Time to get up: the hidden benefits of standing desks

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Talk Five: Annabelle Cournoyer, Crystal Li, Anne Tan, Jessica Zhang, Zachary Lai

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Executive Summary

To improve work experience for UBC staff, we are interested in the benefits the usage of sit-standing desks can bring in terms of productivity, comfort and health level. The study uses a survey to measure self-reported comfort, productivity, and health of participants. The result of the survey suggested that people who have used sit-standing desks in the last three months have a higher level of comfort level compared to those who have not, but no difference was found for health and productivity. For participants in the sitting desk group, we would like to address the question of whether they will use sit-standing desks if made available. The results suggest that participants are more willing to use sit-standing desks if they are available in their office instead of shared areas. The study suggests that sit-standing desks benefit the comfort of UBC employees, that the main reason for not using one concerns convenience factors associated with shared access, and that an overwhelming majority of those who do not have access to one would like to.

Research question and hypothesis

In 2016, University of British Columbia had a significant increase with its staff and faculty members. According to the UBC facts and figures, there are 1400 staff and members in Vancouver campus and 1000 in the Okanagan campus (UBC communication & Marketing, 2016). Sit-standing desks has been imported in UBC to target office workers who have physical injuries or comfort issues in order to perform their work tasks more easily. This raises the idea of adding sit-standing desks for all office employees to improve their productivity, comfort and health level to maximize one's well being while in their work environment. Although it difficult for researchers to found out the direct cause of health issues in relating to long hours of sitting, desk-workers with high prologue sitting times are more likely to suffer from adverse health outcomes such as cardiovascular disease, diabetes and all cause mortality (Y.Chau, Sukala, Fedel 2016). Therefore it suggests a concern for one's health if their profession requires long hours of sitting. Moreover, some workers in sit-stand work stations reported feeling more productive, energized, focused and less stressed (Pronk, 2012). Employees that requires long hour sitting times are aware of the back and neck pain they are receiving (Virginia 2015). Despite employees reporting neck and back pain, it's hard to conclude it is directly caused by prologue sitting times. Other factors might have caused this result such as inappropriate sitting postures. These finding raise the research questions of whether there will be a clear and significant benefit to use sit-standing desks in terms of productive, comfort and health level. To those who are currently not using sit-standing desks, we would like to know if those staff would like to use sit-standing desks if they were available. We hypothesize people using sit-standing desks regularly will have higher levels of health, comfort and productivity level as compare to those who never use them. In addition, we hypothesize that the most prominent reason for people to use sit-standing desk are for health and comfort purposes. People will use their desk more often if in their primary work environment compared to those who need to make an effort to work outside of their primary work area. Therefore, we hypothesize that people with a shared access will tend to use sit-standing desks less despite the fact they have access to it because it is not their primary work desk.

Participants

The participants are 73 staffs at University of British Columbia, and their participation was voluntary. All of the office workers worked at different departments and buildings, and they have either a private access to sit-standing desk, a shared one, or no access at all. The participants list was provided by our client.

Condition

The same survey was sent out as a Google form to all participants, and all answers were only viewed by the researchers and the SEEDS client. Survey questions were split into four sections: the reason and pattern of usage, as well as self-reported comfort, health and productivity. The first question of the survey in reason and patterns of usage assessed whether participants had used a sit-standing desk in the last three months. There were two conditions based on the answer to this question. One group had used a sit-standing desks in the last three months while the other had not. For the sit-standing desk group, participants have private access or shared access to the sit-standing desk. In the sitting desk group, participants generally have either a shared access or no access to a sit-standing desk. Private access allowed participant to have a sit-standing desk at their own offices and shared access indicated that sit-standing desks was located in the shared room that everyone could use. No access meant that participants did not have a sit-standing desk either in their office or shared spaces. In these conditions, 33 participants have been used sit-standing desk in the past three months while 40 participants have not used it.

Measures

A survey created by the researchers aimed to measure the self-reported comfort level, self-reported health level, self-reported productivity level, and assess the patterns and reasons of usage. In the comfort, health and productivity section, the participants was asked to rate, using a 9 point scale, on their experience with their current office environment, more specifically their working desk that they are currently using (whether sitting or sit-standing). Comfort assessed the overall comfort as well as the possible pain experienced while working. Health assessed overall health as well as the level of energy, alertness, and fatigue experienced while working. Productivity assessed overall productivity and perceived satisfaction with one's work. In the pattern and reasons of usage section, some questions are based on our client's interest in assessing participant's opinion on sit-standing desks. Other questions aim to answer our research question by assessing why people use sit-standing desks and their patterns of usage, partly depending on the type of access they have. The survey that participants completed is included in the appendix.

