

The Demographics and Rates of Tattoo Complications, Regret, and Unsafe Tattooing Practices: A Cross-Sectional Study

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BACKGROUND Tattoos have become increasingly common in the United States; however, there are limited data on the rates of tattoo complications and tattoo regret.

OBJECTIVE To determine the rates of infectious and allergic complications after tattooing, rates of tattoo regret, the perception of dermatologists among people with tattoos, and the demographics of people with tattoos.

MATERIALS AND METHODS An 18-question cross-sectional survey was fielded in New Orleans in January 2015. Participants had to be at least 18 years old, have at least 1 tattoo, and reside within the United States.

RESULTS In total, 501 participants from 38 American states were enrolled. Of all participants, 3.2% had a history of an infected tattoo, 3.8% had a history of a painful tattoo, and 21.2% had a history of a pruritic tattoo; 16.2% of participants regret a current tattoo and 21.2% are interested in having 1 or more tattoos removed; 21.2% received a tattoo while intoxicated and 17.6% had a tattoo placed somewhere other than at a tattoo parlor; and 78.9% believe dermatologists are knowledgeable about the infectious and allergic complications of tattoos.

CONCLUSION Given the rates of pruritic tattoos and tattoo regret, there is an opportunity, and trust among people with tattoos, for dermatologists to manage these complications.

The authors have indicated no significant interest with commercial supporters.

In the United States, rates of tattooing have increased over the past several decades. It is currently estimated that 21% to 24% of the population in the United States has at least 1 tattoo.^{1,2} Tattoos also seem increasingly common in younger generations.² As tattoos become more common, so too may tattoo regret. In previous studies, it has been estimated that 16% to 44% of people with tattoos, for various reasons, later regret at least one of their tattoos.^{3–6} Tattoos are also not without risk. At the site of a tattoo, patients are at risk for developing infections, allergic contact dermatitis, pseudolymphoma, and inflammatory reactions.^{7,8}

As tattoos have become more common, the authors wanted to investigate the rates of tattoo regret and tattoo removal in people with tattoos. The authors were also interested in assessing the rate of infections and distant pruritus and pain in people with tattoos, and also the rate of unsafe practices, specifically being intoxicated while receiving a tattoo and receiving a tattoo somewhere other than a traditional tattoo parlor. Additionally, the authors sought to identify the average number of tattoos and tattoo sessions among people with tattoos. Finally, although dermatologists learn about tattoo complications, in their experience,

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the authors believe that most patients with tattoo complications present to a tattoo artist rather than a physician. Therefore, the authors assessed how knowledgeable people with tattoos believe dermatologists are at managing tattoo complications relative to tattoo artists, primary care physicians, and pharmacists.

Methods

Study Design and Population

An 18-question survey was fielded in Jackson Square in New Orleans on January 1, 2, and 4, 2015 (see **Supplemental Digital Content**, Survey1, <http://links.lww.com/DSS/A29>). The survey was only administered between the hours of 11:00 AM and 3:00 PM. The survey items were partially self-constructed and partially based on a similar, earlier study.² Before administering the survey on these dates, it was pre-tested in a small cohort.

The questionnaire was administered by study coordinators who verbally invited people walking through Jackson Square to participate. To participate, participants had to verbally confirm that they currently or previously had at least 1 tattoo, were at least 18 years old, and had not previously completed the survey. Study coordinators subsequently read the purpose, consent, and instructions to all participants. All subjects provided the coordinator with verbal consent to participate in the study. Participants completed the survey on their own, and each survey took approximately 2 to 3 minutes to complete. The survey was approved by the Tulane University Biomedical Institutional Review Board.

Study Measures

The survey measured basic demographics including age, sex, race/ethnicity, and state of residence. To avoid complications, the authors encountered in an unrelated survey,⁹ they grouped race and ethnicity into a single group instead of separate categories. Participants were asked to list their total number of tattoos and number of tattoo sessions. This question was queried because a person with a large tattoo may require numerous sessions, and the risk of the tattoo becoming infected or

rates of regret may vary depending on the size of the tattoo. The survey inquired as to how old the participants were when they received their first tattoo, and whether they were considering getting a new tattoo within the next 12 months.

