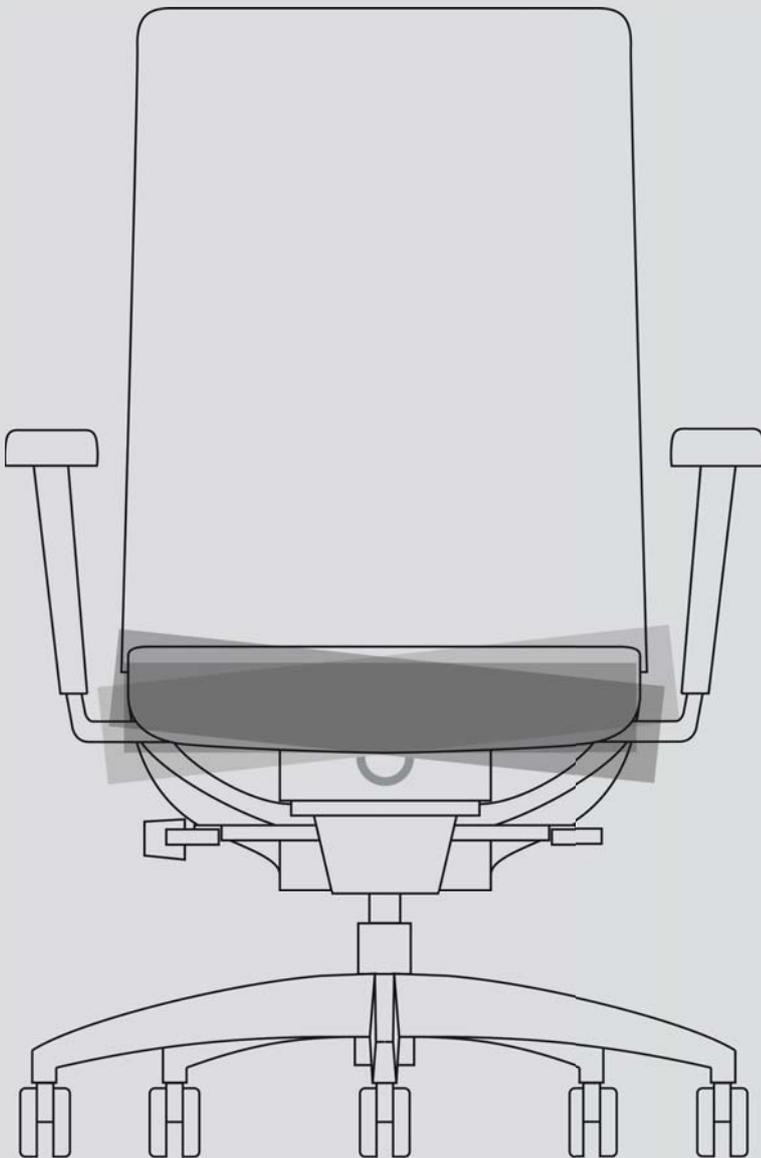


October 2014

**wagner**

Movement – The central element  
of our life – even when sitting.



**Final Report**  
„Dondola Study“

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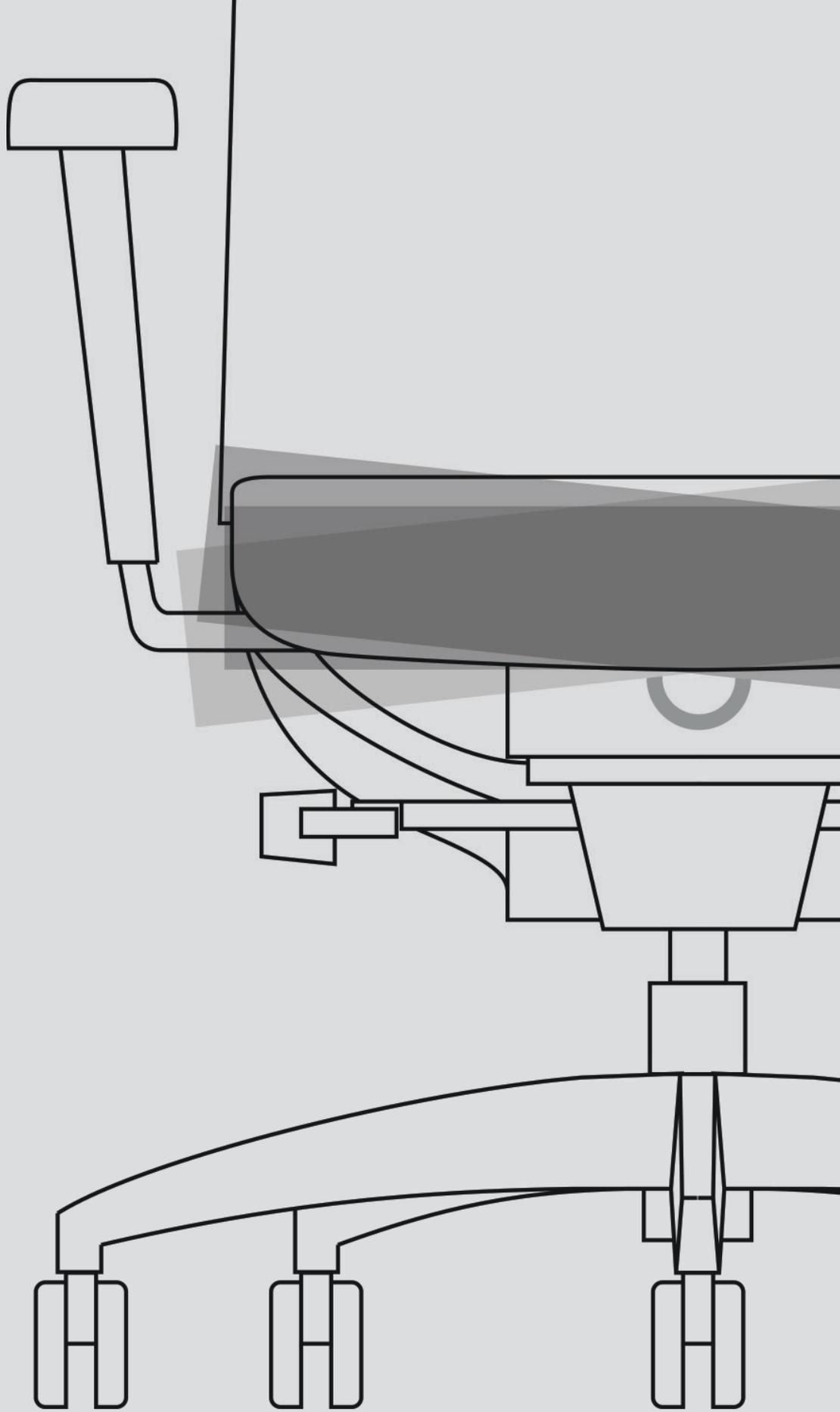
**Orthopaedic Clinic for the  
University of Regensburg  
in Asklepios**

