# The Perceived Risks of Tattoos

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**Abstract**

More and more risks related to tattooing are emerging. Yet, the number of people getting tattooed worldwide rises constantly. In relation to this, the current study aims to identify factors that predict consumers' intention to perform risk-minimizing behaviour (i.e., health-behaviour-intention) when it comes to the decision of getting a tattoo, such as, to do further research on toxic tattoo-inks. This study proposed that there are three factors that predict health-behaviour-intention: individuals' desire to get a tattoo, their perception of knowledge about the risks of tattoos, and their perception of the risks of tattoos. Participants (n = 121) of the study filled out an online questionnaire and were asked to read a screenshot of a website which named the main risks of tattooing. Risk perception was measured before and after they read the risk-information. Results demonstrated that there was a significant positive correlation between risk perception and health-behaviour-intention. Neither perceived knowledge, nor desire were significantly correlated with health-behaviour-intention. Thus, the results of the current study support the suggested role of risk-perception in explaining consumers' intention to engage in risk-minimizing behaviour when it comes to the decision of getting a tattoo, but not the roles of desire and perceived knowledge.

## Introduction

Tattoos are becoming more and more popular, especially among young people. Nowadays, they are seen as commonplace. Faulkner and Bailey (2018) have dealt with the history of tattoo art and reported that even though people might think tattoos are just a trend, they actually are one of the oldest art forms. Thousands of years old finds of mummies prove that people have been getting tattoos a long time ago. Tattooing is a universal practice, found across all cultures around the world. According to a global survey on tattoos conducted in 18 different countries, on average 38% of people have at least one tattoo (Lam, 2018). The highest percent of tattooed people was found in Italy with 48%, followed by Sweden (47%) and the United States (46%). And statistics show the number of tattooed people worldwide increases constantly (Kluger, Seité, & Taieb, 2019). At the same time, more and more risks related to tattooing are becoming known.

Even though tattooing is a non-medical procedure, it falls into the class of minor surgery (Liszewski, Jagdeo, & Laumann, 2016). It can be performed by professionals and by amateurs. Previously, health regulations related to tattooing focused on rules regarding the hygiene and the prevention of infections (Laux et al., 2016). In the Netherlands, for example, the introduction of hygiene guidelines for tattoo shops after an HBV outbreak in Amsterdam in 1982, eliminated the risk of blood-transmitted diseases caused by tattooing (Urbanus et al., 2011). Despite the health regulations and the hygiene guidelines, the owners of tattoo studios are free to decide to what extent they comply with the regulations. Studios, including the tattoo-inks, utensils and education of the tattooists, are hardly controlled (Liszewski et al., 2016). Consumers have to get their impression of the hygiene conditions in tattoo-studios.

Apart from that, the increasing popularity of tattooing poses even new challenges for the healthcare systems. The increasing number of tattoos has ensured that more and more tattoo-inks are developed. Most of these colours and their possible consequences are still unexplored. According to a study, 1 out of 5 tattoo-inks contains carcinogenic ingredients (Slevin, 2016). In contrast to the hygiene regulations, the regulations for tattoo-ink are very lax and are not controlled at all. In some European countries, there are regulations that stipulate that tattoo ink must not contain any harmful substances ("Fragen und Antworten zu Tätowiermitteln," 2019). They list prohibited substances that must not be used for tattooing. However, tattoo-inks do not have to be approved and can be used by tattooists without official testing. They are accessible to every layperson and are easily available, for example, on the Internet. Tattooists can freely use tattoo-inks that may contain toxic ingredients. Customers

do not need to be informed about the ingredients in tattoo-inks and may be exposed to harmful substances without knowing about them.

The use of toxic tattoo-inks can have serious health-related consequences. They can lead to infections, foreign body reactions, scars and allergic reactions (Slevin, 2016). Furthermore, there is little knowledge among consumers about the long-term effects of tattoo-inks. According to a study, very few people are aware of the ingredients of tattoo inks before they get tattooed (Klügl, Hiller, Landthaler, & Bäumler, 2010). Klügl, Hiller, Landthaler, and Bäumler (2010) reported that two-thirds of tattooed participants were not informed about the tattoo ingredients and only 23% were interested in them. When it comes to hygiene in a tattoo studio, the consumer can at least judge externally whether cleanliness and hygiene are taken into account. However, the same does not apply to the ingredients of tattoo ink. If the consumer is not familiar with this topic and does not know which chemicals are used in the colour, he or she cannot assess the risk.

As important as the physical consequences are the potential psychological consequences. It is important to keep in mind that bad tattoo results can lead to disappointment or even trigger feelings of embarrassment and low self-esteem (Armstrong, Owen, Roberts, & Koch, 2004). On top of that, it is possible that clearly visible tattoos can lead to problems in the job-search or cause exclusion from certain social groups (Csesznek & Stemate, 2019).

Facing all these risks, the question comes up why the number of people getting tattooed still rises. To answer this question, several studies have focused also on the positive effects of having a tattoo. For example, tattooed individuals reported that their tattoos help them to create and maintain individuality (Millner & Eichold, 2001). Moreover, tattoos can have self-healing effects. In one study, women, who have been abused, reported that their tattoo helped them to deal with their injured body parts (Atkinson, 2002). However, the question remains: do people know about the risks and if yes, do they care about them? The purpose of this study is to evaluate consumer's intention to perform health risk-minimizing behaviour based on their desire, perceived knowledge, and risk perception regarding the risks of tattooing. The focus is on people who already have one or more tattoos and people who desire to get a tattoo. The question will be explored by reporting the results of an online questionnaire which examines people's *desire*, *knowledge*, *risk perception* and *health-behaviour-intention* when it comes to the decision of getting a tattoo.

## Theoretical Framework

### Motivations to get a tattoo

Next to piercings, hairstyling and jewels, tattooing belongs to procedures that are meant to change the body's appearance without having medical reasons. These procedures are summarized under the name *body-modification* (Myers, 1992). People get tattooed for a variety of reasons. Research on the motives for getting tattooed identified eight different types of reasons (Csesznek & Stemate, 2019). People, for example, reported that they got tattooed to express their ideologies or beliefs, because of aesthetic reasons, or to remember certain people or places which play an important role for them. A lot of participants also reported that the tattoo strengthens their identity. Tattoos can have very important meanings for people, and they can develop strong desires to get a tattoo. This could influence their decision-making process.

### Decision-making

To aid the decision-making process, people deal with risk information. According to Moore (2001), people usually do not seek for information just for its own sake. Individuals go and search for information when they feel threatened by a potential risk and perceive themselves insufficiently informed, or when they need to make important decisions (Alaszewiski, 2005; Yang, Aloe, & Feeley, 2014).

### Risk Information Seeking and Processing Model

The Risk Information Seeking and Processing Model (RISP) offers a framework of the social, psychological, and communicative factors that drive individuals to seek and thoughtful process risk information (Griffin, Dunwoody, & Neuwirth, 1999). The RISP model was developed to examine what leads to changes in health risk behaviour. It postulates that information seeking and information processing are influenced by the gap people perceive, between what they know and what they think they need to know (McComas, 2006).

The RISP model refers to the heuristic-systematic model (HSM) and to the theory of planned behaviour (TPB) (Ajzen,1991; Chen, Duckworth, & Chaiken, 1999). It relates to the Sufficiency Principle from the HSM. The principle proposes that "people will exert whatever effort is required to attain a 'sufficient' degree of confidence that they have satisfactorily accomplished their processing goals" (Eagly & Chaiken, 1993, p. 330). Thereby, people are partially guided by least effort motives (Chen et al., 1999). They attempt to maintain a balance between a) minimizing cognitive effort during information processing, and b)

maximizing confidence. People feel confident that they know enough, when they reach their individual point of the sufficiency threshold, or their desired confidence level (Chen et al., 1999). Adapted to the RISP model, this means that individuals are motivated by their desire for sufficiency to seek for information and to systematically process it.

