Tick check? Check! A cross-sectional survey on the determinants of the tick check

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Abstract

Between 1994 and 2014, the incidence of tick bites and tick-borne diseases, especially Lyme disease, has increased drastically in the Netherlands. Due to the severity of Lyme disease, it is important to reduce the risk of getting bitten by a tick and contracting Lyme disease as much as possible. Performing a tick check after visiting nature is considered the most important preventive measure to avoid contracting Lyme disease. Many previous studies focused on "taking preventive measures" as one behaviour, while different possible measures should be considered as different behaviours with possibly different determinants. In addition, theory is underused in this field of research. The aim of this study is to identify determinants of performing the tick check and to contribute to making this field of research theoretically more comprehensive.

A literature study was done to identify determinants of taking preventive measures to avoid tick bites and Lyme disease and performing a tick check. There were some mixed findings, but the determinants of taking preventive measures according to the literature study were: outcome expectations, perceived severity, perceived susceptibility, self-efficacy, knowledge, possible impediments and having previous experience with ticks and Lyme disease. Many determinants could be relabelled with theoretical labels from Social Cognitive Theory (SCT) by Bandura (1998).

Based on SCT and empirical literature, a survey was designed in which the in the literature study identified determinants and participants' current tick check behaviour were measured. The analysis included 462 participants. Regression analyses were carried out to test predictor variables' effects on dependent variables. In order of importance, intention, self-efficacy, outcome expectations, knowledge and experience were significant contributors to performing the tick check. 24% of the variance in behaviour could be explained by these variables. Identified barriers to perform a tick check were being in company of other people, lacking tweezers and lacking a mirror.

It was concluded that interventions should target the identified determinants of performing a tick check while taking the identified barriers into account. Examples of implementation, limitations of the study and suggestions for future research are provided.

Keywords: Lyme disease, tick check, determinants, health behaviour

Preface

Dear reader,

This MSc thesis was written as a part of my study programme Applied Communication Science at Wageningen University. After six months of learning and hard work, I hereby present the resulting thesis. This thesis has been established with the support of some great people.

First, I would like to thank my supervisor Bob Mulder for great advice and feedback during this period. Your clarifying insights and enthusiasm for this project awakened the scientist in me. During this time, I have grown a lot both as a researcher and as a person, for which I am grateful.

Second, I would like to thank my second supervisor Arnold van Vliet for his great feedback from a different scientific perspective and for promoting the survey on the websites Nature Today and Tekenradar. Thanks to you I was able to include a lot of participants in this study, which is great.

Third, I would like to thank my friends and family who, during this period, listened to my endless puzzling talks about literature, SPSS and regression analysis. I thank you for supporting me during this project.

Last but not least, I would like to thank all the participants of the research for their time and effort to participate. You made this report possible.

Enjoy reading this thesis!

Amy van der Heijden
Houten, 22 February 2016

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1. Introduction

1.1 Background

Between 1994 and 2014, the incidence of tick bites and tick-borne diseases, especially Lyme disease, has increased drastically in the Netherlands (Hofhuis, Harms, Van der Giessen, Sprong, Notermans & Van Pelt, 2010; Sprong, Hofhuis, Gassner, Takken, Jacobs, Van Vliet, Van Ballegooijen, Van der Giessen & Takumi, 2012; Tekenradar, 2015). In 1994, 191 per 100,000 Dutch inhabitants visited their general practitioner concerning a tick bite. In 2009, this was 564 per 100,000. In 1994, 39 per 100,000 Dutch inhabitants visited their GP with an erythema migrans; in 2009, this was 134 per 100,000 (Hofhuis et al., 2010). Dutch people visiting their GP with an erythema migrans in 2014 was 139 per 100,000 inhabitants (Tekenradar, 2015). An erythema migrans is an early sign of Lyme disease. It often looks like a red skin rash in the form of an expanding circle, although there are other types as well (Tijsse-Klasen, Sprong & Pandak, 2013).

Lyme disease, also known as Lyme borreliosis, is a disease that is caused by an infection with the *Borrelia burgdorferi* bacteria, which is a member of the species complex *Borrelia burgdorferi sensu lato* (Piesman & Eisen, 2008). It can be transmitted through a bite from an infected tick. Lyme disease is the most prevalent tick-borne disease in people in Europe (Beaujean, Bults, Van Steenbergen & Voeten, 2013a). The disease can be present in three different stages (Beaujean et al., 2013a). Beaujean et al. (2013a) explain that the first stage is in about 90% of infected people recognizable by an erythema migrans. Symptoms associated with this first stage are fever, headache, fatigue and depression. In the second stage of the disease, the infection may spread to other bodily areas. Symptoms in this stage can include joint pains and swellings, headache, neck stiffness and loss of muscle strength in the face. In the third stage, severe and potentially chronic symptoms can develop such as neurological diseases, joint problems, problems with the nerves system and heart diseases. Treatment with antibiotics in the first stage can prevent the stages two and three from developing (Beaujean et al., 2013a).

Due to the severity of the symptoms of Lyme disease it is important to reduce the chance of being bitten as much as possible. Basic measures to prevent a tick bite include wearing clothing that minimizes skin exposure, for example by wearing long trousers, preferably tucked into socks (Mowbray, Amlôt & Rubin, 2012), tucking in shirts and wearing closed shoes (Davis, 2014). Also, one could use insect repellent on the body when going into nature and avoid walking in high grass and bushes (Mowbray, Amlôt & Rubin, 2012; Davis, 2014). People could also avoid areas with a high risk of tick bites.

After visiting areas where ticks could be present, people should check their body for ticks and tick bites (Mowbray, Amlôt & Rubin, 2012). From now on, this will be referred to as doing a 'tick check'. Ticks usually attach themselves to the body on warm places, like in the armpits, in the buttocks, in the knees, under the underwear, behind the ears and around the hairline in the neck (RIVM, 2012). The National Institute for Public Health and Environment explains in a video how a tick can be removed (RIVM, 2012). According to this video, the first step of the tick check is to remove one's clothes to be able to look at the skin. The second step would be to systematically look at one's body from the top to the bottom, paying extra attention to the warm places of the body. For the back or other places one is not able to look at well, a mirror could be used. If a tick is found, it should be removed with pointy tweezers or a tick remover. One needs to grab the head of the tick with the tweezers and pull it out straight. If a tick remover is used, the instructions that come with that remover should be followed.

The sooner a tick is removed from the body, the smaller the chance is to contract Lyme disease. Especially doing a tick check after visiting nature is a very important preventive measure to avoid contracting Lyme disease, since measures like wearing long trousers and using insect repellent help to avoid a tick bite, but do not give a full guarantee that one will not be bitten; only doing a tick check after visiting nature can fully determine whether one has actually been bitten by a tick or not and gives the opportunity to remove the tick. Additionally, ticks that have not yet bitten can also be discovered and removed. Several studies have been done on the amount of time a tick needs to be attached to its host to transmit the *Borrelia burgdorferi* bacteria that can cause Lyme disease. Cook (2015) concludes in his review that often mentioned transmission times of 24 or 48 hours are not supported by the published data. According to Cook (2015), there is no rule of thumb established yet with regard to the minimum attachment time to transmit Lyme disease in humans. There is, however, evidence that the longer a tick is attached to its host, the higher the risk of Lyme disease becomes (Cook, 2015). So if a tick is discovered after visiting nature, it has to be removed as soon as possible, since the longer the tick has been on the body, the higher the chance becomes to contract Lyme disease if the tick is infected. Doing a tick check after visiting nature is thus one of the most important preventive measures to avoid contracting Lyme disease. Also Beaujean et al. (2013c) conclude that public health efforts with regard to Lyme disease should focus on checking for tick bites.

Various studies show that many people do not take measures to prevent getting bitten by a tick and contracting Lyme disease (e.g. Herrington Jr., Campbell, Bailey, Cartter, Adams et al., 1997; Phillips, Liang, Sangha, Wright, Fossel et al., 2001; Mowbray, Amlôt & Rubin,

2012). Mowbray, Amlôt & Rubin (2012) note that several interventions have been designed over the years and in different places to tackle the problem of people getting tick bites and contracting Lyme disease. However, it appears that the effectiveness of these interventions is often not known. In their article, Mowbray, Amlôt & Rubin (2012) reviewed previous studies that conducted such interventions that also assessed the effectiveness of the designed interventions. Of the 386 articles that were potentially relevant for their review, only nine included an assessment of the effectiveness of the intervention.

In addition, the use of empirically tested psychological theories for behaviour change in the interventions was very limited (Mowbray, Amlôt & Rubin, 2012). As a result, there appears to be a knowledge gap in this field of research. The use of behavioural theories in the interventions is very limited. It is also unclear which theory or theories are potentially the most successful in establishing behaviour change with regard to taking preventive measures to avoid tick bites and contracting Lyme disease. In addition, it is often not clear whether interventions done are effective. Studies on what behavioural determinants are of taking preventive measures are also often not based on behavioural theory (Mowbray, Amlôt & Rubin, 2012 & 2014). On top of this, "taking preventive measures" is often described as one behaviour, while there are many different preventive measures that could be taken. Different preventive measures entail different behaviours, with possibly different determinants. For example, people may have certain reasons to tuck their trousers into socks when visiting nature, but that does not mean that these are the same reasons why they may or may not perform a tick check after visiting nature. Therefore, "taking preventive measures" should not be considered as one behaviour, but each preventive measure should be considered as a different behaviour with possibly different determinants.

Results of studies on the relations between different determinants of behaviour and the preventive behaviour of people have some common grounds, but there is no clear consensus (e.g. Herrington et al., 1997; Shadick, Daltroy, Philips, Liang & Liang, 1996; Maat & Konings, 2010; Beaujean et al., 2013). The findings differ per study and per region. Therefore, it is unclear what determines whether people in the Netherlands will do the important tick check. Nonetheless, there are some websites that aim to inform Dutch inhabitants about ticks and Lyme disease, like www.tekenradar.nl, a collaboration between Wageningen University and the National Institute for Public Health and Environment (RIVM). It is useful to know which determinants of behaviour concerning taking a preventive measure like the tick check are relevant in the Netherlands, for example for such websites and other initiatives that aim to make people take more preventive measures to avoid tick bites

and contracting Lyme disease. A more in-depth review of the determinants of behaviour regarding taking preventive measures to avoid tick bites and contracting Lyme disease, will be discussed in chapter 2.

