

**Wearing a Posture Shirt: Effects on posture, posture awareness and pre-existing aches and pains - a retrospective evaluation bachelor thesis**

**Bachelor thesis submitted by**

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## TABLE OF CONTENTS

<b>Abstract</b>	<b>5</b>
<b>1 Introduction and objective</b>	<b>6</b>
<b>2nd Theory part</b>	<b>7</b>
<b>2.1 posture</b>	<b>7</b>
<b>2.1.1 definition</b>	<b>7</b>
<b>2.1.2 Influencing factors</b>	<b>7</b>
<b>2.1.3 Hypothetical norm of an upright posture</b>	<b>9</b>
<b>2.2 Postural problems</b>	<b>12</b>
<b>2.3 attention</b>	<b>13</b>
<b>2.4 Functional taping</b>	<b>14</b>
<b>2.4.1 definition</b>	<b>14</b>
<b>2.4.2 Current study situation</b>	<b>15</b>
<b>2.5 Functional clothing</b>	<b>16</b>
<b>2.5.1 Current study situation</b>	<b>16</b>
<b>3rd Scientific questions</b>	<b>17th</b>
<b>4th methodology</b>	<b>18th</b>
<b>4.1 Exam design</b>	<b>18th</b>
<b>4.2 Investigators</b>	<b>18th</b>
<b>4.3 Examination procedure</b>	<b>19th</b>
<b>4.4 Conducting the investigation</b>	<b>20th</b>
<b>4.5 Examination evaluation</b>	<b>20th</b>
<b>5 Results</b>	<b>22</b>
<b>5.1 Description of the study population</b>	<b>22</b>
<b>5.2 Evaluation of the three components:</b> aches and pains, posture and posture awareness	<b>24th</b>
<b>5.3 Correlation aches and pains, posture and posture awareness</b>	<b>26</b>
<b>5.4 Effect of the Posture Shirt or Posture Bra on the three Components</b>	<b>27th</b>
<b>6 discussion</b>	<b>28</b>
<b>6.1 discussion of the results</b>	<b>28</b>
<b>6.1.1 Alternative evaluation</b>	<b>30th</b>
<b>6.2 Critical appraisal</b>	<b>30th</b>
<b>6.3 outlook</b>	<b>31</b>
<b>7 conclusion</b>	<b>32</b>
<b>8th bibliography</b>	<b>33</b>

<b>9</b>	<b>List of figures</b>	<b>36</b>
<b>10th</b>	<b>List of tables</b>	<b>37</b>
<b>11</b>	<b>List of abbreviations</b>	<b>38</b>
<b>12</b>	<b>attachment</b>	<b>39</b>
12.1	Appendix 1: Poster	39
12.2	Appendix 2: Anodyne® GmbH online questionnaire	40
12.3	Appendix 3: Codebook	44
12.4	Appendix 4: Declaration of independence	54
12.5	Appendix 5: Consent to loan	55
12.6	Appendix 6: Consent to publication of the poster	56

## ABSTRACT

Poor Posture, which leads to functional limitations, is of great importance in today's society. While functional taping is recognised as a measure to maintain or restore posture in terms of training perception, stimulating blood and lymph flow, and improving muscle function, the effectiveness of posture shirts is little researched.

**Objective:** The aim of the work is to examine the effects of wearing a Posture Shirt™ on aches and pains, posture, and posture awareness.

**Method:** 22,350 buyers purchased an ActivePosture Anodyne® product. 1,039 respondents were included in the study because they participated in an optional anonymous online survey on SurveyMonkey after purchasing a Posture Shirt. IBM® SPSS® Statistics was used for statistical evaluation.

**Results:** Wearing the Posture Shirt has a positive influence on aches and pains, posture and posture awareness. The least positive influence was on existing issues. In addition, a positive correlation within these three components was found.

**Discussion and conclusion:** The Posture Shirt can lead to a positively perceived influence on posture and can be used as a means of perception training. The Posture Shirt from Anodyne® GmbH also shows signs of alleviating aches and pains. However, these are only small compared to the effects mentioned above. A prospective longitudinal study should confirm the validity and sustainability of these effects. **Effects of a posture shirt**

## 1 INTRODUCTION AND OBJECTIVE

The effects of a one-sided or bad posture are a social issue. In Switzerland, 85% of the population described their state of health as good to very good, although back pain, pain in the shoulders or arms and general weakness are among the three most common physical complaints from the age of 15 (Swiss Federal Statistical Office, 2018). Albrecht (2013) underlines the fact that in evolution there has never been a time when man sat for several hours a day and bending became the greatest strain on the back. Experience in everyday physiotherapy shows that the perception of the body and its movements is often regarded as difficult by patients. Taking up an upright posture turns out to be a complex task. One way to train the perception of a person is to put on a functional tape. With the help of this technique, an active posture improvement can be achieved in everyday life through constant feedback. It also improves blood and lymph flow, which in turn improves muscle function (Pohlmann, 2011). Several authors have shown positive effects of functional taping on postural problems (Kim et al., 2018; Yoo, 2013; El-Abd, A.M., Ibrahim, A.R., & El-Hafez, H.M., 2017; Macedo, L. de B., Richards, J., Borges, D.T., Melo, S.A., & Brasileiro, J.S., 2018).

This paper deals with an innovation that uses functional tape in the form of a Posture Shirt. The company Anodyne® GmbH deals with such shirts, which are supposed to transfer the effects of the tape on the body and the posture by so-called neuro bands. It has already been proven that positive effects on posture deviations such as forward head posture, which means in the German Geierhals, or increased thoracic kyphosis can be achieved by wearing the Posture Shirt. It is also been proven that there are differences between wearing a normal T-shirt and a posture shirt in terms of shoulder position and muscle activity and therefore effectiveness can be confirmed (Cole et al., 2013). The aim of this thesis is to show the effects of wearing a Posture Shirt of Anodyne® GmbH on the three components aches and pains, posture and awareness to one's own posture.

Effects of a posture shirt

## 2nd THEORY PART

The following theoretical section introduces the three components. The human, upright posture forms the foundation stone. It is discussed what an upright posture means, what

influences it and what typical deviations are (component aches and pains). The third component, attention to one's own posture, is briefly defined at the end.

## **2.1 posture**

### **2.1.1 Definition**

Due to the young science of posture, it is difficult to find a scientifically correct definition. The Duden describes the posture in his dictionary as "the way, especially when standing, walking or sitting, to hold the body, especially the spine". Albrecht (2013) describes posture briefly and concisely as the "counterforce to gravity" (p.4). Spirgi-Gantert and Suppé (2014) also refer in their definition to the confrontation with gravity and define the upright posture as a position "in which the body sections are optimally aligned against gravity and one above the other" (p.143). Rosario (2017) in his review on the search for the appropriate definition of posture finds the following: "[...] the outcome of the overall position of the joints adopted to balance the skeletal segments against gravity in a given position, serving as a basis for movement and nonverbal communication, maintained by the connective tissue and muscles under the control of the nervous system." (p. 111) It becomes clear that the human posture is a complex construct characterized by many influences.

### **2.1.2 Influencing factors**

As already expressed in the search for definitions, posture depends on various components. According to Albrecht (2013), the following components influence human posture:

- hereditary predisposition: genetic factors such as body size, the shape and condition of bones, joints and organs have an effect on the body and thus indirectly on posture.
- Psyche (emotions and feelings) and character: Already in the first years of life the character is formed as a consequence of feelings and emotions. Man is viewed holistically and the spiritual dimension must never be separated from it.
- Biochemical state of a body: Nutrition, digestion and metabolism determine the biochemical state of the body and thus form the basis for physical resilience.
- Condition of the musculature: The musculature forms the body, the nervous system, the control of the musculature determines the posture.
- Disease patterns: Inflammatory, degenerative joint diseases, tumours or neural diseases such as scoliosis, Scheuermann's disease, Bechterew's disease, osteoporosis, rheumatism, multiple sclerosis, stroke, Parkinson's disease change the shape of the body and thus influence posture.
- Pain: The body's reactions to pain are protective and gentle postures or evasive movements, which must, however, dissolve again when the pain is relieved in order to be able to guarantee the body maximum freedom of movement again.
- Surgical procedures and scars: Free nerve endings and nerve receptors are destroyed, making perception more difficult and influencing movement and posture.
- Drugs: depending on the drug, this can affect the body from sedating to encouraging movement.
- Energy state: The energy state, for example tiredness or strength, has a direct effect on the posture. Energy and strength promote the upright posture, fatigue and exhaustion, on the other hand, favour the flexing posture.
- Temperature: Cold and heat change body expression and movements. Cold contracts, heat opens and relaxes.
- Socio-cultural belonging: Identity, security and belonging are conveyed through appropriate language, clothing and posture.
- Sports: Each sport places different demands on the body, which adapts to the function.
- Habits: Leaving a comfortable position always means leaving the comfort zone and adapting to new, unfamiliar body feelings.

