Because of the design of the study, we could not determine the nature of the complications. The 3 individuals with “inflamed” tat-

Table II. Detailed characteristics of the tattoos in the study population, according to gender

	Men	Women	Total
Age, Years, mean±SD	35.2±9.3	32.1±9.2	33.3±9.2
Number of tattoos, % (n/total)			
1	0 (-)	18 (5/27)	11 (5/44)
2	29 (5/17)	22 (6/27)	25 (11/44)
3	35 (6/17)	7 (2/27)	13 (6/44)
4	6 (1/17)	22 (6/27)	16 (7/44)
5	-	3.5 (1/27)	2 (1/44)
6	12 (2/17)	-	4 (2/44)
7	-	3.5 (1/27)	2 (1/44)
8	-	-	0 (-)
9	-	7 (2/27)	4 (2/44)
10	-	3.5 (1/27)	2 (1/44)
>10	29 (5/17)	11 (3/27)	18 (8/44)
Tattooed body surface, %, mean±SD	20.8±21.8 (1–70)	9.7±14 (1–69)	14.4±18.3 (1–70)
Localization, % (n/total)			
Finger/hand	22 (4/18)	35 (10/28)	30.4 (14/46)
Arm	77 (14/18)	75 (21/28)	76 (35/46)
Shoulder	61 (11/18)	43 (12/28)	50 (23/46)
Upper limb	94 (17/18)	86 (24/28)	89 (41/46)
Tight	22 (4/18)	21 (6/28)	22 (10/46)
Leg	50 (9/18)	43 (12/28)	46 (21/46)
Foot/toes	33 (6/18)	43 (12/28)	39 (18/46)
Lower limb	61 (11/18)	71 (20/28)	67 (31/46)
Back	28 (5/18)	46 (13/28)	39 (18/46)
Trunk	28 (5/18)	14 (4/28)	19.5 (9 /46)
Neck	5 (1/18)	18 (5/28)	13 (6 /46)
Head	0 (0/18)	7 (2/28)	4 (2 /46)
Head & neck	5 (1/18)	25 (7/28)	17 (8/46)
Colour, % (n/total)			
Only in black/gray	50 (9/18)	37 (10/27)	42 (19/45)
Multicolored	50 (9/18)	63 (17/27)	58 (26/45)
Black	100 (15/15)	100 (19/19)	100 (34/34)
Gray	66 (10/15)	47 (9/19)	56 (19/34)
Red	83 (5/6)	60 (6/10)	69 (11/16)
Green	66 (4/6)	50 (5/10)	56 (9/16)
Blue	50 (3/6)	70 (7/10)	62 (10/16)
Yellow	66 (4/6)	50 (5/10)	56 (9/16)
Orange	50 (3/6)	40 (4/10)	44 (7/16)
Pink	16 (1/6)	20 (2/10)	19 (3/16)
Violet	33 (2/6)	10 (1/10)	19 (3/16)
White	50 (3/6)	60 (6/10)	56 (9/16)
Brown	33 (2/6)	20 (2/10)	25 (4/16)
Type, % (n/total)			
Only professional	78 (14/18)	78 (22/28)	78 (36/46)
Professional and home tattooing	22 (4/18)	21 (6/28)	21 (10/46)
Only home tattooing	5.5 (1/18)	7 (2/28)	6.5 (3/46)
Minor (< 18 Year) at first tattoo, % (n/total)			
Yes	21.5 (3/14)	32 (7/22)	28 (10/36)
No	78.5 (11/14)	68 (15/22)	72 (26/36)

toos all warned their tattooist of their condition and sought for medical advice. No long-term complication was reported except scarring on the fourth case.

Our study results are mainly limited by the low response rate compared to other studies (6–9). The difficulties to perform

clinical research among tattooed individuals are well known. Tattooed individuals are often reluctant to take part to such studies because of the negative connotations that are often associated with tattooing. To achieve an acceptable response rate, studies usually are based on phone interviews (7), Internet survey (6) or direct interview of randomly selected tattooed

individuals by surveyors (5, 8, 9). Because of lack of funding in our study, we designed a short survey inspired from previous studies (7, 9) and choose the setting of a small new tattoo convention. The questionnaire was limited to a single page to be the less time-consuming as possible. However, no incentive was given in exchange of answering the survey. Besides, tattooed individuals who attend tattoo convention are not totally representative of the tattooed community. They are usually tattoo enthusiasts that may disclose a higher number or larger tattoos than the overall tattooed population. In this respect, our study is close to the study published by Klügl et al. in 2010 (6). Lastly, the questionnaires were not always fully answered and we had sometimes to deal with loss of data.

Despite those limitations and the highly selected cohort here, our results provide some insights on tattooing in Finland. The snap shot of the “typical tattooed Finn” in this study is quite similar to the profile seen in other countries, a  $\geq 30$  years old male or female tattooed on 14% of his body with 4–5 tattoos made of 2–3 colours (6–9). The most striking feature was here the high number of participants that has received in the past at least one home-tattoo. In the past, we have seen a very uncommon severe infection due to home-tattooing in Finland (10). Besides, the issues of tattooing minor should be addressed. A better regulation of the profession of tattooist is warranted in Finland as it is currently done in other European countries. We hope meanwhile to perform larger epidemiological studies in Finland about tattooing.

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