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**Project Leaders**  
Prof. Dr Dr h.c. Joachim Grifka  
Prof. Dr Petra Jansen  
Dipl.-Sport Silvia Dullien

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Move your life.



# Evaluation of the Dondola® Seating System of the Brand Wagner

## Key Facts

### Participants:

1,462 sedentary workers across the whole of Germany

### Return:

1,296 questionnaires

### Breakdown:

650 Women (50.2%) / 646 Men (49.8%)

### Test duration:

8-12 weeks per participant

### Duration of study:

January 2012 - October 2013

## Central Results

- \_ More than 95% of those surveyed found the Dondola chair to be (very) comfortable and were (very) happy with it (3.2.1, P.18, Fig.8 / 3.1.2, P.16, Fig.6)
- \_ More than 94% would recommend the Dondola chair and the brand WAGNER to others (3.1.2, P.16, Fig.7)
- \_ Over 84% found their seating experience to be more active (3.1.1, P.14, Fig.3)

Over 56% of those tested with back problems (422 from 745) noticed an improvement in their back pain.

(3.2.1, P.18, Fig.10)



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wagner

Sitting in motion.

# Introduction

## 1.1 Meaning of the investigation

**Back Pain** Lumbar pain and pain in the spine are a very common complaint among the population. According to the report from the Robert Koch Institute from 2012, back pain is the number one health issue of AOK members (out of ten) with the longest period of incapacity to work, see table 1 (Raspe, 2012, P.7).

**Prevention** Table 1 illustrates the high number of days off work due to back pain. The Robert Koch report states that there is a lack of effective prevention programs for the early prevention of the occurrence of back pain (Federal health reporting), Issue 53, backache, Berlin: Robert Koch Institute, P.22). This is why working on prevention measures is very important. The construction of this office chair plays a crucial role in addition to sporting interventions. This is why WAGNER developed their Dondola® seating system.

### Cases of working incapacity

Women	447,735
Men	791,569
Total	1,239,304

### Days of incapacity to work

Women	5,460,098
Men	9,002,416
Total	14,462,514

### Days off work per case

Women	12.2
Men	11.4
Total	11.7

Table 1:  
Days off work for obligatory AOK members (excluding pensioners) due to back pain (ICD-10-GM: M54) in 2010; Source: WidO;



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Fig. 1: Office chair with the Dondola® seating system

# Introduction

## 1.2 Description of the office chair with the Dondola® seating system



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According to the manufacturer, the Dondola technique consists of two steel plates that are connected to a central location via a flexible vulcanised connection. This technology comes from the auto-mobile sector and it is therefore very robust and long-lasting. This flexible point resolves the rigid connection of the upper and lower parts of the chair thus enabling unique, three dimensional movement of the seating surface. Due to this decoupling, the three-dimensional Dondola® seating system allows micro-movements which should relieve the spine and at the same time strengthen it.

The manufacturer advertises that the Dondola® seating system optimally supports the spine, strengthens the back muscles and relieves the inter-vertebral discs. This means that the Dondola® seating system enables a large amount of movement freedom. This increases the lateral range at the desk.

# Method

## 2.1 The participants



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A total of 1,462 participants took part in the survey. Out of these 1,462 participants, 1,296 returned the questionnaire 650 women (50.2%) and 646 men (49.8), which corresponds to a return rate of 89%.

Table 2 descriptively illustrates that most men and women who participated, either had a high school diploma or a university degree. This sample therefore differs from the general population especially in terms of university education. In 2012, only around 13% of the population had a high school diploma (<http://de.wikipedia.org/wiki/Hochschulabschluss>, date of access: 13/10/2013)

Table 3 (P. 11) provides the age and anthropometric data of the participants.