– Age: Age does not automatically mean diffraction, stiffness, weakness. The path to old age is crucial, everything is trainable or maintainable. It is emphasized that all influences have a reciprocal effect on the posture: as soon as a pain can influence the posture, the posture can influence the pain.

### 2.1.3 Hypothetical norm of an upright posture

According to Dölken (2005), the S-shape of the spinal column serves as a reference point for the hypothetical norm of human posture. The erection can be kept economical when the body sections are filed. Spirgi-Gantert and Suppé (2014) and Albrecht (2013) also make use of this basis. While Spirgi-Gantert and Suppé (2014) divide the body into five sections, Albrecht (2013) describes the posture from the sagittal view from the feet to the head. These two basically identical descriptions of an upright posture are described in more detail below. In order to describe the body better, it is divided into five functional body sections by Spirgi-Gantert and Suppé (2014) (in the following partly abbreviated by KA):

- Body part legs: Feet, lower and upper legs
- Body section Pelvis: 5 lumbar vertebrae, sacrum, pelvis
- Body section Thorax: 12 thoracic vertebrae, ribs, sternum
- Body section Head: 7 cervical vertebrae, hyoid bone, lower jaw and skull
- Body section Arms: hands, lower and upper arms, scapulae, clavicae

The legs, whose main task is locomotion, form the mobile basis of the spine. The better the axial load on the legs, the better the statics of the spine. The body section pelvis catches the alternating leg movements and transfers them to the spine in an orderly and coordinated manner so that the centre of stabilisation, the body section chest, can act as dynamic abutment against the head and arms. The chest is the stabilizing center of the posture. This also becomes clear when one considers that this part of the body must be connected to three others and coordinate them as well as coordinate them with each other. The thorax section of the body achieves this dynamic stabilization to keep the spine in its zero position through high muscular activity. Another important task in the interaction of this part of the body is the breathing, which is not dealt with in detail in this paper. From the cranial side, fine adjustments of the spine are controlled by the head balancing on the chest. The head is in play function, is used as a counterweight and reaches an optimal use of the sensory organs by a large mobility. This requires the musculature to be highly reactive. The main task of the body section arms is to establish a contact to the environment with touch, feel and feel. Skill activities such as writing, grasping or supporting are also part of his tasks. Since the arms are only connected to other parts of the body by a single articulated connection, they are predestined for the play function and thus as a counterweight in equilibrium reactions. The whole body is in equilibrium when the partial centres of gravity of the respective parts of the body are all above the centre of the supporting surface and cancel out all external forces.

The body sections are important because when they are positioned exactly above each other, they are optimally aligned against gravity and thus construct a position with minimum energy consumption and maximum efficiency. Consequently, the thighs and lower legs must stand exactly on top of each other, the body weight above the Os naviculare, in order to be able to create a stable and selectively mobile substructure for the cranial body sections when standing. No optimal position is defined for the pelvis as it balances on the joint heads of the thigh. On the other hand, the musculature needs a state of easy responsiveness in order to be able to react optimally. The spinal column as a body section overlapping grasped, has to counteract by its economical triple curved form always in the thoracic spine a constant falling tendency forward, since there the bending stretch axes lie further dorsally.

Knapp Albrecht (2013) defines the upright posture from a sagittal point of view as follows: functional foot divergence with 3-point loading, knee and pelvis neutral, physiological lumbar lordosis, raised sternum (dynamic extension), head in extension of the body's longitudinal axis with view to the horizon and calm relaxed shoulder girdle on the thorax.

In comparison with Albrecht (2013), the descriptions of the posture norm of Spirgi-Gantert and Suppé (2014) coincide. Both sources speak of superimposing elements in exactly one axis and muscular activity supporting this construct.

Table 1: Comparison of standard posture between Spirgi-Gantert and Suppé (2014) with Albrecht (2013)

Norm of an upright posture		
authors	Spirgi-Gantert and Suppé (2014) Albrecht (2013)	
Principles	All body sections are exactly on top of each other	Longitudinal tension with an economical and appropriate muscle tension
Head*	KA head: fine adjustment of the spine. Counterweight and great flexibility	In the extension of the body's longitudinal axis with a view towards the horizon
Neck*	Not specifically mentioned by authors.	
Rib cage *	KA chest: center of stabilization	Raised sternum as a dynamic extension
Belly*	Not specifically mentioned by authors.	
Pool*	KA pelvis: catching the leg movements and transmission to the spine No defined position, balance on the joint heads of the thigh	Pelvis neutral Physiological lumbar lordosis
Upper limb *	KA Arms: Establish contact with the environment, game function and counterweight	Calm and relaxed on the thorax
Lower limb *	KA legs: The main task is getting around. Mobile foundation of the spine  Thighs and lower legs exactly one above the other, body weight above the navicular bone	Functional foot divergence with 3 - point load neutral knee joint

\* Classification according to Schünke, Schulte, & Schumacher (2014), p. 24

## 2.2 Postural complaints

As already mentioned, a hypothetical norm of upright posture is defined in such a way that all body sections must be classified. All deviations from this standard are referred to as postural deviations (Dölken, 2005). As a result of this altered arrangement of the body sections, there is a weight shift in the body to the dorsal or ventral direction or to the lateral left or right. The musculature tries to secure this imbalance and thus the posture, whereby it does not play a role whether this new posture is good or bad. Muscles that do not have to hold against gravity under normal posture work permanently to prevent falls and reactive hyperactivity develops. Muscles, which have to work against gravity in their usual posture, but do not have to do such work anymore due to the change, become reactive hypotonic. Muscular imbalances develop which lead to pain and tension. If the state of tension of the muscles is not large enough to maintain this balance, passive structures of the musculoskeletal system will be stressed and painful and degenerative shear stress will occur (Spirgi-Gantert and Suppé, 2014).

According to Spirgi-Gantert and Suppé (2014), possible deviations from typical postural deviations are the following:

- Sway-back type with thoracic kyphosis: The rectus abdominis muscle is activated by moving the thorax dorsally. The entire abdominal musculature receives a high level of tension due to the weight of the thorax and leads to kyphosis. The back muscles are less activated and atrophied.
- Increased lumbar spine lordosis: A limited extension in the hip joint is suspected. In addition, the ischiocrural musculature works constantly extensorially to prevent falls, thus holding back the ilium, while the sacrum is pressed further ventrally by the body's weight. As a result, shear stress occurs on the passive structures of the lumbar spine. In addition, the lower abdominal muscles are overstretched and the diaphragm pelvis is insufficient.
- Extension of the pelvis in the hip joints: The pelvis is extended in the hip joints, which reduces lumbar lordosis and translates the thorax backwards. The gluteal and ischiocrural muscles are approximated. The abdominal muscles become hyperactive to hold the chest against gravity, which means a high effort for the back muscles to fight against the resistance of the abdominal muscles and correct the posture.
- Increased medial rotation of the femoral condyles: Medial rotation of the femur leads medially to a tensile load and laterally to a pressure load. The femur is too far medial in relation to the patella, which leads retropatellarly to an increased load on the lateral side. An inhibition of the hip joint outer rotators and abductors and the knee joint extensors and inner rotators is promoted. The supporting function of the leg is inadequate. The stabilizers of the arch of the foot become insufficient due to the lowering of the longitudinal arch.

## 2.3 Awareness

A good body awareness is a prerequisite for being able to improve attention to one's own posture. According to Spirgi-Gantert and Suppé (2014), a person has a disturbed perception and cannot move normally if he cannot orient himself by his own body or in space. In order to achieve change, the actual situation must be consciously perceived (Albrecht, 2013). A good relationship with oneself and one's body has a positive influence on posture and learning new movements. It is also important to have an idea of the goal, to know the new posture. Only then can the correct control be made. According to Albrecht (2013), body perception is "based on sensuality and on the ability to experience in a differentiated and conscious way" (p.60). According to the author, an improvement in perception requires a training of the senses: observation, feeling, pausing, conscious description. The nerve receptors represent the organs of perception, which are connected with experience and association.



