



FORCE 118-26936

RESULTS

Field Trial at Toyota using Back App Equipment Baseline & 6 weeks follow up surveys

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A	Af rapportering af resultater fra 2 runder surveys	Afd. Anvendt Psykologi	JEBS		Maj 2019
Rev.	Description	By	Checked	Approved	Date
Keywords: Field Trial, Back App Equipment, Lower back pain, experiences from usage				Classification: <input checked="" type="checkbox"/> Open <input type="checkbox"/> Internal <input type="checkbox"/> Confidential	

Field Trial with employees at Toyota Danmark, using Back App Equipment

The data presented here stems from a field trial at Toyota consisting of 2 surveys, one prior to the use of Back App 2.0 and Back App 360, and one follow up surveys (after 6 weeks).

When reading this presentation, it is highly recommendable to have a copy of the questionnaires at hand. Due to the nature of the survey design, some questions did vary in their formulations across the baseline and follow up surveys.

All participant's responses to all questions will be presented here, and it is important to demonstrate caution on the interpretation of the results and possible trends spotted. The limitations in interpretations are presented at the relevant tables below, but throughout this field trial no control group has been part of the investigation, clearly making it difficult to identify a full picture of influencing variables (confounders) on the response patterns seen. It is quite possible that other factors than the use of Back App equipment are causing the trends presented here.

Background data

The field trial included 25 employees, all having completed the BASELINE and the 6 weeks FOLLOW UP questionnaire.

About the participant's gender:

	No. of participants	Percent
Female	11	44,0
Male	14	56,0
Other	0	0,0
Total	25	100,0

The average age is 46,4 years, the youngest being 25 years and the oldest 62 years.

Almost 70% of the participants indicate their height as being between 160 cm and 182 cm:

	No. of participants	Percent
Lower than 160 cm	0	0,0
Between 160 and 182 cm	17	68,0
Taller than 182 cm	8	32,0
Total	25	100,0

Almost participants indicate their weight as being between 50 and 125 kg:

	No. of participants	Percent
Less than 50 kg	0	0,0
Between 50 and 125 kg	25	100,0
More than 125 kg	0	0,0
Total	25	100,0

Which type of chair did people use prior to the field trial?

At the baseline measure, we asked people the following question:

What type of chair have you been using before the upcoming Back App test period?

One choice only.

- Standard office chair with back rest
- Standard office chair with back rest and arm rest
- Elevated office stool with foot ring
- Perching stool

Other (please specify)

The responses are shown in the following table:

	No. of participants	Percent
Standard office chair with back rest	20	80,0
Standard office chair with back and arm rest	5	20,0
Elevated office stool with foot ring	0	0,0
Perching Stool	0	0,0
Total	25	100,0

How do participants rate their old chair?

We also asked them to rate their old chair:

How would you rate your current chair?

Very comfortable, good Quite comfortable Comfortable, fair Quite uncomfortable Very uncomfortable, poor

○ ○ ○ ○ ○

Other (please specify)

The responses were:

	No. of participants	Percent
Very comfortable, good	1	4,0
Quite comfortable	13	52,0
Comfortable, fair	9	36,0
Quite uncomfortable	2	8,0
Very uncomfortable, poor	0	0,0
Total	25	100,0

Note that **2 people** rate their chair as “**quite uncomfortable**”. Using a chair with that experience for many hours every day should raise concern.

How many hours do you **sit** during a normal work day?

This question varied slightly from baseline to the follow up.

Please refer to the questionnaire printouts for inspection of the questions asked.

Think of a normal/average work day:

How many hours per day are you **SITTING** at your computer work station?