1.2 Aim and research questions

The aim of the current research was to provide insight in the determinants of performing the tick check to avoid contracting Lyme disease in the Netherlands. Results from this study can be used in future interventions to let more people do the tick check after visiting nature. In addition, this study contributed to making this field of research theoretically more comprehensive. To support the aim, the following research questions were formulated:
1. What is known in the literature about behavioural determinants to take preventive measures to avoid tick bites and contracting Lyme disease?
2. What are behavioural determinants to do the tick check after visiting nature?

2. Conceptual framework

2.1 The relevance of theory

In designing interventions and doing scientific research, the use of theories is essential and thus highly recommended (Michie, Johnston, Francis, Hardeman & Eccles, 2008; Bartholomew, Parcel, Kok, Gottlieb & Fernández, 2011; Mowbray, Amlôt & Rubin, 2012). Bartholomew et al. (2011) state that in intervention planning, specific attention to theory is required. According to Mowbray, Amlôt & Rubin (2012) the success of public education campaigns will be higher when these campaigns are based on theory; specifically theories of behaviour change. Bartholomew et al. (2011, p.53) state that theories "provide a basis for understanding and predicting behaviour change and designing interventions" and that "theories reflect reality" (p.59). Thus, the use of theory is an essential part in doing research and in designing interventions.

Michie et al. (2008) name three specific reasons why theory should be used in interventions. First, Michie et al. (2008) say that the effectiveness of interventions will improve if causal determinants of behaviour change are targeted and this requires understanding of theoretical mechanisms of change. As a second reason, Michie et al. (2008) say that only if interventions are theoretically informed, evaluation of those interventions can lead to testing and development of theory. The third reason Michie et al. (2008) name is that interventions that are based on theory provide insight in what works and this can be used to develop better theory among various contexts, populations and behaviours. Accordingly, the

importance of using theory also applies to interventions or public education campaigns targeting taking preventive measures to avoid tick bites and contracting Lyme disease. Several existing theories could be used to guide the development of interventions that aim to encourage people to take preventive measures to avoid tick bites and contracting Lyme disease (Mowbray, Amlôt & Rubin, 2012). This will be elaborated upon in section 2.2.

2.2 A theory about changing behaviour: Social Cognitive Theory

Many theories have been developed that explain health behaviour and possible determinants on how to change such behaviour. Some of these theories that are well-known and proven effective in interventions targeting changing certain health behaviours include the Health Belief Model (Hochbaum, Rosenstock & Kegels, 1952), the Protection-Motivation Theory (Rogers, 1975), the Theory of Planned Behaviour (Ajzen, 1985), the Elaboration Likelihood Model (Petty & Cacioppo, 1986) and the Social Cognitive Theory (Bandura, 1986). All of these theories have their own central theoretical concepts. In this study, a central concept is behaviour: doing a tick check after visiting nature (see chapter 1). This behaviour means that a person needs to 'do something' and that can either go right or wrong. Therefore, the facts whether a person thinks he will be able to perform the behaviour (self-efficacy) and whether a person is actually capable of performing the behaviour (behavioural capability, according to Bartholomew et al., 2011), have prominent roles in whether a person will actually perform the behaviour or not. As self-efficacy was already prominent in the Social Cognitive Theory (Bandura, 1986 & 1998), this theory will support the rest of this study. How does the Social Cognitive Theory (Bandura, 1986 & 1998) help us to understand and predict the performance of the tick check?

A schematic overview of the causal structure of the Social Cognitive Theory is presented in figure 1 (Bandura, 1998, p.629). It can be seen that self-efficacy has a very important role in the prediction of behaviour according to this model; it is at the start of the causal structure. In the current context, the behaviour is performing a tick check. Self-efficacy means whether a person thinks that he is capable of performing a certain behaviour or not (Bartholomew et al., 2011). Self-efficacy is an important incentive for behaviour and is therefore linked not only to other determinants like outcome expectations, impediments and intention, but directly to behaviour as well. If people think they will not be able to perform a certain behaviour in the desired way, they may not even start performing the behaviour. At the same time, when people think they will be able to perform a behaviour successfully and it will lead to a desired outcome, this is an incentive to start performing the behaviour (Bandura,

1998). With regard to doing a tick check, self-efficacy means that a person needs to think that he is capable of performing all the steps of performing a tick check. The person needs to think he is able to take off his clothes and look in all relevant places described. He also needs to think that he is able to remove a tick from his skin in the correct way, for example by using pointy tweezers or a tick remover.
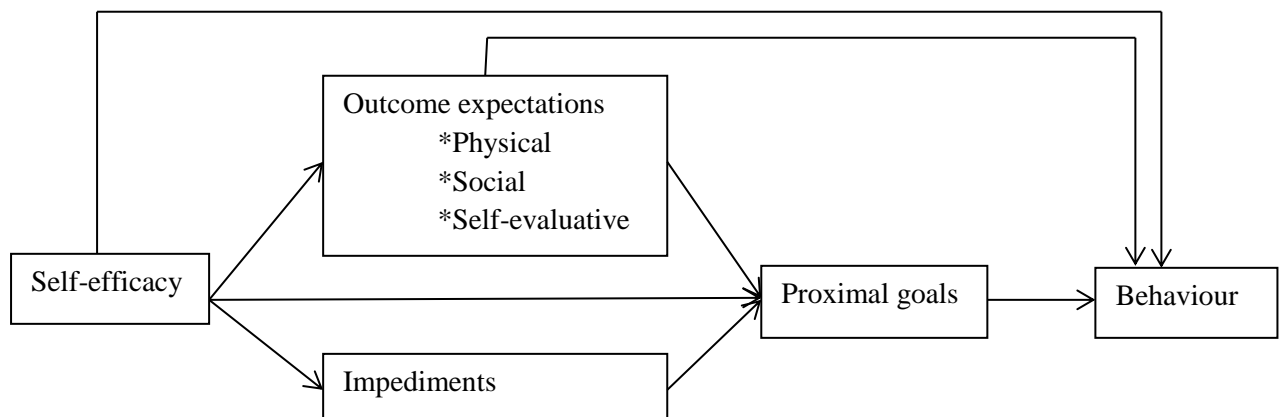
Figure 1. Causal structure of the Social Cognitive Theory as described by Bandura (1998, p.629).

Outcome expectations, also called "attitudes", "behavioural beliefs and values" or "benefits and barriers" (Bartholomew et al., 2011, p.60) are what a person thinks will be the consequences of performing a certain behaviour (Bartholomew et al., 2011). These can be perceived favourably or unfavourably (Bartholomew et al., 2011). Outcome expectations cover three areas: physical outcome expectations, social outcome expectations and self-evaluative outcome expectations (Bandura, 1998). Physical outcome expectations are expectations about physical consequences of the behaviour, such as physical pleasure (favourable) or physical pain (unfavourable) (Bandura, 1998). Social outcome expectations are the either positive (favourable) or negative (unfavourable) social reactions of others that are caused by the behaviour (Bandura, 1998). Self-evaluative outcome expectations concern a person's own positive (favourable) or negative (unfavourable) evaluations of the behaviour, according to the person's own personal standards (Bandura, 1998). Each favourable outcome expectation serves as an incentive to perform the behaviour, unfavourable outcome expectations serve as a disincentive to perform the behaviour (Bandura, 1998). According to Bandura (1986 & 1998), self-efficacy has a strong influence on outcome expectations. If people have low self-efficacy they are also likely to have low outcome expectations, because

they think they will not be able to perform the behaviour and thus the outcome of the behaviour will also not be favourable. If people have high self-efficacy their outcome expectations will also be higher, since they expect to perform the behaviour well and the outcome is then more likely to be favourable. Outcome expectations lead to the intention to perform behaviour, but can also lead directly to behaviour. One may not perform certain behaviour if he thinks the outcome will be bad, even though when his self-efficacy to perform the behaviour is high and he is not restrained by impediments. With regard to performing the tick check, an example of a favourable physical outcome expectation is that the person will not contract Lyme disease by performing the tick check. An example of a favourable social outcome expectation is that other people will approve the person's behaviour of performing the tick check, thereby protecting his health. An example of a self-evaluative outcome expectation is that a person evaluates the behaviour of performing the tick check as positive, because a personal standard of his is that people should take care of their bodies and protect their own health.

Impediments can also be called barriers. Bandura (1998) distinguishes personal impediments and situational impediments. Personal impediments are impediments or barriers to behaviour that come from a person himself (Bandura, 1998). With regard to tick checks, an example of a personal impediment is when someone is disgusted by ticks; that could be a barrier to perform the tick check. Situational impediments are also impediments or barriers that impede performing the behaviour, but these do not come from within the person but from the situation or environment (Bandura, 1998). An example of a situational impediment is when someone wants to remove a tick from his body (a component of the tick check) but does not have tweezers with him. Impediments are related to a person's self-efficacy (Bandura, 1998). If many impediments to performing the behaviour are present, potentially limiting the person's capability of performing the behaviour, the self-efficacy of the person will also be low; he will think it is unlikely that he will be able to perform the behaviour successfully.

Proximal goals can also be called intentions (Bandura, 1998). Proximal goals or intentions represent the behaviour that someone intends to do. Intention is a strong predictor for behaviour (Bandura, 1998). With regard to the tick check, an example is when someone goes into nature and thinks "When I get back from visiting nature, I will do the tick check."

Behaviour refers to a certain action a person can perform. With regard to the tick check, the behaviour is performing the tick check.

2.3 Literature study on determinants of taking preventive measures

2.3.1 Methodology

This literature study aimed to identify behavioural determinants to take preventive measures to avoid tick bites and contracting Lyme disease. The databases Web of Science, Scopus, Global Search and Google Scholar were used. These databases were expected to contain relevant publications about behaviour and determinants of behaviour and behaviour change. The search terms that were used are "preventive measures", "protective measures", "preventive behaviour", "preventive behavior", "protective behaviour", "protective behavior", "tick bites", "ticks", "tick check", "Lyme disease" and "determinants". Articles were selected as relevant for this literature study if a topic of the study was about the determinants of behaviour of taking preventive measures or specifically doing a tick check to avoid tick bites and Lyme disease. In total, ten articles were included in the literature study.

2.3.2 The determinants

As mentioned in section 1.1, multiple studies have been done on the relation between different behavioural determinants and the preventive behaviour of people concerning tick bites. In the literature, different determinants have been found with regard to people taking preventive measures to avoid contracting Lyme disease. Some of the determinants are described in terms that are not part of an existing behavioural theory or the same determinants are described with different terms among different studies. To make clear what exactly is meant by the researchers of those studies and to be able to relate the found determinants in those studies to the Social Cognitive Theory by Bandura (1986 & 1998), some of the determinants described in these studies will be translated to terms more common in the social sciences. In other words, these terms will be "relabelled with their theoretical labels", as Bartholomew et al. (2011, p.31) call this phenomenon. An explanation of the new terms or theoretical labels can be found in section 2.2. The few terms that are not present in the Social Cognitive Theory will be explained in the text itself.