## 2.4 Functional taping

### 2.4.1 Definition

Definition Functional Taping describes a type of taping which is to be oriented and adapted to the normal functions of the musculoskeletal system. Montag and Asmussen (2003) write the following definition: "The functional dressing maintains or creates the physiological balance between stability and mobility. It protects and supports both passively and actively and selectively relieves the endangered, disturbed or injured parts of a functional load in the painless movement space, prevents extreme movements and supports healing." (p. 14) While this definition is therefore based on stabilization with optimal mobilization, since the seventies a further type of functional taping has been known, known under the terms elastic tape or kinesio tape, which is collectively referred to in this work as FT (functional tape). Because movement and muscle activity are important for maintaining or restoring health, this method is less based on stabilization than on mobilization and activation of the muscles (Pohlmann, 2011). Since the musculature can not only initiate and execute movement, but also has an important function in the blood and lymph circulation, the functional tape should help to support the versatile characteristics of the musculature. In this paper, unless otherwise stated, we refer to the FT, which retains stabilizing components but attaches more importance to other modes of action. The properties and effects of the functional tape are analogously taken from the book "Taping Seminar" by Pohlmann (2011): Material: FT is elastic and stretches up to 140% of its original length and adheres to the skin. In addition, the body's own heat activates the adhesive layer, which should give the tape a better hold. The material can be worn up to 3 weeks. Effects: The material properties are designed to approximate the skin properties. After a trauma with local inflammation, swelling and pressure increase the blood circulation is interrupted and the lymph flow is disturbed.

Correct application of the FT can achieve a lifting effect on the epidermis, which counteracts an existing increase in pressure. In summary, Pohlmann (2011) describes the following mode of action:

- Influence on muscles and muscle attachments (toning/detonating), on skin sensors, pain receptors as well as blood circulation and lymphatic drainage
  - Joint function: Stimulation of the proprioceptors, correction of the direction of movement, improvement of stability
  - Influence on meridians and acupuncture points, on scars and the visceral system
- As described above, a good posture is strongly dependent on active and functional muscles. The described effects of the functional tape suggest that it can have an influence on posture and postural problems. The feedback given by a tape to the wearer via skin sensors also makes it possible to sensitise his or her own body perception.

### 2.4.2 Current state of studies

Current state of studies Despite the effects of the functional tape described above, the current state of studies is highly controversial with regard to efficacy. A recent study by Keenan et al (2017) has shown that FT has no effect on shoulder strength, proprioception or shoulder blade kinematic. This applies to healthy persons as well as test persons with an impingement symptomatic of the shoulder. However, other authors were able to achieve positive effects in studies: Yoo (2013) found a significant, positive effect of FT related to forward head posture (vulture neck) and a decreased activation of pars descendens from trapezoid muscle. Macedo et al (2018) also found that FT can reduce the everyday limitations of lower back pain due to pain and tension. Kim et al (2018) compared FT with other therapeutic approaches (McKenzie Exercise and Myofascial Release) and obtained similar positive effects for all three interventions. With regard to restrictions in the neck area, FT even works better than training, as El-Abd et al. (2017) explain in a study. These different statements require further studies, for example Jassi, Del Ant6nio, Moraes, George and Chaves (2017) investigate whether FT has a positive effect on pain intensity and static posture in non-specific back pain in the lumbar spine compared to sham taping. No results have been available to date. It is precisely because

functional tape is so popular in everyday physiotherapy that it is imperative that research provides further findings.

## **2.5 Functional clothing**

An achievement-oriented society demands continuous improvements. For example, functional clothing is used in sports to optimise performance. This also increases the pressure on material manufacturers, who in turn have to develop even more efficient and comfortable clothing so that human performance can be constantly increased. protective function (protection). In addition, there is the thermoregulation function, sometimes one of the most important functions that can be classified in all three function types (Jack, 2002). In addition to highly complex suits for competitive sports, newer technologies try to integrate the effect of a functional tape into a T-shirt suitable for everyday use. So-called neurobands with variable elasticity, which reflect the contractile property of the musculature, transmit this effect of postural support and stabilization (Alignmed, 2019).

### **2.5.1 Current study situation**

Some studies, including Decker et al. (2016), have investigated the effects of a posture shirt in a prospective study. They were able to determine positive effects on forward head posture, thoracic kyphosis and grip strength. They were also able to show that pain was reduced by up to 29% and that energy and functionality increased significantly in everyday life. Several authors also investigated the effect of a posture-supporting T-shirt compared to a normal T-shirt and found significant differences related to an improvement in scapular position (Gascon et al., 2018), shoulder position and muscle activity in overhead athletes (Cole et al., 2013), and rotation ability of the shoulders (Zappala et al., 2017). Experienced cyclists have even reported that a posture-supporting and compressing T-shirt not only serves as an advantage for sitting posture while riding, but also has a positive influence on recovery after sport (Cipriani, Yu, & Lyssanova, 2014).

Effects of a posture shirt

## **3rd SCIENTIFIC QUESTIONS**

Back, shoulder and neck complaints are common diseases in today's society. Studies show different effective therapy approaches, whereby the described functional tape has a high relevance for physiotherapy. With the development of the Posture Shirt, this can be used to simplify the treatment of posture problems. The present paper deals with the relevance of such Posture Shirts and deals with several practical questions. Among other things, it has been described in theory that FT has a positive influence on aches and pains, posture and posture awareness. The aim of this thesis is to confirm the theoretical approaches related to these three components and to uncover possible correlations.

- Hypothesis 1: Wearing the Posture Shirt can relieve back, neck, shoulder and headaches.
  - Hypothesis 2: Wearing the Posture Shirt can improve posture awareness.
  - Hypothesis 3: Wearing the Posture Shirt can influence posture in a positive way.
  - Hypothesis 4: The three components (aches and pains, awareness, posture) correlate with each other.
- In addition, as a secondary question, it is to be found out whether there is a difference between women wearing a Posture Bra or a Posture Shirt with regard to the three components:
- Hypothesis 5: When wearing the Posture Shirt or the Posture Bra, there are no differences in the three components of complaint relief, awareness improvement and positive influence on posture.
- Basically, the aim of this paper is not to conduct a standard examination of the hypotheses, but rather to generate descriptive values. The methodological procedure is described in the next chapter.

## **4th METHODOLOGY**

The data set of the present work was collected by Anodyne® GmbH in the context of a customer survey and made available for the evaluation of this work. The methodological procedure is explained in the following sections.

#### **4.1 Investigation design**

In order to answer the question, quantitative research of a retrospective nature was conducted. In the sense of a descriptive study with non-experimental design, a customer survey was conducted using an online questionnaire (see appendix 1).

#### **4.2 Study participants**

Participants in the study Anodyne® GmbH selected from its database all customers who have purchased one of its products in the last 12 months and sent them the questionnaire (N = 22,350). The inclusion criterion for the authors' evaluation was the correct and complete completion of the questionnaire. This meant that 1,370 anonymous customer data records could be recruited. The processing of the various hypotheses required further inclusion criteria. 1,039 customers bought a Posture Shirt and were included in the study for the analysis of hypothesis 1-4. Using the inclusion criteria woman and purchase of a Posture Shirt or Posture Bra, the subjects were selected to work on Hypothesis 5 (see figure 1)

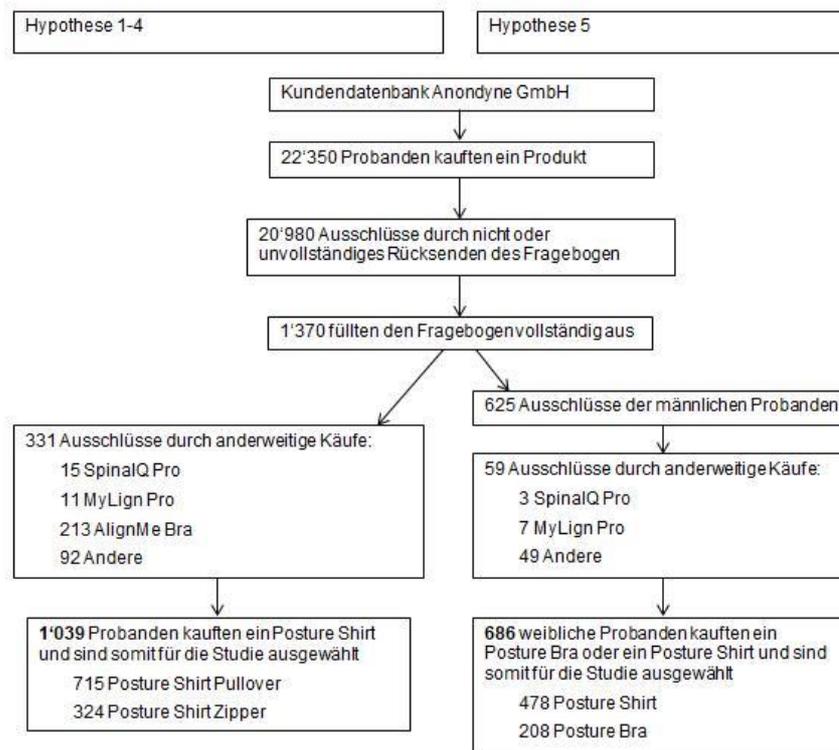


Figure 1: Subject selection procedure. Own representation.