To assess the perception of dermatologists among people with tattoos, participants were asked how knowledgeable they believed the typical tattoo artist, primary care physician, dermatologist, and pharmacist were on the infectious and allergic complications of tattoos. Participants were provided with a four-point Likert scale, which ranged from “very knowledgeable” to “not at all knowledgeable.” A fifth option, “unsure,” was also provided.

Rates of tattoo regret were assessed with questions inquiring whether the participants had ever attempted to remove a tattoo, and if so, what method they used. Participants were also asked whether they regretted any current tattoos and whether they would be interested in having any tattoos removed for free.

Finally, to measure rates of tattoo complications, participants were asked to self-report if any of their tattoos became infected and if pruritus or pain was present 1 month after the tattoo was placed. One month was selected as a time cutoff because after the trauma of tattoo placement, the skin will often be pruritic for several days.⁷ Because most patients will have this initial pruritus, a 1 month cutoff limited cases of pruritus to causes other than the initial trauma of placement. To explore high-risk behavior, 1 survey item inquired whether participants were intoxicated while receiving 1 or more tattoos and another item investigated whether any of their tattoos were placed somewhere other than a tattoo parlor, such as at a party or in prison.

A non-response bias could not be assessed because the authors did not track the number of participants who were verbally invited to take the survey but declined participation. Only fully completed surveys were included in the final data set. In total, 24 surveys were excluded from the final sample: 15 left 1 or more questions blank and 9 were not American (7 from Canada, 1 from Norway, and 1 from Australia).

Statistical Analysis

The analysis was conducted using Stata version 11.2. Generally, inferential statistics were limited to chi-square tests to measure differences between categorical variables and standard two-sample *t*-tests to measure differences in ratio variables. To analyze differences in means between and within groups of more than two levels, analysis of variance was used. A *p*-value less than .05 was considered statistically significant.

Results

Table 1 shows the demographics of all participants. In total, 501 surveys were included in the final data set. There were more female (54.7%) than male participants (45.3%). Most study participants (79.0%) were white. In total, participants resided in 38 different states, and also Puerto Rico and Washington, DC (data not shown). Most participants are residents of the Southeastern United States (57.3%). Although the study was administered in Louisiana, only 28.3% of participants were Louisiana residents.

The number of tattoos, tattoo sessions, and sessions per tattoo stratified by current age and gender is

TABLE 1. Gender, Race/Ethnicity, and State of Residence of All Participants*

Number of surveys	501 (100.0)
Gender	
Male	227 (45.3)
Female	274 (54.7)
Race/ethnicity	
African American/Black	36 (7.2)
Asian/Pacific Islander	15 (3.0)
Hispanic/Latino	26 (5.2)
Native American	4 (0.8)
White	396 (79.0)
Two or more races	24 (4.8)
State of residence (grouped by region)	
Northeast	39 (7.8)
Midwest	41 (13.2)
West	30 (6.0)
Southeast	366 (73.1)
Louisiana	142 (38.8)
Not Louisiana	224 (61.2)

*Data reported as n (% of total).

summarized in Table 2. With few exceptions, within each age cohort, there was no statistically significant difference between men and women. However, men were more likely than women to have more sessions in the 18 to 29 and 30 to 39 cohorts and a greater number of sessions per tattoo in the 18 to 29 cohort. Analysis of the aggregate data set showed that men were more likely than women to have more tattoos ($p = .0049$), but there was no statistically significant difference between genders in terms of sessions or tattoos per session. Participants who are considering a tattoo within the next 12 months tend to be younger on average than people who are not ($p = .026$).

To assess rates of tattoo regret, participants were separated into 3 groups depending on the age of their first tattoo (Table 3). Participants who regretted 1 or more of their current tattoos or wanted one of their tattoos removed tended to have their first tattoo at a younger age than people who do not regret any of their tattoos ($p = .0178$ and $p = .0151$, respectively).

