Understanding the Microtask Crowdsourcing Experience for Workers with Disabilities: A Comparative View

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Microtask crowdsourcing holds great potential as an employment opportunity with the flexibility and anonymity that individuals with disability may require. Though prior research has explored the accessibility of crowd work, the lived crowd work experiences of the broader community of workers with disability are still largely under-explored, especially when it comes to how their experiences are similar to or different from the experiences of workers without disability. In this work, we aim to obtain a deeper understanding of the microtask crowdsourcing experience for people with disabilities, especially regarding their financial and social experiences of participating in crowd work, along with the benefits and challenges that they encounter through this work. Specifically, we first surveyed 1,200 crowd workers both with and without disability about their experiences using the Amazon Mechanical Turk platform, and the differences we found inspired the design of a follow-up survey to gain greater understanding of the crowd work experience for workers with disability. Our findings reveal that workers with disability receive unique benefits from performing crowd work, such as a greater sense of purpose, but also encounter many challenges, such as completing tasks on time and earning a livable wage, causing them to turn to online communities for assistance. Although many of the challenges they face are not unique to crowd workers with disability, workers with disability may be disproportionately impacted by these challenges. From our findings, we provide implications for crowd platforms, as well as the gig economy as a whole, that seek to promote greater consideration of workers with a diverse range of conditions to create a more valuable work experience for them.

CCS Concepts: • **Human-centered computing** → **Empirical studies in accessibility**; **Empirical studies in collaborative and social computing**.

Additional Key Words and Phrases: Crowdsourcing; accessibility; Mechanical Turk; survey

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1 INTRODUCTION

In a time when the notion of traditional work is being challenged, crowdsourcing can provide a feasible and flexible alternative. More specifically, microtask crowdsourcing—performing small tasks for little payment each—has allowed anyone to become a freelance worker regardless of education or skill set. Beyond the relatively low barrier to entry, crowd work allows workers greater control over their schedule, the types of tasks they can perform, and their working location. As a result, although many workers start off as viewing crowdsourcing as temporary or one-off, some choose to make the transition to it as a means of full-time employment [13]. As online work

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becomes increasingly prevalent, there is the capacity for crowdsourcing to form a larger role in the digital economy and, more broadly, the future of work.

While the flexibility of crowd work can be beneficial to the greater population, it holds unique potential for individuals with disability. For example, for the 61 million adults living in the United States with one or more disabilities, roughly 26% of the total U.S. population [53], crowd work has the prospect of providing even further autonomy. Online there is greater freedom in choosing how to present one's self to others, allowing those who struggle socially an avenue to manage levels of interaction, while also supporting the option of withholding one's disability status from others if desired. From an employment perspective, crowd work may afford those with disability the convenience of working from home and avoiding the need for transportation and mobility arrangements, a potential that is underscored by the fact that Americans living with disability are disproportionately unemployed across all ages compared to those without disability[1] [62].

Despite the promise that crowd work may hold for these individuals, the question remains of whether it is a viable alternative when it comes to supporting their financial needs and accommodating their condition. Exploring the accessibility of microtask crowdsourcing platforms, most notably Amazon Mechanical Turk, prior literature has discovered stark issues for workers with disability, especially when those conditions involve visual impairment. These issues include tasks and platform features that are inaccessible to those with a variety of conditions [6, 59, 72], a platform structure and task instructions that are daunting to those lacking technological comprehension [4, 25], and infeasible expectations for work completion [63, 72]. The scope of much of this previous work, however, has been limited to focusing on the *prospect* of crowd work being a viable option for workers with disabilities rather than focusing on the experiences of *existing* crowd workers with disabilities. Furthermore, most previous work has focused on the impact of specific conditions when considering the accessibility of crowdsourcing platforms rather than widening the lens to study the broader community of workers with disability, and the *challenges* that they face have often been the focal point with the *benefits* they receive from crowd work being largely unaddressed. Finally, to the best of our knowledge, no prior literature has systematically addressed the question of how the experiences of crowd workers with and without disability differ, a comparison that can provide further insight into the extent of these benefits received and challenges faced.

In this work, we aim to fill in this gap by collecting the thoughts and experiences of crowd workers both with and without disability, first to explore contrasts between the two groups, and then to delve deeper into the experiences of workers with disability that were emphasized by these contrasts. There are two aspects that we are particularly interested in when exploring the experiences of crowd workers with disability—their financial and social experiences. Considering the staggering imbalance in the rate of employment between individuals with and without disability, we wish to examine the significance that wages earned from crowd work has for workers with disability, as well as the impact that their condition has on their ability to earn money through crowd work. In terms of social experience, prior literature has suggested that being a part of online communities related to crowd work could be especially useful for workers with disability [63, 72], prompting a closer look into whether and how existing crowd workers with disability already utilize these communities.