	No. of participants BASELINE	Percent	No. of participants 6 weeks follow up	Percent
0-2 hours	0	0,0	3	12,0
2-4 hours	5	20,0	10	40,0
4-6 hours	10	40,0	9	36,0
More than 6 hours	10	40,0	3	12,0
Total	25	100,0	25	100,0

The pattern seen at BASELINE changed in **a significant way**, which means that participants at the 6-weeks follow up indicate to spend **fewer hours sitting** at their workstation when using Back App 2.0 compared to using their old chair. *Wilcoxon signed rank test: $Z=-2,77$ $p < 0,05$ ($p = 0,006$).* However, a cautious interpretation is needed: The formulation of the question at the 6-weeks follow up leaves room for a different interpretation. Participants might have answered the question believing they were required to indicate how many hours they are sitting on the Back App 2.0 only. Maybe they still have their old chair nearby and sometimes use this as their preferred device at the work station. Hours spend on the old chair are not included, which might bring the total hours spend sitting to a higher level than revealed through this question.

How many hours do you **stand** during a normal work day?

This question varied slightly from baseline to the follow up.

Please refer to the questionnaire printouts for inspection of the questions asked.

Think of a normal/average work day:

How many hours per day are you **STANDING** at your computer workstation?

0-1 hour

1-2 hours

2-3 hours

3-4 hours

More than 4 hours



	No. of participants BASELINE	Percent	No. of participants 6 weeks follow up	Percent
0-1 hour	19	76,0	17	68,0
1-2 hours	4	16,0	4	16,0
2-3 hours	2	8,0	2	8,0
3-4 hours	0	0,0	2	8,0
More than 4 hours	0	0,0	0	0,0
Total	25	100,0	25	100,0

In this case, the pattern seen at BASELINE did not change in any significant way, which means that participants at the 6-weeks follow up indicate to spend the same number of hours standing at their workstation when having Back App 360 at their disposal. *Wilcoxon signed rank test: $Z = -1,1, p > 0,05$ ($p = 0,27$)*. The trend in responses might very well reflect that participants indicate the hours spend on the Back App 360, not including hours spend standing directly on the floor. Since the formulation of this question at the follow up leaves room for different interpretations, the total hours spend standing might be higher than revealed through the table above.

How **often** have you experienced pain in the upper body?

This question varied slightly from baseline to the follow up.

Please refer to the questionnaire printouts for inspection of the questions asked.

How often have you experienced pain in either the

- back
- shoulder(s)
- neck
- head
- arm(s) or
- hand(s)

at work during the past 6 months?

Never, almost never Once a week 2-3 days a week Almost every day



	No. of participants BASELINE	Percent	No. of participants 6 weeks follow up	Percent
Never, almost never	7	28,0	13	52,0
Once a week	6	24,0	6	24,0
2-3 days a week	9	36,0	2	8,0
Almost every day	3	12,0	4	16,0
Total	25	100,0	25	100,0

To check for the trend of participants experiencing pain in various areas less frequently when using Back App for 6 weeks, we have used the Wilcoxon Signed Ranks Test, but find no statistically significant change. *The Wilcoxon signed ranks test: $Z=-1,56$, $p>0,05$ ($p=0,12$).*

However, it seems like there is a trend: 13 people indicate to experience pain “never, almost never” in the upper body when using Back App for 6 weeks, compared to the use of ordinary office chairs. This number was only 7 at baseline.

At Baseline we ask people to think back 6 months and this might have an influence on the accuracy of the given responses since it is harder to remember the “history of pain” through 6 months without reminders along the way, rather than through 6 weeks, where attention for each participant is more focused on bodily pain, due to the participation in the field trial. Also, this field trial does not involve a control group, leaving room for uncertainty in the interpretation of where the less frequently experienced pain stems from (e.g. organizational changes, other work environment changes).

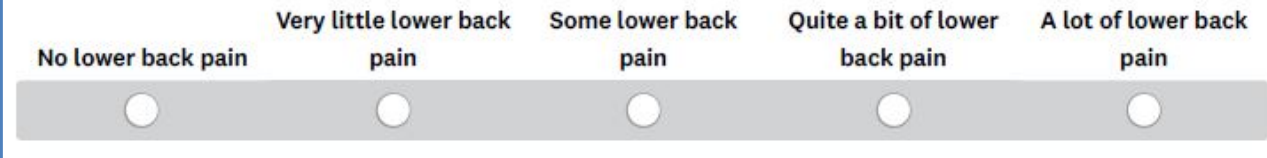
In other comparable field trials we have seen a significant trend regarding this question. We suspect that the limited number of participants in the present study makes it difficult to spot significant differences between the baseline and the follow up measure, unless the differences are very large. It seems they are not in this case.