Outcome expectations was found in all ten included studies (Hallman, Weinstein, Kadakia & Chess, 1995; Shadick, Daltroy, Philips, Liang & Liang, 1996; Herrington et al., 1997; Herrington, 2004; Gould et al., 2008; Mowbray, Amlôt & Rubin, 2014; Aenishaenslin et al., 2015; Maat & Konings, 2010; Beaujean et al., 2013a & Velsen, Beaujean, Gemert-Pijnen, Maat & Steenbergen, 2012). In the various studies, different terms were used for this determinant of behaviour. For example, Hallman, Weinstein, Kadakia & Chess (1995) call it the belief that Lyme disease is not easy to cure. This is an expectation of a negative physical

consequence of Lyme disease (by not taking preventive measures) and is therefore an unfavourable (physical) outcome expectation of not taking preventive measures. This means that the other way around, people will probably have positive outcome expectations of taking the preventive measures (and thereby not contracting Lyme disease).

Shadick, Daltroy, Liang & Liang (1996) use the term perceived severity of Lyme disease and the belief that preventive measures' benefits are more important than the inconvenience that they cause. Perceived severity is "a person's feelings concerning the seriousness of contracting an illness" (Bartholomew et al., 2011, p.67). It means that if people think that Lyme disease is a very serious illness, they are more likely to take preventive measures. Believing that Lyme disease is a very serious illness is an unfavourable physical outcome expectation of contracting Lyme disease by not taking preventive measures. The belief that preventive measures' benefits are more important than the inconvenience that they cause is also a physical outcome expectation. People expect that the benefit (not contracting Lyme disease, which is physical) is more important than the inconvenience of the preventive measures (for example wearing long trousers with high temperatures, also physical).

Herrington et al. (1997) describe this determinant as attitudes that favour personal protection against Lyme disease, as beliefs about Lyme disease, as beliefs that one is at personal risk of getting Lyme disease and as "values". As mentioned in section 2.2, attitudes and outcome expectations are similar. Beliefs about Lyme disease are also outcome expectations, since a person has an expectation that contracting Lyme disease has certain (negative) consequences. Beliefs that one is at personal risk of getting Lyme disease is also an outcome expectation; people have the expectation that they can get Lyme disease which is a negative physical outcome expectation.

Herrington (2004) uses again different terms in another study; in this study terms used to describe the determinant outcome expectations are being concerned about being bitten by a tick (perceived susceptibility), perceiving insect repellent to be effective and believing Lyme disease is a serious disease (perceived severity). Being concerned about being bitten by a tick is a negative physical outcome expectation of being bitten by a tick and possibly contracting Lyme disease. Perceiving insect repellent to be effective against tick bites and Lyme disease, or perceiving any preventive measure to be effective against tick bites and Lyme disease, is a positive physical outcome expectation of taking a preventive measure. Believing Lyme disease is a serious disease is called perceived severity and this can be seen as an outcome expectation, as explained earlier.

Gould et al. (2008) mention that perceived susceptibility and perceived severity of

Lyme disease should motivate people to take preventive measures. Perceived susceptibility (believing one is at personal risk of getting Lyme disease) and perceived severity (believing Lyme disease is a serious illness) are outcome expectations.

Mowbray, Amlôt & Rubin (2014) speak of perceived susceptibility and not being disgusted by ticks. Perceived susceptibility is an outcome expectation and not being disgusted about ticks can also be seen as an outcome expectation of performing a tick check. Because if someone is disgusted about ticks, the inconvenience of doing a tick check might be higher for this person than the benefits, while if someone is not disgusted about ticks, the benefits of doing a tick check might be higher than the inconvenience. Believing the benefits of a preventive measure are more important than the inconvenience that they cause is an outcome expectation, as was explained earlier.

Aenishaenslin et al. (2015) found that perceived risk of getting Lyme disease and the perceived efficacy of the preventive measures were associated with taking preventive measures. Perceived risk of getting Lyme disease is perceived susceptibility and is therefore an outcome expectation. The perceived efficacy of the preventive measures concerns an expectation of the effect of taking the preventive measure (positive, negative or none; favourable or unfavourable) and is therefore an outcome expectation of taking the preventive measure.

Self-efficacy towards taking preventive measures to avoid tick bites and Lyme disease was also found as a determinant in some studies (Shadick, Philips, Liang & Liang, 1996; Mowbray, Amlôt & Rubin, 2014; Maat & Konings, 2010; Beaujean et al., 2013a & Velsen, Beaujean, Gemert-Pijnen, Maat & Steenbergen, 2012). Two things are notable about this. First, this determinant is labelled with the same term in the various studies in which it was found, in contrast with the determinant "outcome expectations" for which many different terms were used. Second, this determinant was found in far less studies than the determinant "outcome expectations". Judging from the explanation of the Social Cognitive Theory by Bandura (1986 & 1998) in section 2.2 it may have been expected that the determinant "self-efficacy" would be found in many studies on the topic of taking preventive measures to avoid tick bites and contracting Lyme disease. A possible explanation for this discrepancy is that many studies on determinants of taking preventive measures to avoid tick bites and contracting Lyme disease focused on knowledge as the key outcome rather than behaviour (Mowbray, Amlôt & Rubin, 2012 & 2014). Knowledge is related to outcome expectations, because logically, outcome expectations of a certain behaviour are based on what a person knows about that behaviour. However, when focusing on behaviour rather than knowledge,

the fact whether a person thinks he is capable of performing the behaviour (self-efficacy) becomes more important than only knowledge and outcome expectations of that behaviour.

Knowledge of ticks and Lyme disease and knowledge about how to take preventive measures was also found as one of the determinants of taking preventive measures (Shadick, Daltroy, Liang & Liang, 1996; Herrington et al., 1997; Herrington, 2004; Gould et al., 2008; Mowbray, Amlôt & Rubin, 2014, Beaujean et al., 2013a & Aenishaenslin et al., 2015). Knowledge of preventive measures was also named as a determinant (Beaujean et al., 2013a), as well as previous experience with ticks and Lyme disease (Velsen, Beaujean, Gemert-Pijnen, Maat & Steenbergen, 2012).

Also some impediments were mentioned as determinants (or disincentives) for taking preventive measures (Mowbray, Amlôt & Rubin, 2014). Having little time and forgetting it were reasons not to take preventive measures, as was found by Mowbray, Amlôt & Rubin (2014).

Knowing someone with Lyme disease and having previous experience with Lyme disease was also found in association with taking preventive measures (Hallman, Weinstein, Kadakia & Chess, 1995; Herrington, 2004).

2.3.3 Conclusion of the literature study

Several studies have been done on the determinants of behaviour regarding taking preventive measures to avoid tick bites and contracting Lyme disease. The determinants found in various studies mentioned in section 2.3.2 provide some insight in the determinants of taking preventive measures to avoid tick bites and contracting Lyme disease. However, derived from these results no strong conclusion can be drawn yet for the current situation regarding determinants of performing a tick check in the Netherlands. The findings of some studies are contradictive. Hallman, Weinstein, Kadakia & Chess (1995) for example found that perceived severity of Lyme disease and perceived inconveniences and benefits of taking preventive measures (both outcome expectations) were not associated with taking preventive measures, while Shadick, Daltroy, Philips, Liang & Liang (1996) found that these were important determinants of taking preventive measures. In addition, some studies (Herrington et al., 1997; Herrington, 2004; Aenishaenslin et al., 2014 & Aenishaenslin et al., 2015) indicate that the results they found differ per area. Therefore, the determinants of taking preventive measures and specifically doing a tick check in the Netherlands anno 2016 may be different than in the other studies done.

Additionally, for some studies on this topic it remains unclear whether and which behavioural theory was used to support the research and the determinants that were chosen to

investigate. In their reviews, Mowbray, Amlôt & Rubin (2012 & 2014) also recognize that in many studies in this field of research the use of theory is very limited. This does not mean that the results of conducted studies are not useful. Yet, to get a theoretically grounded grip on the current situation in the Netherlands on determinants of taking preventive measures (specifically doing a tick check) to avoid tick bites and contracting Lyme disease and to contribute to the theoretical comprehensiveness of the research in this domain, a multifactorial model was used to support the remains of the current study, namely the Social Cognitive Theory by Bandura (1986 & 1998).

Despite some mixed findings, there are several determinants that are mentioned a lot in the included studies and that are likely determinants of behaviour with regard to taking preventive measures to avoid tick bites and Lyme disease. Taking all these determinants together, relabelling them with their theoretical labels, and assuming they will be applicable to not only "taking preventive measures" to avoid tick bites and contracting Lyme disease in general but also to more specifically taking the preventive measure "doing a tick check after visiting nature", likely determinants for people to do a tick check after visiting nature in the Netherlands are: outcome expectations of doing the tick check, perceived severity, perceived susceptibility, self-efficacy towards doing the tick check, knowledge of ticks and Lyme disease, knowledge about the preventive behaviour "doing a tick check" and knowledge about how to perform the tick check, possible impediments, knowing someone with Lyme disease and having previous experience with ticks and Lyme disease.

Many different determinants were mentioned in the included studies that can all be seen as outcome expectations in terms of the Social Cognitive Theory by Bandura (1986 & 1998), as was shown in section 2.3.2. Therefore, most of these were not mentioned one by one in the list of found determinants in the previous section but were all gathered under the theoretical label "outcome expectations". However, a notable exception was made for the determinants "perceived severity" and "perceived susceptibility". These two concepts are also examples of physical outcome expectations according to Bandura (1998). Yet, these are determinants mentioned in respectively three and five of the ten included studies. This may imply that perceived severity and perceived susceptibility are important determinants of performing a tick check. In addition, these two concepts are not only present as examples of physical outcome expectations in terms of Social Cognitive Theory by Bandura (1986 & 1998), but are also theoretical concepts in the Health Belief Model by Hochbaum, Rosenstock & Kegels (1952). In that model they lead to a perceived threat, which leads to health-promoting behaviour. This emphasizes the relevance of these two concepts in models of

(health) behaviour change and possibly as determinants of doing a tick check, which can also be seen as health behaviour. For these reasons the concepts perceived severity and perceived susceptibility were not simply gathered under the term of outcome expectations, but were mentioned in addition to outcome expectations to emphasize their possible relevance.

