



Analyzing the health status of crowd workers compared
to desk workers

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Abstract

Microtask crowdsourcing workers, also known as crowd workers, perform small tasks known as microtasks. These people use crowdsourcing platforms to complete these microtasks. Crowd workers have to work in front of a screen to complete these microtasks, risking musculoskeletal problems and other mental problems. Their working conditions look similar to desk workers, who are people that work remotely or at the office behind a desk. This study aims to find the health differences between crowd workers and desk workers. It will provide a general overview on the subjective well-being, experienced and mental health. In order to analyze the differences in health, a survey will be deployed on a crowdsourcing platform in order to recruit crowd workers and desk workers will be recruited through snowball sampling. The questions of the survey are divided into 5 groups, each representing a health category: general health, workspace quality, physical well-being, social well-being and emotional well-being. For this study 17 crowd workers were recruited and 9 desk workers. From the results, desk workers are healthier in general, have a healthier workspace because some desk workers work in ergonomically good offices, a healthier physical well-being, a healthier social well-being due to them having colleagues and a better emotional well-being. Crowd workers have a lower level of stress, because of the microtasks being mostly very simple, while desk workers have mentally demanding deadlines and projects to work on.

1 Introduction

In 2022 more than half of the people still work at home after the pandemic [1]. These people sit behind a screen for the majority of their time, which is unhealthy. Common physical health problems are muscular strain and muscular fatigue [2], while the common mental health problems are stress, depression, fatigue and strain [3]. The particular group of people that work from home that this research will focus on, are the microtask crowdsourcing workers, also known as crowd workers.

Microtask crowdsourcing is an effective system to distribute one big repetitive task into smaller microtasks, which can typically be done in a minutes. This system consists of crowd workers, a crowdsourcing platform and a requester.

Crowd workers: These workers perform small tasks that called microtasks. These tasks are used to gather distributed and unbiased data or processing existing data. For example: validation and verification tasks, image tagging, audio transcription, translation and surveys [4] [5]. The gathered data can then be used to train a machine learning model or for quantitative research purposes in particular.

Crowdsourcing platforms: A platform that acts as a bridge to connect a crowd worker with many microtasks and serves as a place where crowd workers can perform microtasks. Amazon's Mechanical Turk¹ is an example of a well known microtask crowdsourcing platform. In exchange for doing a microtask, the crowd worker will get a monetary reward, which is funded by the requester.

Requester: Someone who provides microtasks to a crowdsourcing platform, which will then distribute the microtasks to crowd workers.

Working from home has many benefits like reduced commuting time, creating your own work schedule, more free time and better work-life balance. However, it has its drawbacks like an isolated feeling, less visibility and career opportunities, invasion of personal life and the mental and physical problems mentioned earlier [6]. Crowd working especially can feel

¹<https://www.mturk.com/>

very isolating, which is proven to be detrimental for the health [7]. Unlike teleworking people who are able to converse via online meetings, crowd workers lack colleagues to socialize with, who establish that feeling of recognition and improve experienced meaningfulness [8].

There is little previous research done about the health status of crowd workers. There has been an attempt to improve the worker engagement of crowd workers [9]. This talks little about the health status of crowd workers, however. People can reason that they can be placed under the remote workers or office workers category to analyze the health of crowd workers, like Crawford et al. does [10]. Is that really the correct classification though? That is why this research will compare crowd workers to remote/desk workers.

The research question is *What are the health differences between crowd workers and desk workers?* with the purpose to find similarities and differences in both their health status.

To aid the research question, there are three sub-questions to be answered:

1. What score do both crowd workers and desk workers give their health?
2. How do the workplaces of crowd workers and desk workers compare?
3. How do crowd workers and desk workers compare in their physical well-being?
4. How do crowd workers and desk workers compare in their social well-being?
5. How do crowd workers and desk workers compare in their emotional well-being?