Furthermore, the RISP model incorporates elements of the theory of planned behaviour. First, it relates to perceived behavioural control, which is a person's perception of his or her ability to perform a target behaviour (Ajzen, 1991). In the RISP model, this is called *perceived information gathering capacity* and refers to people's confidence in their ability to seek for risk information and to thoughtfully process it (Griffin, Dunwoody, & Yang, 2013). Second, the RISP model refers to Ajzen's (1991) subjective norms, which are a person's beliefs that relevant others think he or she should perform or not perform a behaviour. In the RISP model, this is called *informational subjective norms* and would be an individual's perception of social pressure to stay informed about a given risk (Griffin et al., 2013). People who feel pressure from others to stay informed and are confident that they have the mental capacity to process a given risk information, are more likely to perceive information insufficiency and think that they need to seek for more information.

**Information seeking and correlates with other health-related behaviour**

People who make a specific effort to seek for more health-information, are more likely to perform other health-related actions (Kassulke, Stenner-Day, Coory, & Ring, 1993). Information-seeking is one of the characteristics of individuals who are actively doing something for their health (Rakowski et al., 1990). A study by Rakowski et al. (1990) examined the correlation between information seeking and other health-related practices. Results showed that individuals who engaged more frequently in information seeking also engaged in several other health-related actions, for example, self-conducted breast and testicular self-exam.

**Information avoidance**

Even though acquiring knowledge can provide various benefits, people often choose to avoid information instead of seeking for it. Information avoidance can be defined as "any behaviour designed to prevent or delay the acquisition of available but potentially unwanted information" (Sweeny, Melnyk, Miller, & Shepperd, 2010). Sweeny, Melnyk, Miller and Shepperd (2010) name three main motivations to avoid information: (a) the information challenge the individual's beliefs, (b) the information demands displeasing actions from the

individual, and (c) the information cause negative emotions. Different circumstances can lead to one motivation being emphasized more than the other. The motivations can occur alone or interact.

The first reason people may wish to avoid information is that it might demand a change in their beliefs (Sweeny et al., 2010). On the one hand, people tend to seek for information that support their attitudes, decisions and beliefs (Smith, Fabrigar, & Norris, 2008). On the other hand, they try to avoid learning information that demands them to change beliefs or even force them to give up important beliefs (Sweeny et al., 2010).

Secondly, people are motivated to avoid information when the information demand undesired behaviour (Sweeny et al., 2010). Health studies support that people avoid information when they make them feel obligated to take action. A study asked women in Nigeria about their reasons for delaying medical appointments if they felt a suspicious lump in their breast (Ajekigbe, 1991). Most women justified their behaviour because they were afraid that an examination would show that they had to undergo a mastectomy. Although people can always decide not to take action, regardless of the information they learn, people may feel accountable to change their behaviour. Avoiding information prevents them from making the potentially difficult decision whether or not to take action (Sweeny et al., 2010).

The third motivation for information avoidance is possible emotional consequences (Sweeny et al., 2010). People might be threatened that a given information would cause negative emotions. A study examined the means of commercial sex workers and their partners to cope with HIV risks (Vergas, 2001). The study revealed that clients of commercial sex workers reported not to get tested for AIDS because positive test results would damage the psychological present and cause feelings of fear.

Besides that, Sweeny et al. (2010) define four moderators of information avoidance. The first moderator of information avoidance is the extent wo which the individual believes he or she can control the consequences of information. People are more likely to avoid information when they feel unable to control the consequences of the information. For example, studies revealed that participants were more interested in being tested for a disease when there were preventive measures to reduce symptoms or the disease was treatable rather than untreatable (Cutler & Hodgson, 2003; Dawson, Savitsky, & Dunning, 2006).

The second moderator is the individual's perception of his or her ability to cope with the information itself (Sweeny et al., 2010). If people feel unable to handle information, they are more likely to avoid them.

The third moderator is the perceived availability, accessibility, and comprehensibility of information (Sweeny et al., 2010). People are more likely to avoid information when it is difficult for them to obtain or interpret the information.

Finally, the fourth moderator of information avoidance is the expectation about an information (Sweeny ter al., 2010). When individuals are presented to unknown information, they evaluate the possibility that the content of it might be negative. If they feel unable to cope with negative information, avoidance is more likely.

**Risk perception**

Acquired knowledge about a risk influences the individuals' risk perception, which in turn is central to most health-related behavioural theories. Risk perceptions are subjective judgments about the severity of possible risks or losses (Darker, 2013). They can be divided into different types, namely, perceived likelihood, perceived susceptibility, and perceived severity (Brewer et al., 2007). Likelihood is an individual's probability of being affected by a risk. Susceptibility can be defined by the individual's perceived likelihood and the perceived seriousness of the consequences. The term severity is used to describe the extent of harm of the risk. All these types influence how the individual perceives a risk.

Risk perception motivates behaviour that is intended to reduce a specific threat. Meta-analysis on the relationship between risk perception and health behaviour of 17 studies reported a strong association between risk perceptions and behaviour (Brewer et al., 2007). Risk perceptions are more likely to be strongly associated with health behaviours that are easier to carry out (Brewer et al., 2007). Roger's (1975) Protection Motivation Theory states that the components of a fear appeal initiate a cognitive mediating process which in turn leads to a change in attitude. In other words, the presented severity of a risk, the probability of its occurrence, the described efficacy of recommended behaviour, and the perceived self-efficacy initiate cognitive processes which lead to risk-reducing behaviour. Risk information influences the individual's perceived severity of a risk, the expectancy to be exposed to it and self-efficacy beliefs. These processes lead to protection motivation and drive the intention to adopt health-behaviour.

**The Present Study**

The theories and studies reported in the literature raise the relevant question: Is the desire to get a tattoo a determinant of the knowledge related to tattoo risks and thus, a determinant of

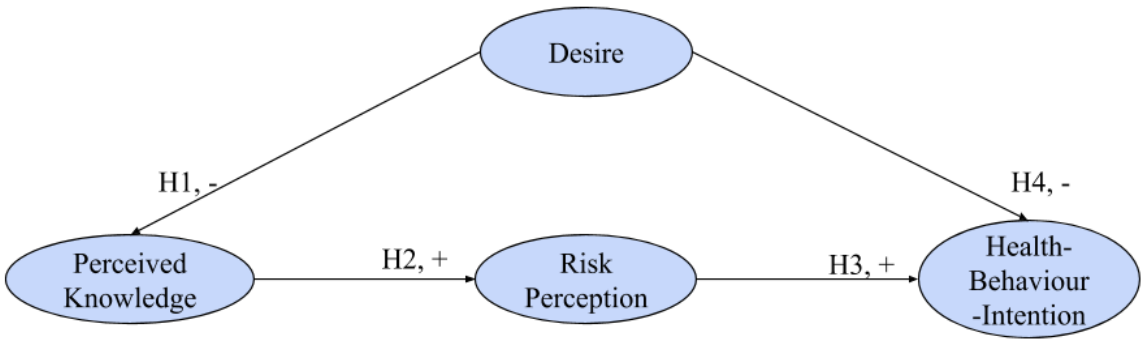
risk perception and health-behaviour-intention of consumers? Yet, there is only little research available in the literature about this specific relationship.

Therefore, this study aims to examine whether there is a relationship between the desire to get a tattoo, the perceived knowledge related to tattoo risks, risk perception and health-behaviour-intention of consumers that are interested in tattoos, by using an online questionnaire. The findings could be relevant when developing interventions to make people aware of the risks of tattoos and to support health-behaviour that reduces the risks.

A hypothetical model was developed based on theories and reports provided in the literature. The model connects potential determinants of risk perception and health-behaviour intention. It is visualized in Figure 1.

**Figure 1.**

*Hypothesized model, explaining health-behaviour-intention.*




People tend to avoid information when they get the feeling that this specific information would challenge their beliefs (Sweeny et al., 2010). This could be true for people who have a strong desire to get a tattoo and generally a positive attitude towards tattooing. Risk information could challenge their attitude. Therefore, the consumer's *desire* to get a tattoo was hypothesized to be a significant determinant of their perceived knowledge about risks related to tattooing: the greater the desire to get a tattoo, the less the individual would know about the risks of tattoos (**H1**).

*Perceived knowledge* about the risks of tattoos was hypothesized to be a significant determinant of risk perception: the more knowledge about the risks of tattoos, the higher would be the individual's perception of the risks (**H2**). Literature shows that knowledge about risks influences people's perception of the severity of a possible risk (Darker, 2013).