Table 4 shows the frequency of infectious, painful, or pruritic complications of tattoos among all participants. Of all participants, 3.2% self-report that they developed an infected tattoo, and these participants were statistically more likely to have more tattoos ($p = .0001$) and number of tattooing sessions ($p = .0001$) than people who have never had an infected tattoo. Similarly, 22.6% report that at least one of their tattoos was pruritic at least a month after it was finished. Again, participants with pruritic tattoos were more likely to have more tattoos ($p = .0199$) and tattoo sessions ($p = .0076$) than participants who deny a history of pruritic tattoos. Finally, 3.8% report that at least one of their tattoos was painful more than a month after it was finished. There were no statistically significant differences in the number of tattoos or sessions between participants with or without painful tattoos.

The perceived knowledge of tattoo artists, dermatologists, primary care physicians, and pharmacist regarding infectious and allergic complications of tattoos is displayed in Figure 1. Participants most commonly believed dermatologists were “very knowledgeable” about tattoo complications, followed

TABLE 2. Number of Tattoos, Sessions, Sessions per Tattoo, and Willingness to Get a New Tattoo*

Age Group	Total	Number of Tattoos	Number of Sessions	Number of Sessions per Tattoo	Considering New Tattoo in the Next 12 Months?	
					Yes	No
18–29†‡						
Male	100 (38.8%)	4.2 ± 5.3 (1–36)	5.1 ± 6.5 (1–40)§	1.4 ± 1.6 (0.5–15)	78%	22%
Female	158 (61.2%)	3.2 ± 3.6 (1–30)	3.3 ± 3.4 (1–20)	1.1 ± 0.4 (0.3–3.75)	64%	36%
30–39						
Male	69 (53.5%)	6.0 ± 8.5 (1–47)	8.1 ± 13.8 (1–100)¶	1.6 ± 2.1 (0.13–18)	74%	26%
Female	60 (46.5%)	4.7 ± 6.6 (1–44)	4.4 ± 4.6 (1–24)	1.1 ± 0.3 (0.4–2)	62%	38%
40–49						
Male	38 (50%)	6.6 ± 8.0 (1–40)	7.3 ± 8.3 (1–40)	1.2 ± 0.6 (0.25–4)	71%	29%
Female	38 (50%)	4.6 ± 5.5 (1–25)	6.3 ± 8.9 (1–40)	1.9 ± 4.7 (0.67–30)	50%	50%
50≥						
Male	20 (52.6%)	4.6 ± 6.1 (1–20)	5.4 ± 8.0 (1–30)	1.3 ± 0.9 (0.26–4)	35%	65%
Female	18 (47.4%)	3.2 ± 3.9 (1–16)	2.8 ± 2.2 (1–8)	1.1 ± 0.5 (0.5–3)	56%	44%

*Data reported as n (% of total), mean ± SD (min–max), or % of total responses.

†People in the 18- to 29-year-old age group have fewer tattoos and fewer sessions than people in the 30- to 39-year-old age group ($p = .0091$ and $p = .0024$).

‡People in the 18- to 29-year-old age group have fewer tattoos and fewer sessions than people in the 40- to 49-year-old age group ($p = .0042$ and $p = .0003$).

§Men were statistically more likely to have more sessions than women in the 18- to 29-year-old age group ($p = .0034$).

||Men were statistically more likely to have more sessions per tattoo than women only in the 18 to 29 age group ($p = .032$).

¶Men were statistically more likely to have more sessions than women in the 30- to 39-year-old age group ($p = .0483$).

by tattoo artists, primary care physicians, and pharmacists. Overall, 93.2% of all participants believed tattoo artists were “very knowledgeable” or “knowledgeable” about tattoo complications, compared with 78.8% for dermatologists, 69.9% for primary care physicians, and 39.1% for pharmacists. Of all participants, 21.2% were “unsure” how knowledgeable

pharmacists were, compared with 14.2% for dermatologists, 11.0% for primary care physicians, and 2.0% for tattoo artists.