The model that was used to guide the rest of this research is the Social Cognitive Theory by Bandura (1986 & 1998). Most determinants that were mentioned in the included studies of the literature study already fit into the model as elements of outcome expectations, as self-efficacy or as impediments. Different types of knowledge, which were also mentioned as determinants in the literature study, were in this study assumed to precede outcome expectations: information about the tick check and Lyme disease has to be known first, before outcome expectations can be composed. In addition, Bandura (1998, p.624) mentions that "knowledge creates the precondition for change".

Perceived severity and perceived susceptibility appear to be important determinants as explained earlier in this section. They are specific applications of outcome expectations. Theoretical concepts are functions of underlying beliefs, according to Glanz, Rimer & Viswanath (2008). Therefore, perceived severity and perceived susceptibility could also be seen as two of the underlying beliefs of the theoretical concept outcome expectations. They are therefore not only examples of, but possibly also ahead of outcome expectations.

Figure 2 shows a schematic overview of the determinants found in the literature, placed in the context of the Social Cognitive Theory by Bandura (1998). This figure gives an overview of which determinants were studied in the remains of this research and in what context they were seen. As can be seen in figure 2, perceived severity and perceived susceptibility were placed in front of outcome expectations. The consideration that they are also underlying beliefs of outcome expectations approves that they were placed as preceding the outcome expectations, rather than just being elements of outcome expectations. In addition to this theoretical explanation, it was also methodologically justified to place perceived severity and perceived susceptibility in front of outcome expectations in this schematic overview. This will be elaborated upon in chapter three.

Because experience and knowledge are assumed to be preceding outcome expectations as well, their place in this schematic overview is also in front of outcome expectations. The methodological reasoning for this is described in chapter three. The other shown determinants, meaning self-efficacy, outcome expectations, impediments, intention and behaviour, are shown in the way in which they are assumed to be connected to each other according to the Social Cognitive Theory by Bandura (1986 & 1998).
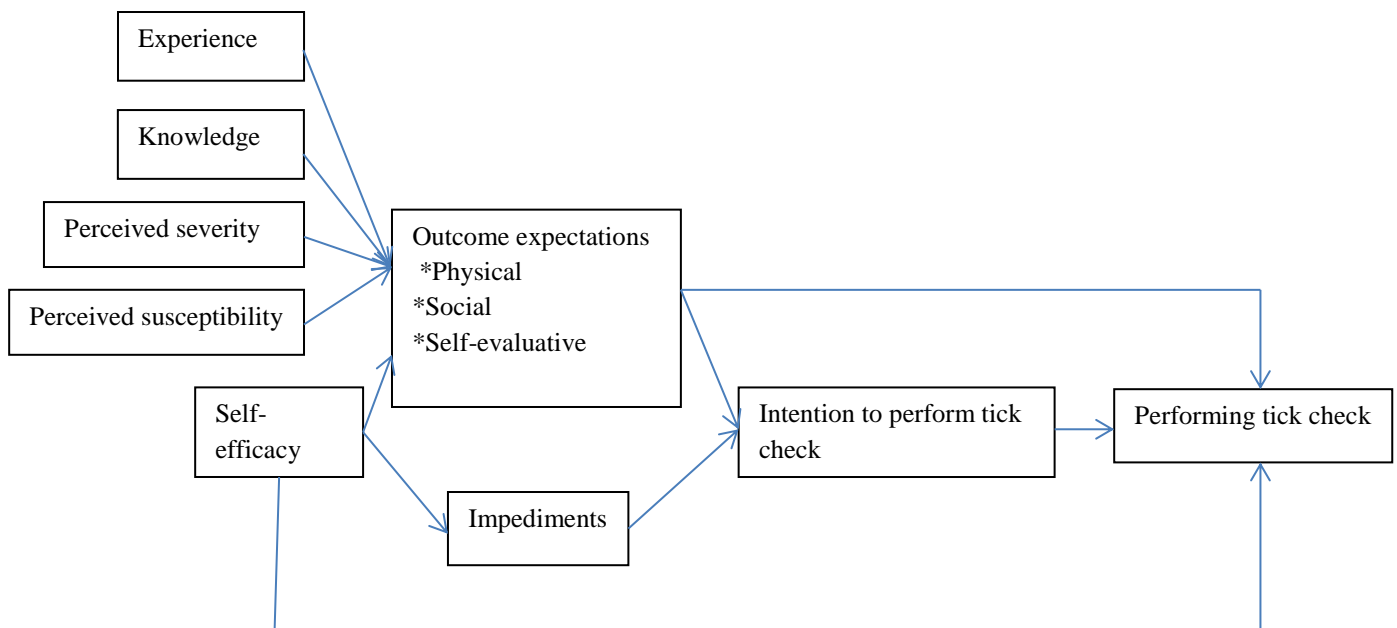
Figure 2. Schematic overview of the determinants found in the literature, in the form of the Social Cognitive Theory as described by Bandura (1998, p.629) and the variables experience and knowledge as preconditions for change and perceived severity and perceived susceptibility as underlying beliefs of outcome expectations added to that.

3. Methodology

3.1 Design and procedure

The research questions were *"what is known in the literature about behavioural determinants to take preventive measures to avoid tick bites and contracting Lyme disease?"* and "*what are behavioural determinants to do the tick check after visiting nature?*" These questions were answered through a combination of research methods. The first question was studied in a literature study. This literature study and the methodology were integrated in the conceptual framework and were described in section 2.3. The method for the second question was a survey in which it was studied to what extent the described determinants influenced participants' intention and behaviour to do a tick check after visiting nature. The survey was pre-tested first and possible unclear questions or other flaws from the survey were revised. The pre-test of this survey was done via acquaintances of the researcher. They were asked whether the questions were clear and if there were flaws or ambiguities that needed to be changed before the survey was distributed. The survey was then spread via the internet on the websites www.naturetoday.com, www.tekenradar.nl and www.facebook.com. After data gathering, a statistical analysis was done using the statistics programme SPSS version 22 (IBM Corp, 2013). The survey is presented in the Appendix. The results are presented in chapter 4.

3.2 Measures

The survey consisted of seven parts, in addition to the parts in which information about the survey was provided. Each part was based on one of the elements of figure 2 shown in section 2.3.3. For all measures of behaviour and its determinants, a hundred point scale was used. This was inspired by Bandura (2006), who states that scales with only a few steps are less reliable and less sensitive than larger scales.

The first part measured the current behaviour of the participants with regard to doing the tick check (Cronbach's alpha = .84; M = 35.63, SD = 32.85). Four items were used to measure the current behaviour. For example, it was asked whether the participant had systematically checked top-down or bottom-up if there were ticks present on his or her body.

The second part measured self-efficacy concerning doing a tick check (Cronbach's alpha = .91; M = 78.69, SD = 19.03). To measure self-efficacy, fifteen items were used. The design of this part of the survey was inspired by Bandura (2006), who provides a guide for the construction of self-efficacy scales. Measures of impediments were included in the part of self-efficacy, because Bandura (1998) mentions that efficacy beliefs should be measured against gradations of impediments to successful performance. Examples of items to measure self-efficacy is "I am able to perform the tick check when I am in company of other people" and "I can perform the tick check completely if I have little time". In addition to impediments being integrated in the part on self-efficacy, later in the survey there was an open question about impediments in which participants could fill in their own barriers to perform a tick check.

The third part was about participants' knowledge (M = 9.24, SD = 1.04) and experience (M = 1.86, SD = 0.70) regarding ticks, the tick check and Lyme disease. This part was designed in the form of statements and participants could answer "True", "Not True" or "I don't know". There were ten items to measure knowledge and for each correct answer the participants received one point, while for a wrong answer and for "I don't know" the participants received zero points. This way, each participant received a score for knowledge on a scale of zero to ten. A knowledge item looked for example like "ticks can be active at temperatures below fifteen degrees Celsius". In addition, there were three items to measure experience and the participants received one point for each experience that was true for them. A statement to measure experience was, for example, "I have been bitten by a tick before".

The fourth part was about measuring outcome expectations (Cronbach's alpha = .81; M = 68.26, SD = 13.97). In total, there were 22 items to measure outcome expectations. The outcome expectations were divided into different categories: sixteen items for physical

outcome expectations (Cronbach's alpha = .72; M = 67.08, SD = 13.69), three items for social outcome expectations (Cronbach's alpha = .39; M = 69.03, SD = 21.16) and three items for self-evaluative outcome expectations (Cronbach's alpha = .79; M = 73.87, SD = 26.17). Among the statements about physical outcome expectations, there was a division between perceived severity (Cronbach's alpha = .81; M = 79.50, SD = 21.41), for which there were four items, perceived susceptibility (Cronbach's alpha = .34; M = 62.55, SD = 16.90) for which there were five items and other physical outcome expectations (Cronbach's alpha = .54; M = 66.99, SD = 16.65), which included seven items. An item to measure perceived severity (physical outcome expectations) for example looked like "I think Lyme disease is a serious condition". Among the statements about social outcome expectations, there was a division between injunctive norms and descriptive norms. Injunctive norms are social norms with regard to what other people approve or disapprove, descriptive norms are what other people do themselves (Cialdini, Reno & Kallgren, 1990). Social outcome expectations were measured for example by "people whose opinion I value, will appreciate it if I do a tick check". An item for self-evaluative outcome expectations for example looked like "performing a tick check is important to me". The formulation of the statements on outcome expectations was generally inspired by Dewar, Lubans, Plotnikoff & Morgan (2012), who also made a survey based on the Social Cognitive Theory by Bandura (1986 & 1998). The formulation of statements on perceived severity and perceived susceptibility, however, was inspired by the review of Yarbrough & Braden (2001), who gave an overview of different ways in which perceived severity and perceived susceptibility were measured among different studies.

The fifth part was about how important different outcome expectations were for the participants. This part included seven items. One of the statements was for example "my level of disgust or fear of ticks".

The sixth part measured participants' intention to do a tick check (Cronbach's alpha = .89; M = 63.77, SD = 28.39). There were nine items to measure intention. The formulation of statements targeting intention is inspired by how Ajzen (2002) recommends it should be done, with three gradations for each intention. Participants were asked how much they intended to perform certain behaviour regarding the tick check in the coming month if they were visiting nature, for example "in the coming month, if I visited nature, I will try to do a tick check". A next statement was "in the coming month, if I visited nature, I really plan to do a tick check", followed by "in the coming month, if I visited nature, I will definitely do a tick check".

The seventh part consisted of six items and registered personalities such as age, sex and country of residence.

4. Results

4.1 Sample

The target group of this study consisted of people aged eighteen years or older that are living in the Netherlands. In total, 964 surveys were started of which 512 were completed. From the 512 completed surveys, 50 were excluded from further analysis because the participants did not belong to the target group. After exclusion of non-completed and unsuitable cases, 462 participants were included in the analysis.