Furthermore, literature proves that *risk perception* motivates risk-reducing actions (Brewer et al., 2007). This led to the hypothesis that consumer's risk perception would be a

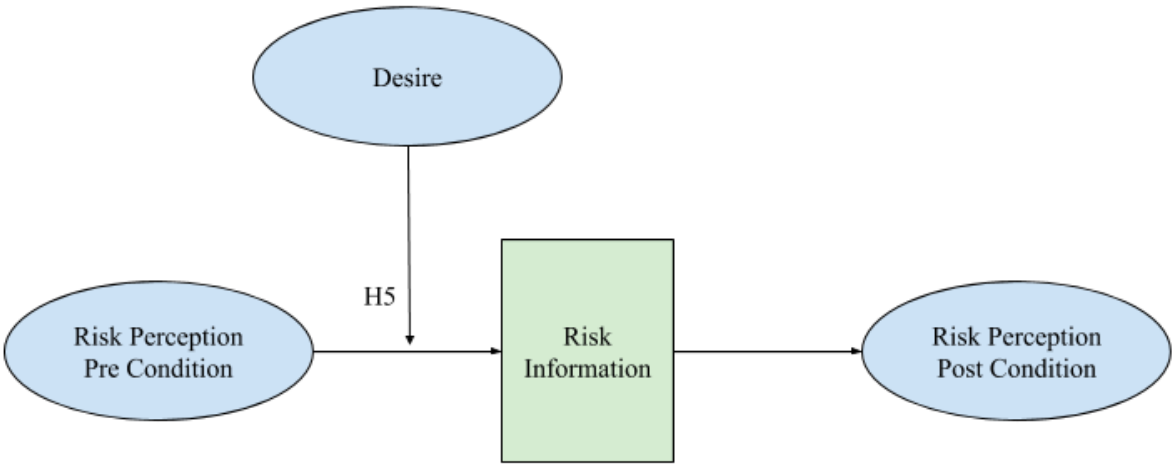
significant determinant of their health-behaviour-intention: the higher the perception of the risks, the greater the individual's intention would be to perform health-behaviour (**H3**).

Moreover, it was hypothesized that health-behaviour-intention is significantly determined by the individual's desire to get a tattoo: the greater the desire to get a tattoo, the lower would be the intention of the individual to perform health-behaviour (**H4**).

Finally, it was hypothesized that the individual's risk perception after reading a risk information could be predicted from his/her desire to get a tattoo and his/her risk perception before reading the risk information (**H5**). This is illustrated in Figure 2.

**Figure 2.**

*Hypothesized model, explaining hypothesis 5*




## Method

### Participants and Design

Participants were recruited during April 2020 through fora on Facebook that discuss tattoo studios, tattoo designs or tattoos in general and by personally addressing friends. Selection criteria to participate in the study included that participants either already had a tattoo or/and were planning to get a tattoo. Participants were asked to complete an online questionnaire regarding their attitudes towards the risks of tattoos. Taking part in the study took the respondents about 10 minutes.

In total, 222 people started the survey. Only participants who completely filled out the questionnaire were included in the study, therefore, 91 participants needed to be excluded. Furthermore, 10 people were excluded from the data set because they indicated neither that

they have a tattoo, nor that they were planning to get one. This resulted in a sample of 121 respondents.

Of these, 84% identified as female (n = 102), 14% identified as male (n = 17), 2% identified their gender in some other way (n = 2). The majority of the sample indicated to have one or more tattoos (n = 103) and 101 of them indicated that they were currently planning to get a tattoo. Most of them indicated that they were planning to get a tattoo for about a year or more (53%), 29% were planning it for a few months, and 17% were planning it for less than a month. Mean age was 27 on a range from 18 to 52 (*SD* = 8.5). Most of the participants were aged between 18 and 24 (55%), followed by participants aged between 25 and 31 (23%).

In order to test the hypothesis, a self-report questionnaire was designed (Appendix A). Ethical approval was obtained by the BMS Ethics Committee of the University of Twente. The questionnaire consisted of three parts. First of all, respondents were asked to indicate their desire to get a tattoo, their perceived knowledge about related risks, and their perception of the risks. Afterwards, participants were given a screenshot of a website describing the main risks of getting a tattoo (Appendix B). Finally, risk perception was measured a second time and participants had to indicate their health-behaviour-intentions. The purpose of the pre- and post-measure of risk perception was to evaluate whether desire influences risk information processing.

## Instruments

### Pre-test Instruments.

*Desire* was conceptualized to consist of 2 components (10 items, α=.69, 5-point-Likert scale). It was measured by asking the participants to indicate whether they imagine getting a tattoo (5 items) and how often they think about getting a tattoo (5 items). Items were derived from scales available in the literature (May et al., 2014; Caselli & Spada, 2011). Factor analysis showed that the items loaded on three factors. Therefore, the items were divided to build three different sub-scales. Five items loaded on the first factor and were combined to build one scale, which described *tattoo-imagination* (α=.72), for example: “I imagine myself getting a tattoo“. Factor loadings ranged from 0.75 to 0.59. Three items loaded on the second factor and were combined to build one scale, which described *tattoo-thoughts-intrusiveness* (α=.72). An example of a question is: “Since you have been planning to get a tattoo, how often were the thoughts intrusive?”. Factor loadings ranged from 0.81 to 0.73. Two items

loaded on the third factor and were combined to build one scale, which described the *desire-intensity* (α=.72). One of the items was: “Since you have been planning to get a tattoo, how often did you want the tattoo?”. Factor loadings ranged from 0.91 to 0.80. Both, the total scale as well as the scales based on the factors were analysed.

*Perceived knowledge* was measured by seven statements regarding the participant’s perception of knowledge about risks of getting a tattoo, for instance: ‘I am satisfied with the knowledge I have about the risks of tattooing’ (7 items, α=.86, 5-point-Likert scale, 1= *strongly disagree* to 5 = *strongly agree*). Items based on scales available in the literature and were adapted to the current purpose (Klügl, Hiller, Landthaler, & Bäumler, 2010; Schulte, 2015). Factor analysis showed that the items loaded on two factors. Therefore, the items were divided to build two different sub-scales. Four items loaded on the first factor and were combined to build one scale, which described *knowledge-satisfaction* (α=.81). An example of the items is: “What I know about the risks of tattooing is enough for me”. Factor loadings ranged from 0.90 to 0.66. Three items loaded on the second factor and were combined to build one scale, which described *colour-related-knowledge* (α=.87), for instance: “I think I know enough about tattoo colour ingredients to accurately evaluate their risks”. Factor loadings ranged from 0.87 to 0.84. Both, the total scale as well as the scales based on the factors were analysed.

*Risk perception w*as conceptualized to consist of seven statements. Participants had to indicate whether they think the risks of tattoos are a real problem and whether they are frightened by the risks of tattoos (10 items, α=.78, 5-point-Likert scale, 1= *strongly disagree* to 5 = *strongly agree*). The items were adapted from an existing questionnaire (Floer, 2019). Factor analysis showed that the items loaded on three factors. Therefore, the items were divided to build three different sub-scales. Five items loaded on the first factor and were combined to build one scale, which described *risk-perception-personal* (α=.86). An example of a statement is: “I am concerned about the risks of tattoos”. Factor loadings ranged from 0.86 to 0.67. Three items loaded on the second factor and were combined to build one scale, which described *risk-perception-societal* (α=.58), for example: “I do believe the risks of tattoos are a real problem”. Factor loadings ranged from 0.75 to 0.61. Two items loaded on the third factor and were combined to build one scale, which described *risk-perception-uncertainty* (α=.66). One of the statements was: “I am uncertain about whether the problem of risks of tattoos is even real”. Factor loadings ranged from 0.88 to 0.77. Both, the total scale as well as the scales based on the factors were analysed.

**Presented risk information.** After finishing the first part of the questionnaire participants were asked to read a screenshot of an online website (Higuera & Healthline Editorial Team, 2016). The presented text described the main risks related to getting a tattoo and possible long-term consequences. The information was written in common language and easy to understand.