Procedure

The online survey was sent out to the participants via email. Participation was voluntary, and it was stated in the survey that the survey is completely anonymous and that by completing the survey, the participants give the researchers consent to use the data in the study. Over a 100 surveys were sent out and 73 employees decided to participate in the research. The participants were then categorized into the two conditions according to the type of desk they are currently using. The total scores of each participant in comfort, productivity and health level were recorded by adding up the numerical value accorded to each question by a participant (with some questions being reverse scored). The scores for each of these three measures were averaged for each group, and then compared using one-tailed independent sample t-test with 72 degree of freedom and 0.05 significance level to determine if the difference between the mean of the two conditions was significant. The t value was compared to a t critical value, and a p-value was calculated in the two groups to determine whether the result was valid and did not happen purely by chance. In the reasons and patterns of usage section, the analysis was done differently. The researchers looked at each question separately since they did not measure one thing, but instead each assessed a different part of the reasons and patterns of usage. The open-ended question were analyzed by categorizing each answers into a certain type, which will be mentioned in the results. Some of the question in the survey were not included in the

analysis because those were irrelevant to the research questions and hypothesis, but only concerned the interest of the client.

Results

Health, productivity, and comfort: Each participant had an individual score for comfort, health, and productivity. The higher the score, the higher the level of each. For health, the average score for the sit-standing group participants was of 24.09 and that of the sitting group participants was of 23.63. An independent sample t-test yielded a non-significant result ($p = 0.34 > 0.05$). Thus, no statistically significant difference was found in the average level of health across group. The hypothesis which stated that self-reported health level would be on average higher for those in sit-standing group was not confirmed by these results. For productivity, the average score for the sit-standing group participants was 30, while that of the sitting group participants was 29.55. An independent sample t-test yielded a non-significant result ($p = 0.378 > 0.05$). Thus, no statistically significant difference was found in the average level of productivity across group. The part of the hypothesis stating that self-reported productivity would be higher in the sit-standing group on average was not confirmed by these results. For comfort, the average score for the sit-standing participants was 83.36, and that of the sitting participants was 73.63. An independent sample t-test yielded a significant result ($p = 0.014 < 0.05$). Thus, the level of comfort among the sit-standing group participants was significantly higher than that of the sitting group participants on average. This result confirms the part of the hypothesis which stated that the sit-standing group participants would have on average a higher comfort score than the sitting group participants.

Reasons and patterns of usage: Among the 73 participants surveyed, 40 were part of the sitting group while 33 were part of the sit-standing group, meaning they had used or not a sit-standing desk in the last three months. However, 55 of all participants did have access to a sit-standing desk. Moreover, 32 of these participants had access to a shared as opposed to a private sit-standing desk. The amount of time since the first use for these same participants ranged from one month to 10+ years, and the average time was about 22 months. Around 69% of the sit-standing group participants reported using it every day, which means that the data from this group mostly comes from people who are used to using a sit-standing desk, and who have been able to use it for around 2 years. Only 8 participants reported using a standing-only desk in the sit-standing group, while the others used a manual or electronic adjustable sit-standing desk. A total of 12 participants (across groups) reported never switching position from sitting to standing, or standing to sitting. Every other participants switched at least once a day, once every few hours, or once an hour, and these were distributed fairly equally, though the most popular being once every few hours (24 participants). In the sit-standing group, 22 participants had a private access while only 11 had a shared access. In the sitting group, 21 had a shared access, 18 had no access at all, and only 1 participant reported having a private access. Most participants (83.6%) reported that they were aware of their sitting/standing habits in general.