Only 7.0% of participants had previously removed a tattoo, with the two most common options being laser removal or a new tattoo over an old tattoo

TABLE 3. Rates of Tattoo Regret and Unsafe Tattooing Practices Among Participants Based on the Age of Their First tattoo*

Tattoo Association	First Tattoo ≤17 Years Old	First Tattoo 18–20 Years Old	First Tattoo ≥21 Years Old	p
Total	77 (15.4)	257 (51.3)	167 (33.3)	
Regret 1 or more tattoos				
Yes	27 (35.1)	35 (13.6)	19 (11.4)	.0178
No	50 (64.9)	222 (86.4)	148 (88.6)	
Interested in having 1 or more tattoos removed for free				
Yes	33 (42.9)	49 (19.1)	24 (14.4)	.0151
No	44 (57.1)	208 (80.9)	143 (85.6)	

*Data reported as n (% of total).

TABLE 4. Rates of At Least 1 Infected, Pruritic, or Pain Tattoo*

<i>Complication</i>	<i>Total</i>	<i>Number of Tattoos</i>	<i>Number of Sessions</i>
History of infected tattoo			
Yes	16 (3.2)	10.1†	12.2‡
No	485 (96.8)	4.2	4.8
History of pruritic tattoo (more than a month after finishing tattoo)			
Yes	113 (22.6)	5.5§	6.7
No	388 (77.4)	4.0	4.5
History of painful tattoo (more than a month after finishing tattoo)			
Yes	19 (3.8)	5.6	8.0
No	482 (96.2)	4.3	4.9

*Data reported as n (% of total).

†History of infection associated with more tattoos ($p = .0001$).

‡History of infection associated with more sessions ($p = .0001$).

§History of pruritus associated with more tattoos ($p = .0199$).

||History of pruritus associated with more sessions ($p = .0076$).

(Table 5). Of all participants, 21.2% admitted to being intoxicated while receiving 1 or more tattoos, and 17.6% admitted to receiving at least 1 tattoo somewhere besides a traditional tattoo parlor, such as at a party or in prison.

Discussion

This survey among a convenience sample of Americans found that younger people with tattoos are more likely to consider getting a new tattoo within the next 12 months. However, older participants were more likely to have more tattoos than younger people, presumably because of the accumulation of tattoos

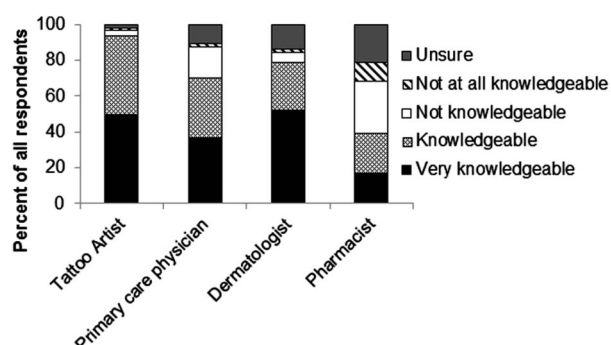


Figure 1. Frequency of participant responses regarding their perceived belief of how knowledgeable each typical professional is in terms of the allergic and infectious complications of tattoos.

over time. Given the public nature of the study, instead of measuring tattoos by body surface area, the authors assessed for large tattoos by calculating the average number of sessions per tattoo. Among 18 to

TABLE 5. Rates of Tattoo Removal and Unsafe Tattooing Practices*

Have you removed 1 or more tattoos?	
Yes	35 (7.0)
No	466 (93.0)
What did you use?	
Laser	16
New tattoo over old tattoo	15
Tattoo removal cream	3
Other	5
Razorblade	1
Excision	1
Pick at it	1
Knife	1
Did not specify	1
Have you been intoxicated while receiving 1 or more tattoos?	
Yes	106 (21.2)
No	395 (78.8)
Have 1 or more of your tattoos been done somewhere other than a tattoo parlor?	
Yes	88 (17.6)
No	413 (82.4)

*Data reported as n (% of total) or n.

29 year olds, men were more likely than women to have more sessions per tattoo, suggesting that younger men in this age group are more likely to have larger tattoos. However, there was no statistically significant difference in the number of sessions per tattoos between age cohorts, suggesting that larger tattoos are not more common in younger or older people.