Table 2

Percentage of qualifications of the participating women and men (24 missing data)

	Men 	Women 
<b>High school</b>	46 (7.1%)	42 (6.5%)
<b>Mid-level high school</b>	223 (34.5%)	295 (45.4%)
<b>High school diploma</b>	150 (23.2%)	129 (19.8%)
<b>University</b>	204 (31.6%)	162 (24.9%)
<b>Doctorat</b>	17 (2.6%)	4 (1.1%)

# Method

## 2.2 The questionnaire



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The questionnaire was developed with the agreement of Wagner by Prof. Dr Dr Grifka, Dipl.-Sport Dullien and Prof. Dr Jansen. Some questions were taken from the Oswestry Disability Index (Fairbank, & Pynsent, 2000). The questionnaire consisted of a total of 64 questions. Breakdown of questions: concerning the people (4 questions), on general health (14 questions), back history (14 questions), sport history (3 questions), sitting history (6 questions), the meaning of the office chair (12 questions), the colour and shaping (3 questions) and evaluation of WAGNER (8 questions). The questions could be answered with yes or no, or were left open to be answered with a text or using a scale provided.

Table 3  
Age and anthropometric  
data of the participants

	Men 	Women 
<b>Age (years)</b>	40.52 (SD=11.87)	38.51 (SD=12.01)
<b>Height (cm)</b>	181.46 (SD=6.94)	168.10 (SD=6.38)
<b>Weight (kg)</b>	84.28 (SD=18.92)	66.53 (SD=19.04)
<b>BMI</b>	25.52 (SD=5.44)	22.71 (SD=6.34)



## Method

### 2.3 Carrying out the study

### 2.4 Statistical evaluation



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The study was carried out between February 2012 and May 2013. It was begun upon delivery of the chair in February 2012. The first questionnaires were sent eight weeks later (April 2012) via an online survey tool. In some cases, the questionnaires were given out in paper form since not all participants had a PC with internet access. The last responses from the test subjects were gathered in May 2013.

The statistical evaluation was carried out in July and October 2013 using the statistics programme SPSS 20.0 using descriptive, and in some areas, inferential statistics. This was mainly used for the analysis of important questions such as chair comfort, development of back pain, through to whether they would recommend WAGNER.