Among the participants who do not have access to a sit-standing desk, about 83% reported that they would want to have access to one (15 participants). A total of 47 participants across groups reported preferring sit-standing desks (64.4%). Specifically, in the sitting group, around 47.5% reported preferring sit-standing desks (19 participants). In the sit-standing group, only 5 (out of 33) participants reported preferring sitting desk, but 4 out of these 5 had a shared access to a sit-standing instead of a private one, which raises the question of whether their preference is related to the sit-standing desk itself or the to fact that it can only be used in a shared space. Our hypothesis which stated that people with a shared access to sit-standing desks will tend to use them less than those with a private access was confirmed by the fact that 95.65% of those with a private access reported using it in the last three months, while only 34.38% of those with

a shared access reported the same. In fact, from the 29 participants who answered the open-ended question of why they aren't using a sit-standing desk despite having access to one, around 57% of the answers mentioned convenience factors associated with a shared access. These included, but were not limited to, access to one's own phone, having to move work files from one desk to another, and wanting to conduct confidential work in the privacy of one's own office. Around 21% of the answers mentioned comfort or health reasons which prevented one from using a sit-standing desk, such as fatigue or back problems. The rest of the answers simply mentioned that the need did not seem to arise, since these participants reported getting enough exercise outside of work or trying to switch position from sitting to getting up regularly without the use of a sit-standing desk (18%). Overall, these results confirm that while those with a private access are almost guaranteed to use it, it is much less the case for those with a shared access, and this is mostly due to convenience factors. The most popular reasons that were found for wanting to use a sit-standing desk for all participants were health and comfort, with 26 and 16 participants, respectively. Medical reasons came in third with 6 participants, productivity came in fourth with 5 participants, 2 participants justified their use by their simple access, and 6 selected other reasons. The rest answered they did not see any particular reason for them to use a sit-standing desk (12 participants). These results confirmed our initial hypothesis, which stated that health and comfort reasons would be the two most common reasons for wanting to use a sit-standing desk. It is worth pointing out that these two types of reasons may overlap. For example, back problems are health-related, but ultimately will affect comfort. The same can potentially apply to medical reasons. Thus, the personal understanding of each of these reasons may be varied across participants, but importantly, they are still the three most popular. In the comfort, health, and productivity section, an open-ended question was asked concerning the perception of the participant on the benefit of sit-standing desk concerning these domains. Specifically, participant were asked to report whether or not they had noticed a difference in their comfort, health, or productivity level since they started to use a sit-standing desk (if they did, evidently). The results were consistent with the quantitative differences obtained in comfort levels. Around 72.41% of participants (21 out of 29 answers) reported they had noticed an increase in their comfort level due to the sit-standing desks. However, there was some inconsistency in the health results, as about 66,67% of participants (22 out of 33 answers) reported they perceived an increase in their level of alertness and energy (3 out of the 4 health questions were related to energy and alertness), but there was no difference found in the health scores. The results for productivity were somehow more consistent with the numerical data, as only about 41.37% of participants (12 out of 29 answers) reported an increase in productivity, and the rest perceived no difference.

Discussion

Based on our results, we found that using sit-standing desks is associated with higher comfort levels but not higher health and productivity levels. Moreover, most UBC office workers would like to have access to sit-standing desks. However, if it is not accessible as their primary desk, they usually do not use them mainly for convenience and privacy reasons. In fact, those with a shared access will tend to use them less than those with a private access. In addition, the primary reasons for using a sit-standing desks were found to be health, comfort, and medical related. Our study contributed to the literature body by analyzing the patterns and reasons of usage, which previous research did not address. We also asked open-ended questions, which helped us understand better our quantitative results. In addition, we tried to minimize the effect that bad sitting/standing postures may have on the results by asking the question: are you aware of your sitting/standing habits? In general, people reported that they were aware of their sitting/standing habits, and we assumed when people are aware of their sitting/standing habits, they would try to sit/stand as well as possible. Therefore, we concluded that bad sitting/standing

habits were not a determining factor in our research. Nevertheless, since the purpose of this research was to discover if it is worthwhile to invest in more sit-standing desks for UBC staffs (all research participants were UBC staffs), we need to be aware to what extent that we can generalize these findings to workers outside of UBC. In addition, all data on comfort, health and productivity levels were self-reported which meant that it was purely based on the feelings of the subjects. Therefore, we could not conclude whether using sit-standing desks is associated with higher objective measures of comfort, health, productivity levels. Another limitation this research may have is that the survey was made by the UBC undergraduate researchers. Future studies are needed to verify the validity of the survey. We also suggest that future research should design more experimental design to control for additional factors. For example, to control the working duration and the types of jobs to eliminate factors that may play a role in the results. Furthermore, the fact that our participants reported that they noticed an increase in their comfort level since they started using a sit-standing desk suggests that the results found point to a cause and effect relationship, not just a correlation. Future researchers should directly investigate this possible relationship with a controlled experimental design. On the other hand, because we did not control for a placebo effect, we also encourage future researchers to test if people who use sit-standing desks feel more comfortable just because they think the sit-standing desks will benefit them, rather than because of the actual effects from using sit-standing desks. Moreover, if using sit-standing desks does improve objective comfort, health and productivity levels, we may ask to what extent does the frequency of switching positions from sitting to standing play a role.