After this introduction section there will be the methodology section. Section 3 will contain an ethical discussion about responsible research. In section 4 the results of the study will be shown and will be discussed in section 5. Afterwards a conclusion to the research question will be in section 6 together with a discussion about future work.

2 Methodology

Analyzing how healthy crowd workers are, compared to desk workers, will be done through conducting a survey. It is difficult to evaluate the health of a person through the internet without physical testing or measuring. For example, measuring blood pressure is harder than asking how happy you feel through the internet. That is why this research will mainly focus on analyzing the experiences of each worker. How workers experience their health, or subjective well-being, is still very important for the actual health [11]. Workers can also easily share feelings they experienced with performing tasks.

Health is hard to measure on its own as it is very broad, so we will split it into a few different categories. These categories will help analyzing the experience of the workers towards their jobs, which helps to conceptualize the definition of health. Hence the workers will be asked to describe the feelings they experienced for each category.

The categories will be defined as follows:

- healthy workplace: this includes feeling comfortable, having ergonomic furniture and good work environment conditions such as enough light and air and a good room temperature.
- physical well-being: since this is hard to measure it will be in the form of healthy habits, namely taking breaks, healthy snacks, exercising and enough sleep.
- social well-being: this describes if the worker is feeling connected and meaningful to society.

Table 1: The general questions at the beginning of the survey.

No.	Question	Answer type
1	How much time do you spend on microtask crowdsourcing per week on average?	Single-selection
2	In general, what score do you give your mental and physical health on average?	5-pt. Likert scale
3	How happy are you with your job?	5-pt. Likert scale
4	What health benefits are you experiencing from doing your job?	Open question
5	What health drawbacks are you experiencing from doing your job?	Open question

Table 2: The questions in the survey to analyze the healthy workplace category.

No.	Question	Answer type
6	How comfortable is your workspace regarding noise, lighting, humidity, temperature etc.?	5-pt. Likert scale
7	How well are you maintaining a good posture during your work?	5-pt. Likert scale
8	Do you think your posture impacts your health a lot?	5-pt. Likert scale
9	Do you have an ergonomic chair or a standing desk to keep you healthy?	Multiple-selection
10	Do you feel that having ergonomic furniture improves your health? If you don't have them, explain why you don't need/have one.	Open question
11	Are your eyes getting tired during your work?	3-pt. Likert scale
12	Are you using a blue light filter or giving your eyes a break by viewing in the distance to protect your eyes?	Multiple-selection

- emotional well-being: this last category will take emotion, stress and mood into account.

Categories were inspired by [12]. It provided a range of types of well-being, that also inspired the survey questions of this research.

Due to limited time and budget in this research, not many participants could be recruited. With a limited budget of 20 pounds, 17 crowd workers were recruited through Prolific, a microtask crowdsourcing platform, to fill in the survey. Another consequence of these limitations is the ability to recruit many desk workers for the survey. The desk workers were selected by snowball sampling, which is a recruitment technique where participants are helping with finding other participants. These crowd workers were filtered on being fluent in English, having a work week of 31-40 hours per week and having an approval rate of 90-100 percent. Crowd workers are able to do their microtasks on any device, but for this microtask survey they were only able to do the microtask on a computer in order to make the comparison between desk workers more fair.

General questions

The survey begins with some general questions about the worker to get to know the general sense of their health, which can be seen in Table 1. The first question asks how much time the worker spends on crowd working to distinguish full-time and part-time crowd workers. These first questions further serve no other purpose than to let the participant already think about their health and give a score to later find the average of.

Workplace questions

To help analyzing the healthy workplace category the questions 6-12 were designed, which

Table 3: The questions in the survey to analyze the physical well-being category.

No.	Question	Answer type
13	How often do you take a break while working?	Single-selection
14	How healthy are your snacks during your job, if any?	Single-selection
15	How many hours are you exercising per week?	Single-selection
16	Are you getting enough sleep to feel rested while doing your job?	3-pt. Likert scale
17	How often do you go outside on average on a daily basis?	5-pt. Likert scale

Table 4: The questions in the survey to analyze the social well-being category.