Overall, we are motivated by the following questions:

- How do workers with and without disability differ in terms of their experiences with microtask crowdsourcing?

[1]In 2019, the Bureau of Labor Statistics as a part of the U.S. Department of Labor found that those with a disability between the ages of 16 and 64 were employed at a rate of 30.9%, while that rate was 74.6% for those without disability.

- What benefits and challenges do the broader community of crowd workers with disability encounter through their work?
- How does disability impact both the target wages and actual wages of crowd workers?
- Does interaction with others related to crowd work play a vital role for workers with disability, and if so, what is this role?

To investigate these questions, we engaged in a two-phase study. We chose to focus on workers using the Amazon Mechanical Turk platform in order to build upon the existing body of work focusing on its accessibility. For the first phase, we hosted a large-scale survey on Mechanical Turk that was open to all workers, and we asked them to identify whether or not they had a disability. Additional questions asked about general platform usage, usability of the platform, typical amount of money earned from the platform, and any interaction with others related to crowd work, including usage of online communities for Mechanical Turk workers. We then analyzed the differences in responses between our workers who reported that they did have a disability and those who reported that they did not, and we used these differences to inspire the design of our second phase survey. In this next phase, we reached out to the respondents of the first survey that self-reported as having a disability with a second, more in-depth survey to learn more about their experiences using the Mechanical Turk platform that correspond to the differences we found in the first phase.

Our findings indicate that workers with disability have greater difficulty in using the Mechanical Turk platform, have lower target wages, interact with other workers more frequently and more extensively, and receive more benefits beyond income than workers without disability. Inquiring further into the experiences of our respondents with disability, we find that they receive a variety of benefits from their crowd work, including a newfound sense of purpose and increased confidence in their abilities, but these benefits are not without challenges. Our respondents report that their condition adversely affects their ability to earn a livable wage on the platform, motivating them to interact with others as a way of gaining assistance with their work and avoiding requesters who seek to take advantage of the power that the platform provides them. Despite sharing similar obstacles as crowd workers without disability, we find that those with disability may be disproportionately impacted. Altogether, our findings increase our understanding of crowd workers with disability, and this understanding allows us to provide future directions for microtask crowd platforms and the gig economy as a whole that can be taken to help improve their overall work experience.

2 RELATED WORK

Broadly, our work falls into the greater collection of literature relating to understanding the experiences of crowd workers and the relationship between accessibility and crowd platforms.

2.1 Understanding Crowd Workers

Early literature on crowdsourcing platforms largely focused on improvements to the platform from the requester's standpoint [1, 37, 44] and the demographics of crowd workers [14, 55], leaving much to be desired in terms of understanding the experience of workers on crowdsourcing platforms. To this end, Martin et al. produced one of the earliest seminal work on understanding crowd workers when they analyzed a series of Turker Nation posts [49]. From the words of workers themselves, they found that the key driver for workers to continue using crowd platforms is the money, along with other key insights including why they work for this money and greater understanding of the worker-requester relationship from the perspective of the worker. From there, a large body of literature that sought to have greater understanding of crowd workers was produced, which can be roughly broken down into three subareas: the motivations behind crowd work, the issues that crowd workers face, and how workers learn to cope with these issues.

2.1.1 Motivations. Though it is consistently found that money is the primary motivator for workers to work on crowdsourcing platforms, prior literature has revealed a number of other motivations that workers also have, such as the flexibility and ease of crowd work and the variety of tasks crowd work offers [13]. Chen et. al. went further to examine how worker motivations correlate with their demographics and vary across multiple platforms [7]. Interestingly, Brawley et al. discovered that intrinsic motivation is a strong predictor of satisfaction on crowdsourcing platforms [3]. Nevertheless, in a follow-up work of [49], it was found that years later, crowd workers continue to work on these crowdsourcing platforms for the money, not for leisure, fun, or for the satisfaction of helping a cause, suggesting that money is still the longstanding primary motivation for crowd workers [48].