Of the 462 participants, 231 were male (50%) and 231 were female (50%). The participants had a mean age of 51.6 years (SD = 16.1), with the youngest participant being 18 and the oldest being 87 years old.

Most participants (72.7%) had a higher education degree (Dutch HBO) or were a university graduate. 18.4% of the participants went to community college (Dutch MBO). For 8.7% of the participants, the highest educational level was high school and for 0.2% this was primary school.

The participants had different frequencies of visiting nature (forest, moorland, natural park or garden), but most participants visited nature daily or weekly (86.6%). 11.0% of the participants visited nature monthly, 2.2% visited nature a few times a year and 0.2% visited nature once or less than once a year.

The survey was distributed online on different websites. Most participants (66.0%) found the survey on the website Nature Today, followed by 19.5% who found it on Facebook, 12.3% filled in "Other" as source of where they found the survey and 2.2% found the survey on Tekenradar.

4.2 Analyses

4.2.1 Correlations

The Pearson correlations between all variables were calculated. The correlations are presented in Table 1. Please note that "all outcome expectations" consists of the items for physical, social and self-evaluative outcome expectations.

4.2.2 Regression analyses

Four multiple regression analyses were done to test predictor variables' effect on a dependent variable (DV). A sequential regression (block-wise) entry method was used. First,

a multiple regression analysis was done concerning the effect of intention, self-efficacy, outcome expectations, knowledge and experience on behaviour; performing the tick check (DV). This analysis was done in two ways; with all outcome expectations as one variable, and with the three dimensions of outcome expectations as three variables. Second, the effects of self-efficacy, outcome expectations, knowledge and experience on intention (DV) were studied through multiple regression analysis. This analysis was done with two versions of outcome expectations (i.e. combined and as separate dimensions) as well. Third, another multiple regression analysis was done to study the effects of perceived severity and perceived susceptibility on outcome expectations (DV). In this analysis, perceived severity and perceived susceptibility were excluded from the outcome expectations. Fourth, the effects of knowledge and experience on outcome expectations (DV) were studied. For behaviour, intention, self-efficacy and outcome expectations the mean score of the items measuring each variable was used in the analyses. For knowledge and experience the sum of scores was used.

Table 1. Pearson correlations between variables

	Performing tick check	Intention	Self-efficacy	All outcome expectations	Physical outcome expectations	Social outcome expectations	Self-evaluative outcome expectations	Knowledge	Experience
Performing tick check	-	.338**	.324**	.309**	.239**	.214**	.370**	.208**	.172**
Intention		-	.120**	.382**	.293**	.254**	.470**	.006	-.003
Self-efficacy			-	.189**	.120*	.220**	.228**	.226**	.168**
All outcome expectations				-	.947**	.598**	.791**	.157**	.104*
Physical outcome expectations					-	.378**	.615**	.146**	.109*
Social outcome expectations						-	.472**	.125**	.030
Self-evaluative outcome expectations							-	.100*	.080
Knowledge								-	.310**
Experience									-

Note: **p<0.01, *p<0.05. N = 462

Table 2. Multiple regression analysis to test the effects of intention, self-efficacy, all outcome expectations together, knowledge and experience on behaviour: performing the tick check (= dependent variable)

	β	t	p	R^2
DV: Behaviour (tick check)				
Model 1:				.11
Intention	.34	7.69	.000	
Model 2:				.20
Intention	.30	7.19	.000	
Self-efficacy	.29	6.83	.000	
Model 3:				.22
Intention	.24	5.42	.000	
Self-efficacy	.26	6.26	.000	
Outcome expectations	.17	3.68	.000	
Model 4:				.24
Intention	.26	5.76	.000	
Self-efficacy	.23	5.34	.000	
Outcome expectations	.14	3.15	.002	
Knowledge	.11	2.41	.016	
Experience	.09	2.01	.045	

Note: DV = dependent variable; β is considered statistically significant if p<.05.

According to these results, intention explained 11% of the variance in behaviour. When self-efficacy was added, together they explained 20% of the variance in behaviour. Intention, self-efficacy and outcome expectations explained 22%. The full model including intention, self-efficacy, outcome expectations, knowledge and experience explained 24% of the variance in behaviour, performing the tick check. This table shows that in this model, intention (β = .26, p = .000) was the variable with the most significant influence on behaviour, followed by self-efficacy (β = .23, p = .000) and outcome expectations (β = .14, p = .002). Knowledge (β = .11, p = .016) and experience (β = .09, p = .045) also contributed significantly, although the contribution of especially experience is very small. F change was significant for all models.

Table 3. Multiple regression analysis to test the effects of intention, self-efficacy, physical outcome expectations, social outcome expectations, self-evaluative outcome expectations, knowledge and experience on behaviour: performing the tick check (= dependent variable)

	β	t	p	R^2
DV: Behaviour (tick check)				
Model 1:				.11
Intention	.34	7.69	.000	
Model 2:				.20
Intention	.30	7.19	.000	
Self-efficacy	.29	6.83	.000	
Model 3:				.23
Intention	.21	4.42	.000	
Self-efficacy	.25	5.88	.000	
Physical outcome expectations	.03	0.47	.635	
Social outcome expectations	.00	0.07	.945	
Self-evaluative outcome expectations	.20	3.34	.001	
Model 4:				.26
Intention	.22	4.72	.000	
Self-efficacy	.21	4.92	.000	
Physical outcome expectations	.00	0.01	.993	
Social outcome expectations	.00	0.01	.989	
Self-evaluative outcome expectations	.20	3.42	.001	
Knowledge	.11	2.57	.011	
Experience	.09	2.00	.046	

Note: DV = dependent variable; β is considered statistically significant if p<.05.

The main difference between table 3 and table 2 is that in table 3 the three dimensions of outcome expectations were presented as separate variables. Model 3, which includes intention, self-efficacy, physical outcome expectations, social outcome expectations and self-evaluative outcome expectations, explained 23% of the variance in behaviour. This is 1% more than all outcome expectations as one variable. When knowledge and experience were added, the full model explained 26% of the variance in behaviour which is 2% more than in table 2. Physical outcome expectations (β = .00, p = .993), however, was not significant, just as social outcome expectations (β = .00, p = .989). Self-evaluative outcome expectations (β = .20, p = .001) did have significant influence on behaviour. F change was significant for all models.

Table 4. Multiple regression analysis to test the effects of self-efficacy, all outcome expectations together, knowledge and experience on the intention to do a tick check (= dependent variable)

	β	t	p	R^2
DV: Intention				
Model 1:				.01
Self-efficacy	.12	2.59	.010	
Model 2:				.15
Self-efficacy	.05	1.13	.258	
Outcome expectations	.37	8.50	.000	
Model 3:				.15
Self-efficacy	.07	1.49	.137	
Outcome expectations	.38	8.64	.000	
Knowledge	-.06	-1.26	.210	
Experience	-.04	-.78	.437	

Note: DV = dependent variable; β is considered statistically significant if p<.05.

The results in table 4 show that 1% of the variance in intention could be explained by self-efficacy. Self-efficacy and outcome expectations together explained 15% of the variance in intention. This percentage remained the same when knowledge and experience were added; the full model explained 15% of the variance in intention. Outcome expectations (β = .38, p = .000) is the only variable with a significant contribution to intention. The contributions of

self-efficacy (β = .07, p = .137), knowledge (β = -.06, p = .210) and experience (β = -.04, p = .437) were not significant. F change was significant for model 1 and 2, but not for model 3.

Table 5. Multiple regression analysis to test the effects of self-efficacy, physical outcome expectations, social outcome expectations, self-evaluative outcome expectations, knowledge and experience on the intention to do a tick check (= dependent variable)

	$β$	t	p	R^2
DV: Intention				
Model 1:				.01
Self-efficacy	.12	2.59	.010	
Model 2:				.22
Self-efficacy	.01	0.21	.836	
Physical outcome expectations	.00	0.03	.973	
Social outcome expectations	.04	0.84	.403	
Self-evaluative outcome expectations	.448	8.01	.000	
Model 3:				.23
Self-efficacy	.02	0.52	.606	
Physical outcome expectations	.01	0.20	.841	
Social outcome expectations	.04	0.85	.396	
Self-evaluative outcome expectations	.45	7.96	.000	
Knowledge	-.04	-0.91	.361	
Experience	-.03	-0.73	.468	

Note: DV = dependent variable; β is considered statistically significant if p<.05.

In table 5 it can be seen that self-efficacy explained 1% of the variance in intention, the same as in table 4, but when physical, social and self-evaluative outcome expectations as separate variables were added to the model this rose to 22%. The full model, including self-efficacy, physical outcome expectations, social outcome expectations, self-evaluative outcome expectations, knowledge and experience explained 23% of the variance in intention. Self-evaluative outcome expectations ($\beta = .45$, $p = .000$) was the only significant contributor to this model. The contributions of self-efficacy ($\beta = .02$, $p = .606$), physical outcome expectations ($\beta = .01$, $p = .841$), social outcome expectations ($\beta = .04$, $p = .396$), knowledge ($\beta = -.04$, $p = .361$) and experience ($\beta = -.03$, $p = .468$) were not significant. F change was significant for model 1 and 2, but not for model 3.

Table 6. Regression analysis to test the effects of perceived severity and perceived susceptibility on outcome expectations (= dependent variable)

	β	t	p	R^2
DV: Outcome expectations				
Model 1:				.25
Perceived severity	.25	5.95	.000	
Perceived susceptibility	.37	8.76	.000	

Note: DV = dependent variable; β is considered statistically significant if $p<.05$.

In table 6 it is shown that 25% of the variance in outcome expectations could be explained by perceived severity and perceived susceptibility. Both perceived severity ($\beta = .25$, $p = .000$) and perceived susceptibility ($\beta = .37$, $p = .000$) contributed significantly to outcome expectations. F change of the model was significant.

Table 7. Regression analysis to test the effects of knowledge and experience on all outcome expectations together (= dependent variable)

	β	t	p	R^2
DV: Outcome expectations				
Model 1:				.03
Knowledge	.14	2.84	.005	
Experience	.06	1.27	.205	

Note: DV = dependent variable; β is considered statistically significant if $p<.05$.

Table 7 shows that only 3% of the variance in outcome expectations could be explained by knowledge and experience. In addition, it appears that the contribution of knowledge (β = .14, p = .005) to outcome expectations is significant, but the contribution of experience (β = .06, p = .205) is not. F change of the model was significant.

4.2.3 Self-efficacy levels in combination with impediments

Self-efficacy can be influenced by possible impediments, as was described in section 2.2. In the survey, participants' self-efficacy levels were measured while adding different potential impediments, as was described in section 3.4. The mean self-efficacy levels (M) and their standard deviations (SD) combined with different impediments added are presented in table 8.