Recommendations:

Our findings suggest that a significant amount of office workers at UBC do prefer to have sit-standing desks as their primary desks in their own offices and using sit-standing desks does improve self-reported comfort level. Therefore, we suggest that UBC should invest in more sit-standing desks for its employees and if possible, UBC should prioritize sit-standing desks in private offices instead of sit-standing desks in shared and open spaces. In addition, some employees showed concerns on the drawbacks of sit-standing desks. For example, standing too long might hurt their ankles or negatively affect their comfort or productivity levels. However, this is not what we found in the study. Therefore, we suggest that UBC should make an effort to advertise the benefits of sit-standing desks and to encourage its employees to use sit-standing desks.

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APPENDIX I: SURVEY

Time to get up: the hidden benefits of standing desks
Survey questions

In the context of the environmental psychology course at UBC, we are conducting a psychological study on sit-standing desks. We are interested in the impact of desks and sit-standing desks on individual comfort, health, and productivity levels. We are also looking to assess patterns and reasons of usage and sit-standing desks in employees at UBC.

The following survey will examine the usage and patterns of desks and sit-standing desks as well as comfort, health, and productivity. Please read each item carefully, and answer to the best of your capabilities. There are no right or wrong answers. The survey should take about eight minutes to complete.

Your participation in this survey is completely voluntary. By submitting your answers, you agree to the terms of participation in this study. Every answer will be kept confidential, and used only for the purpose of this research project.

Thank you for your time.

Patterns and reasons and usage

The following questions concern your personal usage habits of your desk or sit-standing desk while working at UBC.

****** Please note that if a question is not marked as required, and it does not apply to your personal situation, you should not give any answer. ******

1. Have you used sit-stand desks within last three months?
   - Yes
   - No

2. Do you have access to sit-stand desks?
   - Yes
   - No

   If yes, where do you have access to it?
   - At my desk
   - Shared desk/platform available in my department but not at my own desk
   - I do not have access to a sit-standing desk

   If no, would you like access to it?
   - Yes
   - No
   - I already have access to a sit-standing desk

3. What type of sit-standing desk do you use?
   - Standing desk
   - Sit-stand desk (electronic/pneumatic)

- Manual crank sit-stand desk
- I don't regularly use a sit-standing desk.

4. If you regularly use a sit-standing desk, how often do you use it?

Once a month				Once a week				Everyday
1	2	3	4	5	6	7	8	9

5. If you have access but you don't use it, why? (Open-ended question)

_____

6. What is the primary reason you use a sit-standing desk or why you would use a sit-standing desk?

- Medical reasons
- Comfort reasons
- Productivity reasons
- Health reasons
- Because you have access to one
- I am not interested in using sit-standing desk
- Other_____

7. How long have you use them for? (Blank space for answer)

_____

8. How frequently do you switch position from sitting to standing up?

- Never
- Once a day
- Once every few hours
- Once an hour
- More than once an hour

9. Are you aware of your sitting/ standing habits in general?

- Yes
- No

10. Do you prefer using a normal desk or a sit-stand desk?

- Normal Desk
- Sit-stand Desk

11. What is your opinion on sit-standing desk in terms of their possible benefits? What are your concerns about sit-standing desk, if you have any? (Open-ended question)

_____

Comfort Level

The following questions concern your comfort level and pain experience while working. Please answer according to your perceived comfort WHILE WORKING AT YOUR DESK.

1. How easy is it for you to set up desk ergonomically, so that the keyboard and mouse are below your elbows and the monitor-top line of the text at eye level?