**Post-test instruments.** *Risk perception* was measured a second time, using the same questions as in the pre-test condition (10 items, α=.85, 5-point-Likert scale, 1= *strongly disagree* to 5 = *strongly agree*). Factor analysis showed that the items loaded on two factors. Therefore, the items were divided to build two different sub-scales. Seven items loaded on the first factor and were combined to build one scale, which described *risk-perception-general* (α=.90). Factor loadings ranged from 0.87 to 0.61. Three items loaded on the second factor and were combined to build one scale, which described *risk-perception-doubts* (α=.62). Factor loadings ranged from 0.84 to 0.59. Both, the total scale as well as the scales based on the factors were analysed.

*Health-behaviour-intention* refers to the tendency to perform behaviour that is intended to reduce the risks of getting a tattoo. Low scores indicate that participants are less likely to perform such behaviour, whereas high scores indicate that participants are more likely to engage in actions that will lower the risks of getting a tattoo. Items were designed for the purpose of this study and were based on information available in the literature (Higuera & Healthline Editorial Team, 2016). Health-behaviour-intention was measured by asking the participants to indicate their likelihood to perform specific risk-reducing behaviour (11 items, α=.87, 5-point-Likert scale, 1= *Definitely I will not* to 5 = *Definitely I will*). Factor analysis showed that the items loaded on two factors. Therefore, the items were divided to build two different sub-scales. Five items loaded on the first factor and were combined to build one scale, which described *pre-visit-behaviour* (α=.88). One of the statements was: “I will check that the tattoo artist uses a fresh pair of gloves and washes his/her hands before starting the procedure”. Factor loadings ranged from 0.88 to 0.68. Six items loaded on the second factor and were combined to build one scale, which described *on-sight-behaviour* (α=.93). An example is: “I will do further research on toxic tattoo-inks”. Factor loadings ranged from 0.91 to 0.74. Both, the total scale as well as the scales based on the factors were analysed.

## Procedure

Before starting with the data collection, a pilot study was conducted to see whether the questionnaire runs well with respondents and the questions are easy to understand.

Respondents were asked to complete an online questionnaire that included a screenshot of a website with information about the possible risks of getting a tattoo. Before participating, all participants gave informed consent. Furthermore, they were informed about the general topic of the study. Participants were told that they can take the survey if they are interested in tattoos or if they already have a tattoo. They were not informed about the purpose of the study because that might have influenced their responses. At the beginning of the questionnaire, participants were asked to answer some demographic questions. Furthermore, they were asked whether they already have one or more tattoos and whether they are planning to get a tattoo.

After filling out the questions about their desire to get a tattoo, their risk perception of tattoos, and their perceived knowledge about tattoos, participants were asked to read a short information about the main risks of tattoos. Then, they had to indicate their perception of the risks of tattoos again. Furthermore, respondents were asked to indicate their intention to perform health-behaviour that would reduce the risks of tattoos. It took about 10 minutes to complete the questionnaire.

**Analysis**

In order to answer the research question and to test the hypotheses, a series of statistical tests were performed. First of all, the dataset was adapted to a SPSS data file and processed to ensure that the data were ready for analyses. Participants with missing values were excluded from the dataset. Furthermore, respondents who were neither interested in getting a tattoo nor already had one or more tattoos were deleted.

To get an overview of the data, sociodemographics and mean item scores, as well as descriptives and frequencies, were calculated. Furthermore, factor analysis was conducted to identify latent variables or constructs. To check for the internal consistency, Cronbach’s alpha was calculated for each scale.

To test the first four hypotheses, Pearson’s correlation was conducted. Furthermore, a moderation analysis by Baron & Kenny (1986) was performed in order to check the moderation by desire on the relation risk perception pre-condition and risk perception post-condition.

# Results

## Means and Correlations

Table 1 shows the means, standard deviations and Pearson's correlations of the variables. Results showed that the scores on *desire* to get a tattoo on average were slightly above the middle of the scale (M = 3.25, SD = .53), as well as the scores of *perceived knowledge* about the risks of tattoos (M = 3.65, SD = .81), the scores of *risk perception pre condition* (M = 2.46, SD = .66), and the scores of *risk perception post-condition* (M = 2.66, SD = .78). The mean scores for health-behaviour-intention (M = 4.12, SD = .65) were moderately high.

## Relationship between desire and perceived knowledge (H1)

In hypothesis 1, it was stated that the participant's desire to get a tattoo would be a determinant of the perceived knowledge about tattoo-related risks. Pearson's r was computed to assess the relationship between desire and perceived knowledge. As shown in Table 1, there was no significant correlation between perceived knowledge-total and desire-total ($r(119) = .17$, $p = .06$). Desire-total was significantly correlated with the sub-scale knowledge-satisfaction ($r(119) = .19$, $p = .03$). The sub-scale desire-intensity was positively correlated with perceived knowledge-total ($r(119) = .42$, $p < .001$). and the sub-scales knowledge-satisfaction ($r(119) = .44$, $p < .001$) and colour-related-knowledge ($r(119) = .30$, $p = .001$): the more intense the participant's desire to get a tattoo, the better was his/her perceived knowledge on tattoos. Neither desire-intensity, nor tattoo-thought-intrusiveness were significantly correlated with colour-related knowledge. Consequently, the hypothesis needs to be partially rejected.

## Relationship between perceived knowledge and risk perception (H2)

In hypothesis 2, it was stated that participant's perceived knowledge would be a determinant of risk perception. Pearson's r was computed to assess the relationship between perceived knowledge and risk perception. As shown in Table 1, a strong negative correlation has been found between perceived knowledge-total and perceived risk-total ($r(119) = -.52$, $p < .001$). Knowledge-satisfaction was negatively correlated with risk-perception-personal ($r(119) = -.47$, $p < .001$) and risk-perception-societal ($r(119) = -.47$, $p < .001$): the higher the participant's satisfaction of knowledge, the lower was his/her perception of risks. Colour-related-knowledge was negatively correlated with risk-perception-personal ($r(119) = -.36$, $p < .001$) and risk-perception-societal ($r(119) = -.39$, $p < .001$): the higher the participant's perception of knowledge on tattoo-colour, the lower was his/her perception of risks. Neither

knowledge-satisfaction, nor colour-related-knowledge were significantly correlated with risk-perception-uncertainty. Consequently, the hypothesis needs to be partially rejected.

**Relationship between risk perception and health-behaviour-intention (H3)**

In hypothesis 3, it was stated that risk perception would be a determinant of health-behaviour-intention. Pearson's r was computed to assess the relationship between risk perception and health-behaviour-intention. As shown in Table 1, there was a significant correlations between perceived risk-total and health-behaviour-intention-total ($r(119) = .41$, $p < .001$). There was a significant correlation between risk-perception-general and pre-visit-behaviour ($r(119) = .59$, $p < .001$): the higher the participant's general risk perception, the greater was his/her intention to perform risk reducing behaviour before visiting a tattoo studio. Risk-perception-doubt was correlated with pre-visit-behaviour ($r(119) = .27$, $p = .003$): the more seriously the participants rated the risks, the greater was their intention to perform risk reducing behaviour before visiting a tattoo studio. Neither risk-perception general, nor risk-percpetion-doubts were significantly correlated with on-sight-behaviour. Consequently, the hypothesis needs to be partially rejected.

**Relationship between desire and health-behaviour-intention (H4)**

In hypothesis 4, it was stated that desire would be a determinant of health-behaviour-intention. Pearson's r was computed to assess the relationship between desire and health-behaviour-intention. As shown in Table 1, there was no significant correlation between desire-total and health-behaviour-intention-total ($r(199) = -.04$, $p = .69$). There was a correlation between tattoo-imagination and on-sight behaviour ($r(119) = .28$, $p = .002$), but not between tattoo-imagination and pre-visit behaviour. Furthermore, desire-intensity was negatively correlated with pre-visit behaviour ($r(119) = -.30$, $p = .001$), but not correlated with on-sight behaviour. Looking at the scale tattoo-thought-intrusiveness, there was a negative correlations with on-sight behaviour ($r(119) = -.40$, $p < .001$): the greater the participant's thought-intrusiveness, the lower was his/her health-behaviour-intention during the visit of a tattoo studio. The correlation to pre-visit behaviour was not significant. Consequently, the hypothesis needs to be partially rejected.