Table 8. Self-efficacy levels in combination with potential impediments

Self-efficacy combined with impediment	*M*	*SD*
Able to undress completely to check skin	89.82	24.43
Able to check skin systematically for ticks, if necessary with use of a mirror	87.04	24.19
Able to recognize a tick and find it on skin	92.59	17.32
Able to remove tick from skin in a proper way	87.60	21.50
Able to complete all steps of the tick check	88.23	23.12
Able to completely perform the tick check when tired	70.69	30.99
Able to completely perform the tick check when having other issues on the mind	74.93	31.47

Able to complete perform the tick check when in company of other people	47.42	38.16
Able to completely perform the tick check when on vacation	83.15	27.31
Able to completely perform the tick check in warm weather	90.04	22.19
Able to completely perform the tick check in cold weather	83.32	27.92
Able to completely perform the tick check while lacking a mirror	57.81	34.12
Able to completely perform the tick check while lacking tweezers	63.66	37.12
Able to remember doing a tick check after visiting nature	81.71	28.41

This table shows that overall, the self-efficacy levels to perform the tick check are high. The self-efficacy level drops down when the impediment "in company of other people" is added. Also lacking a mirror and lacking tweezers appear to lower the self-efficacy level.

4.2.4 Perceived importance of different outcome expectations

Outcome expectations can be present in different variations. Participants were asked how important different types of outcome expectations were for them. The mean importance of different outcome expectations according to the participants (M) and the standard deviations (SD) are presented in table 9.

Table 9. Perceived importance of different outcome expectations

Formulation	Represents	*M*	*SD*
Level of disgust or fear of ticks	General physical outcome expectations	37.31	37.71
Seriousness of Lyme disease	Perceived severity	87.81	22.22
Degree to which the participants runs the risk of getting bitten by tick when visiting nature	Perceived susceptibility	75.18	29.20
The benefits a tick check can yield, like not getting Lyme and possibly removing a tick before it bites	General physical outcome expectations / perceived severity	86.08	23.01
The disadvantages a tick check can yield, like having to undress completely and having tweezers available	General physical outcome expectations	31.09	33.24
What people whose opinion is valued think of the participant performing a tick check	Social outcome expectations / injunctive norm	22.90	31.89
How good the participant feels about himself when performing a tick check	Self-evaluative outcome expectations	40.93	39.14

It can be seen that the seriousness of Lyme disease, the benefit of not contracting it when doing a tick check and the participants' personal risk of getting bitten by a tick were perceived as very important. This represents perceived severity and perceived susceptibility.

5. Discussion

5.1 Conclusion

The aims of the study were to provide insight in the behavioural determinants of performing the tick check to avoid contracting Lyme disease in the Netherlands and to contribute to making this field of research theoretically more comprehensive. The results can be used in future interventions to increase the number of people performing a tick check after visiting nature. The research questions of this study were: *"what is known in the literature about behavioural determinants to take preventive measures to avoid tick bites and contracting Lyme disease?"* and *"what are behavioural determinants to do the tick check after visiting nature?"*

Concluding from the results of the literature study, determinants to take preventive measures are outcome expectations of doing the tick check, perceived severity, perceived susceptibility, self-efficacy towards doing the tick check, knowledge of ticks and Lyme disease, knowledge about the preventive behaviour "doing a tick check" and knowledge about how to perform the tick check, possible impediments, knowing someone with Lyme disease and having previous experience with ticks and Lyme disease.

Concluding from the results of the survey, in order of importance intention, self-efficacy and outcome expectations contributed significantly to performing a tick check. Knowledge and experience also contributed significantly, although the contribution of especially experience was very small. The most important outcome expectations were perceived severity and perceived susceptibility. Barriers that potentially prevent people from doing a tick check were being in company of other people (having to undress completely) and lacking tweezers and a mirror to be able to perform the tick check completely.

A similarity between the findings from the literature study and the findings from the survey is that perceived severity and perceived susceptibility were identified as important outcome expectations. Outcome expectations was described as a determinant of taking preventive measures in all ten included studies in the literature study, so derived from this it may have been expected that this was a very important determinant of taking preventive measures and performing a tick check. However, in the survey it was found that outcome

expectations had a significant contribution to performing the tick check, but it was not the variable with the largest contribution. The variables with the largest contribution were intention and self-efficacy, then followed by outcome expectations. However, in the literature study self-efficacy was mentioned in only five out of ten included studies. Various variants of knowledge were mentioned as determinants of taking preventive measures in the literature study. In the survey, knowledge appeared to have a significant contribution to performing the tick check as well, but it was the variable with the second least contribution. There are several possible explanations for the differences between the findings from the literature study and the findings from the survey. They may be caused by the fact that the survey was aimed at performing a tick check, while in the other studies various preventive measures were targeted at once. As was argued in the introduction, different preventive measures possibly have different determinants. "Performing a tick check" and "taking preventive measures" could thus be considered as different outcome variables and continuing from this belief, it is not surprising that both outcome variables have different (importance of) determinants. Another possible explanation is that the methodology differed across the different studies, which may have contributed to the different results.

Intention was, according to the results of the survey, the variable with the most significant influence on performing the tick check, followed by self-efficacy and outcome expectations. This confirms the causal structure of the Social Cognitive Theory by Bandura (1998) that was shown in figure 1. The contributions of knowledge and experience were also significant, but their contribution was smaller than the contribution of intention, self-efficacy and outcome expectations. When comparing the effects of the overall measure of outcome expectations with the separate dimensions of outcome expectations on intention, it was shown that the contribution of self-evaluative outcome expectations was significant, but the contributions of physical outcome expectations and social outcome expectations were not. A possible explanation for this is that (parts of) these scales have low inter-item correlations (Cronbach's alpha), as was mentioned in section 3.2 and will be elaborated upon further in section 5.2.

Because intention is the most important predictor of behaviour, according to the Social Cognitive Theory by Bandura (1986 & 1998) and demonstrated again in this study and looking at the causal structure of the Social Cognitive Theory as shown in figure 1, it may be expected that self-efficacy and outcome expectations would be predictors of intention. However, self-efficacy did not significantly contribute to the intention to do a tick check and neither did knowledge and experience. The only variable that contributed significantly to the

intention to do a tick check was outcome expectations. Separated into their three dimensions, only the contribution of self-evaluative outcome expectations was significant, while the contributions of physical and social outcome expectations were not. A possible explanation for the fact that that self-efficacy, knowledge and experience did not contribute significantly to intention, but did contribute significantly to behaviour, is that they contribute directly to behaviour without interference of other variables such as intention. Social Cognitive Theory by Bandura (1986 & 1998) indicates that this is true for self-efficacy. Derived from the results in this study, it seems that knowledge and experience contribute directly to behaviour as well without interference of intention. Social and physical outcome expectations may, in contradiction to self-evaluative outcome expectations, not be significant for the same reasons they were not significant as predictors for behaviour. It may be due to their low scale reliability (Cronbach's alpha).

The effects of perceived severity and perceived susceptibility on outcome expectations were investigated as well, in addition to their being part of the physical outcome expectations scale. The results showed that the contributions of both perceived severity and perceived susceptibility were significant and together they explained 25% of the variance in outcome expectations. These findings legitimate the statement made in section 2.3.3, that perceived severity and perceived susceptibility as theoretical concepts in itself are important variables and they should not only be seen as examples of physical outcome expectations but also as variables that underlie outcome expectations.

Because in the literature study knowledge and experience were found in several studies as determinants of taking preventive measures and in this study it was assumed that they underlie outcome expectations, their influence on outcome expectations was investigated. However, only 3% of the variance in outcome expectations could be explained by knowledge and experience and while the contribution of knowledge was significant, the contribution of experience was not. Bandura (1998, p.624) mentions that "knowledge creates the precondition for change". It would appear that this is quite true; knowledge delivers a significant contribution to some dependent variables, but not to all. This confirms that knowledge is a necessary, but insufficient condition for change; "additional self-influences are needed to overcome the impediments to adopting new lifestyle habits" (Bandura, 1998, p.624). In addition, the contribution of knowledge is a lot smaller than the contribution of other variables such as intention, self-efficacy and outcome expectations. The contribution of experience to different dependent variables is even smaller than the contribution of knowledge, and is often not significant. It appears that knowledge and experience indeed

create preconditions of change, but as predictor variables for outcome expectations, intention and behaviour they contribute a lot less than other variables.

From the table in which the importance of various outcome expectations were shown, it can be concluded that perceived severity and perceived susceptibility are important outcome expectations. Another notable finding is that the disadvantages a tick check can yield, such as being in company of other people and needing to have tweezers available, were rated as not so important. This is somewhat in contradiction with the results on the self-efficacy scale in combination with different impediments, which indicated that being in company of other people and lacking tweezers and a mirror lowered the self-efficacy levels. However, although this may seem contradictive it is possible according to the Social Cognitive Theory by Bandura (1986 & 1998), because it is possible for impediments to have influence on self-efficacy without affecting outcome expectations. These findings should be interpreted with some caution, because it was not tested whether the differences in rating of importance between perceived severity and perceived susceptibility and the other outcome expectations and the differences between various self-efficacy levels combined with impediments were statistically significant.

5.2 Limitations of this study

There are several limitations of this study that should be noted. First, this study was cross-sectional. This means that relationships were examined between predictor variables and outcome variables, but no statements regarding causality can and should be done. Because of this, the implications for practice should be formulated with some caution. Moreover, the results of this study could be used as inspiration for the development of future interventions aiming to let more people do a tick check, but should not be used as evidence of why a future intervention should work.

Second, because data gathering in this study was done by means of a survey, the data in this study was self-reported. This may have introduced memory bias or social desirability bias. In this case this means that participants may not have remembered clearly what their behaviour was regarding the tick check in the past month. Therefore their answers in the survey may not correspond completely with their performed behaviour. In addition, participants may have filled in the questionnaire in ways that they would expect to be favourable for the researcher.