Figure 2  
Assessment of the comfort of the chairs

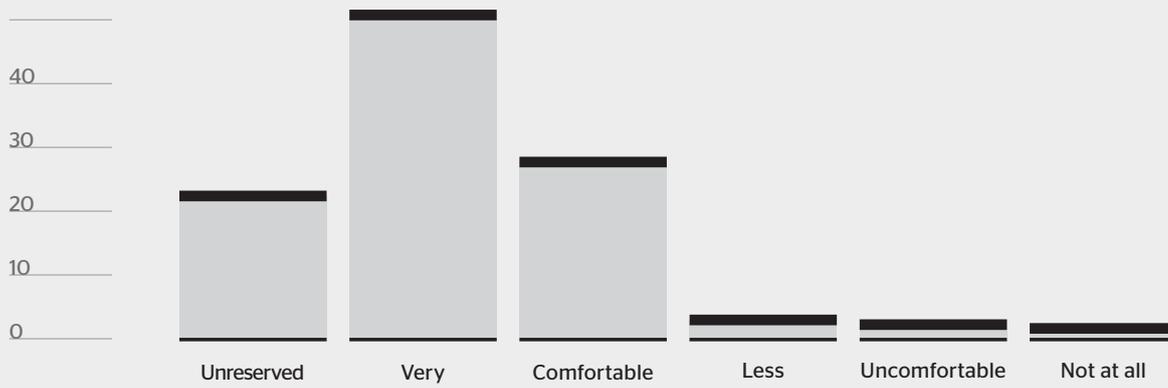


Figure 3  
Assessment of the sensation of active sitting

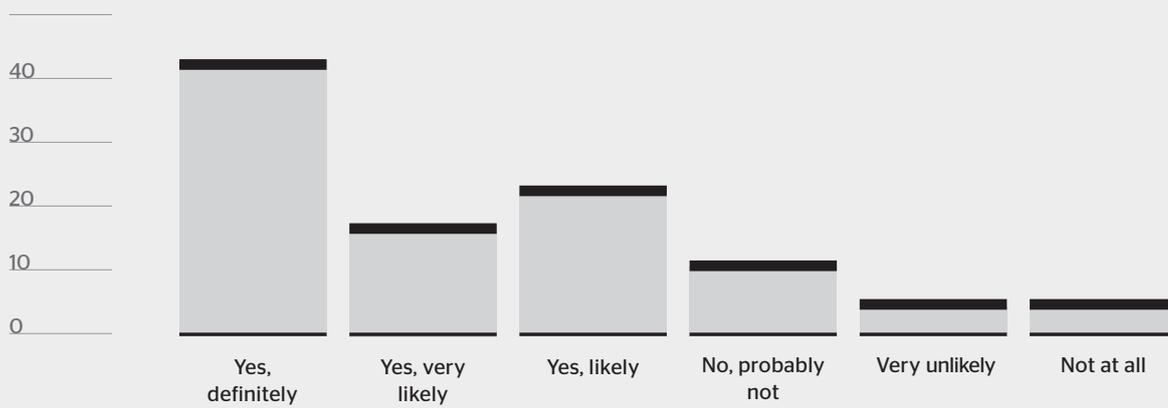


Figure 4  
Assessment of the movable seating surface

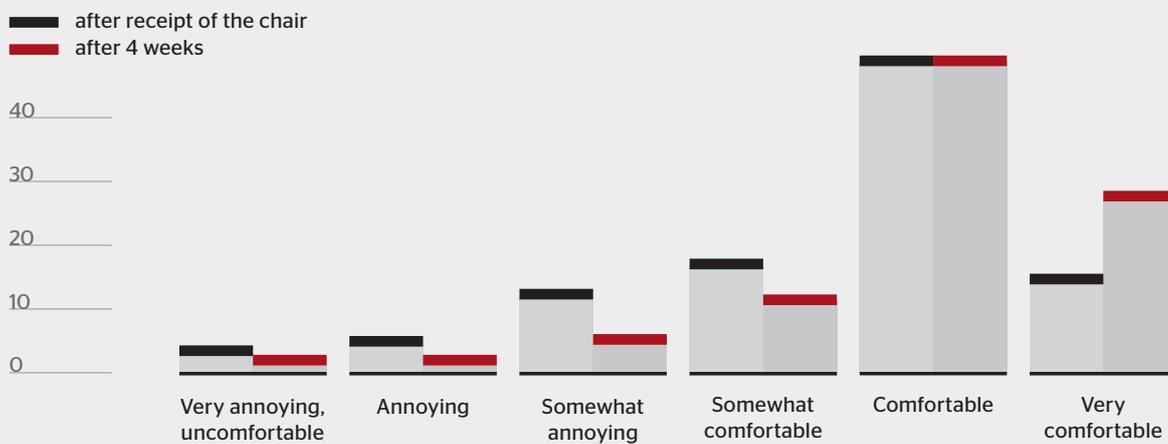
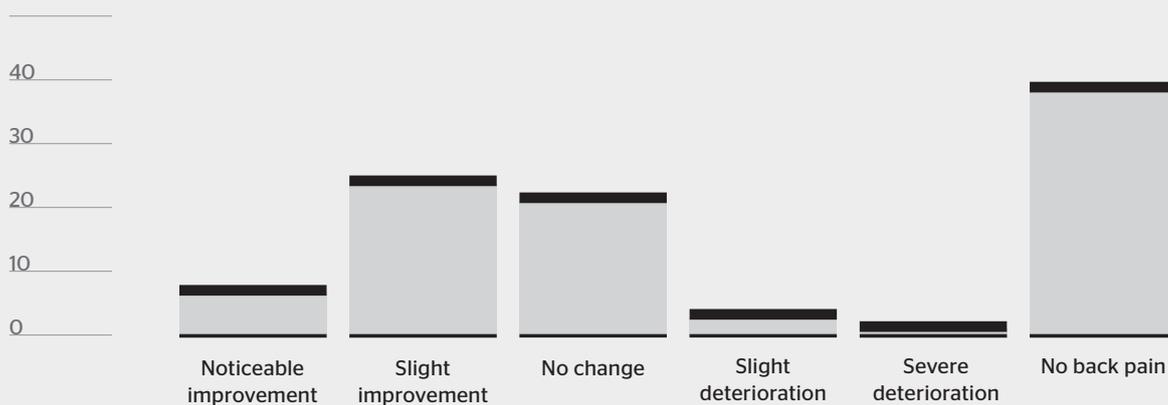


Figure 5  
Effect on back pain



# Results

## 3.1 About the participants



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**3.1.1 Sitting comfort of the chair** For the question on the comfort of the chair tested, 21.8% responded with unreservedly comfortable, 44.7% very comfortable, 28.7% comfortable, 3.4% less than comfortable, 0.9% uncomfortable and 0.5% not at all comfortable (see figure 2). This means that a total of 95.2% of the participants rated the chair as comfortable. There was a correlation between BMI of participants and their assessment rating of the chair comfort.

When asked if the participants have a sensation of sitting more actively, 41.8% responded with yes definitely, 18.8% probably, 23.5% very likely, 11.6% probably not, 1.9% very improbable, and 2.4% not at all (see figure 3).

Two further questions related to how the participants found the movable sitting surface right after purchase and after a few weeks. The following percentages resulted: very annoying (1.1%; 0.5%); annoying (2.4%; 0.6%), somewhat annoying (14.2%, 3.6%), slightly uncomfortable (19.4%; 11.4%), comfortable (46.2%; 55.2%), very comfortable (16.7%; 28.7%). Figure 4 makes it clear that the movable seating surface is rated more positively over time.

For the question relating to how the Dondola® systems influenced their back pain: 32.6% said they noticed an improvement, 23.2% noticed no difference and 1.6% said the situation worsened. 32.6% said they did not have back pain. The following picture details this (see figure 5).