Very difficult — Somewhat difficult — Not difficult at all

1 2 3 4 5 6 7 8 9

2. During the past three months, how often do you experience pain in any of these regions?

- Neck

  Never — Sometimes — Almost Always

  1 2 3 4 5 6 7 8 9

- Shoulder

  Never — Sometimes — Almost Always

  1 2 3 4 5 6 7 8 9

- Arms/wrists

  Never — Sometimes — Almost Always

  1 2 3 4 5 6 7 8 9

- Back

  Never — Sometimes — Almost Always

  1 2 3 4 5 6 7 8 9

- Legs and feet

  Never — Sometimes — Almost Always

  1 2 3 4 5 6 7 8 9

3. During the past three months, how would you rate the degree of pain you experienced in any of these regions?

- Neck

  Non-existent — Moderate — Severe

  1 2 3 4 5 6 7 8 9

- Shoulder

  Non-existent — Moderate — Severe

  1 2 3 4 5 6 7 8 9

- Legs

  Non-existent — Moderate — Severe

  1 2 3 4 5 6 7 8 9

- Arms/ wrist

  Non-existent — Moderate — Severe

  1 2 3 4 5 6 7 8 9

- Back

  Non-existent — Moderate — Severe

  1 2 3 4 5 6 7 8 9

4. How comfortable are you while working at your desk?

Very uncomfortable — Somewhat comfortable — Very comfortable

1 2 3 4 5 6 7 8 9

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5. If you are using a sit-standing desk, do you feel your comfort has changed since you started using one? If yes, specify how. (Open-ended question)

_____

Health

The following questions concern your general health and level of energy both in general and while working. Please read each item attentively before answering.

1. During the past three months, how would you rate your average level of alertness while working at your desk?

Low				Moderate				High
1	2	3	4	5	6	7	8	9

2. During the past three months, how frequently did you experience fatigue while working, or at the end of your workday?

Never				Sometimes				Almost always
1	2	3	4	5	6	7	8	9

3. In general, would you say your health is:

Poor				Moderate				Excellent
1	2	3	4	5	6	7	8	9

4. During the past three months, how would you rate your energy level at work?

Poor				Moderate				Excellent
1	2	3	4	5	6	7	8	9

5. If you are using a sit-standing desk, do you feel your level of alertness and/or energy has changed since you started using one? If yes, how so? (Open-ended question)

_____

Productivity

The following questions concern your productivity level. Please answer according to how you perceive your productivity WHILE AT WORK.

1. How would you rate your overall productivity in the current office setting you are in?

Poor				Moderate				Excellent
1	2	3	4	5	6	7	8	9

2. During the past three months, how often did you feel it was hard to concentrate on the job you were working on?

Never				Sometimes				Almost always
1	2	3	4	5	6	7	8	9

3. During the past three months, how often did you feel like you were accomplishing less than what you wanted to at work ?

Never				Sometimes				Almost always
1	2	3	4	5	6	7	8	9

4. During the past three months, how would you rate your quality of work compare to what you expected?

Poor				Moderate				Excellent
1	2	3	4	5	6	7	8	9

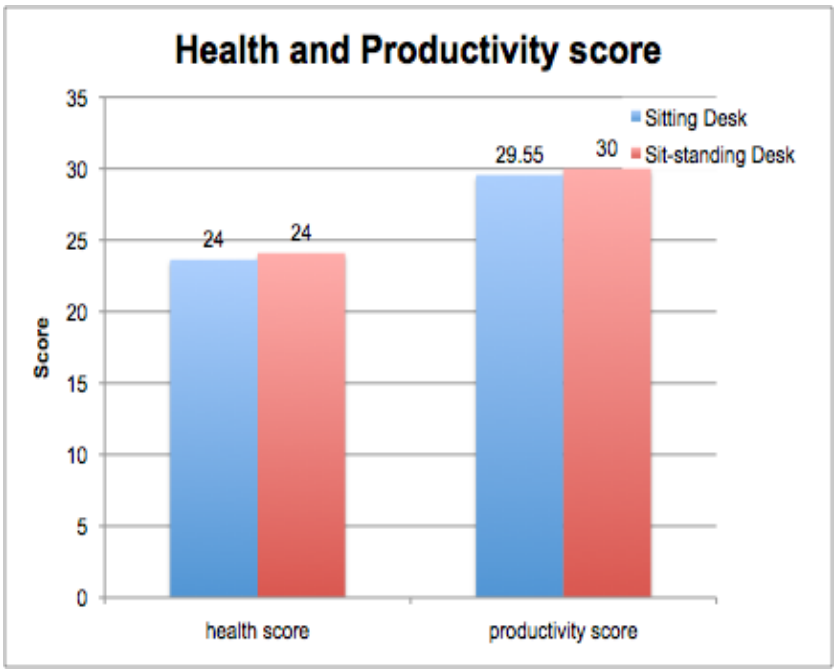
5. During the past three months, how frequently did you procrastinate?