Although individual cases of tattoo infections^{10–12} and pruritus¹³ are documented in the literature, the authors wanted to determine how many people with tattoos have a history of at least 1 pruritic, painful, or infected tattoo. Among the participants, the rate of any type of tattoo infection was 3.2%. Infection of a new tattoo can be due to unsanitary tattooing conditions, contaminated tattoo ink, or improper care of the tattoo while it is healing.^{14,15} However, it is important to note that these data are self-reported and do not reflect a clinically confirmed diagnosis. As such, these findings may be an overestimate of the actual rate. Overall, 22.6% of all participants reported at least 1 tattoo that was pruritic at least a month after it was placed. There are numerous potential causes of pruritic tattoos, including an allergic contact dermatitis,^{16,17} phototoxic dermatitis,¹⁸ or the development of psoriasis, sarcoidosis, or lichen planus in the tattoo because of Koebnerization.^{7,8} However, the authors did not ask participants to clarify whether the tattoo was pruritic in sunlight, to specify the colors of the tattoo, or whether they have a history of any dermatologic disorders. Participants were also only asked to report tattoos that were at least 1 month old at the time of pruritus tattooed skin takes approximately 1 month to remodel, during which time the skin may be painful or pruritic.^{7,19} Finally, 3.8% of all participants reported at least 1 painful tattoo more than 1 month after placement. Among the participants, the more tattoos and sessions a person has had, the more likely they are to have had at least 1 infected or pruritic tattoo; however, this association was not present for painful tattoos. It has been previously shown that patients with larger tattoos are more likely to have complications, such as pruritus or infections.²⁰ The results suggest that the number of tattoos and number of tattoo sessions are also risk factors for later developing a pruritic or infected tattoos.

Within the sample, there are several troubling findings. First, 17.6% of all participants had at least 1 tattoo placed at somewhere other than a traditional tattoo parlor, such as at a party or in prison. This is concerning because the tattoo artists may not have been in compliance with local and state sanitation guidelines. Second, although many states prohibit individuals from receiving tattoos while intoxicated,²¹ 21.2% of all participants admitted to being intoxicated while receiving at least 1 of their tattoos. Finally, 15.4% of all participants had their first tattoo placed at or below the age of 17 years. The presence of participants who received their first tattoo under the age of 18 may be because the individual received the tattoo outside a traditional parlor⁴ or because certain states allow minors to receive tattoos.²¹ Not surprisingly, the authors' data suggests that people who regret at least one of their tattoos received their first tattoo at a younger age than people who do not have tattoo regret.

In the sample group, more participants considered dermatologists to be "very knowledgeable" about infectious and allergic complications of tattoos than tattoo artists, primary care physicians, or pharmacists. Dermatologists were also second only to tattoo artists in terms of the sum of "very knowledgeable" or "knowledgeable" rankings (78.8% vs 93.2%). These data suggest that there is considerable trust in the ability of dermatologists to manage tattoo complications.

There are several limitations to this study. Geographically, although the authors had participants from 38 states, Puerto Rico, and Washington, DC, approximately one-fourth of all participants were residents of Louisiana, and 73.1% of all participants were residents of a state within the Southeastern United States. Additionally, given the small sample size and single study site, these results may not be representative of the general population. Most of the participants were 29 years old or younger, so the findings may not be generalizable to older populations. The smaller sample of older respondents also may have impeded the ability to detect significantly significant associations in the subgroup analysis. Also, because the survey was conducted in a major public space, participants may have been distracted, and because of a recall bias, participants' answers may

represent an estimate rather than an exact number. Furthermore, when designing the survey, the authors did not anticipate that approximately one-fifth of participants would have a history of at least 1 pruritic tattoo. In retrospect, it would have been ideal if the survey asked additional questions to determine the etiology of the participants' pruritus.