Figure 6  
Level of satisfaction  
with the chair

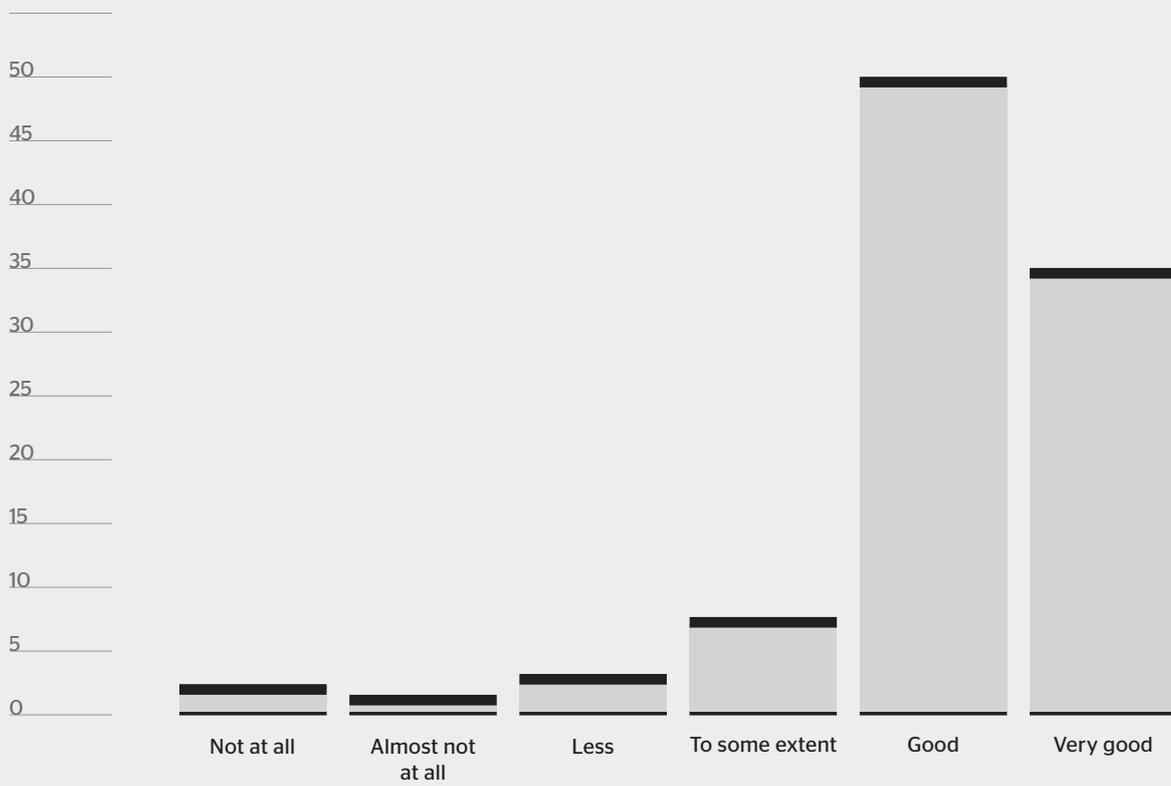
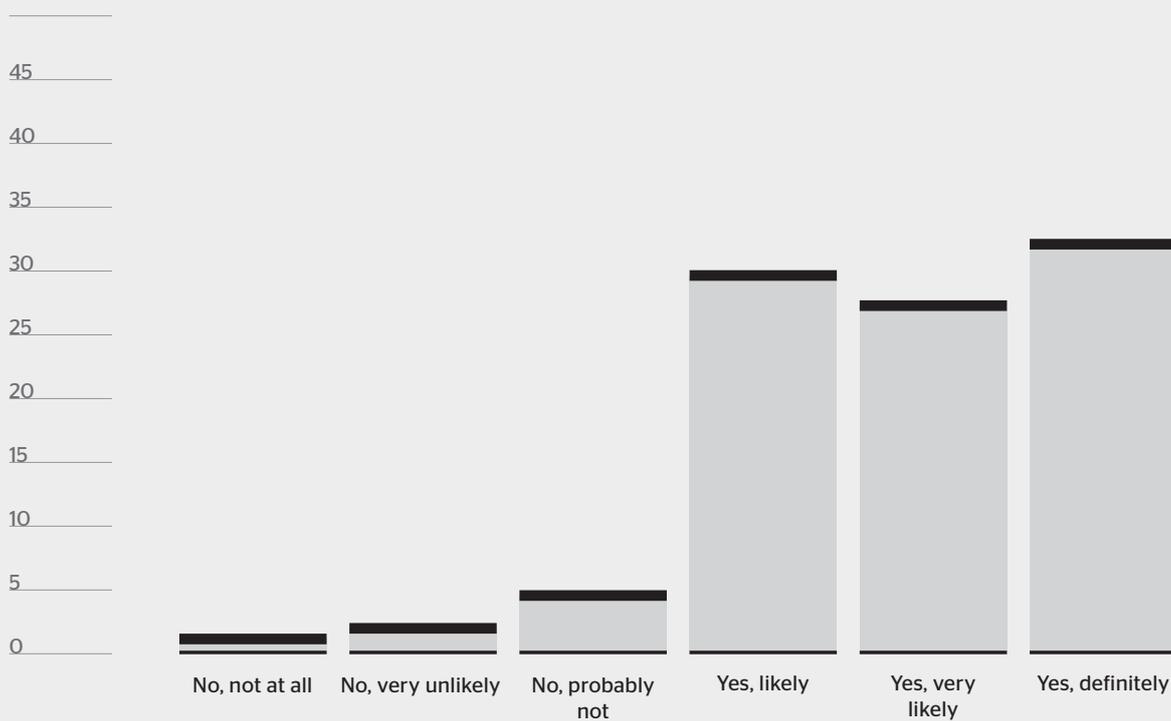


Figure 7  
Recommending  
WAGNER.



# Results

## 3.1 About the participants



Dondola®

**3.1.2 Level of satisfaction** 95.4% of the participants said they were happy with the chair. For details, see figure 6.