Third, with regard to scale reliability, in addition to all outcome expectations together there were also scales for the different dimensions of outcome expectations. The scales of

perceived susceptibility, other physical outcome expectations (both included in physical outcome expectations) and social outcome expectations scored a low Cronbach's alpha. This may mean that the items in the scales meant to measure perceived susceptibility, other physical outcome expectations and social outcome expectations seem to measure different things, because the items for each variable do not correlate highly with each other. This means that these dimensions of outcome expectations and their relationships with other concepts should be interpreted carefully. A possible explanation for the low Cronbach's alpha scores is that the questions measuring these variables may have been suboptimal. The items for both perceived susceptibility and social outcome expectations included reverse-scored items. Although that does not have to be a problem, the finding that precisely these items have low scores for scale reliability, may mean that the formulation of these statements was less effective than intended. Another possible explanation for the low Cronbach's alpha for the social outcome expectations is that the statements for social outcome expectations in the survey were divided into the descriptive social norm and the injunctive social norm. It is suggested that descriptive norms and injunctive norms differ with regard to their impact on behaviour (Rimal & Real, 2003). People could have a high score for injunctive norm and a low score for descriptive norm or the other way around. This may explain why putting them together in one variable, social outcome expectations, leads to a low Cronbach's alpha. In addition, whether acquaintances of a participant perform a tick check after visiting nature or not (descriptive norm) does not necessarily have to influence the participant's perception of other people's approval or disapproval of the participant performing a tick check. Another possible explanation for the low Cronbach's alpha of perceived susceptibility is that this is a difficult concept to measure and the way in which participants' perceived susceptibility was asked about could be improved upon. Perceived susceptibility in this case is about perceived risk of getting a tick bite and/or Lyme disease, and this was asked to participants in ways of to what extent they thought their risk was "high" or "low", indicated on a hundred point scale. This may not be an accurate measure. With regard to the "other physical outcome expectations", it may have been expected that these items would not correlate highly with each other. The other physical outcome expectations were the items measuring physical outcome expectations excluding perceived severity and perceived susceptibility. These items measured for example participants' fear of ticks, but also whether they thought performing a tick check would have a lot of benefits. So just as the low Cronbach's alpha suggests, these items are indeed measuring different things.

Fourth, for this study a convenience sample was used. Participants were recruited from

the websites Nature Today, Tekenradar and Facebook. Nature Today and Tekenradar are likely to have online visitors that are interested in nature and regularly visit nature; this is also reflected in the description of the sample in section 4.1. On the one hand, this convenience sample is useful because these are people who visit nature regularly and are thus likely to come into contact with ticks and represent the target group of interest. On the other hand, this sample may not be representative for the whole population.

Fifth, this study was conducted in late autumn and winter. Ticks are often associated with warm weather and summer. This may have influenced participants' answers on statements about their current tick check behaviour and their intention to do the tick check in the coming month.

5.3 Suggestions for further research

More research on this topic needs to be done. After all, as was discussed earlier, 24% of the variance in behaviour was explained by the studied variables, which means that 76% is yet to be explained.

First, to be able to make statements about causality regarding determinants and performing a tick check, prospective observational and/or experimental studies should be done. For example, an intervention could be tested that is based on the current study.

Second, to solve the possible problem of memory bias or social desirability bias due to the way of data gathering, future research should gather data that is not self-reported. This could for example be achieved by observing behaviour in an experiment, rather than letting participants tell about their behaviour in a survey.

Third, the way in which certain variables are measured should be improved in comparison to this study. This is especially the case for social outcome expectations and perceived susceptibility. Perceived susceptibility questions should be asked differently and should be answered on a different scale than in the current study. Instead of asking participants to what extent they thought their risk of contracting Lyme disease was high and letting them answer on a hundred point scale, they should be asked what they think would be their risk of contracting Lyme disease on a scale varying from "very low" to "very high". They could be asked what their perceived risk of contracting Lyme disease would be in comparison with others as well. This was also asked in the current study. However, this should also be measured on a scale varying from "very low" to "very high". Social outcome expectations should also be measured using different questions and a different scale than in the current study. In addition, social outcome expectations should not be divided into

injunctive norm and descriptive norm. They could be measured both, but as separate variables. A future item on social outcome expectations could for example ask how the participant thinks others will approve his behaviour of performing a tick check. The answer scale could vary from "much disapproval" to "much approval".

Fourth, for a study to be more representative for the whole population, a more representative sample should be used with more participants that visit nature less often than most of the participants in this sample.

Fifth, future research on determinants of performing a tick check should be conducted in summer, since people are then more aware of ticks than in winter and this may influence their behaviour regarding the tick check.

5.4 Implications for practice

Different behaviours can have different determinants. Therefore, interventions aiming to reduce the amount of tick bites and Lyme disease cases should not focus on "taking preventive measures" as a whole, but on one preventive measure specifically targeting a behaviour. Unlike other possible preventive measures, doing a tick check is the only measure that can guarantee that one does or does not have a tick on one's body. In addition, it creates the opportunity to remove a tick before it even has bitten. Doing a tick check after visiting nature is therefore the measure that should be focused on.

The results of this study suggest that intention, self-efficacy and outcome expectations, from which perceived severity and perceived susceptibility are the most important ones, contribute to performing a tick check. In addition, being in company of other people and lacking tweezers and a mirror are identified barriers to perform a tick check. Therefore, an intervention aiming at increasing the amount of people performing a tick check after visiting nature should focus on these predictive variables whilst taking the possible barriers into account.

In practice, this means that an intervention should aim at increasing people's self-efficacy to perform a tick check. Bandura (1998) names four ways in which self-efficacy could be increased. The first one is through mastery experiences. Previous successful experiences with performing certain behaviour establish high self-efficacy, while failures decrease self-efficacy. The second way is through vicarious experiences by social models. This means people's self-efficacy regarding certain behaviour may increase when they see persons similar to themselves successfully perform the behaviour. In addition, watching others perform the behaviour teaches the observer skills on how to perform it. The third way

is through social persuasion. This means that people's self-efficacy may increase when they are told that they are capable of performing certain behaviour. The fourth way to increase self-efficacy is decreasing stress, improving people's emotional state and adjust people's interpretations of their physical state. This is because stress, mood and physical state influence people's self-efficacy beliefs. The first way and the fourth way may be difficult to accomplish through an intervention, but there are possibilities for the second and third way. With regard to the second way, a meeting could be organized in which someone sets an example on how to properly perform the tick check. To reach more people, a tool could be used to spread the message to a wider audience. For example, a video could be made in which someone performs a tick check and this video could be spread among a greater public, for example via the websites Nature Today and Tekenradar. By watching someone perform a tick check, the observers could learn how to do it and they can see that other people are able to do it as well. As a result, their self-efficacy beliefs may increase. With regard to the third way, people's self-efficacy beliefs could be increased by telling people that the tick check is not difficult to perform and that they can do it. This message could be spread personally, but for example also on posters or digitally. Telling people that performing a tick check is not that difficult could for example also be integrated in the previously mentioned video.

In addition, an intervention should address the severity of Lyme disease and should increase people's perceived susceptibility of getting a tick bite that may result in contracting Lyme disease. To increase perceived severity of Lyme disease, some of the symptoms of Lyme disease in the first, second and third stage could be presented. In addition, it should be mentioned that Lyme disease is treatable with antibiotics in the first stage, but the longer the disease remains untreated, the smaller the chance of success of treatment becomes and the symptoms getting only worse. Perceived susceptibility could be increased in different ways. Statistical messages and narrative messages are two of these possibilities (Greene & Brinn, 2003). Statistical messages often summarize statistics for a population (Greene & Brinn, 2003). In the case of Lyme disease, this would mean for example presenting numbers of how many people are being bitten by a tick each year and how many of them contract Lyme disease. Narrative messages are narratives about a particular case dealing with the problem (Greene & Brinn, 2003). In the case of Lyme disease, this would mean that a story could be presented of a man or woman who contracted Lyme disease and now suffers severe consequences from it, such as heart and joint problems. In their review, Greene & Brinn indicate that in some studies, the persuasive effect of statistical messages is higher, while in other studies it is shown that the persuasive effect of narrative messages is higher. Greene &

Brinn (2003) found in their study that both possibilities have an effect on behaviour, although they function differently. Statistical messages were rated higher on information value, while narrative messages rated higher on realism. In the case of perceived severity and susceptibility, it could be a possibility to do a combination of the two. A statistical summary of how many people are being bitten by a tick and contract Lyme disease could be presented, followed by a heart-breaking story of a person whose life is damaged by Lyme disease.

Interventions should also take impediments into account. This study suggested that being in company of other people and lacking tweezers and/or a mirror decreased people's self-efficacy to perform a tick check. Therefore, interventions should come up with suggestions on how to overcome these problems. An intervention could for example provide the idea of linking the tick check to a certain moment of the day, such as before bedtime. People are probably going to undress anyway by that time and are probably not in company of unwanted other people. In addition, the idea could be provided to put a mirror and tweezers next to the bed, so that they are available and can be used immediately during the tick check.

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Appendix: Survey

Determinanten van de tekencheck

Q1 Beste deelnemer,

Hartelijk dank voor uw interesse in deze enquête! Deze enquête gaat over het doen van een tekencheck nadat u in de natuur bent geweest. Deze enquête wordt afgenomen door een student van Wageningen University als onderdeel van een masterthesis onder begeleiding van dr. B. C. Mulder van de leerstoelgroep Strategische Communicatie en dr. ir. A. J. H. van Vliet van de leerstoelgroep Milieusysteemanalyse en Tekenradar.nl. De resultaten van de enquête zijn anoniem en zullen niet worden verstrekt aan derden. Het invullen van de enquête duurt ongeveer vijftien minuten. Op de volgende pagina volgt informatie over de tekencheck.

Alvast bedankt voor uw deelname!

Q2   De tekencheck houdt in dat u uw lichaam controleert op teken nadat u in de natuur bent geweest, bijvoorbeeld bos, heide, park of tuin. Teken zijn kleine spinachtige diertjes die in de natuur leven in onder andere hoog gras en struiken. Teken kunnen de ziekte van Lyme veroorzaken als ze u bijten. Het is daarom belangrijk om, als u in de natuur bent geweest, uw lichaam te controleren op teken en ze zo snel mogelijk van uw huid te verwijderen. We noemen dit de tekencheck. Concreet bestaat de tekencheck uit de volgende stappen. Lees deze alstublieft goed door.

1. Trek al uw kleding volledig uit zodat u uw huid overal goed kunt bekijken. Teken gaan namelijk vaak zitten op warme plaatsen, zoals in de oksels, de knieholten, de bilnaad en achter uw oren.

2. Controleer systematisch van boven naar beneden of van beneden naar boven of er teken op uw lichaam zitten. Voor plaatsen die u niet goed kunt zien, kunt u een spiegel gebruiken.

3. Als er een teek is gevonden, verwijdert u deze het best met een puntig pincet of een tekentang. Met een puntig pincet pakt u de teek stevig beet bij de kop en trekt hem er recht uit. Met een tekentang volgt u de aanwijzingen op in de gebruiksaanwijzing van de tekentang.