Despite the limitations of the questionnaire and convenience sample, these results provide new data on the complications and demographics of Americans with tattoos. The most striking finding was that approximately one-fifth of all participants have had at least 1 pruritic tattoo more than a month after it was placed. Ultimately, continued research on the underlying cause of pruritic tattoos, and also investigating ways to prevent or minimize this complication, is needed. Given the incidence of pruritic tattoos, tattoo regret, unsafe tattooing practices, and desire to have tattoos removed among the study participants, dermatologists have an opportunity to provide medical and cosmetic care, as well as anticipatory guidance, for these patients.

References

- Centers for Disease Control and Prevention (CDC). Tattoo-associated nontuberculous mycobacterial skin infections—multiple states, 2011–2012. *MMWR Morb Mortal Wkly Rep* 2012;61:653–6.
- Laumann AE, Derick AJ. Tattoos and body piercings in the United States: a national data set. *J Am Acad Dermatol* 2006;55:413–21.
- Lande RG, Bahroo BA, Soumoff A. United States military service members and their tattoos: a descriptive study. *Mil Med* 2013;178:921–5.
- Houghton SJ, Durkin K, Parry E, Turbett Y, et al. Amateur tattooing practices and beliefs among high school adolescents. *J Adolesc Health* 1996;19:420–5.
- Varma S, Lanigan SW. Reasons for requesting laser removal of unwanted tattoos. *Br J Dermatol* 1999;140:483–5.
- Dupont C. Decorative tattoos: an analysis of 100 cases. *Acta Derm Venereol* 1994;74:236.
- Juhas E, English JC. Tattoo-associated complications. *J Pediatr Adolesc Gynecol* 2013;26:125–9.
- Simunovic C, Shinohara MM. Complications of decorative tattoos: recognition and management. *Am J Clin Dermatol* 2014;15:525–36.
- Liszewski W, Becerril J, Terndrup C, West N, et al. The rates, perceptions, and willingness of men who have sex with men to donate blood. *Transfusion* 2014;54:1733–8.
- Philips RC, Hunter-Ellul LA, Martin JE, Wilkerson MD. *Mycobacterium fortuitum* infection arising in a new tattoo. *Dermatol Online J* 2014;20.
- Kluger N, Saarinen K. *Aspergillus fumigatus* infection on a home-made tattoo. *Br J Dermatol* 2014;170:1373–5.
- Kennedy BS, Bedard B, Younge M, Tuttle D, et al. Outbreak of *Mycobacterium chelonae* infection associated with tattoo ink. *N Engl J Med* 2012;367:1020–4.
- Hutton Carlsen K, Serup J. Patients with tattoo reactions have reduced quality of life and suffer from itch: dermatology life quality Index and itch severity score measurements. *Skin Res Technol* 2015; 21:101–7.
- LeBlanc PM, Hollinger KA, Klontz KC. Tattoo Ink–Related infections—Awareness, diagnosis, reporting, and prevention. *N Engl J Med* 2012;367:985–7.
- City of Milwaukee Health Department. Tattoo aftercare instructions. Milwaukee. Available from: http://city.milwaukee.gov/ImageLibrary/Groups/healthAuthors/CEH/PDFs/Tattoo_aftercare.pdf Accessed January 20, 2015.
- Tang MM, Beltraminelli H, Perruchoud D, Pelivani N, et al. A tattoo complicated by allergic contact dermatitis and panniculitis. *J Eur Acad Dermatol Venereol* 2014;28:127–8.
- Treudler R, Tebbe B, Kregel S, Orfanos CE. Allergic contact dermatitis from black tattoo. *Contact Dermatitis* 1997;37:295.
- Bjornberg A. Reactions to light in yellow tattoos from cadmium sulfide. *Arch Dermatol* 1963;88:267–71.
- Lea PJ, Pawlowski A. Human Tattoo. Electron microscopic assessment of epidermis, epidermal-dermal junction, and dermis. *Int J Dermatol* 1987;26:453–8.
- Klügl I, Hiller KA, Landthaler M, Bäumler W. Incidence of health problems associated with tattooed skin: a nation-wide survey in German-speaking countries. *Dermatology* 2010;221:43–50.
- Armstrong M. Tattooing, body piercing, and permanent cosmetics: a historical and current view of state regulations, with continuing concerns. *J Environ Health* 2005;67:38–43.

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