For the question of whether they would buy one for home, 64.6% responded with yes and 35.5% with no. There were two main reasons for not wanting to buy the chair: 1st There is no need since I do not spend much time at my desk, 2nd Buying the chair would cost too much. For the question of whether they would recommend WAGNER to others, 94.1% of the participants said yes. You can see a detailed list in figure 7.

Figure 8  
Chair comfort

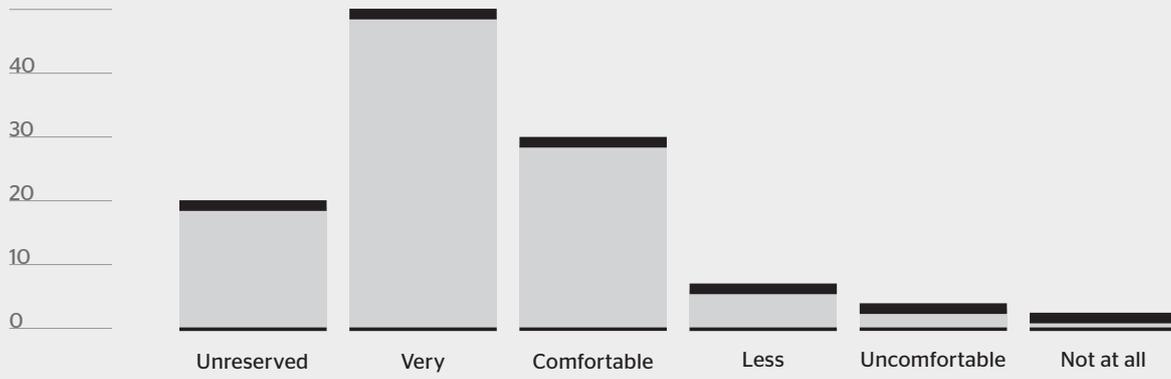


Figure 9  
Assessment of the movable seating surface

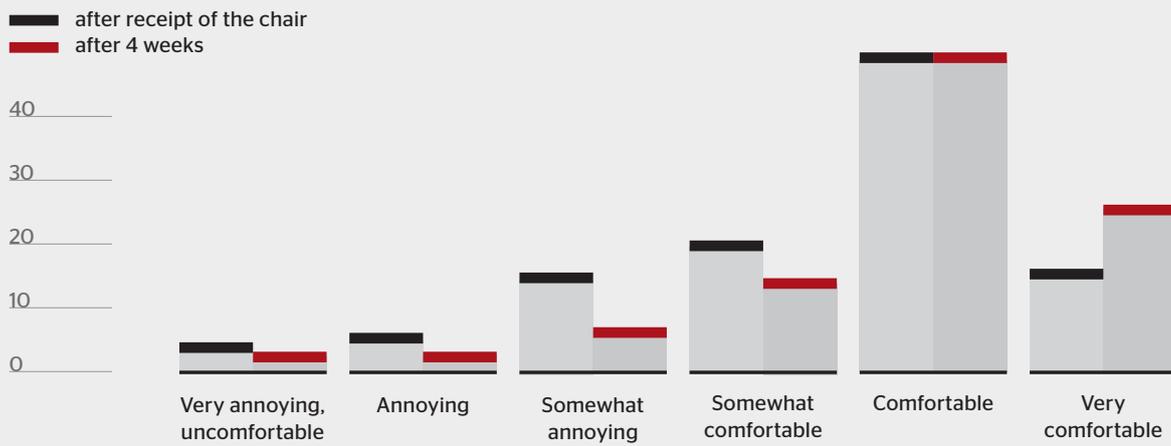


Figure 10  
Improvement to back pain

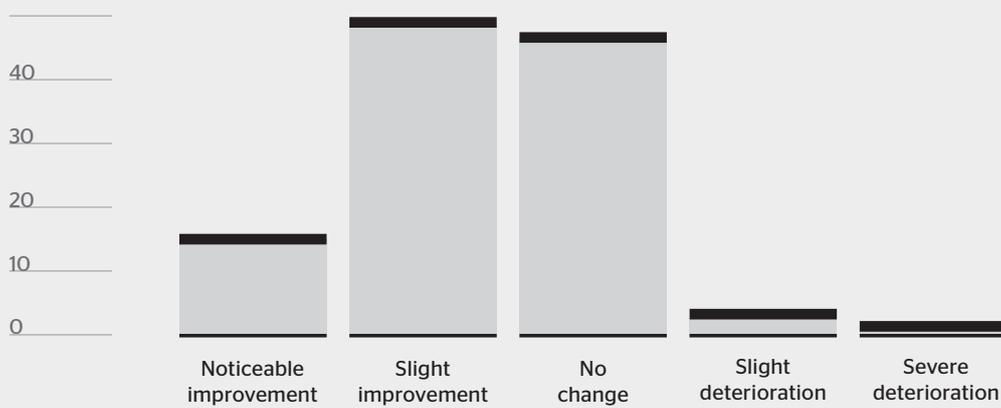
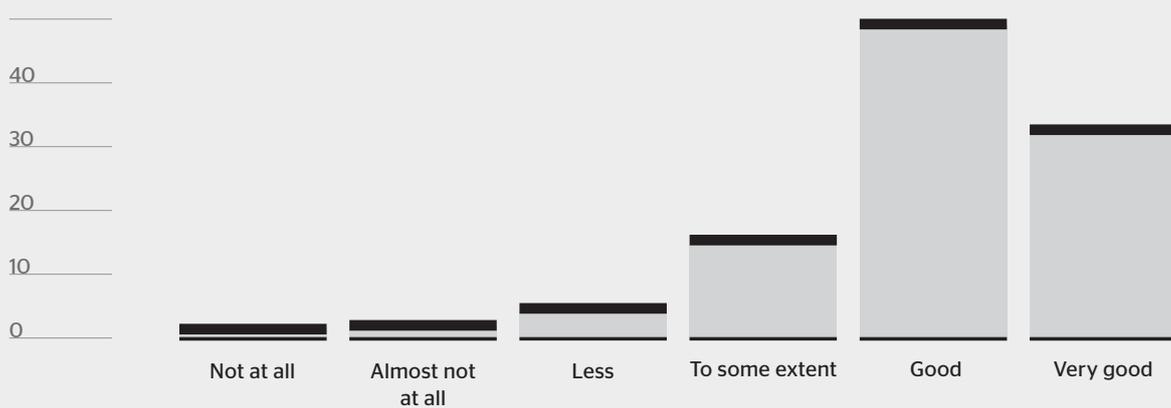