No.	Question	Answer type
18	Do you feel that performing tasks in your job is meaningful?	5-pt. Likert scale
19	Do you have social interactions during your job? If none, does this make you feel isolated/lonely?	Single-selection
20	Do you feel connected to the people doing the same job?	5-pt. Likert scale
21	Do you feel recognized doing your job?	5-pt. Likert scale

can be found in Table 2. The first question in this category is about the Indoor Environmental Quality (IEQ). Reducing environmental stressors improves the IEQ, so a low IEQ will reduce the worker’s well-being and productivity [13].

Questions 7-10 were designed as ergonomics are of importance for a better quality of work life [14]. Ergonomic furniture encourages the body to take different working positions, thus increasing body movement. This therefore reduces musculoskeletal and visual discomfort whilst sitting [15]. Ergonomic furniture helps for a good posture, which is reducing neck and back pain by reducing static postures [16]. The questions are asking their experiences towards these ergonomics, thus relating to their subjective well-being and therefore their health [11].

The last two questions are for a common discomfort in working digitally, digital eye strain. It is an emerging public health issue, which causes visual stresses and discomfort [17]. Since 90 percent of all digital device users have experienced symptoms of digital eye strain, this needs to be addressed in the survey as well.

Physical well-being questions

In order to analyze the physical well-being of the workers, their habits will be examined using the questions in Table 3. Short breaks and sleep quality are beneficial for the work engagement [18]. These two topics are tackled in questions 13 and 16. In 15 and 17 the questions are about going outside or exercising, which are longer breaks away from the desk in contrast to short breaks. Then question 14 aims to interrogate the eating behavior during the job, because food can impact the mood of the workers [19].

Social well-being questions

table 4 shows the questions are related to analyzing the social well-being, from which questions 18 and 20 target feeling connected and meaningful to society.

Managing meaningful social relationships is another important aspect, because without them there is the risk of becoming socially isolated, which results in loneliness. Social isolation can also result in poor health conditions and behaviors [20]. Questions 19 and 21 will take care of those aspects.

Table 5: The questions in the survey to analyze the emotional well-being category.

No.	Question	Answer type
22	While doing your job, how often have you felt anxious?	5-pt. Likert scale
23	While doing your job, how often have you felt depressed?	5-pt. Likert scale
24	While doing your job, how often have you felt lonely?	5-pt. Likert scale
25	While doing your job, how often have you felt stressed?	5-pt. Likert scale
26	While doing your job, how often have you felt calm and peaceful?	5-pt. Likert scale
27	While doing your job, how often have you felt energetic?	5-pt. Likert scale
28	While doing your job, how often have you felt happy?	5-pt. Likert scale

Emotional well-being questions

Lastly, the questions in Table 5 are analyzing the emotional well-being of the workers. This last part of the survey focuses on the feelings of the worker, which consists of emotions, feelings and experiences. Workers are asked which positive and negative emotions they feel and how often they experience them.

3 Responsible Research

Data collected through surveys have to be handled responsibly. In this research, the survey included a introduction text in the beginning that communicates to the participants what data will be collected, stored and used. Their data is safely stored behind a password protected environment and is anonymous. This text was aimed to provide informed consent to the participants. The introduction text also started off to try build trust by introducing the researchers and giving an overview of the research. The questions inside of the survey also were checked with a cognitive bias checklist called the Human Research Ethics Checklist, also known as HREC ²

This research can be easily reproduced as the methodology has been thoroughly described in the previous chapter. The whole survey can be reconstructed with the help of the question tables and the consent form found in appendix A.1 in this paper, but the participants will of course differ.

4 Results

The following results will help in answering the research question about analyzing the health differences in crowd workers and desk workers. The answers of each survey question were compressed into Table 6 in order to be easier to comprehend. The Likert scale question results got compressed by converting the scale to numerical values from 1 to 5 and then taking the average to end up with a weighted average. A bad or good score should not matter, since we are only interested in the comparison. Some questions were grouped in another health sub-category of health categories. The scores in each health category are calculated by taking the average of the sub-category scores. The open questions will be discussed in the text.