The experienced level of lower back pain

This question varied slightly from baseline to the follow up.

Please refer to the questionnaire printouts for inspection of the questions asked.

Do you experience lower back pain during a normal work week?



Note that this question (at BASELINE) aims to the level of experienced pain in the lower back in general, and not with reference to the “past 6 months”. The responses were:

	No. of participants BASELINE	Percent	No. of participants 6 weeks follow up	Percent
No lower back pain	8	32,0	9	36,0
Very little lower back pain	10	40,0	10	40,0
Some lower back pain	6	24,0	4	16,0
Quite a bit of lower back pain	1	4,0	1	4,0
A lot of lower back pain	0	0,0	1	4,0
Total	25	100,0	25	100,0

To check for the trend of participants experiencing pain in the lower back less frequently when using Back App for 6 weeks, we have used the Wilcoxon Signed Ranks Test.

The Wilcoxon signed ranks test: $Z = 0,0$, $p > 0,05$ ($p = 1,0$).

This is not a statistically significant result, indicating no change in the level of pain experienced in the lower back when using Back App for 6 weeks, compared to the use of ordinary office chairs.

A significant reduction in the number of painful areas on the body

Baseline:

Which of the following have you experienced during a normal work week that included pain? Multiple choices allowed.

<input checked="" type="checkbox"/> Lower back pain/stiffness	—————>	1 point
<input type="checkbox"/> Shoulder and neck pain/stiffness		
<input checked="" type="checkbox"/> Headaches during or after work	—————>	1 point
<input checked="" type="checkbox"/> Arm and/or hand pain	—————>	1 point
<input type="checkbox"/> None of the above		
<input type="checkbox"/> Other (please specify)		

Total: 3 point

In this question participants can check several boxes to indicate the number of (and which) painful areas on the upper body. In the example above a participant has indicated three areas, which translates into a “pain score” of three. Thus, it is possible for a participant to achieve a pain score of 0 (zero) through 4. Reviewing the comments made in the “other”-category could of course qualify for an extra point, making it possible to obtain a pain score of 5 as a maximum.

The same question during the 6 weeks follow up looked like this:

This question regards the period you have been using Back App 2.0 and Back App 360.

Which of the following have you experienced during a normal work week that included pain? Multiple choices allowed.

- Lower back pain/stiffness
- Shoulder and neck pain/stiffness
- Headaches during or after work
- Arm and/or hand pain
- None of the above
- Other (please specify)

1 point

Total: 1 point

As was the case with the Baseline questionnaire, participants could make use of several check boxes in the follow up. The example above shows one participant's follow-up pain score of 1.

The points achieved were:

	No. of participants BASELINE	Percent	No. of participants 6 weeks follow up	Percent
Pain score = 0	4	16,0	9	36,0
Pain score = 1	8	32,0	11	44,0
Pain score = 2	11	44,0	4	16,0
Pain score = 3	2	8,0	1	4,0
Pain score = 4	0	0,0	0	0,0
Pain score = 5	0	0,0	0	0,0
Total	25	100,0	25	100,0

At baseline only 4 participants indicated to be without any pain (Pain score = 0) in the upper body during a normal week. At the 6-weeks follow up, this has changed to 9 participants.

The trend clearly seems to be that participants indicate a lower **number** of painful areas both in the follow up, which is also confirmed in the statistical calculations:

Pain Scores: Higher, lower or unchanged at the 6 weeks follow up?