Never				Sometimes				Almost always
1	2	3	4	5	6	7	8	9

6. If you are using a sit-standing desk, do you feel your productivity has changed since you started using one? If yes, specify how. (Open-ended question)

_____

APPENDIX II: RESULTS



Productivity	Sitting Desk	Sit-standing Desk
Variance	45.07	31.12
Count	40	33
Mean	29.55	30
Standard error of the mean difference	1.438	
T value	0.312 (<1.6663) **Insignificant**	
P value	0.378 (>0.05) **Insignificant**	

Health	Sitting Desk	Sit-standing Desk
Variance	20.96	25.21

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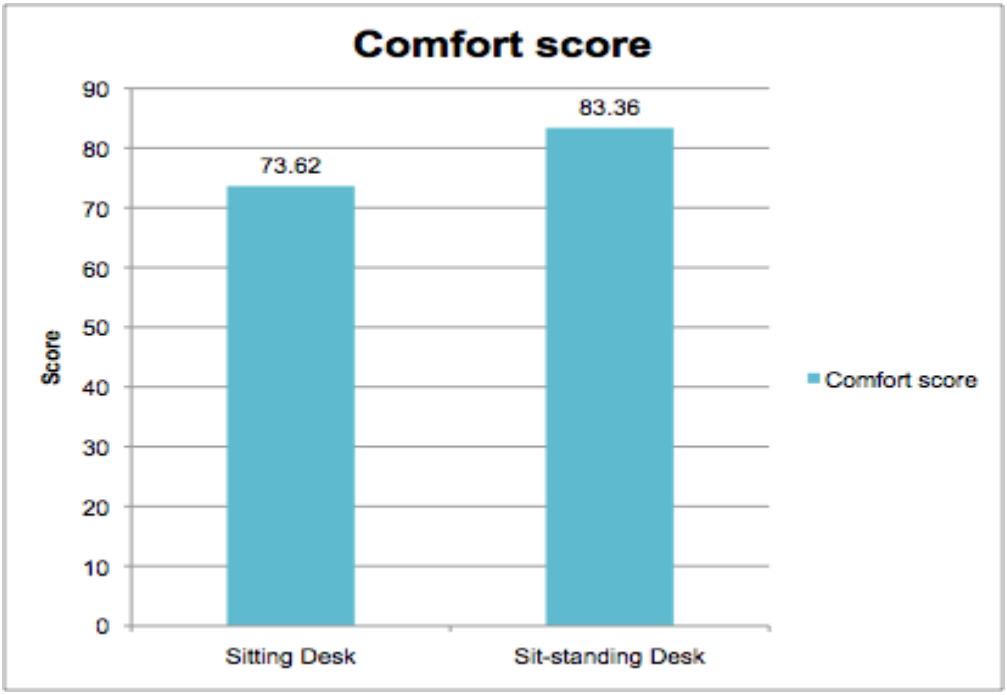
Count	40	33
Mean	23.63	24.09
Standard error of the mean difference	1.13	
T value	0.41 (<1.6663) **Insignificant**	
P value	034 (>0.05) **Insignificant**	



Comfort	Sitting Desk	Sit-standing Desk
Variance	487.62	225.93
Count	40	33
Mean	73.63	83.36
Standard error of the mean difference	4.36	