The results were obtained with a sample size of 17 crowd workers and 9 desk workers. The majority of the crowd workers (64.7%) work less than 10 hours per week, while the majority of the desk workers (66.7%) work more than 30 hours per week. So the most crowd

²<https://www.tudelft.nl/over-tu-delft/strategie/integriteitsbeleid/human-research-ethics>

workers were working part time and most desk workers work full time, with jobs consisting of a teacher, lawyers, engineers, developers, designers and managers.

Table 6: The average scores of the survey question results excluding open questions, organized in categories and subcategories. Parent category scores were calculated by taking the average of their subcategory scores. A higher score is more positive than a lower score.

Health aspects	Crowd workers	Desk workers
General	3.441	3.778
- Subjective health score	3.412	3.556
- Happy with job	3.471	4.000
Healthy workspace	2.863	3.185
- Indoor Environmental Quality	3.412	3.444
- Posture	2.529	3.333
- Posture importance	94.12% agrees	100% agrees
- Standing	29.41% uses a standing desk	44.44% uses a standing desk
- Tired eyes	2.647	2.778
Physical well-being	3.061	3.319
- Short breaks	3.294	3.778
- Longer breaks	2.824	3.000
- Healthy snacks	3.304	3.056
- Sleep	2.824	3.444
Social well-being	3.256	4.111
- Meaningfulness	3.706	4.111
- Social interactions during work	58.82% have social interactions	66.67% have social interactions
- Social isolation / loneliness	3.143	5.000
- Feeling connected to colleagues	3.353	3.778
- Recognition	2.824	3.556
Emotional well-being	3.243	3.801
- Negative emotions	3.426	3.972
- - Anxious	3.412	4.000
- - Depressed	3.412	4.778
- - Lonely	3.882	4.556
- - Stressed	3.000	2.556
- Positive emotions	3.059	3.630
- - Calm and peaceful	3.059	3.444
- - Energetic	3.059	3.556
- - Happy	3.059	3.889

Overall the desk workers perform better than the crowd workers on all categories, considering only Likert scale questions. The desk workers outperform the crowd workers on social well-being the most by 0.855. Emotional well-being is the second biggest difference with 0.558. Then comes the general category with a difference of 0.337, a healthy workspace with 0.322 and lastly the smallest difference of 0.258 being the physical well-being.

The open questions started with asking the worker's experienced health benefits and drawbacks, so here are the health benefits and drawbacks, starting with the crowd workers. Common experienced health benefits of crowd workers were a better mental health (than with an office job), additional income for healthcare insurances, a flexible job, increased peace of mind and mental stimulation by thinking and writing. The most common experienced health drawbacks were stress, muscle strain or pain around the back or neck and eye strain. Other drawbacks were a headache, mental health issues, long and mentally draining microtasks, bad posture, fatigue, less physical activity, depression and anxiety. There were also 6 responses with no experienced health benefits, while only 2 experienced no health drawbacks.

The experienced health benefits of desk workers were biking or walking to work, meeting colleagues, preventing boredom, more sleep by working from home, having many options to keep moving at work and letting the brain think in creative ways by problem solving. Drawbacks were having long working days, stress, worse cardio, eye strain from looking at a screen, soreness from sitting and a home workplace that is not as good as at work. Very frequently mentioned as a drawback was much sitting and less movement, which are very similar. This time 3 desk workers responded with experiencing no health benefits and there were no responses with no drawbacks.

Since back pain and too much sitting were very common health drawbacks for both workers, good ergonomics are important, which was asked in open question 10. All 8 crowd workers with ergonomic furniture feel that their ergonomic furniture improves their health and back problems, while the other 9 workers would want one, but cannot afford one. In the other case, 5 desk workers have ergonomic furniture with one worker saying they do not feel the health effects and one who rarely uses their standing desk. This leaves the other 4 without ergonomic furniture, where 3 workers do not need one, because their job does not involve that much sitting. The remaining one needs one, but also cannot afford it.