### 4.3 Examination procedure

For the customer survey, an online questionnaire was developed using the free SurveyMonkey survey tool (SurveyMonkey, 2019). This questionnaire consisted of the following four parts: 1. general information about the person: socio-demographic factors, type of product purchased, duration of wearing, average activity per day

2. physical condition before purchasing an Anodyne product: postural problems and their limitations, medical diagnosis, type, duration and frequency of treatment

3. physical condition after purchasing an Anodyne product: effects on postural problems and posture due to wearing the product

4. about the Anodyne product: general satisfaction, recommendation

The questionnaire consists of open and closed questions about the Anodyne product: general satisfaction, recommendation

The questionnaire consists of open and closed questions. Nominal and 5- to 8-step ordinal scales were generated to answer the closed questions.

### 4.4 Carrying out the investigation

In January 2019, the link to the online questionnaire was sent to customers of Anodyne® GmbH who had placed an order within the last 12 months. Answering the survey took place in all countries at the same time. To ensure that the survey was based on experienced information, customers who had ordered within the previous month were not contacted. The data collection took three weeks and was completed at the end of January 2019. In order to achieve a statistically relevant response rate, each

participant received a value voucher for the next order.

## 4.5 Examination evaluation

The statistics program IBM® SPSS® Statistics Version 25 was used for the statistical evaluations. A large part of the work consisted of preparing the original data of the questionnaire. In order to create a complete dataset, the individual datasets were adapted to a randomly selected one from Austria. The order of the variables and the multiple response possibilities were standardized. A codebook in which each variable was precisely declared was used as a tool. The entire data record was then checked for correctness and imported into the statistics program. The first step was to get an overview of the data set. Gender, age, weight, height, country of origin, aches and pains, daily exercise, therapy, medical diagnosis based on anamnesis and subjective poor posture were analysed descriptively with SPSS and presented in a table. This data set refers to the study population of selected customers who have purchased a Posture Shirt, i.e. who are eligible to evaluate hypotheses 1-4. Hypothesis 5 is treated as a secondary question in this paper and thus does not appear in this overview. However, on the basis of descriptive comparisons, it can be assumed that the data between men and women or between posture shirts and posture bra do not differ relevantly and that this description is also the basis for the data set used for hypothesis 5.

The main questions revolve around the three components, aches and pains, posture and posture awareness, which are described in more detail below:

1. Aches and pains: Defined as "pafter1" in the codebook, this is a question from the Anodyne® GmbH questionnaire: "Since I have been wearing my Anodyne® product, my reported complaints (pain, tension, headaches or shoulder problems) have been alleviated". This component is further abbreviated as complaints.

2nd posture: Defined as "postafter1" in the codebook, this component refers to the following statement: "The Anodyne® product has a positive effect on my posture". It will be called posture in the future.

3rd Posture Awareness: This component is "postafter2": "By wearing my Anodyne® product I became more aware of my posture". In the following it is called awareness.

The verification of hypotheses 1-3 was purely descriptive. Since the three components are ordinal scaled non-normally distributed variables, the linear relationship between two of the three variables was calculated according to hypothesis 4 using a Spearman bivariate correlation analysis. Statistical significance achieved the correlation at a p-value < 0.01. The effect strength was determined using Spearman's correlation coefficient (rs) and the Cohen classification (1992). Cohen indicates a weak effect for  $r = 0.10$ , a medium effect for  $r = 0.30$ , and a strong effect for  $r = 0.50$ . Hypothesis 5, the secondary question, also refers to the three components. For these calculations, the total data set was reduced to women (see Table 5). It was calculated descriptively how many percent of the women had a positive influence on the three components by buying a Posture Shirt or a Posture Bra. In order to make a comparison between the shirt and the Bra, the percentages were compared.

## 5 RESULTS

The following sections present the results of the statistical analyses. First, an overview of the study population is given, followed by the evaluation of the hypotheses.

### 5.1 Description of the study population

The subjects represent 1039 buyers of an Anodyne® Posture Shirt with or without zipper (52.2% of whom are women). The majority (approx. 85%) were between 25 and 64 years old and came largely from Denmark (29.5%), the Netherlands (28.6%) and Switzerland (16.1%). About half of the test persons sat between four and eight hours a day and were active for one to two hours. Before purchasing an Anodyne® Posture Shirt, 90% of all test persons had physical complaints, with the area from the lower back to the neck being mentioned, but also headaches by just under one fifth. Almost one third of the study population experienced these symptoms every day and two thirds at least once a week.

A medical diagnosis showed about a third. Herniated discs (6.1%), arthrosis (2.7%) and general malposition (1.8%) were the most frequently mentioned.

Of the 1039 subjects, slightly more than half were in treatment before purchasing a Posture Shirt, with

the most frequently visited forms of treatment being physiotherapy (N=178, 17.1%) and massage (N=46, 4.4%). 774 subjects (74.5%) felt that they had a poor posture before purchasing the product. A detailed overview is given in Table 2 below:

Table 2: Overview of study population (N: shirt with / without zipper). Own representation.

	N = 1039 (100%)		N = 1039 (100%)
Age ( Years) Q3	25y - 64y. (85.6%)	Size Q4	from 1.60m - to 1.89m (88.2%)
Women Q1	478 (46%)	Weight Q2	from 50kg to 99kg (93.3%)
Country of origin P4		complaints Q12-13	
Denmark	307 (29.5%)	No	103 (9.9%)
Netherlands	297 (28.6%)	Yes: Art	936 (90.1%)
Switzerland	167 (16.1%)	Lower back	441 (42.4%)
Great Britain	102 (9.8%)	Upper back	405 (39%)
Sweden	64 (6.2%)	Shoulders	569 (54.8%)
Germany	56 (5.4%)	neck	509 (49%)
Austria	27 (2.6%)	a headache	206 (19.8%)
France	19 (1.8%)	Yes: frequency	From 1-4 times a week (34.7%) to daily (34.5%),  <Once a week (25.3%)
Lifestyle (hours per day) Q7-10		Therapy* Q16-18	
Sitting	2-10 h (78.7%)	No	412 (39.7%)
Standing	1-8 h (82.8%)	Yes	554 (53.3%)
Lying	6-10 h (76.2%)	Art, top 3	
Moving	From <1h to 24h (84.4%)	physical therapy	178 (17.1%)
		massage	46 (4.4%)
		> 3 therapies combined	51 (4.9%)
		frequency	From 1-2 times a year (9.7%) to 1-2 times a week (13.3%) from 1-6 months (13%) to  > 3 years (21.6%)
Medical diagnosis ** Q15		Bad posture *** Q11	
Yes	324 (31.2%)	Yes	774 (74.5%)
No	642 (61.8%)	No	207 (19.9%)

(N (N in percent). \* Q1-18 indicate the numbering of the question in the questionnaire. Q = question. P = person \* Therapy: No = no therapy and no complaints. \*\* Medical diagnosis: No = none

Therapy or no complaints. Bad posture: yes = applicable / very applicable, no = at all not applicable, not applicable and neither nor.)

## 5.2 Evaluation of the three components: ache and pain, posture and posture awareness

Of a total of 1,039 respondents who bought a Posture Shirt with or without a zipper, slightly more than half (53.7%, n = 558) stated that wearing the Posture Shirt alleviated the symptoms reported at the beginning. (see Figure 2, text in German).

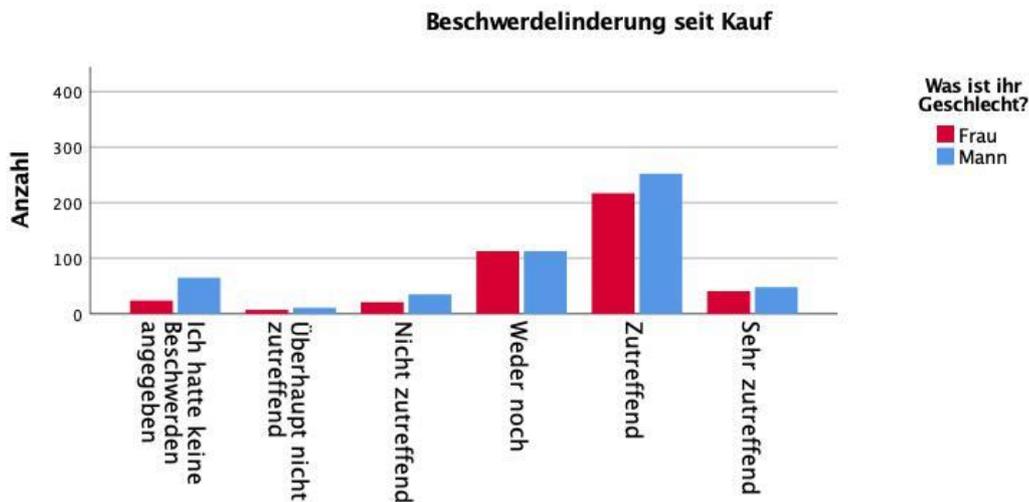


Figure 2: Evaluation of complaints component.