	N	Mean Rank	Sum of Ranks
Pain Score_6 weeks vs Negative Ranks	13 ^a	7,81	101,50
Pain Score_Baseline Positive Ranks	2 ^b	9,25	18,50
Ties	10 ^c		
Total	25		

- a. Pain Score_6 weeks < Pain Score_Baseline
- b. Pain Score_6 weeks > Pain Score_Baseline
- c. Pain Score_6 weeks = Pain Score_Baseline

Wilcoxon signed ranks test: $Z=-2,5$, $p<0,05$ ($p=0,014$).

As shown the “negative ranks” = 13, which means that 13 participants experience pain in a **fewer** number of upper body areas after using Back App for 6 weeks compared to their experienced number of painful areas prior to the use of Back App equipment. 10 participants experience no difference and 2 participants a higher number of painful areas. The tables tell us nothing about the ‘amount’ or strength of pain experienced. However, this is a **statistically significant** result (as opposed to a random pattern) and strongly indicates, that half of the participants (approx. 50%, 13 out of 25) tend to experience pain in fewer areas of the upper body when using Back App for 6 weeks, compared to the use of ordinary office chairs.

Since this field trial did not include a control group, caution must be taken when trying to conclude on the causes of the reduction in pain score. We cannot know for sure, whether other factors have contributed to the effect registered (confounding variables). The lower number of painful areas could stem from many other variables, i.e. we do not know what else has happened in the company in question here.

Overview of painful areas indicated

- Q13 at Baseline and Q11 at 6 weeks unfolded

Adding insight to the analysis we have looked at the distribution of painful areas indicated by the participants:

	No. of participants BASELINE	Percent of 25 participants	No. of participants 6 weeks follow up	Percent of 25 participants
Shoulder and neck pain/stiffness	13	52,0	7	28,0
Headaches during or after work	6	24,0	3	12,0
Lower back pain/stiffness	11	44,0	11	44,0
Arm and/or hand pain	4	16,0	0	0,0
None of the above (pain score = 0)	4	16,0	8	32,0

Please note: The sum in each column does not add up to 100 %, since each participant were allowed to select multiple areas on their body.

The management of pain

This question varied slightly from baseline to the follow up.
Please refer to the questionnaire printouts for inspection of the questions asked.

**If you experience pain during a normal work week:
How often do you eat "pain killers" to reduce this pain?**

Never, almost never 1-2 days during the week 3-4 days during the week 5-6 days during the week All week Not relevant to me

Responses to this were:

	No. of participants BASELINE	Percent	No. of participants 6 weeks follow up	Percent
Not relevant to me	1	4,0	2	8,0
Never, almost never	21	84,0	18	72,0
1-2 days during the week	3	12,0	2	8,0
3-4 days during the week	0	0,0	1	4,0
5-6 days during the week	0	0,0	1	4,0
All week	0	0,0	1	4,0
Total	25	100,0	25	100,0

Note that the category "Not relevant to me" is included, so that participants not experiencing any pain or not wanting to answer the question, can give a meaningful answer to this question as well.


There is no significant change in the frequency of pain management among the participants.

How often do you feel tired?

This question varied slightly from baseline to the follow up.
Please refer to the questionnaire printouts for inspection of the questions asked.

How often do you feel tired at the end of a normal work day?

Frequently/every day Quite often Every now and then Infrequently Never



	No. of participants BASELINE	Percent	No. of participants 6 weeks follow up	Percent
Never	0	0,0	0	0,0
Infrequently	10	40,0	7	28,0
Every now and then	11	44,0	16	64,0
Quite often	4	16,0	2	8,0
Frequently/every day	0	0,0	0	0,0
Total	25	100,0	25	100,0

Wilcoxon Signed Ranks Test: $Z = -0,18$; $p = 0,86$

Analyzing the data reveals no statistically significant reduction in the frequency with which participants feel tired after a normal work day.

Rating the ability to work

This question varied slightly from baseline to the follow up.
Please refer to the questionnaire printouts for inspection of the questions asked.

This question regards the period you have been using Back App 2.0 and Back App 360.

During a normal week:

How would you grade your ability to work?