5 Discussion

In each category of table 6 the desk workers have scored better than the crowd workers on average. This section will discuss and interpret the results and reason about certain results, starting with the first category. Generally, the desk workers have given them selves a higher health score on average, meaning their subjective well-being is higher, resulting in better health [11]. After the discussion on the general health benefits and drawbacks, a deeper analysis to some mentioned aspects in the corresponding category will follow.

Looking at the experienced health drawbacks, the crowd workers gave more drawbacks than desk workers. This shows that there are more factors negatively impacting the health of crowd workers. Both groups share many health drawbacks: stress, eye strain, less physical activity and back pain as frequent health problems. Long and mentally draining microtasks can be comparable to long working days. The difference is because of crowd workers having extra drawbacks like headaches, mental health issues, muscle strain and fatigue, depression and anxiety.

The health benefits really depend on the desk worker's job. Office jobs allows the desk worker to travel to their office in order to counter the health drawback of less physical activity, but a desk worker from home can use the time to travel to work for more sleep or spend time to relax to de-stress. An important benefit that desk workers have are colleagues to have social interactions with, which will prevent loneliness. The benefit of more income for healthcare is also worth to mention, since it was an unexpected benefit for crowd workers.

Moving to the second category, a healthy workspace, the desk workers scored better, probably because office workplaces are designed to boost productivity. The design of a workplace is also provided by the company for office workers, unlike the workers from home who have to pay for the expensive furniture themselves. Good ergonomics are very important, since back pain and muscle strain are a common problem among these workers. Hence the desk workers scored just a little better in the IEQ subcategory, because of the office workers being among the desk workers.

The posture problem can also be explained by furniture, because some crowd workers had old chairs and bad furniture. So good furniture can improve the posture. Standing desks seem to be also quite important for the experienced health, since many workers feel that they are sitting too much as health drawback and standing improves posture. So a higher percentage of desk workers using a standing desk can explain the higher posture score. For the last subcategory, both parties already mentioned eye strains in the experienced health drawbacks. The score difference could be explained because of the majority of crowd workers protect their eyes by looking somewhere in the distance, while the majority of desk workers use a blue light filter, which might work better.

In the physical well-being category, the most notable differences are in the breaks subcategories, because a more flexible job like crowd working should mean that taking breaks is more easily. An argument that might explain this is that desk workers are taking breaks together with colleagues, which makes taking breaks more appealing. Another difference that is hard to explain is why crowd workers eat healthier snacks than desk workers. This depends on way too many factors like lifestyle, the health quality of local food shops or the insignificant amount of workers recruited, so it is hard to draw a conclusion out of this. The difference in sleep scores might be explained by desk workers having a set working schedule, while microtasks can be done at any time since they are so short. This means that the sleep schedule of desk workers has to be more consistent. These desk workers also work more hours per week than the crowd workers, which means that feeling rested is more important for a long day of work than for a few hours for performing microtasks. This category needs some more research, but since this measures the physical well-being, this is the hardest one to measure through a survey than measuring equipment.

The social well-being category was the category where desk workers outperformed the crowd workers the most. This was very much expected, since crowd workers do not really have colleagues, so their social score was already expected to be low. This then explains why crowd workers have fewer social interactions than desk workers. Following, the desk workers have a perfect score on social isolation, which can once again be explained by them having colleagues. The meaningfulness of a crowd worker is lower than the desk worker score, probably because of crowd workers not seeing what happens to their microtasks afterwards, hence not experiencing the impact of completing a microtask. Crowd workers will probably feel less recognized, since they will receive gratitude in the form of text messages, while desk workers will probably receive an in person thank you with a smile, which feels much more rewarding.