Compared to the total study group, there are differences in the type and proportion of physical complaints. The proportions of the individual areas increased above all in neck pain (+10%), shoulders (+11%) and the upper extremity (+8%). In addition, there are differences in the indication of whether a therapy has already been administered in advance (+10%). Otherwise, the two groups have similar values (see Table 3).

**Table 3:** Presentation of the anomalies between the total study group the sample with symptom alleviation.

### Alleviation of complaints.

	Total N = 1039 (100%)	Pain relief N = 558 (100%)
No complaints	9.9%	1.6%
Upper back	39%	47.7%
Shoulders	54.8%	66.7%
neck	49%	59.7%
In therapy / treatment before purchase	53.3%	63.8%

The effect on one's own posture could be positively increased. 758 subjects, almost three-quarters of the total (73%), said that wearing the Posture Shirt had a positive effect on their posture. Three quarters of the test persons (76.2%, n = 792) also described an improvement in the awareness of their own posture.

Three quarters of the subjects (76.2%, n = 792) also described an improvement related to the attention of one's own posture, (see Figure 4).

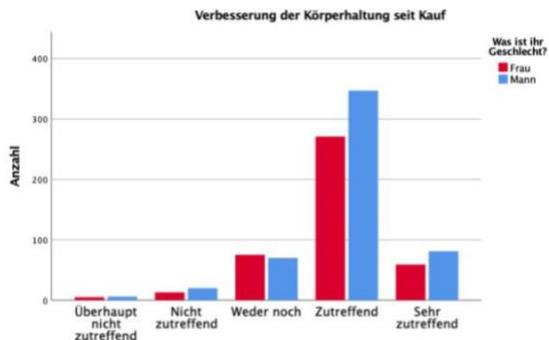


Figure 3: Component evaluation  
Posture.

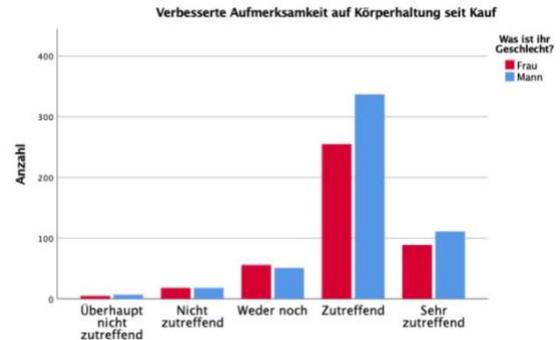


Figure 4: Component evaluation  
Perception.

The two samples of posture and awareness show no differences in the composition of responses when compared to the total study group. The shown positive influence of the Posture Shirt on the three components aches and pains, posture and awareness show only minimal differences between the male and female subjects. Since the number of men in the total study group is higher, the graphically apparent differences are additionally relativised.

### 5.3 Correlation of aches and pains, posture and awareness

Table 4: Correlations of the three components. SPSS excerpt in own presentation.

Correlations				postafter2	pafter1	postafter1
Spearman	post after 2	correlation coefficient	1,000		.358 **	.596 **
Rho		Sig. (2-sided)		.	.000	.000
		N		947	947	947
	pafter1	Correlation coefficient		.358 **	1,000	.494 **
		Sig. (2-sided)		.000	.	.000
		N		947	947	947
	postafter1	correlation coefficient		.596 **	.494 **	1,000
		Sig. (2-sided)		.000	.000	.
		N		947	947	947

\*\* . The correlation is significant at the 0.01 level (two-sided).

postafter2 = attention, pafter1 = complaints, postafter1 = posture, N = 1039, n = 947 due to 92 missing values.

The correlation is significant at the 0.01 level (two-sided). postafter2 = awareness, pafter1 = aches and pains, postafter1 = posture, N = 1039, n = 947 due to 92 missing values. The correlation coefficients of the three variables aches and pains, posture and awareness have values >0, i.e. they show a positive correlation. This means that if the relief of the symptoms (aches and pains) is greater, the improvement of the posture and the attention to the posture also increases proportionally.

Awareness to posture after purchasing a Posture Shirt correlates significantly with the reported complaints of the same group,  $r_s = 0.358$ ,  $p = 0.000$ ,  $n = 947$ . According to Cohen (1992), this is a medium effect. Table 4 also shows that posture is statistically significantly correlated with attention to posture by wearing the Posture Shirt,  $r_s = 0.596$ ,  $p = 0.000$ ,  $n = 947$ . Based on the classification according to Cohen (1992), the effect is described as medium to strong.

The positive influence on posture and the alleviation of aches and pains by wearers of a Posture Shirt correlate significantly,  $r_s = 0.209$ ,  $p = 0.000$ ,  $n = 947$ . According to Cohen (1992), this is a medium effect.

Overall, it can be said that these three components correlate with each other. According to Cohen (1992) there are medium to even strong effects. The positive influence on posture shows the strongest effects with the other two components. The effect on the complaints is the smallest, nevertheless, this is to be evaluated still with middle strength.

### 5.4 Effect of the Posture Shirt or Posture Bra on the three components

In over three quarters of all women, awareness to their posture can be improved by wearing the Posture Shirt or Posture Bra. The Posture Shirt or Posture Bra also has a positive effect on posture in almost 70% of women. 54% of all women wore the Posture Shirt and 49.5% wore the Posture Bra to alleviate aches and pains. The biggest difference between shirt and bra thus shows the component 'aches and pains' with 4.5% (see table 5).

**Table 5:** Number of women feeling an improvement by wearing the clothing. Own representation.

<b>Women 686 (100%)</b>		<b>attention</b>	<b>posture</b>	<b>complaints</b>
<b>Shirt n = 478</b>	<b>N = 344 (71.9%)</b>	<b>N = 330 (69%)</b>	<b>N = 258 (54%)</b>	
<b>Bra n = 208</b>	<b>N = 153 (73.5%)</b>	<b>N = 136 (65.4%)</b>	<b>N = 103 (49.5%)</b>	

*N (N in percent)*

## 6 DISCUSSION

What effects does wearing a posture shirt from Anodyne® GmbH have on body posture? This question summarises the starting position of the present work. The aim of the non-experimental study was to evaluate the effects of wearing a posture shirt on awareness, aches and pains and posture. It was assumed that the Posture Shirt had a positive influence on the three components and that the components correlate positively with each other. To explain these assumptions, literary works with themes on human posture, functional tape and functional clothing were consulted.

### 6.1 Discussion of the results

The evaluations show that all three components, posture awareness, posture and aches and pains, are positively influenced by wearing the Posture Shirt and also correlate positively with each other. In comparison, the Posture Shirt has the smallest positive effect on the relief of symptoms. Only about half of the test persons experienced a relief of their aches and pains with the Posture Shirt, whereby three quarters of the test persons experienced a positive influence on their posture and posture awareness. It can be assumed that a positive influence on the posture and an improvement in awareness to one's own posture include many components and thus already show success with smaller inputs. It should also be borne in mind that no information on the course of the aches and pains had to be given when the aches and pains were being made. Chronic symptoms are not identified and can influence the answers.

In addition, it should be noted that 42.8% of the 1,039 test persons moved for 1-2 hours a day, which is comparable with the Swiss population (Swiss Federal Statistical Office, 2018), but a quarter of the total population still spends 4-6 hours a day sitting. According to Albrecht (2013), sitting is a cause of many misalignments in the direction of diffraction. The result and the theory of the awareness component are the same. Around three quarters of the test persons felt an improvement in their attention to their posture after wearing the Posture Shirt. A number to underline, which speaks for the Posture Shirt.