Low
 Somewhat low
 Moderate
 Somewhat high
 High

The response pattern from the surveys:

	No. of participants BASELINE	Percent	No. of participants 6 weeks follow up	Percent
Low	0	0,0	0	0,0
Somewhat low	0	0,0	0	0,0
Moderate	2	8,0	5	20,0
Somewhat high	16	64,0	12	48,0
High	7	28,0	8	32,0
Total	25	100,0	25	100,0

No statistically significant trends were found here. Participants experience an **unaffected ability to work** during the field trial.

Would you like to replace your regular chair to a Back App 2.0?

Would you like to replace your regular office chair with Back App 2.0 and Back App 360?

Yes

No

For obvious reasons this question was not asked in the baseline survey, but at the follow up only. The response pattern looks like this:

	No. of participants 6 weeks follow up	Percent
Yes	20	80,0
No	5	20,0
Total	25	100,0

Which after 6 weeks is as many as 80 %.

Of course, the responses given should be seen in the light of "who is paying". The respondents here are not paying for a chair out of their own pocket. Maybe the response pattern would be different if they were to pay themselves.

Yes or no - elaborations

Please help us understand why you selected the answer above:
(why yes or why no)

On the following pages we have divided the statements into those stemming from yes or no indications, respectively. Note that all statements (typos included) are the originals.

Please, also be aware that even though all statements are numbered, it is not possible to view equally numbered lines of statements as stemming from the same person.

The statements shown are merely included to give a flavor of the thoughts and reflections from the pro- and con-users of Back App equipment.

Yes – I would like to replace my regular chair to Back App 2.0

1. Back App 2.0 sørger for jeg ikke synker ned i den normale stol jeg bruger. Men jeg vil rigtig gerne bibeholde den gamle stol også, da den i nogle tilfælde kan være bedre.
2. Back App har hjulpet mig til at aktivere muskler i lænden som ofte ikke blev styrket i en travl hverdag
3. Behagelig at sidde på & færre smerter
4. Behagelig at sidde på, samt troen på at det giver en bedre holdning
5. Den er supergod at sidde på, jeg kan mærke forskel på styrken på muskler i mave / ryg
6. Den gir mere energi og man sidder godt på den
7. Den har gjort underværker. Min ryg og hofte har det exceptionelt bedre.
8. Det hjælper til en bedre holdning i ryggen og jeg tænker meget mere over min kropsholdning når jeg aktivt vælger mellem om jeg enten sidder på Back App 2.0 eller står på Back App 360, istedet for bare at dumpe ned i den samme kontorstol hver dag.
9. Får meget mindre ondt i ryg og lænd
10. God sidde- og stå- komfort.
11. ja, men dog stadig ikke på fuld tid, da jeg syntes den er besværlig at komme op på, og syntes det er rart at have en stol at skifte med
12. Jeg arbejder i en bedre sidde stilling. Selvom jeg nu kan sidde med benene over kors, så sidder jeg væsentlig mindre med benene over kors i forhold til en alm kontorstol.
13. Jeg er lidt uafklaret. Begyndte at få ondt i nakke/skuldre efter 2-3 uger med Backapp. Men tænker at det skyldes forkert justering. Men har ikke kunnet finde tilbage til den oprindelige (gode) justering. Alt i alt oplever jeg derfor ikke nogen nævneværdig forskel i fht. min nuværende stol.
14. Jeg kan mærke at stolen er god for min krop og generelle velvære.
15. Jeg sidder mere "vågen"
16. jeg synes at det var ok at sidde på stolen men har haft brug for at bruge min egen stol en gang imellem der jeg fik smertet i lænden nogle gang og har aldrig har haft det før
17. Jeg vil helst have en kombination at en almindelig stol og Back App 2.0, da jeg oplever at vælte fremad på Back App når jeg bliver træt i ryggen. Back App 360 har jeg ikke brug meget, da jeg ikke synes den er fantastisk.
18. Når først man har vænnet sig til den, er den god at sidde på.