In the last category, the desk workers outperformed the crowd workers in all negative

emotion subcategories except stress. The first 3 might once again be explained through colleagues, as they are people who you can share negative feelings with, reducing the impact of negative emotions on one's mood, preventing overthinking them. The difference in stress scores might be due to deadlines being a thing for desk workers. Deadlines cause much more stress in your job, while performing microtasks do not have deadlines other than a time limit in which they have to complete a microtask. Most microtasks are also simply answering questions, which is less mentally demanding than some desk jobs might be.

For the positive emotions, desk workers feel more calm and peaceful than crowd workers. This might be tied to the work environment of the workers, where desk workers also scored better. Desk workers also feel more energetic than crowd workers, which could be related to desk workers performing better in the sleep subcategory than crowd workers. Lastly, the desk workers feel happier more often than crowd workers, which can be explained by a combination of job satisfaction, social interactions with colleagues and a better overall well-being.

The reasons provided to explain the results are purely speculative and just for discussion purposes only. This research provided a health overview of mental and perceived health through a survey, so others interested in a certain category can go deeper to extend the research.

The two groups are hard to compare, due to the big difference of hours put into the job and the wide variety of desk jobs. Most crowd workers work part time, so their answers might have been influenced a little by their main job. For example the crowd workers still performed above average on the social well-being questions related to colleagues, which also brings up the question how some crowd workers have colleagues in their work environment.

The questions of the survey could have been improved. More open questions can lead to more information gathered from the workers. However, multiple choice questions are easier to process. Given the limited time, the choice was to reduce the amount of open questions, to reduce the time to process the results.

6 Conclusions and Future Work

From the analysis on the results, we can answer the research question of what the health differences are between crowd workers and desk workers. Desk workers are healthier in general, have a healthier workplace and have a better physical, social and emotional well-being, with one exception for stress where the crowd workers experience lower stress levels than desk workers. Common health drawbacks found were stress, back pain, eye strain and less physical activity.

Desk workers often use the office as their workplace, which makes the company responsible for providing good ergonomics and good working conditions. Most crowd workers want ergonomic furniture, but cannot afford to purchase them. An ergonomic chair and a standing desk help with back pain, meaning desk workers have reduced risks of back pain because of better ergonomics and thus a healthier workspace.

The difference in physical well-being is the smallest, but the office workers among the desk workers travel to their work, hence increasing the amount of physical activity, which tackles another common health drawback.

Desk workers have a better social well-being, because of them having colleagues to have social interactions with, reducing social isolation and feeling more collected and recognized.

Emotionally, desk workers feel better than crowd workers, except for stress. Crowd workers experience less stress, because of their mostly simple microtasks, while desk workers

have many deadlines or mentally demanding projects to work on.

This study can be improved through a better quality survey and a bigger time frame and budget. Questions that arose during the result analysis were how crowd workers are eating healthier snacks than desk workers and how crowd workers have colleagues in their work environment. Since this study provides a general overview on subjective well-being, experienced health and mental health, others can extend the research by focusing on certain categories. The comparison also depended on the type of work the desk workers had, so others can narrow down the desk worker group to only office workers or remote workers, for example.

A Survey

A.1 Survey consent

Dear participant, this survey will be used for a research project for a third year student at the Technical University of Delft in The Netherlands. The research is about how healthy microtask crowdsourcing workers are compared to desk workers in general. As remote working becomes more and more popular, it is important we remain healthy while we sit at home all day. For example, crowd workers have a lot of freedom in their time management without a boss and have no colleagues. These differences and other factors might play a role in the health of a crowd worker compared to a desk worker.

In this survey you will be asked questions about your health. The questions range from your work environment to how healthy you feel. Answer these questions with how you feel on average. Please give detailed answers in the open questions.

Your data will be secured in a password protected environment and will not be shared with any other parties. The data is saved in an anonymous way, so nobody will be traceable. The only data collected will be from the survey and the user profile data when submitting your answers.

By clicking next at the bottom of this page you agree on confirming that you have understood and consent the information provided.

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