This effect is also supported by Pohlmann (2011), who calls the stimulating proprioception as one of the effects of functional tape. The Posture Shirt gives the wearer an input through which the posture is better perceived and awareness is trained. In comparison with Albrecht (2013), which describes a training of the senses to improve body awareness, the close concern of the Posture Shirt primarily promotes tactile input. Kinaesthetics is also addressed because the Posture Shirt guides the body through the neurobands into a different position. The optical system is also trained if the new posture is analysed and compared by repeated observations. The Posture Shirt can therefore be used in practice as an additional aid in the training of perception in physiotherapy. Congruent with Yoo (2013) and Decker et al. (2016), who showed positive effects on posture deviations due to functional tape, the evaluations of the present study confirm that posture can be positively influenced by wearing a posture shirt with FT-like neuro bands. It should be noted that 74.5% of the test persons described a bad posture from their subjective point of view before buying the product. These test persons therefore accounted for the majority of buyers. It must be taken into account that this proportion would also have achieved a positive result with a different intervention in terms of posture. An evaluation of the test persons with regard to body posture before and after was not made in this study. In addition, the question arises as to what the effects would have looked like in a comparative population. The correlation of the three components could be confirmed on the basis of hypothesis 4. This is conclusive in the sense that aches and pains, posture and posture awareness, as described in theory, are interrelated. The greatest correlation between posture and perception expected from hypothesis 1-3 was also confirmed.

To answer the supplementary question, the difference between Posture Shirt and Posture Bra was shown in tabular form. The considerations that the Posture Bra does not differ significantly from the Posture Shirt proved to be correct. No relevant differences were found in the results. In order to be able to answer certain further questions, the questionnaire available for the work lacked a depth for individual items. A central question, which would be unavoidable for further analysis, relates to the wearing time or frequency with which the product, be it Posture Shirt or Posture Bra, was worn. Results about this would make it possible to find out how optimal effects can be achieved with a Posture Shirt and how recommendations can be made. The effects found must be put into perspective. Albrecht (2013) describes many influences on posture that could not be considered in the context of

this work. By the observed correlation the hypotheses 1-3 are represented very simplified and the results should be considered cautiously under this aspect.

### **6.1.1 Alternative evaluation**

The original aim of the work was to make a practical contribution by identifying factors to define groups of people who would be most likely to experience relief from aches and pains if they wore a Posture Shirt. With a linear, backward regression analysis, a dependent variable should be compared with several independent variables and the largest correlations described. The results would have influenced practice to the extent that it would have been possible to identify a specific target group. The variables that would have been promising in our data set for such an analysis were mainly ordinally scaled. However, a linear regression analysis requires interval- or nominal-scaled variables, which is why this statistical method could not be applied and should be defined as a goal for further work.

### **6.2 Critical assessment**

The entire Anodyne questionnaire has a large number of samples with  $N=1300$ , of which  $n = 1039$  were included for our work. The results are statistically significant and can also be classified as clinically relevant due to the absolute effects. In addition, data was collected in eight different countries, with a diverse audience in terms of age, gender, height and weight. Language barriers was avoided as the questionnaire was completed in the respective national language. The online survey, which did not run via the product page but via SurveyMonkey, ensured the anonymity of the respondents, which reduced the bias of social desirability. In order to achieve the desired large number of random samples, a voucher was provided for the next purchase of a product. On the one hand, the effects of a posture shirt distorted the participants' motivation and, on the other hand, a relevant number of study participants were gained. In addition to the positive characteristics of the questionnaire, some elements were formulated inadequately. Posture or aches and pains were not precisely defined. The interindividual interpretation of these terms may have influenced the answers. The variables size, weight and age were also asked in categories. This made the exact evaluation more difficult. Metric data would have been better suited. With more precise information, the evaluations would have been refined and conclusions could have been made clearer. The present work did not use the normal procedure of quantitative research. Data collection was completed before hypotheses were formulated. The questionnaire and the data collected thus limited the scope of the question.

### **6.3 Outlook**

The results of this work form a basis for further investigations. The effects the Posture Shirt has on body posture and awareness as well as aches and pains are one approach to working with data from the present study group. Due to the positive result of this cross-sectional comparison, there is a demand for a prospective longitudinal study, which can assess how the presented effects behave over a longer period of time.

In practice, there are exciting questions that can also be investigated: are the positive effects of wearing the Posture Shirt based on the effects of muscle stimulation or on the improved awareness of the wearer? Is it enough to only wear the Posture Shirt to improve your posture or do you need active therapy? What is the optimal interdependence of therapy and wearing the Posture Shirt?

## **7 CONCLUSION**

The Posture Shirt can lead to a positive influence on posture and be used as a means of posture awareness training. The Posture Shirt from Anodyne® GmbH also shows signs of alleviating aches and pains, but these are only minor compared to the previously mentioned effects. The three components correlate positively with each other, which suggests that improving one component also positively affects the other two. The Posture Shirt from Anodyne® can therefore be used as a supportive aid for improving the upright posture in practice. For women, it makes no difference if a Posture Bra or a Posture Shirt is used. These results should be treated with care, as a prospective longitudinal study on the sustainability of the effects is lacking.

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## 9 FIGURE DIRECTORY

Figure 1: Subject selection procedure. Own representation.....	19
Figure 2: Evaluation of complaints component. ....	24
Figure 3: Evaluation of the posture component. ....	25
Figure 4: Evaluation component perception. ....	25

## 10th TABLE

Table 1: Comparison of standard posture between Spirgi-Gantert and Suppé (2014) with Albrecht (2013) .....	11
Table 2: Overview of study population (N: shirt with / without zipper). Own Presentation. ....	23
Table 3: Representation of the abnormalities between the total population and the Sample with an alleviation of complaints.....	24
Table 4: Correlations of the three components. SPSS excerpt in own presentation. .	26
Table 5: Number of women who experienced an improvement through wearing. Own Presentation. ....	27

## 11 LIST OF ABBREVIATIONS

abbreviation	Explanation
FT	Functional tape
KA	Body section
Hours.	Hours

## 12 ATTACHMENT

## 12.1 Appendix 1: Poster

## Tragen eines Posture Shirts: Auswirkungen auf Körperhaltung, Aufmerksamkeit und vorbestehende Beschwerden - eine retrospektive Auswertung



Maurice Thomas, Ramona von Flüe, Bsc PHY16



### Einleitung

Haltungsschwächen, welche zu funktionellen Einschränkungen führen, sind in der heutigen Gesellschaft von grosser Bedeutung. In der Schweiz gelten Rückenschmerzen, Schmerzen in der Schulter oder Armen sowie allgemeine Schwäche zu den drei häufigsten körperlichen Beschwerden ab dem 15. Lebensjahr (BAS 2018). Eine Möglichkeit, die Körperhaltung zu beeinflussen besteht im Anlegen von Kinesiotapes [1,2,3,4]. Durch das Posture Shirt von der Anodyne® GmbH, kann die Funktion des Kinesiotapes mittels einem Shirt getragen werden.

Das Ziel dieser Arbeit ist es, die Effekte eines Posture Shirts auf die Körperhaltung, die Beschwerden sowie auf die Aufmerksamkeit auf die Körperhaltung zu untersuchen.

### Methodik

- Studiendesign: deskriptive Studie mit nicht-experimentellem Design
- Einschlusskriterien: Kauf Posture Shirt
- Probanden: 1'039 Kundinnen und Kunden der Anodyne® GmbH
- Online Fragebogen (SurveyMonkey®)
- Statistische Analyse durch IBM® SPSS® Statistics Version 25

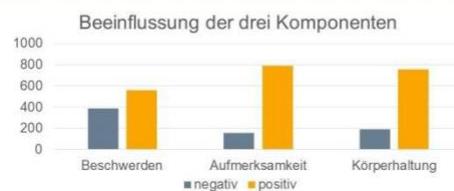


Abbildung 1: Eigene Darstellung der Effekte. Y-Achse = Anzahl absolut.

### Ergebnisse

Die 1'039 Probanden stammen aus acht europäischen Ländern, wobei 46% weiblich sind, 90.1% unter Beschwerden leiden, 53.3% sich in Therapie befinden und 74.5% ihre Haltung vor dem Kauf als schlecht bezeichnen. Das Tragen des Posture Shirts hat bezogen auf die Komponenten *Körperhaltung*, *Aufmerksamkeit* auf die eigene Körperhaltung und *Beschwerden* einen positiven Einfluss. Am kleinsten ist der positive Effekt auf die Beschwerden (siehe Abbildung 1). Diese drei Komponenten korrelieren positiv miteinander und zeigen mittlere bis starke Effekte nach Cohen [5].

### Diskussion

Die Ergebnisse deuten auf eine gute Effizienz des Posture Shirts bezüglich Körperhaltung hin. Durch das Tragen des Posture Shirts konnte die Komponenten Beschwerden am wenigsten beeinflusst werden. Verschiedene Gründe dazu können nur angenommen werden. Indirekt konnten dadurch die Wirkungsweisen eines Kinesiotapes bestätigt werden. Die Umsetzung in die Praxis muss bezüglich Dosierung noch genauer untersucht werden. Zudem könnte eine Längsschnittstudie die Nachhaltigkeit dieser Effekte noch bestätigen.