Figure 11  
Level of satisfaction with the chair



# Results

## 3.2 Evaluation by the participants with back pain

This evaluation excludes all participants who responded to question 39 saying that they have no back pain.

**3.2.1 Sitting comfort of the chair** For the question on the comfort of the chair tested, 19.2% responded with unreservedly comfortable, 43.8% very comfortable, 31.1% comfortable, 4.2% less than comfortable, 1.3% uncomfortable and 0.5% not at all comfortable (see figure 8). This means that a total of 94.1% of the participants rated the chair as comfortable.

The analysis of both questions on seating comfort right after receiving the chair and four weeks later gave the following results: very annoying (0.9%; 0.1%); annoying (2.6%; 0.7%), somewhat annoying (15.6%, 3.9%), somewhat comfortable (21.2%; 13%), comfortable (43.8%; 54%), very comfortable (15.3%; 27.2%). Figure 9 makes it clear that the movable seating surface is rated more positively over time.

For the question on how the WAGNER chair affected their back pain, 422 participants said they noticed a difference, 301 saw no difference and 22 noticed a deterioration (for a detailed view, see figure 10 and compare with figure 7).

**3.2.2 Level of satisfaction** 96.5% of the participants said they were happy with the chair. For full details, see figure 11.

Table 4

Gender-specific differences between the evaluation of the tested chair

Item	Men 	Women 	Scale
Level of satisfaction	5.22	5.22	1 = not at all 6 = very well
Comfort	2.18	2.19	1 = Unreservedly comfortable 6 = Not comfortable at all
Effect on back pain	2.32	2.33	1 = Great improvement 6 = Great deterioration
Got on well with the seating surface straight after receiving chair	4.58	4.56	1 = Very annoying 6 = Very comfortable
Got on well with the seating surface after a few weeks	5.04	5.09	1 = Very annoying 6 = Very comfortable
Buying for home	64.7%	61.4%	Yes

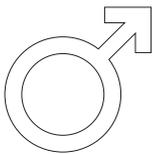
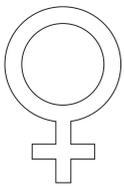
Table 5

Gender-specific differences between the evaluation of the tested chair

Item	Men 	Women 	Scale
Seat colour	1.91	1.90	1 = Very good 6 = Unsatisfactory
Agreement with the colour	1.94	1.85	1 = Very good 6 = Unsatisfactory
Effect of the colour	1.91	1.90	1 = Very good 6 = Unsatisfactory
Seating surface shape	1.88	1.78	1 = Very good 6 = Unsatisfactory
Design combination	1.95	1.85	1 = Very good 6 = Unsatisfactory
Effect of the shape	1.92	1.81	1 = Very good 6 = Unsatisfactory

# Results

## 3.3 Gender-specific evaluation



The mean values of the responses were calculated in order to check whether there are differences between the sexes in different variables. The following tables (table 4 and table 5) provide an overview.

Calculation with the chi-square test showed none of the items have a significant gender difference; four items showed a tendency for possible gender effects, but not all of them were significantly demonstrated.