19. Oplever at det hjælper på lændesmerter og min holdning
20. større fleksibilitet i siddemåder

No – I would not replace my regular chair to Back App 2.0

1. Det kræver mere tilvending at bruge den som permanent kontorstol.
2. Jeg har været glad for Backapp 360 ståpladen, men måtte hurtigst stoppe med stolen, da gamle lændesmerter kom tilbage for fuld styrke
3. Jeg mangler støtte i lænden og jeg bryder mig ikke om at sidde med så spredte ben
4. Synes ikke jeg har haft det forventet udbytte af at sidde på Back App 2.0. Har endnu ikke funde den for mig rigtige sidde position
5. Vil gerne kunne skifte mellem Back App og en normal kontorstol.

Please tell us about your experience with Back App 2.0/360

Please tell us about your experience with Back App 2.0 and Back App 360 so far:



Again, it makes sense to divide the responses between those in favor of switching chairs and those not keen on the idea.

Yes – (elaborations on the general experience with Back App)

1. Behagelig at sidde på
2. De første 2 uger var temmelig hårde for mellemkøddet og lænden, men herefter har det været en drøm at arbejde ved skrivebordet
3. Den er rigtig god og jeg sidder sjældent på en rigtig stol. Enten står jeg op ellers bruger jeg App 2,0
4. Den tvinger Å"n til at sidde mere ret.
5. Det har været en god oplevelse med en let tilvænning
6. Det har været fantastisk. Meget mere fleksibilitet. Bedre holdning. Husker at stå meget mere op.
7. God sidde- og stå- komfort.
8. gode erfaringer
9. Hårdt at starte op - det kræver tilvænning. Men det fungerer rigtig godt nu.
10. Har mest brugt stolen og ikke 360.
11. I starten havde jeg øget smerter I lænd og skuldre, men det blev reduceret over tid. Kunne godt have brugt en mere detaljeret indtroduktion til korrekt brug af stol.

12. Jeg er lidt uafklaret. Begyndte at få ondt i nakke/skuldre efter 2-3 uger med Backapp. Men tænker at det skyldes forkert justering. Men har ikke kunnet finde tilbage til den oprindelige (gode) justering. Alt i alt oplever jeg derfor ikke nogen nævneværdig forskel i fht. min nuværende stol.
13. Jeg har brugt Back App en del - dog ikke i et par uger midt i forløbet, da vi havde meget travlt og det var nemmere at tage den almindelige kontorstol. Men jeg har generet været glad for den. Back App 360 har jeg ikke brugt så meget.
14. Jeg kan mærke en stor forbedring når jeg laver "planken", eller armstræk ifm. med opvarmning, uden at have ændret på min træning.
15. Jeg synes stolen er glimrende. Brættet glemmer jeg at bruge. men jeg starter altid morgenen og efter frokost med at stå.
16. Jeg var desværre ude af huset den dag udstyret blev demonstreret, men kunne heldigvis få informationen overleveret fra gode kollegaer. Jeg er generelt set meget glad for grej, så det passer mig fint at der er lidt man kan skrue på og dimse ved for at indstille det til mine personlige præferencer.
17. lidt svær tilvænning, med lidt smerter i lænd og nakke, syntes den kan være svære at komme op på.
18. Min erfaring er at jeg strækker ryggen mere. Men jeg har dog være for dårlig til at få stået op på brættet.
19. Skulle lige vænne mig til det. Men nu kan jeg ikke undvære den.

No – (elaborations on the general experience with Back App)

1. Fik desværre ikke en rigtig introduction til produktet, så det kan være årsagen til at jeg ikke har fundet mig godt til rette med bruge af den
2. Generelt positive erfaringer. Jeg mærker tydeligt hvordan "core" bliver trænet.
3. God stol der der hjælper til korrekt siddeposition.
4. Jeg fik hurtigt ondt i lænden og manglede min lændestøtte på min normale kontorstol. Den passer ikke til mig
5. Jeg har været glad for Backapp 360, men måtte hurtigt stoppe med stolen, da gamle lændesmerter kom tilbage for fuld styrke

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May 2019.