**Interaction effect of risk perception pre-condition and desire on risk perception post-condition (H5)**

In hypothesis 5, it was stated that the individual's risk perception in the post-condition could be predicted from his/her desire and risk perception in the pre-condition. A paired Samples t Test was conducted to evaluate the null hypothesis, that there is no change in participants' risk perception scores when measured before and after reading the risk information ($N = 121$). Risk perception in the pre-condition and risk perception in the post-condition were strongly and positively correlated ($r = .88$, $p < .001$). There was a significant average difference between risk perception pre-condition and risk perception post condition scores ($t_{120} = 6.05$, $p < .001$). On average, risk perception scores after reading the risk information were 0.2 points higher than risk perception scores before reading the risk information (95% CI [.14, .27]). There is significant evidence to reject the null hypothesis. There was a small, significant increase in scores over time, suggesting that the risk information increased participants' level of risk perception.

**Table 1.**

*Means, standard deviations, and Spearman correlations between the variables (n = 121).*

| Constructs | | Mean | sd | Correlations | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Desire | | | | Perceived Knowledge | | | Perceived risk pre-condition | | | | Perceived risk post-condition | | | Health-behaviour-intention | | |
| | | | | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. | 14. | 15. | 16. | 17. |
| 1. | Desire (total) | 3.25 | .53 | 1.00 | | | | | | | | | | | | | | | | |
| 2. | Tattoo-imagination | 3.32 | .73 | .85** | 1.00 | | | | | | | | | | | | | | | |
| 3. | Desire-intensity | 4.12 | .91 | .54** | .33** | 1.00 | | | | | | | | | | | | | | |
| 4. | Tattoo-thought-intrusiveness | 1.72 | .80 | .51** | .11 | -.06 | 1.00 | | | | | | | | | | | | | |
| 5. | Perceived Knowledge (total) | 3.65 | .82 | .17 | .08 | .42** | -.05 | 1.00 | | | | | | | | | | | | |
| 6. | Knowledge-satisfaction | 4.05 | .81 | .19* | .15 | .44** | -.14 | .88** | 1.00 | | | | | | | | | | | |
| 7. | Colour-related-knowledge | 3.12 | 1.10 | .11 | -.02 | .30** | .05 | .89** | .56** | 1.00 | | | | | | | | | | |
| 8. | Perceived risk pre-condition (total) | 2.46 | .66 | -.13 | -.09 | -.34** | .11 | -.52** | -.48** | -.43** | 1.00 | | | | | | | | | |
| 9. | Risk-perception-personal | 2.23 | .94 | -.13 | -.10 | -.40** | .16 | -.47** | -.47** | -.36** | .88** | 1.00 | | | | | | | | |
| 10. | Risk-perception-societal | 2.45 | .82 | -.02 | -.01 | -.17 | .10 | -.49** | -.47** | -.39** | .73** | .45** | 1.00 | | | | | | | |
| 11. | Risk-perception-uncertainty | 3.05 | .96 | -.09 | -.07 | .04 | -.12 | -.00 | .12 | -.11 | .35** | .02 | .12 | 1.00 | | | | | | |
| 12. | Perceived risk post-condition (total) | 2.66 | .78 | -.14 | -.10 | -.36** | .11 | -.58** | -.52** | -.50** | .88** | .81** | .60** | .28** | 1.00 | | | | | |
| 13. | Risk-perception-general | 2.45 | .98 | -.15 | -.11 | -.43** | .15 | -.56** | -.54** | -.45** | .86** | .88** | .55** | .08 | .95** | 1.00 | | | | |
| 14. | Risk-perception-doubt | 3.17 | .86 | -.03 | -.01 | .057 | -.09 | -.28** | -.16 | -.34** | .39** | .10 | .35** | .63** | .51** | .20* | 1.00 | | | |
| 15. | Health-behaviour-intention (total) | 4.12 | .65 | -.04 | .20* | -.12 | -.30** | -.28** | -.17 | -.32** | .35** | .30** | .28** | .11 | .41** | .37** | .26** | 1.00 | | |
| 16. | Pre-visit behaviour | 3.41 | .96 | -.11 | .06 | -.30** | -.11 | -.47** | -.43** | -.40** | .54** | .50** | .45** | .08 | .61** | .59** | .27** | .84** | 1.00 | |
| 17. | On-sight behaviour | 4.70 | .67 | .07 | .28** | .14 | -.40** | .07 | .21* | -.08 | -.02 | -.05 | -.03 | .11 | .01 | -.05 | .14 | .77** | .30** | 1.00 |

**. Correlation is significant at the 0.01 level (2-tailed); *. Correlation is significant at the 0.05 level (2-tailed)

As shown in Table 2, a regression analysis was calculated to predict risk perception post-condition based on desire, risk perception pre-condition, and the interaction between desire and risk perception post-condition. A significant regression equation was observed [F (3, 117) = 136.89, p < .001], with an R-squared of .78. Participants' predicted risk perception post-condition is equal to 2.66 -.04 (desire) + 1.03 (risk perception pre-condition) -.06 (interaction between desire and risk perception pre-condition). Only risk perception pre-condition (ß = .88, p < .001) was a significant predictor of risk perception post-condition. Desire (ß = -.03, p = .54) and the interaction between desire and risk perception pre-condition were no significant predictors of risk perception post-condition (ß = -.03, p = .51). Consequently, the hypothesis needs to be rejected.

**Table 2.**

*Results of the regression analysis of the dependent variable risk perception post-condition and the predictors desire, risk perception pre-condition and the interaction between desire and risk perception pre-condition (n = 121).*

| | B | SE(B) | ß | t | p |
|---|---|---|---|---|---|
| Total Risk perception post-condition | 2.66 | .03 | | 78.05 | .00 |
| Desire | -.04 | .07 | -.03 | -.62 | .54 |
| Risk perception pre-condition | 1.03 | .05 | .88 | 19.98 | .00 |
| Desire*Risk perception pre-condition | -.06 | .09 | -.03 | -.66 | .51 |

$R^2$=.778

## Additional Results

### Relationship between perceived knowledge and health-behaviour-intention

Pearson's r was computed to assess the relationship between perceived knowledge and health-behaviour-intention. As shown in Table 1, there was a significant negative correlation between knowledge-satisfaction and pre-visit behaviour (r(119) = -.43, p < .001). Colour-related-knowledge was negatively correlated with pre-visit behaviour (r(119) = .40, p < .001). Neither knowledge-satisfaction, nor colour-related-knowledge were correlated with on-sight behaviour.

**Prediction of health-behaviour-intention-total**

Multiple regression was conducted to see if desire, risk perception pre-condition, and risk perception post-condition predicted health-behaviour-intention-total. Using the enter method it was found that desire, risk perception pre-condition, and risk perception post-condition explain a significant amount of the variance in health-behaviour-intention-total [$F (3, 117) = 8.02$, $p < .001$, $R^2 = .17$]. Participants' health-behaviour-intention-total is equal to 3.13 + .03 (desire) - .04 (risk perception pre-condition) + .38 (risk perception post-condition). Only risk perception post-condition (ß = .46, p = .01) was a significant predictor of health-behaviour-intention-total. Desire (ß = .02, p = .78) and risk perception pre-condition (ß = -.05, p = .80) were no significant predictors of health-behaviour-intention-total.

**Prediction of pre-visit behaviour**

Multiple regression was conducted to see if desire, risk perception pre-condition, and risk perception post-condition predicted pre-visit behaviour. Using the enter method it was found that desire, risk perception pre-condition, and risk perception post-condition explain a significant amount of the variance in pre-visit behaviour [$F (3, 117) = 22.94$, $p < .001$, $R^2 = .37$]. Participants' pre-visit behaviour is equal to 1.55 - .04 (desire) + .02 (risk perception pre-condition) + .73 (risk perception post-condition). Only risk perception post-condition (ß = .59, $p < .001$) was a significant predictor of pre-visit behaviour. Desire (ß = -.02, p = .78) and risk perception post-condition (ß = .02, p = .92) were no significant predictors of pre-visit behaviour.