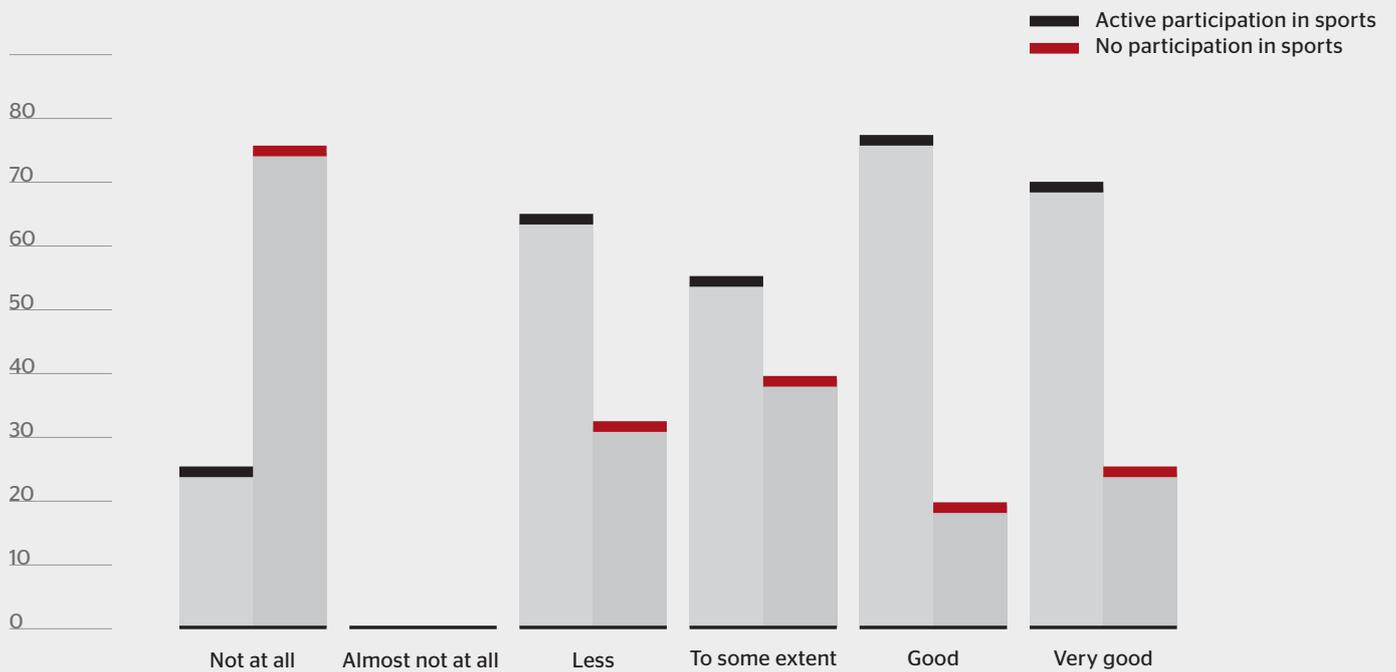
Table 6

Division of the participants according to sport activity by age group

Age group	Age	Takes part in sports	Does not take part in sports
1	Up to 30 years	77.4%	21.3%
2	Up to 40 years	73.9%	24.7%
3	Up to 50 years	61.5%	36.0%
4	Up to 60 years	69.6%	29.4%
5	Up to 70 years	60.4%	37.5%

Figure 12

Correlation between satisfaction and sport activity for the participants between 30 and 39 years old



# Results

## 3.4 Consideration of the factor of sport activity



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Each age group was evaluated for the correlation between the answers to the question on sport activity and satisfaction with the Dondola® office chair calculated using the Chi square test. Table 6 gives an overview of the share of those who take part in sport vs those who do not by age group.

There were only significant values in the participant age group of between 30 and 40 years: Age group 1:  $p=.359$ ; age group 2:  $p=.020$ ; age group 3:  $p=.317$ ; age group 4:  $p=.197$  and age group 5:  $p=.344$ . The significant correlation in the age group of 30 to 40 years is shown in figure 12. The figure shows that there is a high level of certainty that there is a correlation between sport activity and evaluation of level of satisfaction.



# Discussion and Outlook

The results of this survey study show that the three-dimensional Dondola® seating system is positively evaluated by participants. Over 95% of the participants found the chair to be comfortable and said they were satisfied. This also shows that if you analyse only the participant data provided on having back pain, the level of satisfaction with the chair is more than 96%. In general, it is reflected in the assessment of the chair that there is a similar picture for all participants who have indicated that they have had back pain.

It also shows that the moveable seating surface is found to be more comfortable after four weeks (95.3% of participants) than directly after receiving the chair (82.3% of participants). This means that users need to become accustomed to it, that said, a level of satisfaction of 80% straight after receiving the chair is already very high. In addition, more than 30% of participants said they noticed an improvement in their back pain. These positive findings show that more than 95% of participants are satisfied with the Dondola® seating system. However, this does not necessarily mean that they will buy the chair for personal use since they are not at their desk often enough or the relatively high price of the chair is off putting.

An evaluation based on gender and sport activity does not show any decisive results. It can be generally said that a positive evaluation of the chair is not dependent on gender. Sport activity seems to only be relevant in participants between 30-40 years old. In this case, tho-

se who take part in sports are more satisfied with the chair than those who do not. It is difficult to ascertain why this effect is only visible in this age group and it is not noticeable upon first glance.

A few further factors must be considered alongside the positive evaluation of the chair. First of all it is a pre-experimental scientific study since only one chair system was evaluated. A control group is lacking in the form of another possible chair system. Only once compared with another chair system can statements be made in which regard the participants are satisfied with which chair system. Additionally, the sample group of participants has a higher level of education than the general population. Therefore, the results of the study cannot necessarily be generalised for all citizens. However, it can be seen that the sample group is only a sample of the general population who would consider using this particular chair.





# Summary

## Literature

Fairbank, J.C.T., & Pynsent, P.B. (2000)

The Oswestry Disability Index. Spine, 25, 2940-2953

Raspe, H. (2012)

Federal health reporting, Book 53, Back Pain  
Berlin: Robert-Koch Institute.

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This study deals with the evaluation of a Dondola® seating system from WAGNER. The questionnaires were answered by 1,296 participants and evaluated. The results of the study are very positive: More than 95% of the participants rated the chair as comfortable and were satisfied with its characteristics, irrespective of whether they suffer from back pain or not. These results are not dependent on gender.



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