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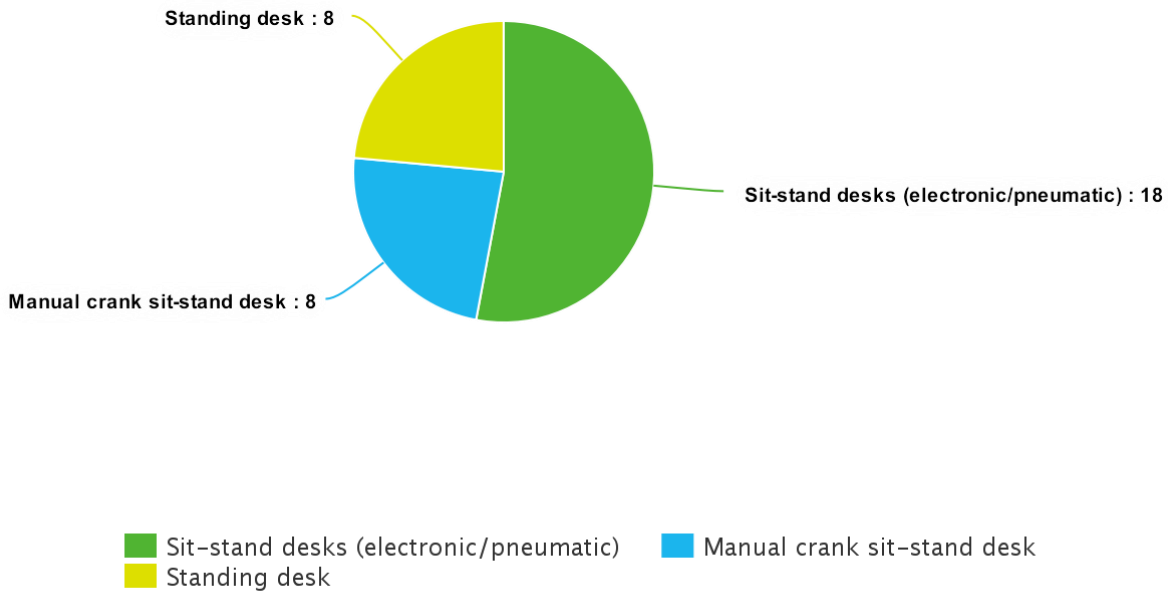
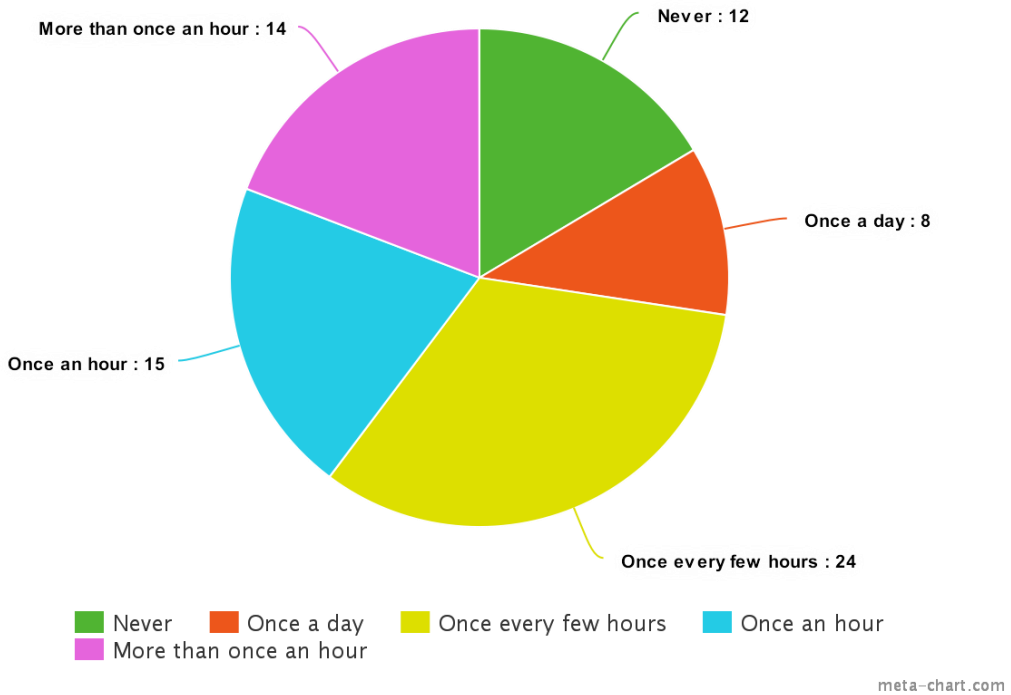
T value	2.23 (>1.6663) **Significant**
P value	0.014 (<0.05) **Significant**