**Prediction of on-sight behaviour**

Multiple regression was conducted to see if desire, risk perception pre-condition, and risk perception post-condition predicted on-sight behaviour. Using the enter method it was found that desire (ß = .10, p = .60), risk perception pre-condition (ß = -.10, p = .62), and risk perception post-condition (ß = .07, p = .47) do not explain a significant amount of the variance in on-sight behaviour [$F (3, 117) = .26$, $p = .86$, $R^2 = -.02$].

## Discussion

The number of people getting tattooed worldwide increases constantly (Kluger et al., 2019). Simultaneously, more and more risks about tattooing and tattoo inks are emerging. Health behaviour can reduce these risks. Whether an individual performs risk-reducing behaviour depends on a number of factors. Perceived knowledge and risk perception have been thoroughly investigated in many contexts (Melnyk et al., 2010; Verga, 2001; Brewer et al., 2007), but studies on perceived knowledge and risk perception in the context of tattooing are scarce. The desire to get a tattoo might influence the intentions to perform health-behaviour, too, as feelings of reward and pleasure are also involved in the process of decision-making ("Reward System", n.d.). Studies on health-behaviour-intention, however, rarely include the influence of desire.

The purpose of this study was to better understand the factors that influence health-behaviour-intention in the context of getting a tattoo. The focus was on the participant's desire to get a tattoo, their perceived knowledge on this topic and their perception of tattoo-related health-risks. A hypothetical model was developed based on theories and reports provided in the literature. In order to investigate these factors, an online survey was designed. The questionnaire included an information sheet which explained the main risks when getting a tattoo.

The results of the study reveal evidence for the suggested role of risk-perception in health-behaviour-intention when it comes to the decision of getting a tattoo: the higher the perception of risks, the greater were the participants' intentions to perform risk-minimizing behaviour. Furthermore, there was proof for the assumption that perceived knowledge would be a predictor of risk perception. The results did neither support the assumed role of desire in perceived knowledge, nor its role in health-behaviour intention. There was no proof for a correlation between desire and perceived knowledge. Furthermore, there was no evidence that desire would be a determinant of health-behaviour-intention. Finally, results did not support the assumption that the interaction between desire and risk perception in the pre-condition would be a significant predictor for risk perception in the post-condition.

On average, participants had moderately high intentions to perform risk-minimizing behaviour. The strongest predictor for health-behaviour intention was risk perception. The higher the participants scored on risk perception, the greater was their intention to perform health-behaviour. This is in line with Roger's (1975) Protection Motivation Theory, which suggests that high risk perception drives the intention to adopt health-behaviour.

Risk perception was correlated with pre-visit health-behaviour-intention but not with individual's behaviour-intention during the visit of a tattoo studio. A reason for that might be that participants perceived risk-reducing actions that they could perform before visiting a tattoo studio easier to carry out than risk-reducing behaviour while they are visiting a tattoo studio. For example, they might have perceived doing further research on the internet easier than choosing another facility because of poor sanitation once they are already at a tattoo studio. This is in line with other research showing that health behaviours that are easier to carry out are more likely to be strongly associated with risk perceptions (Brewer et al., 2007).

Perceived knowledge was hypothesised to be a predictor for risk perception. Contrary to the second hypothesis, results showed that perceived knowledge was negatively correlated with risk perception: the higher the participant's perceived knowledge about tattoos, the lower was his or her risk perception. The findings could lead to the assumption that people actively downplay risks, if they believe they know the risks and are aware of them. Earlier studies on various topics focused mainly on the relationship between education in general and risk perception (Black, Nease, & Tosteson, 1995; Brug et al., 2004; Sjöberg, 2000). They reported mixed findings on the relationship between education and risk perception. Research on the specific relationship between knowledge and risk perception is scarce. The current study provides support for a negative relationship between perceived knowledge and risk perception.

It was expected that the desire to get a tattoo would predict perceived knowledge. The results of this research showed that participant's perceived knowledge about tattoos was not correlated with their desire to get a tattoo. Previous research showed that people tend to avoid information that could challenge their attitude and beliefs and that would demand undesired behaviour (Sweeny et al., 2010). In line with that, some sub-scales of desire seemed to be more connected to perceived knowledge than others, providing some evidence to support the first hypothesis. For instance, the participant's desire intensity was correlated with knowledge-satisfaction and colour-related-knowledge: the more intense the desire to get a tattoo, the higher participants scored on the scales knowledge-satisfaction and colour-related-knowledge.

Previous research proposed that people tend to avoid information because of its potential to cause negative emotions like sadness, fear, or shame. For example, one study about soccer fans in Belgium and the Netherlands found, that the fans were less likely to visit their teams' websites after a defeat and to read about the loss than after victory (Boen, Vanbeselaere, & Feys, 2002). In line with that, a study which examined information seeking

in close relationships found that individuals were more inclined to actively avoid information about a relationship if they assume the feedback will be negative (Afifi, Dillow, & Morse, 2004). In contrast to that, the results of this study revealed that individuals who indicated a more intense desire to get a tattoo tended to score higher on perceived knowledge. This could also be explained by the assumption previously made: that people actively devalue risks if they believe they know the risks. Another explanation could be the fact, that the current study did not test actual knowledge about the risks of tattoos, but the subjective perception of knowledge. It is possible, that people have perceived their knowledge as good or sufficient even though it was not.

It was hypothesized that the desire to get a tattoo would be a predictor for participants' intention to perform risk-minimizing behaviour. However, results revealed that desire was no significant predictor for health-behaviour-intention. Nevertheless, desire was significantly correlated with some sub-scales of health-behaviour-intention. For instance, tattoo-thought-intrusiveness seemed to be negatively correlated to on-sight behaviour: the more often the individual had intrusive thoughts about the tattoo, the lower was his/her health-behaviour intention during the visit of a tattoo studio. Additionally, results showed a negative correlation between desire-intensity and pre-visit behaviour: the more intense the desire to get a tattoo, the lower the intention to perform risk-minimizing actions.

At the same time, the sub-scale tattoo-imagination seemed to be positively correlated to on-sight behaviour: the more often the individual imagined the tattoo, the greater was his/her intention to perform risk-minimizing behaviour during the visit of a tattoo studio, such as making sure that the tattoo artist removes the needles from a new, sealed package. This contradicts the assumption that a stronger desire for a tattoo reduces the willingness to show risk-minimizing behaviour. The results seem contradictory. This suggests that the desire scale was not accurate enough and may have measured different constructs.

It was assumed that desire would have a moderation effect on the way people process risk information. The results did not support this hypothesis. The interaction between desire and risk perception in the pre-condition (i.e., measured risk perception before the participants read the risk information sheet) had no significant effect on risk perception in the post-condition (i.e., measured risk perception after participants read the risk information). In contrary to these findings, previous research supports that people tend to avoid information and to not process it sufficiently when they get the feeling that this information would challenge their beliefs or would demand undesired behaviour (Sweeny et al., 2010).

**Limitations and suggestions for future research**

To draw conclusions from this study, it is necessary to consider possible limitations that might have influenced the research in regard to validity. First of all, it is crucial that the small sample size clearly impedes the reliability of the results. An improvement of the sample size would be an important aspect to focus on in future research. Therefore, the reasons for the limited sample size should be considered. One possible reason could be, that participants were mainly recruited through the social media platform Facebook. Because new posts are continuously uploaded, older posts quickly fade into the background and are ignored. If posts are not updated regularly, fewer people will notice it. To enlarge the sample size, it might have been helpful to speak directly to customers in front of tattoo studios and invite them to take part in the survey. Unfortunately, this possibility was unavailable at the time of the study due to the measures regarding Covid-19.

Another possible reason that should be considered is the high number of participants that did start but not finish the survey. About 40% quit before they finished the questionnaire. Therefore, it can be assumed that the design of the questionnaire impeded the motivation of the participants to complete it. The questions may have been difficult to understand. Moreover, a possible factor impeding the motivation to finish the survey could be the text materials that were included in the questionnaire. It could be that the participants did not feel like reading the risk information and therefore quitted. It is also possible that the questionnaire was simply too long overall. Therefore, a suggestion for further research is to revise the general design of the questionnaire.