2.1.2 Issues. Prior research also describes a number of issues that workers face from performing crowd work. For example, Silberman et al. found that common issues encountered by workers on Mechanical Turk are often caused by the requesters [58]. Specifically, these issues involve requesters who do not pay and scam their workers, the lack of support from Amazon in confronting these fraudulent requesters, and ultimately workers bearing the cost when HITs do not work (e.g. leading to wasted time [21] and rejections). This mistrust and risk is further explored in McInnis et al. [50], where workers describe risk coming from a lack of clarity in task instructions/design and in the reasoning behind worker rejections, as well as a lack of responses from requesters to the questions and concerns of workers. Finally, issues also lie in the money that workers are able to make from the platform, with Hara et al. finding that 96% of workers on Mechanical Turk earn below U.S. minimum wage as a result of the deluge of work that is available from a minority of low-paying requesters [23].

2.1.3 Coping with Issues. Crowd workers have found their own ways to cope with these issues. For instance, workers have created tools that can assist their work (e.g., MTurk Suite for finding, catching, and tracking HITs on Mechanical Turk) and inform their decision making on what type of work to take (e.g., Turkopticon for rating requesters based on factors such as their task quality and fairness of payment). Kaplan et al. found that the use of scripts, browser extensions, and other tools is prevalent among Mechanical Turk workers, especially those who are high-earners on the platform [35]. Harmon et al. further created a platform that allows workers to rate digital labor platforms on five metrics: pay, communication, evaluation, tasks, and technology [27], making it possible for incoming workers to get a more holistic view of the quality of crowd platforms before deciding which ones they want to sink their effort into. Another key coping mechanism adopted by crowd workers is to build worker community, both for the explicit purpose of promoting collective action [56], and for collaborating with each other to get direct assistance on their work. Such collaborative networks are often enabled by online forums *outside* of the crowd work platform [19, 70], and involvement in them can help mitigate desires to quit performing crowd work [46].

2.2 Accessibility and the Crowd

Earlier literature that relates crowd work with accessibility focuses on exploring the potential of the crowd to provide assistance to those living with disability [2, 5, 20, 26, 29, 42]. More recently, researchers have looked into the accessibility of crowdsourcing platforms, wondering if those living with disability are able to join the crowd themselves. In one of the earliest works along this line, Zyskowski et al. surveyed and interviewed people with disabilities and job coaches in order to get their thoughts about crowdsourcing [72]. They found that although the concept is promising for those with disabilities and does help alleviate issues that are associated with traditional work, there are a number of issues that crowd workers with disability face, and it was still not seen as a fitting

form of work by the job coaches interviewed. Researchers also investigated the accessibility of crowdsourcing tasks by examining how well a sample of tasks on Mechanical Turk aligned with web content accessibility guidlines, concluding that workers with a wide range of conditions may face issues when attempting tasks on Mechanical Turk [6, 59]. Additional studies explored the ways and challenges of engaging sub-groups of people with specific conditions in attempting crowd work, such as adults with autism [25] and older adults [4, 39].

Most recently, Uzor et al. studied the demographics of Mechanical Turk workers with disabilities along with the challenges these workers face when it comes to using the Mechanical Turk platform [63]. Although similar to our work here, we identify three important distinctions. First, we considered all workers who self-identified as having a disability, not just those that would impact computer use, meaning that we also considered workers with conditions such as Generalized Anxiety Disorder, Major Depression, and Autism Spectrum Disorder. Another distinction is that as part of our analysis, we systematically address the question of how the experience of Mechanical Turk workers with or without disability differs, and we use these findings to inspire our later study design to probe into why we see these differences. Finally, we explore the overall experiences of workers with disabilities, going beyond just the challenges that they face and additionally exploring the value they receive from the platform. Overall, we see our work less as filling a gap when it comes to identifying accessibility issues of the Mechanical Turk platform, and more as a starting point for gaining greater understanding of the impact of crowd work for workers with disabilities.

3 STUDY DESIGN

To understand the experiences of workers with disability in microtask crowdsourcing, we created two surveys and posted them sequentially to Amazon Mechanical Turk (MTurk). The full design of this study as well as the wording of both surveys' questions were approved by the institutional review board (IRB) of the authors' affiliated university.

For our first survey, we accepted responses from all workers living in the United States, regardless of their disability status, and we advertised the HIT as being a survey on demographics and activities of online crowd workers. We asked multiple choice questions about respondents' general platform usage, their motivations for using the platform, their wages earned from the platform, and what interactions they have with others relating to their use of the platform. Questions that asked about perceptions of difficulty using the platform were given in a random order to respondents to prevent provided answers from influencing how they answered later questions. At the end of this survey, respondents were asked to identify if they had a disability, and if so, to classify their disability into a provided general category. These categories were taken directly from Hara et al. [24], and they can also be found in Table 1. The full list of questions in our first survey along with the possible answer choices can be found in the supplementary material.