### Schlussfolgerung

Das Posture Shirt kann zu einer positiven Beeinflussung der Körperhaltung führen und als Mittel zur Wahrnehmungsschulung eingesetzt werden. Ebenfalls zeigt das Posture Shirt der Anodyne® GmbH Anzeichen zur Linderung von Beschwerden.

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Titelbilder Posture Shirts: [www.anodyne-shop.ch](http://www.anodyne-shop.ch)

## 12.2 Appendix 2: Online questionnaire from Anodyne® GmbH

### Anodyne Customer Survey 2.0

#### First draft



#### personal information

##### General information

1. Country of residence

2. Sex

3. Age

4. Weight

5. Height

6. Since how long are you wearing an Anodyne product?

0-1 month  2-3 months

4-6 months

6-12 months

1 year +

7. Which Anodyne product did you buy?

Interactive bra  Posture Shirt 2.0  Posture Shirt 2.0 Zipper  MyLign Pro

SpinalQ Pro

8. How would you distribute your daily activity in average (in%)

\_\_\_% sitting

\_\_\_% standing

\_\_\_ & Moving (Scroll down menus)

### Condition before buying an Anodyne product

1. Before purchasing an Anodyne product I had a bad posture

- Strongly disagree       Disagree       neutral       Agree       Strongly agree

2. Before purchasing an Anodyne product, I suffered from one or more of the following issues

- No issues  Lower back pain  Upper back pain  Shoulder problems  neck tensions  
 headaches

a. If any issues: I received a diagnosis from an expert

- Yes, my diagnosis was: .....  No, I had no diagnosis

b. If any issues: I was suffering to following degree (severeness of issues)

- No impairments       To a lesser degree       Not relevant       To some extent  
 To a large extent

c. If any issues: I was suffering (frequency of issue)

- 1x year  1x per month       1x per week       2-3x per week       Daily

3. I have been in therapy / treatment before buying an Anodyne product

- yes       no

a. If yes, for how long have you been in therapy?

- 1-4 weeks       1-6 months       6-12 months       1 - 3 year       3 years +

b. If yes, how often have you been in therapy?

- 1x a year       2x a year       4x a year       1x a month       1x a week

## Condition after buying an Anodyne product

1. How often are you in therapy since you started wearing your Anodyne product?

- never been in therapy                       Not in therapy anymore                       1x a year  
 2x a year                       4x a year                       1x a month                       1x a week

2. I feel my Anodyne product has a positive impact on my posture

- Strongly disagree                       Disagree                       neutral                       Agree                       Strongly agree

3. I have become more aware of my posture since using my Anodyne product

- Strongly disagree                       Disagree                       neutral                       Agree                       Strongly agree

4. I feel my Anodyne product has reduced the in part 1 mentioned issues (pain, tensions, headaches or shoulder problem) in terms of severeness

- Strongly disagree                       Disagree                       neutral                       Agree                       Strongly agree  
 Did not mention any issues in part 1

5. I feel with my Anodyne product I suffer less often from my in part 1 mentioned issues (pain, tensions, headaches or shoulder problem)

- Strongly disagree                       Disagree                       neutral                       Agree                       Strongly agree  
 Did not mention any issues in part 1

6. Since I wear my Anodyne product I generally feel better

- Strongly disagree                       Disagree                       neutral                       Agree                       Strongly agree

## About the Anodyne product

1. My Anodyne product is comfortable to wear

Strongly disagree       Disagree       neutral       Agree       Strongly agree

a. If disagree, why not? \_\_\_\_\_

2. I like to wear my Anodyne product during following activities (several answers possible)

desktop work       physical work  sport / training  Therapy  at home  
 outdoor activities       gardening       flights       driving a car       sleeping

3. I wear my Anodyne product

1x year       1x per month       1x per week       2-3x per week       Daily

4. I would recommend Anodyne products to family & friends or co-workers

Strongly disagree       Disagree  Neutral       Agree       Strongly agree

5. My Anodyne product supports me best with

posture       Shoulder Pain       Upper back pain  Lower back pain  
 Neck Tensions       Upper back tension       Lower back tensions

6. How did you find out about Anodyne?

Facebook  Instagram  Print media  Friends or family  Google  
 Therapist / Doctor

7. How can we improve the Anodyne product? (Please answer in bullet points)

## 12.3 Appendix 3: Codebook

Codebook							
Question no	Variable name	Variable type	Variable label	Value label	MV	dimension	comment
P1	rID	nominal	Respondent ID				
P2	clD	nominal	Collector ID				
P3	date	nominal	data created				
P4	country	nominal	country	1 = Austria (At) 2 = German-speaking Switzerland (CHde) 3 = Romandie (CHfr) 4 = Germany (DE) 5 = Denmark (DK) 6 = Netherlands (NL) 7 = France (FR) 8 = Sweden (SE) 9 = Great Britain (UK)			
Q1	sex	nominal	What is your gender?	1 = woman 2 = man	999		
Q2	weight	ordinal	How heavy are you approximately?	1 = less than 49 kg 2 = 50 - 59 kg 3 = 60-69 kg 4 = 70-79 kg 5 = 80-89 kg 6 = 90-98 kg 7 = 100-109 kg 8 = 110-119 kg 9 = over 120 kg	999	details about person	

Q3	age	ordinal	How old are they?	1 = under 18 2 = 18 to 24 3 = 25 to 34 4 = 35 to 44 5 = 45 to 54 6 = 55 to 64 7 = 65 to 74 8 = 75 and older	999	details about person	
Q4	height	ordinal	How tall are you?	1 = under 1m49cm 2 = 1m50cm - 1m59cm 3 = 1m60cm - 1m69cm 4 = 1m70cm - 1m79cm 5 = 1m80cm - 1m89cm 6 = 1m90cm - 1m99cm 7 = over 2m00cm	999	details about person	
Q5	prchoice	nominal	What product did you buy from Anodyne @:	1 = Posture Shirt Pullover 2 = Posture Shirt Zipper 3 = SpinalQ Pro 4 = MyLign Pro 5 = AlignMe Bra 6 = Others	999	details about person	
Q6	prtwear	ordinal	How long have you been wearing your Anodyne @ product?	1 = 0-1 month 2 = 2-3 months 3 = 4-6 months 4 = 7-12 months 5 = + 1 year	999	details about person	

Q7	sith	ordinal	How many hours a day do you sit? (e.g. on an office chair, in the car, etc.)	2 = less than 1 hour 3 = 1-2 hours 4 = 2-4 hours 5 = 4-6 hours 6 = 6-8 hours 7 = 8-10 hours 8 = 10-12- hours 9 = 12+ hours	999	daily Activities (24h)	
Q8	stand	ordinal	How many hours a day do you spend standing? (e.g. when cooking, while working, etc.)	1 = less than 1 hour 2 = 1-2 hours 3 = 2-4 hours 4 = 4-6 hours 5 = 6-8 hours 6 = 8-10 hours 7 = 10-12 hours 8 = 12+ hours	999	daily Activities (24h)	
Q9	activeh	ordinal	How many hours, on average, do you spend on the move? (e.g. running, doing exercises, etc.)	1 = less than 1 hour 2 = 1-2 hours 3 = 2-4 hours 4 = 4-6 hours 5 = 6-8 hours 6 = 8-10 hours 7 = 10-12 hours 8 = 12+ hours	999	daily Activities (24h)	

Q10	lyingh	ordinal	How many hours on average per day do you spend lying down? (e.g. sleeping, etc.)	1 = less than 1 hour 2 = 1-2 hours 3 = 2-4 hours 4 = 4-6 hours 5 = 6-8 hours 6 = 8-10 hours 7 = 10-12 hours 8 = 12+ hours	999 daily	Activities (24h)	
Q11 post	-before ordnial		To what extent do you agree with the following statement: "In my opinion I had a bad attitude before I bought an Anodyne ® product":	1 = Not applicable at all 2 = Not applicable 3 = Neither nor 4 = Applicable 5 = Very applicable	999 condition	Product purchase	
Q12 pbefore1		nominal	Did you suffer from one or more of the following complaints before buying an Anodyne® product (several answers possible)	1 = no complaints 2 = pain / tension in the lower back 3 = pain / tension in the upper back 4 = pain / tension in the shoulders 5 = pain / tension in the neck 6 = headache	999 condition	Product purchase	Multiple answers possible
Q13 pbefore2		ordinal	How often have you had these symptoms before using an Anodyne ® product?	1 = less than 5-6 times a year 2 = 1-2 times a month 3 = 1-2 times a week 4 = 3-4 times a week 5 = daily	999 condition	Product purchase	