In addition, it is unclear to what extent the results are generalizable in terms of gender. More than 80% of the participants were female. The high number of female participants could have influenced the results. The questionnaire was publicly accessible. Therefore, it was not possible to control for an even distribution of gender. This makes it difficult to generalize the sample of the study to the general population, as the difference between the number of tattooed men (17.6%) and women (19.4%) is not so big (Kluger et al., 2019). Consequently, the research sample of the current study is not representative, as the number of tattooed women is much higher than the number of tattooed men in real-life.

Furthermore, the impact of this problem is demonstrated by previous research that shows, that there are considerable differences between men and women, for example regarding information-seeking (Kassulke et al., 1993; Rakowski et al., 1990). For instance, the study of Kassulke, Stenner-Day, Coory, and Ring (1993) showed that more women (49.4%) reported to make a special effort to obtain health information than men (34.1%).

Such findings imply that the high proportion of women within the research sample of the current study probably have influenced the results concerning generalizability and validity. Therefore, changes in the recruitment process to ensure a balanced number of genders that is closer to reality would be worth considering for future studies.

It is unclear whether the provided risk information sheet might be considered as a limitation of the study design. The risk information sheet was needed in order to estimate whether desire has an influence on how people process risk information. The aim was to keep the information as short, understandable and to the point as possible. However, a longer text with more precise explanations of the risks might have led to different results. Since the text highlighted only the risks and disadvantages of tattoos it is also possible that the text was perceived as very negatively biased. This could have influenced participants' responses, too.

Moreover, a striking point of this study design could be that participant’s perceived knowledge was established through self-report measurement, but not their actual knowledge. The results of this study showed that perceived knowledge was negatively correlated with risk perception and health-behaviour-intention. However, it is unclear whether perceived knowledge is an accurate indicator of actual knowledge. It is possible that participants did not know a lot about the specific risks of tattoos or tattoo inks but felt that their knowledge was sufficient. Thus, they might have reported having more knowledge about the risks than they actually had. It would be worthwhile firstly, to investigate to what extend perceived knowledge indicates actual knowledge and secondly, to investigate whether actual knowledge is correlated with risk perception and health-behaviour-intention.

The results of this study suggest that desire is correlated neither with knowledge, nor with risk perception or health-behaviour-intention. Previous research would have suggested other findings (Sweeny t al., 2010). Therefore, further research is indicated to investigate whether desire has an influence on knowledge, risk perception and health-behaviour-intention.

Since desire was only explained by a few items, it is unclear whether the desire-scale might be considered as a limitation of the study design. Desire was measured by three different subscales, namely, tattoo-imagination, desire-intensity, and tattoo-thought-intrusiveness. Exclusively tattoo-thought-intrusiveness seemed to be correlated with perceived knowledge, risk-perception, and health-behaviour-intention. The other two sub-scales hardly correlate with the other scales, even though they were expected to measure the same general construct namely, the desire to get a tattoo. Furthermore, tattoo-thought-intrusiveness was only measured by two items. When the desire scale was constructed, all

items were meant to load on one factor. However, factor analysis showed that the items loaded on three factors. Thus, three different scales were built, resulting in tattoo-thought-intrusiveness being explained only by two items. A pilot study with a larger sample maybe would have revealed these factor loadings early. Thus, it would have been possible to add more items before publishing the final survey. More accurate measurements and a larger number of items could lead to different results and to better validity. Consequently, it is recommended to examine more closely how desire can be measured.

An interesting question for further investigation could be which risk-minimizing behaviours are considered easier to carry out and which actions are considered harder to carry out. The results of this study showed that consumers' intention to engage in health-behaviour was greater before the visit of a tattoo studio than during the visit. In line with these results, regression analysis revealed that health-behaviour-intention-total and pre-visit behaviour were predicted by risk perception post-condition. In contrast, on-sight behaviour was predicted by neither desire, nor by risk perception pre-condition and risk perception post-condition. However, it is unclear whether the formulation of the questions might have influenced the response of the participants. Nevertheless, the findings support the assumption, that people are more likely to perform health-behaviour when it is perceived to be easy in the implementation. Future research is indicated to investigate on the one hand, which health-behaviour is classified by the consumer as simple. On the other hand, it should be examined which behaviour is classified as difficult and is, therefore, less frequently implemented.

Finally, it is unclear to what extent the results of the current study are generalizable to other issues for which consumers develop a desire even though these desires might entail risks. Further research is needed to gain more insight into how consumers are influenced by their desire when it comes to knowledge, risk perception and health-behaviour intention.

**Practical implications and conclusion**

Several conclusions can be made from this study. The aim of this study was to answer the research questions whether the desire to get a tattoo is a determinant of the knowledge related to tattoo risks and thus, a determinant of risk perception and health-behaviour-intention of consumers. Considering the results, risk perception was the strongest predictor for health-behaviour-intention. It can be concluded that customers risk perception of tattoo risks appears to have an impact on their intention to perform risk-minimizing actions. The greater consumers assess a risk, the more likely they are to adapt their behaviour. This effect is especially present when customers intent to perform health-behaviour before they visit a

tattoo studio. These results indicate that it might be useful for risk communicators to stimulate risk perception of consumers. Stimulating risk perception might be useful as it reinforces the consumer's intention to perform health-behaviour.

However, this study faced some challenges that need to be considered when interpreting the results. The sample might have not been diverse enough to be representative for all people who are interested in tattoos. Apart from that, it is suspected whether the concepts of desire and perceived knowledge were measured specifically enough.

Future research should incorporate the findings of the current study into their research so that they are able to uncover whether the desire to get a tattoo is correlated with knowledge, risk perception, and health-behaviour-intention. Beyond that, it should be investigated which risk-minimizing-behaviours are perceived easier and which health-behaviours are considered more complex and whether the difference has an influence on the intention to perform such behaviours.

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# Appendix A

## Questionnaire

Start of Block: Default Question Block

**Welcome!** You are invited to take part in this research study. This project is being conducted by Kim Lara Bamberg. You can take part in the study if you would like to get a tattoo or if you already have a tattoo. If you choose to participate, you will be asked to answer some questions related to tattooing. Every question should be filled out carefully. This will take approximately 10 minutes. The survey is anonymous, no one will be able to identify you. The collected information will be kept confidential and will not be passed on to third parties. Taking part in this research project is completely voluntary, you can stop at any time. After completing the questionnaire, it is not possible to withdraw due to the anonymization. If you have any questions or concerns regarding this questionnaire do not hesitate to contact me: k.l.bamberg@student.utwente.nl **Thank you!**

I hereby declare that I have read and understood the provided information.

- ○ Yes (1)
- ○ No (2)

*Skip To: End of Survey If I hereby declare that I have read and understood the provided information. = No*

I agree with the terms and voluntarily decide to take part in this study.

- ○ Yes (1)
- ○ No (2)

*Skip To: End of Survey If I agree with the terms and voluntarily decide to take part in this study. = No*

End of Block: Default Question Block

Start of Block: Block 2

What is your age?

_____

What is your gender?

- ○ Male (1)
- ○ Female (2)
- ○ Other (3)

Do you already have one or more tattoos?

- ○ Yes (1)
- ○ No (2)

Are you currently planning to get a tattoo?

- ○ Yes (1)
- ○ No (2)

End of Block: Block 2

Start of Block: Block 1

Please indicate how much you agree or disagree with the following statements.

| | Strongly agree (18) | Somewhat agree (19) | Neither agree nor disagree (20) | Somewhat disagree (22) | Strongly disagree (23) |
|---|---|---|---|---|---|
| I imagine myself getting a tattoo. (1) | ○ | ○ | ○ | ○ | ○ |
| I imagine how it would feel like on my skin getting a tattoo. (2) | ○ | ○ | ○ | ○ | ○ |
| I begin to imagine getting tattooed every time it comes to my mind. (3) | ○ | ○ | ○ | ○ | ○ |
| I imagine myself involved in getting tattooed as if it were a movie. (4) | ○ | ○ | ○ | ○ | ○ |
| I picture the tattoo. (5) | ○ | ○ | ○ | ○ | ○ |

How long have you been planning to get a tattoo?