Upon the completion of the first survey, we analyzed responses to explore differences between respondents with and without disability. Trends that we noticed in the results from this first survey helped us identify themes that we sought to explore further relating to the experiences of workers with disability specifically. We used these trends to inspire the questions written for a second survey, which we advertised in the HIT as being a survey to explore the accessibility of online crowdsourcing platforms. Only workers who had both taken our first survey and self-identified as having a disability were able to participate in our second survey. Different from the first survey, we asked broader long-form questions to these respondents, and we encouraged longer written responses. The primary topics of this survey involved experiences of difficulty using the platform due to disability, perceptions of ability to earn money using the platform, and the nature of social interactions related to use of the platform. The full list of the questions of this survey can be found in the supplementary material.

Disability Categories	Count	Percentage
Problems or disabilities (including arthritis or rheumatism) connected with your arms or hands	58	32%
Problems or disabilities connected with your legs and feet	57	31%
Problems or disabilities connected with your back or neck	76	42%
Depression, bad nerves, or anxiety	83	46%
Mental illness or suffer from phobias or other nervous disorders	73	40%
Learning difficulties	51	28%
Chest or breathing problems, asthma, bronchitis	37	20%
Difficulty in hearing	28	15%
Difficulty in seeing (while wearing spectacles or contact lenses)	25	14%
Other health problems or disabilities	9	5%
Would prefer not to say	17	9%

Table 1. The breakdown of the types of conditions that N=181 respondents self-reported. Percentages represent the proportion of respondents reporting the condition out of the entire set who identified themselves as having at least one disability. Note that respondents could choose to identify with multiple conditions, so the total counts and percentages for all categories sum to greater than 181 and 100%, respectively.

In order to make our surveys accessible to workers that require the use of additional software (e.g., screen readers) to complete MTurk tasks, we used HTML CodeSniffer[2] to verify that our tasks met Web Content Accessibility Guideline 2.0 (WCAG 2.0) standards[3]. We also included an optional question at the end of each of our surveys asking respondents if they had encountered any issues in completing the task. From these responses, to the best of our knowledge, there were no workers that encountered any task design issues when it came to accessing or completing either of the surveys.

4 SURVEY 1: HOW DOES THE EXPERIENCE OF CROWD WORKERS WITH DISABILITY DIFFER FROM THOSE WITHOUT DISABILITY?

In this first survey, we aimed to explore the differences in how workers with one or more disabilities and those without disability perceive and interact with the MTurk platform.

4.1 Data

We collected responses from 1,200 unique workers over the course of one and a half weeks in October 2020 for our first survey. After filtering through workers with potentially unreliable data (e.g., completed the survey multiple times, completed the survey in less than 1 minute), we were left with 1,097 respondents in total. Workers were paid $0.85 for completing the survey, and the average worker took a little longer than 4 minutes to finish the survey, which is about a $12/hr rate.

Of those 1,097 respondents that we considered for this study, 181 self-identified as having one or more disabilities, or 16.5% of the total respondents. This is a bit lower than what has been reported previously, which estimated roughly 22% of workers on the platform as having one or more disabilities [24]. Of those respondents that self-identified as having one or more disabilities, Table 1 shows the breakdown of type of disability using the specific categories provided in the question.

[2]http://squizlabs.github.io/HTML
[3]https://www.w3.org/WAI/standards-guidelines/wcag/

The average age for our respondents was 37, and the population was 40.5% female. There is no significant difference in terms of age or gender breakdown between the sub-group of respondents with one or more disabilities and the sub-group of respondents without any disabilities.

4.2 Analysis Methods

Our survey consisted of three main types of questions: multiple choice where a single answer could be selected, multiple choice where multiple answers could be selected, and Likert scale. All questions asked utilizing a Likert scale had a scale from 1 to 5, although how these options were described to respondents qualitatively varied based on the corresponding question.

Our analysis started by splitting our respondents into two sub-groups: those who self-identified as having at least one disability and those who did not. For the analysis itself, we chose not to adopt null hypothesis significance testing (NHST) for a few important reasons. Although widely used, this approach has received many criticisms over the years [52], largely because of how it is often interpreted as a black and white measure of significance and findings that p-values can have high variance upon replication [12]. To counter these issues, methods that provide an *estimation* consisting of an effect size and confidence intervals have been proposed [12]. These methods also avoid multiple comparison problems and help us frame our analysis as an exploration of emerging themes rather than a definitive answer to pre-defined questions.