Q3 Deze vraag gaat over uw huidige gedrag met betrekking tot de tekencheck. Geef alstublieft aan in hoeverre de onderstaande stellingen op u van toepassing zijn, door de slider bij elke stelling te verslepen. Elke stelling begint met "In de afgelopen maand, als ik in de natuur was geweest...".

1 = Nooit
100 = Altijd

In de afgelopen maand, als ik in de natuur was geweest...

_____ ...controleerde ik mijn lichaam op teken. (1)

_____ ...controleerde ik op een systematische manier van beneden naar boven of van boven naar beneden mijn lichaam op teken. (2)

_____ ...gebruikte ik bij het controleren van mijn lichaam op teken een spiegel voor de plaatsen die ik anders niet goed kon zien. (3)

_____ ...gebruikte ik een tekentang of puntig pincet om de teek te verwijderen, wanneer ik een teek op mijn huid vond. (4)

Q4 Deze vraag gaat over hoeveel vertrouwen u heeft dat u bepaalde handelingen kunt uitvoeren. Geef alstublieft aan hoeveel vertrouwen u heeft dat u de handelingen in elke stelling kunt uitvoeren op een schaal van 1 tot 100.

1 = Zeker niet
100 = Zeker wel

_____ Ik kan mijn kleding volledig uittrekken zodat ik mijn huid overal goed kan bekijken. (1)

_____ Ik ben in staat om systematisch van boven naar beneden of van beneden naar boven te controleren of er teken op mijn lichaam zitten, zo nodig met het gebruik van een spiegel. (2)

_____ Ik ben in staat om een teek te herkennen en op mijn huid te vinden. (3)

_____ Als ik een teek vind kan ik deze op een goede manier van mijn huid verwijderen. (4)

_____ Ik ben in staat om alle stappen van de tekencheck, zoals eerder in deze enquête beschreven, volledig uit te voeren. (5)

_____ Ik kan de tekencheck volledig uitvoeren als ik moe ben. (6)

_____ Ik kan de tekencheck volledig uitvoeren als ik weinig tijd heb. (7)

_____ Ik ben in staat om de tekencheck volledig uit te voeren als ik andere dingen aan mijn hoofd heb. (8)

_____ Ik ben in staat om de tekencheck volledig uit te voeren als ik in het gezelschap ben van andere mensen. (9)

_____ Ik kan de tekencheck volledig uitvoeren als ik op vakantie ben. (10)

_____ Ik kan de tekencheck volledig uitvoeren als het warm is. (11)

_____ Ik kan de tekencheck volledig uitvoeren als het koud is. (12)

_____ Ik kan de tekencheck volledig uitvoeren als ik geen spiegel bij me heb. (13)

_____ Ik ben in staat om de tekencheck volledig uit te voeren als ik geen pincet of tekentang bij me heb. (14)

_____ Ik ben in staat om te onthouden een tekencheck te doen nadat ik in de natuur ben geweest. (15)

Q5 Deze vraag gaat over uw kennis en ervaring met betrekking tot teken, de tekencheck en de ziekte van Lyme. Als de stelling volgens u waar is, vul dan 'Waar' in; is de stelling volgens u niet waar, vul dan 'Niet waar' in. Weet u het antwoord niet, vul dan 'Weet ik niet' in.

	Waar (1)	Niet waar (2)	Weet ik niet (3)
De bacterie die de ziekte van Lyme veroorzaakt, kan worden overgedragen door een geïnfecteerde teek. (1)	○	○	○
De ziekte van Lyme kan leiden tot zenuwaandoeningen, gewrichtsklachten en/of hartklachten. (2)	○	○	○
Teken zijn minimaal 1 centimeter groot. (3)	○	○	○
Als ik een teek binnen 24 uur van mijn huid verwijder, is de kans een stuk kleiner dat ik Lyme krijg. (4)	○	○	○
Teken kunnen ook actief zijn bij temperaturen lager dan 15 °C. (5)	○	○	○
Teken kunnen voorkomen in het bos. (6)	○	○	○
Teken kunnen	○	○	○

voorkomen in tuinen. (7)			
Teken zijn soms slechts 1 millimeter groot. (8)	○	○	○
Ik ben al eens gebeten door een teek. (9)	○	○	○
Ik heb de ziekte van Lyme (gehad). (10)	○	○	○
Ik ken iemand die de ziekte van Lyme heeft (gehad). (11)	○	○	○
Voordat ik deze vragenlijst startte, wist ik al van het bestaan van de tekencheck. (12)	○	○	○
Voordat ik deze vragenlijst startte, wist ik al hoe ik op een goede manier de tekencheck kon doen. (13)	○	○	○

Q6 Deze vraag gaat over uw houding ten opzichte van teken, de tekencheck en de ziekte van Lyme. Geef alstublieft aan in hoeverre u het eens bent met de stellingen.

1 = Helemaal niet mee eens
100 = Helemaal mee eens

_____ Ik ben bang voor teken. (1)

_____ Ik heb een afkeer van teken. (2)

_____ Als ik de ziekte van Lyme had, zou ik me zorgen maken. (3)

_____ De ziekte van Lyme zou een negatieve invloed hebben op mijn leven. (4)

_____ Ik geloof dat de ziekte van Lyme moeilijk te genezen is. (5)

_____ De ziekte van Lyme is een ernstige ziekte. (6)

_____ Het risico dat ik door een teek gebeten word als ik de natuur in ga, is groot. (7)

_____ Ik acht de kans groot dat ik de ziekte van Lyme krijg na een tekenbeet. (8)

_____ Een tekencheck doen vind ik belangrijk voor mijn gezondheid. (9)

_____ Ik loop een even groot risico om door een teek gebeten te worden als andere mensen. (10)

_____ Een tekencheck doen voorkomt dat ik de ziekte van Lyme krijg. (11)

_____ Een tekencheck is een effectieve manier om te voorkomen dat ik de ziekte van Lyme krijg. (12)

_____ Ik denk dat ik in vergelijking met anderen meer risico loop om door een teek gebeten te worden. (13)

_____ Een tekencheck doen levert mij veel voordelen op, zoals de kans op Lyme verminderen en mogelijk zelfs een teek verwijderen voordat hij bijt. (14)

_____ Een tekencheck doen is lastig, bijvoorbeeld omdat het veel tijd kost of onaangenaam is om te doen. (15)

_____ De voordelen die een tekencheck oplevert vind ik belangrijker dan de nadelen van het doen van een tekencheck. (16)

_____ Ik denk dat ik in vergelijking met anderen minder risico loop om door een teek gebeten te worden. (17)

_____ Mensen van wie ik de mening belangrijk vind, zullen het waarderen als ik de tekencheck doe. (18)

_____ Mensen van wie ik de mening belangrijk vind, zullen het afkeuren als ik de tekencheck doe. (19)

_____ Mensen die belangrijk voor mij zijn doen de tekencheck als zij in de natuur zijn geweest. (20)

_____ Een tekencheck doen vind ik voor mezelf belangrijk. (21)

_____ Door een tekencheck te doen, voel ik me goed over mezelf. (22)

Q7 Mensen kunnen verschillende redenen hebben voor het uitvoeren van de tekencheck. Kunt u aangeven hoe belangrijk de volgende redenen voor u zijn voor het bij uzelf uitvoeren van de tekencheck?

1 = Helemaal niet belangrijk
100 = Heel belangrijk

_____ Mijn mate van afkeer of angst voor teken. (1)

_____ De ernst van de ziekte van Lyme. (2)

_____ De mate waarin ik risico loop om door een teek gebeten te worden als ik de natuur in ga. (3)

_____ De voordelen die een tekencheck kan opleveren, zoals geen Lyme krijgen en mogelijk zelfs een teek verwijderen voordat hij bijt. (4)

_____ De nadelen die een tekencheck kan opleveren, zoals het zich volledig moeten uitkleden en een pincet bij de hand moeten hebben. (5)

_____ Wat mensen van wie ik de mening belangrijk vind ervan vinden als ik de tekencheck doe. (6)

_____ Hoe goed ik me over mezelf voel als ik een tekencheck gedaan heb. (7)

Q8 Wat zijn redenen waarom u (mogelijk) een positieve houding hebt ten opzichte van de tekencheck?

Q9 Wat zijn redenen waarom u (mogelijk) een negatieve houding hebt ten opzichte van de tekencheck?

Q10 Wat zou u tegenhouden om de tekencheck te doen?

Q11 De volgende stellingen hebben betrekking op wat u zou doen als u op dit moment of in de komende maand de natuur in zou gaan. Elke stelling begint met "Als ik de komende maand in de natuur ben geweest..." Geef alstublieft aan in hoeverre u het eens bent met de volgende stellingen.

1 = Helemaal niet mee eens
100 = Helemaal mee eens

Als ik de komende maand in de natuur ben geweest...

_____ ... ga ik proberen de tekencheck te doen. (1)

_____ ... ben ik echt van plan om de tekencheck te doen. (2)

_____ ... ga ik zeker de tekencheck doen. (3)

_____ ... ga ik proberen een puntig pincet of tekentang te gebruiken als ik een tekenbeet ontdek. (4)

_____ ... ben ik echt van plan om een puntig pincet of tekentang te gebruiken als ik een tekenbeet ontdek. (5)

_____ ... ga ik zeker een puntig pincet of tekentang gebruiken als ik een tekenbeet ontdek. (6)

_____ ... ga ik proberen een spiegel te gebruiken bij de tekencheck. (7)

_____ ... ben ik echt van plan om een spiegel te gebruiken bij de tekencheck. (8)

_____ ... ga ik zeker een spiegel gebruiken bij de tekencheck. (9)

Q12 Geef alstublieft een korte toelichting op de voorgaande vraag: waarom denkt u wel of juist niet de tekencheck te zullen gaan doen?

Q13 Woont u in Nederland?

❍ Ja (1)

❍ Nee (2)

Q14 Wat is uw leeftijd?

Q15 Wat is uw geslacht?

❍ Man (1)

❍ Vrouw (2)

Q16 Wat is uw hoogst genoten opleiding?

❍ Basisschool (1)

❍ Middelbare school (2)

❍ MBO (3)

❍ HBO / Universiteit (4)

Q17 Hoe vaak gaat u gemiddeld per maand de natuur in? (Bijvoorbeeld bos, heide, park of tuin)

❍ Dagelijks of wekelijks (1)

❍ Maandelijks (2)

❍ Een paar keer per jaar (3)

❍ Jaarlijks of minder dan een keer per jaar (4)

Q18 Hoe bent u bij deze enquête terechtgekomen?

◯ Via Nature Today (1)

◯ Via Facebook (2)

◯ Via Tekenradar (3)

◯ Anders (4)