- ○ Few hours (1)
- ○ Few days (2)
- ○ Few weeks (3)
- ○ Few months (4)
- ○ About a year (5)
- ○ Several years (6)

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Since you have been planning to get a tattoo, how often ...

| | Always (16) | Most of the time (12) | About half of the time (14) | Sometimes (15) | Never (13) |
|---|---|---|---|---|---|
| ...did you want the tattoo? (1) | ○ | ○ | ○ | ○ | ○ |
| ...did you have a strong desire for the tattoo? (2) | ○ | ○ | ○ | ○ | ○ |
| ...were you trying not to think about the tattoo? (3) | ○ | ○ | ○ | ○ | ○ |
| ... were the thoughts intrusive? (4) | ○ | ○ | ○ | ○ | ○ |
| ... was it hard to think about anything else? (5) | ○ | ○ | ○ | ○ | ○ |

End of Block: Block 1

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Start of Block: Block 4

Please indicate how much you agree or disagree with the following statements.

| | Strongly agree (6) | Somewhat agree (7) | Neither agree nor disagree (8) | Somewhat disagree (10) | Strongly disagree (11) |
|---|---|---|---|---|---|
| I am satisfied with the knowledge I have about the risks of tattooing. (1) | ○ | ○ | ○ | ○ | ○ |
| What I know about the risks of tattooing is enough for me. (2) | ○ | ○ | ○ | ○ | ○ |
| I think that I know enough about the risks of tattooing to be able to deal with them in my daily life. (3) | ○ | ○ | ○ | ○ | ○ |
| I need more information to form a clear opinion about the risks of tattoos. (4) | ○ | ○ | ○ | ○ | ○ |
| What I know about the risks of tattoo color ingredients is enough for me. (5) | ○ | ○ | ○ | ○ | ○ |
| I think I know enough about tattoo color ingredients to accurately evaluate their risks. (6) | ○ | ○ | ○ | ○ | ○ |
| I need more information about tattoo color ingredients to accurately evaluate their risks. (7) | ○ | ○ | ○ | ○ | ○ |

End of Block: Block 4

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Start of Block: Block 3

Please indicate how much you agree or disagree with the following statements.

| | Strongly agree (6) | Somewhat agree (7) | Neither agree nor disagree (8) | Somewhat disagree (10) | Strongly disagree (11) |
|---|---|---|---|---|---|
| I do believe the risks of tattoos are a real problem. (1) | ○ | ○ | ○ | ○ | ○ |
| I consider the possible long-term effects of tattoos as unacceptable. (2) | ○ | ○ | ○ | ○ | ○ |
| I am concerned about the risks of injecting colorings beneath my skin. (3) | ○ | ○ | ○ | ○ | ○ |
| I am uncertain about whether the problem of risks of tattoo is even real. (4) | ○ | ○ | ○ | ○ | ○ |
| The evidences of risks of tattoos are unreliable. (5) | ○ | ○ | ○ | ○ | ○ |
| I am afraid of skin infections when I get a tattoo. (6) | ○ | ○ | ○ | ○ | ○ |
| Too much fuss is made about the possible consequences of tattoos. (7) | ○ | ○ | ○ | ○ | ○ |
| I am afraid of blood-borne diseases that can be transmitted during the tattooing process. (8) | ○ | ○ | ○ | ○ | ○ |
| Risks of tattoos frighten me. (9) | ○ | ○ | ○ | ○ | ○ |
| I am concerned about the risks of tattoos. (10) | ○ | ○ | ○ | ○ | ○ |

End of Block: Block 3

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Start of Block: Block 5

Please read the following information carefully!

## Health risks of tattoos

When you receive a tattoo, a tattoo artist uses a handheld machine with an attached needle to puncture the skin. Every time this device makes a hole, it injects ink into the dermis — the second layer of skin below the epidermis.

Tattoos are a common form of self-expression, but they also damage the skin and can cause complications. Complications could include:

- allergic reaction to tattoo dyes, which may develop years later; signs of an allergic reaction include a rash at the tattoo site
- skin infection, such as a staph infection or tuberculosis
- development of nodules of inflamed tissue called granulomas around the tattoo site
- formation of keloids, which are overgrowths of scar tissue
- blood-borne diseases, such as hepatitis B, hepatitis C, HIV, and tetanus; these can be contracted by using contaminated tattoo needles that haven't been sanitized
- interference with future magnetic resonance imaging (MRI) tests
- burning or swelling at the tattoo site

The long-term effects of tattoo ink and colorings remain unknown. Until recently, no government regulatory agency has closely examined the safety of tattoo ink.

More than 50 colorings used in tattoos have been approved for use in cosmetics, but the risk of injecting them beneath the skin is unclear. Such pigments are regulated by the U.S. Food and Drug Administration (FDA). So far, the FDA has only looked at whether these pigments were safe for external use, not for injection under the skin. No coloring has been officially approved for injection under the skin.

End of Block: Block 5

Start of Block: Block 6

Please indicate how much you agree or disagree with the following statements.

| | Strongly agree (6) | Somewhat agree (8) | Neither agree nor disagree (10) | Somewhat disagree (11) | Strongly disagree (12) |
|---|---|---|---|---|---|
| I do believe the risks of tattoos are a real problem. (1) | ○ | ○ | ○ | ○ | ○ |
| I consider the possible long-term effects of tattoos as unacceptable. (2) | ○ | ○ | ○ | ○ | ○ |
| I am concerned about the risks of injecting colorings beneath my skin. (3) | ○ | ○ | ○ | ○ | ○ |
| I am uncertain about whether the problem of risks of tattoo is even real. (4) | ○ | ○ | ○ | ○ | ○ |
| The evidences of risks of tattoos are unreliable. (5) | ○ | ○ | ○ | ○ | ○ |
| I am afraid of skin infections when I get a tattoo. (6) | ○ | ○ | ○ | ○ | ○ |
| Too much fuss is made about the possible consequences of tattoos. (7) | ○ | ○ | ○ | ○ | ○ |
| I am afraid of blood-borne diseases that can be transmitted during the tattooing process. (8) | ○ | ○ | ○ | ○ | ○ |
| Risks of tattoos frighten me. (9) | ○ | ○ | ○ | ○ | ○ |
| I am concerned about the risks of tattoos. (10) | ○ | ○ | ○ | ○ | ○ |

Please indicate whether you will perform the following behaviour in order to reduce the risks of tattoos.

| | Definitely I will (7) | Probably I will (8) | Maybe I will, maybe I will not (14) | Probably I will not (10) | Definitely I will not (11) |
|---|---|---|---|---|---|
| I will do further research on the risks of tattoos. (1) | ○ | ○ | ○ | ○ | ○ |
| I will only get a tattoo from a licensed, reputable facility. (2) | ○ | ○ | ○ | ○ | ○ |
| I will make sure that the tattoo artist removes the needles from a new, sealed package. (3) | ○ | ○ | ○ | ○ | ○ |
| I will check that the tattoo artist uses a fresh pair of gloves and washes his/her hands before starting the procedure. (4) | ○ | ○ | ○ | ○ | ○ |
| I will make sure that the surfaces, chairs, and non-disposable equipment are properly cleaned and sterilized. (5) | ○ | ○ | ○ | ○ | ○ |
| I will choose another facility if there is evidence of poor sanitation. (6) | ○ | ○ | ○ | ○ | ○ |
| I will make sure that the area of skin being tattooed is swabbed with a disinfectant. (7) | ○ | ○ | ○ | ○ | ○ |
| I will do further research on toxic tattoo-inks. (8) | ○ | ○ | ○ | ○ | ○ |
| I will ask the tattoo artist about the ingredients of the used tattoo-ink. (9) | ○ | ○ | ○ | ○ | ○ |
| I will choose another facility if the tattoo-artist cannot give me sufficient information about the ingredients in the used tattoo-ink. (10) | ○ | ○ | ○ | ○ | ○ |
| I will choose another facility if the used tattoo-ink contains toxic ingredients. (11) | ○ | ○ | ○ | ○ | ○ |

End of Block: Block 6

**Appendix B**

**Screenshot of the Website about Risk Information**

## Health risks of tattoos

When you receive a tattoo, a tattoo artist uses a handheld machine with an attached needle to puncture the skin. Every time this device makes a hole, it injects ink into the dermis — the second layer of skin below the epidermis.

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