Q14 pbefore3	ordinal	To what extent have you affected the symptoms mentioned in your everyday life before using an Anodyne ® product?	1 = No impairment / No symptoms 2 = Very little impairment 3 = Little impairment 4 = Certain impairment 5 = Severe impairment	999	condition Product purchase	
Q15 dgbefore1	nominal	Did you get a diagnosis (for example, a herniated disc) for your symptoms, which caused pain or tension, from an expert before you bought an Anodyne® product?	1 = I had no symptoms / complaints 2 = Yes, I had a diagnosis 3 = No, I had no diagnosis If 2, "Please name your diagnosis:"	999	diagnosis / Therapy before buying a product	
Q15.2 dgbefore1.2 nominal		If 2, "please state your diagnosis:	1 = Unspecific back problems 2 = Bad posture 3 = Tension 4 = Muscular imbalance 5 = Degenerative change in the WS 6 = Unspecific deformation of the WS 7 = Scoliosis 8 = Scheuermann's disease 9 = Bechterew's disease 10 = Vertebral fracture 11 = Spinal canal stenosis 12 = Discopathy 13 = Disc herniation 14 = Complaints of the facet joints 15 = spinal surgery		Diagnosis / therapy before buying a product	

				16 = whiplash 17 = shoulder pain 18 = shoulder impingement 19 = frozen shoulder 20 = migraine 21 = tension headache 22 = other physical complaints 23 = Parkinson 24 = rheumatic disease 25 = hypermobility 26 = fibromyalgia 27 = osteoporosis 28 = arthrosis 29 = arthritis 30 = CRPS 31 = Inaccurate information 32 = Complex problems			
Q16	tpbefore1	nominal	Have you been in treatment (eg surgery, physiotherapy, massage, chiropractic, etc.) before you bought your Anodyne ® product?	1 = I had no complaints 2 = Yes, I was in treatment 3 = No, I was not in treatment If 2, "Which treatment did you use?"	999	diagnosis / Therapy before buying a product	
Q16.2	tpbefore 1.2 nominal		If 2, "What treatment did you use?"	1 = massage 2 = physiotherapy 3 = osteopathy 4 = chiropractic 5 = acupuncture 6 = craniosacral therapy 7 = surgery 8 = other individual therapies		Diagnosis / therapy before buying a product	

				<p>9 = Physiotherapy and Massage 10 = Physiotherapy and Chiropractic 11 = Physiotherapy and Osteopathy</p> <p>12 = Physiotherapy and acupuncture 13 = Physiotherapy and surgery 14 = Physiotherapy and medication (infiltration, anti-inflammatory, cortisone, cream) 15 = Chiropractic and surgery 16 = Chiropractic and osteopathy</p> <p>17 = Chiropractic and Massage 18 = Chiropractic and Acupuncture</p> <p>19 = Massage and osteopathy 20 = Massage and acupuncture 21 = Massage and craniosacral therapy 22 = Occupational therapy and physiotherapy 23 = 3 or more therapies 24 = Inaccurate information</p>			
Q17	tpbefore2	ordinal	How many times have you been treated before buying your Anodyne ® product?	<p>1 = I was not in treatment 2 = 1-2 times a year 3 = 3-4 times a year 4 = 5-6 times a year 5 = 1-2 times a month 6 = 1 or more times a week</p>	999	diagnosis / Therapy before buying a product	

Q18	tpbefore3	ordinal	How long were you totally treated for the symptoms mentioned before buying an Anodyne ® product?	1 = I was not in treatment 2 = 1-6 months 3 = 6-12 months 4 = 1-3 years 5 = 3+ years	999	diagnosis / Therapy before buying a product	
Q19	tpafter	ordinal	Since you started using an Anodyne® product, how often have you been treated for your symptoms?	1 = I have never been in treatment 2 = 1 or more times a week 3 = 1-2 times a month 4 = 5-6 times a year 5 = 3-4 times a year 6 = 1-2 times a year 7 = I am no longer in treatment	999	situation after product purchase	
Q20 post	-after1 ordinal		The Anodyne ® product has a positive influence on my posture	1 = Not applicable at all 2 = Not applicable 3 = Neither nor 4 = Applicable 5 = Very applicable	999	situation after product purchase	
Q21 post	-after 2 ordinal		By wearing my Anodyne ® product I became more aware of my posture	1 = Not applicable at all 2 = Not applicable 3 = Neither nor 4 = Applicable 5 = Very applicable	999	situation after product purchase	
Q22 pafter	1	ordinal	Since I have been wearing my Anodyne® products, my complaints (pain, tension, headache or shoulder problems) have been alleviated:	0 = I had no complaints 1 = Not at all applicable 2 = Not applicable 3 = Neither nor 4 = Applicable 5 = Very applicable	999	situation after product purchase	

Q23 paffer2	ordinal	Since I have been wearing my Anodyne ® product, I have suffered less frequently from the complaints mentioned (pain, tension, headache or shoulder problems)	0 = I had no complaints 1 = Not at all applicable 2 = Not applicable 3 = Neither nor 4 = Applicable 5 = Very applicable	999	situation after product purchase	
Q24 product1	ordinal	My Anodyne ® product is comfortable to wear in everyday life:	1 = Not applicable at all 2 = Not applicable 3 = Neither nor 4 = Applicable 5 = Very applicable If 1 or 2: "Why?"	999	opinion on product	
Q24.2 product1.2 nominal	_____	If 1 or 2: "Why?" _____	1 = wearing time too short 2 = poor fit 3 = constricting 4 = sweat / smell 5 = material 6 = consequential complaints 7 = heat _____ _____			Deleted because too much effort and answers are not relevant for BT
Q25 product2	nominal	My Anodyne ® product supports me best regarding:	1 = pain / tension in the upper back 2 = pain / tension in the lower back 3 = pain / tension in the shoulders 4 = neck 5 = headache 6 = none of the above answers / no symptoms	999	opinion on product	Multiple answers possible

Q26 product3	nominal	I have had a negative effect since using the Anodyne® product:	4 = yes 2 = no if 4 = yes, please give us more information:	999	opinion on product	
Q26.2 product3.2 nominal	nominal	if 4 = yes, please give us more information:	4 = shoulder pain increases 2 = fit 3 = itching 4 = pressure sores 5 = smell / sweating 6 = consequential complaints 7 = no positive effect			Deleted because too much effort and answers are not relevant for BT
Q27 product4	nominal	How did you hear about Andoyne®?	1 = Facebook / Instagram 2 = TV advertising 3 = newspaper / magazine 4 = friend / family / colleagues 5 = Google 6 = professional recommendation 7 = others	999	opinion on product	
Q28 product5	nominal	I like to wear my Anodyne® product during the following activities:	1 = desk work 2 = physical work 3 = sport / training 4 = at home 5 = outdoor activities 6 = gardening 7 = driving / traveling 8 = sleeping 9 = none of the answers mentioned / something else	999	opinion on product	Multiple answers possible
Q29 product6	nominal	I would recommend Anodyne® products to my family, friends or work colleagues:	2 = No 2 = Maybe 3 = Yes	999	opinion on product	2/2: Both have the same values

## 12.4 Appendix 4: Declaration of independence

I hereby declare

- that I wrote the present work independently and without using sources and resources other than those specified;
- that I have identified all sources, texts, graphics and / or thoughts that have been taken over verbatim or in accordance with them, and have cited them in accordance with the "Guidelines for written work in the field of health";
- that I have not already submitted this work or parts of it in the same or similar form to another educational institution;
- that I am aware that plagiarism is a serious academic misconduct and will be sanctioned accordingly;
- that I am familiar with the policy on dealing with plagiarism at the Bern University of Applied Sciences.

Title of the work .....

**Author 1:**

**Name first Name** .....

**Matriculation number** .....

**Place and date** .....

**signature** .....

**Author 2:**

**Name first Name** .....

**Matriculation number** .....

**Place and date** .....

**signature** .....

## 12.5 Appendix 5: Consent to borrow

Title of the work ..... ..

Author 1: ..... ..

agrees that the present work may be borrowed

is Not agree that the present work may be borrowed

Place and date: ..... ..

Signature of author 1 : ..... ..

Author 2: ..... ..

agrees that the present work may be borrowed

is Not agree that the present work may be borrowed

Place and date: ..... ..

Signature of author 2 : ..... ..

## 12.6 Appendix 6: Consent to publication of the poster

Title of the work .....

Author 1: .....

agrees that the poster as a PDF on the BFH homepage in the Department of Health is published.

is Not agree that the poster as a PDF on the homepage of the BFH is published in the health department.

Place and date: .....

Signature of author 1 : .....

Author 2: .....

agrees that the poster as a PDF on the BFH homepage in the Department of Health is published.

is Not agree that the poster as a PDF on the homepage of the BFH is published in the health department.

Place and date: .....

Signature of author 2 : .....