Type of sit-standing desk of the participant





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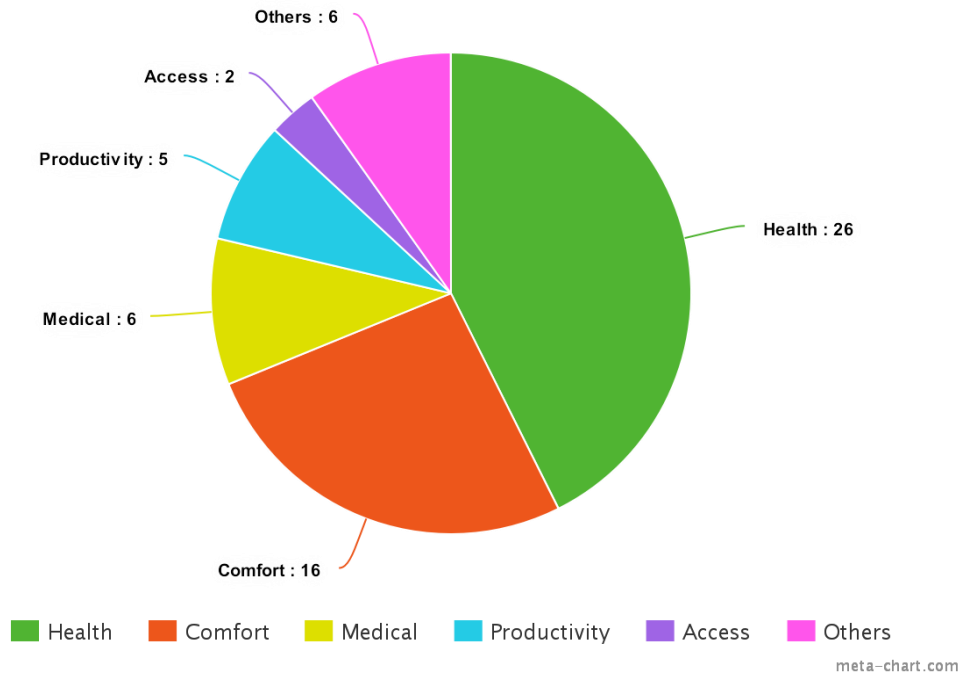
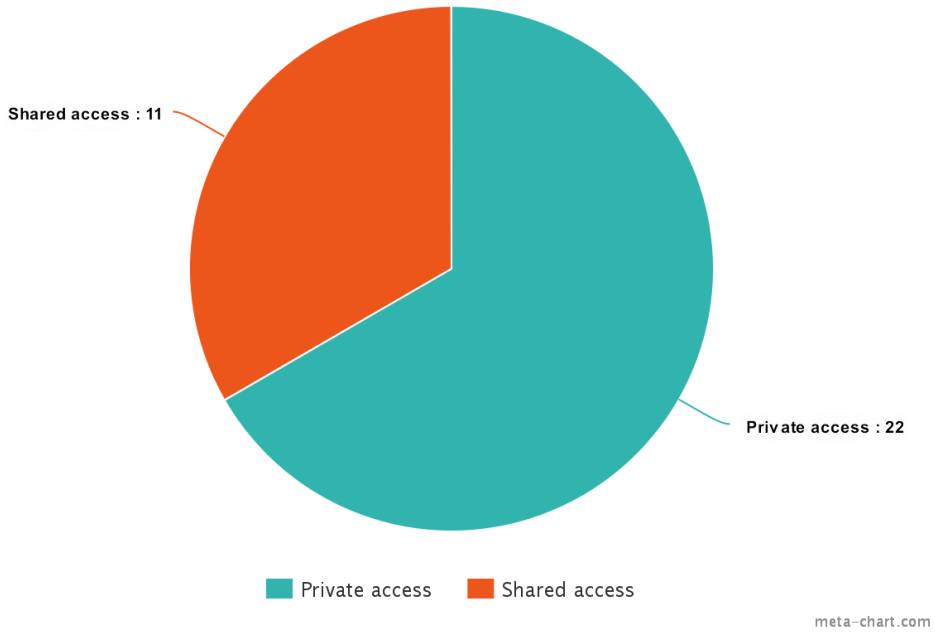
Switching habits of participants

Reasons to use a sit-standing desk



Type of access in sit-standing group



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