In lieu of NHST, to compare our two sub-groups for differences in their experiences using the MTurk platform, we used the interval estimate method [12, 15]. We plotted the difference of mean values of responses between the sub-group of respondents with disability and those without disability along with their 95% bootstrap confidence intervals ($R = 5000$). For Likert scale questions, a mean value of responses was considered to be the mean of all values (1 through 5) chosen for that question by respondents in a respective sub-group. For multiple choice questions, a mean value of responses was considered to be the number of respondents in a respective sub-group that chose a specific answer option divided by the total size of that sub-group[4]. This means that for Likert scale questions, there was one confidence interval per question, and for multiple choice questions, there was one confidence interval per answer choice provided to respondents.

Results were interpreted based on the ranges of these confidence intervals, and we used Cohen's d to measure effect sizes[5]. Following Cumming (2013), we also consider a confidence interval's range in relation to 0 to indicate the size of an effect [11].

4.3 Findings

We first take a look at results from our sub-group of respondents that identified as having a disability. Then, we compare their results with the results of our respondents who did not identify as having a disability. By comparing the two sub-groups, we can gain context into the situations of our respondents with disability by using respondents without disability as a baseline to represent both the experiences of the majority of users of the platform and who were likely the users in mind when the MTurk platform was developed.

4.3.1 Understanding Work Activities. We start by looking into a few questions that help us understand our respondents' work activities on MTurk. These questions asked workers how long they have been performing work on MTurk, how many hours they work on MTurk in a day on average, and what types of tasks they had recently been performing on MTurk.

[4]For some of these questions, the data could have also been treated as ordinal rather than categorical. We chose not to include this treatment of the data in this paper due to the constraints of properly analyzing ordinal data, but we have included it in the supplementary materials as additional consideration.

[5]In computing Cohen's d, we always treat the sub-group of respondents without disability as the baseline group.

When focusing on the responses given by the sub-group of respondents with disability, we find that the number of years they have been working on MTurk is quite varied, and so is the number of hours they spend on the platform on an average day. However, the majority of our respondents with disability started working on the platform less than 2 years ago (75%) and typically work somewhere between 1–8 hours a day on MTurk (86%), with roughly similar proportions of them working between 1–2 hours (26%), 2–5 hours (29%) or 5–8 hours (31%) per day. In terms of the types of tasks completed by respondents with disability within the two weeks prior to taking our survey, the top two most popular answers are surveys (55%) and experiments (53%).

We next conducted the confidence interval analysis on these questions to see how the work activities of our respondents with and without disability differ. For our analysis, we consider an effect to be significant if the range of its confidence interval falls entirely on one side of 0. We then interpret a confidence interval whose lower bound is greater than 0 as representing a significantly larger mean value of responses for respondents with disability, and as such, a confidence interval whose upper bound is less than 0 represents a significantly larger mean value of responses for respondents without disability. All findings that we address in this section are considered to be significant under this classification.

We find some evidence suggesting that our respondents with disability have been a part of the MTurk platform for a *shorter* period of time than our respondents without disability—compared to respondents without disability, a slightly larger fraction of respondents with disability reported that they had been working on MTurk for 1–2 years (Cohen's d=0.17 [0.004, 0.33]), while a smaller fraction of them reported working on MTurk for 2–4 years (d=−0.25 [−0.40, −0.08]) or more than 4 years (d=−0.16 [−0.32, −0.0002]). In addition, our respondents with disability may also spend *fewer* hours in a day working on MTurk than respondents without disability (more selection of the option "1–2 hours", Cohen's d=0.22 [0.05, 0.37]; less selection of the option "2–5 hours": Cohen's d=−0.32 [−0.49, −0.16]; no reliable differences for other options). Finally, in terms of the tasks respondents have been performing, our respondents with disability are less likely to perform experiments (d=−0.29 [−0.45, −0.12]), surveys (d=−0.85 [−1.03, −0.66]), and voting tasks (d=−0.34 [−0.50, −0.17]) than our respondents without disability, despite experiments and surveys being the most popular types of tasks performed by them.

4.3.2 Workers with Disability Experience Greater Difficulty in Using the Platform. Our survey included seven questions about the usability of the MTurk platform based on our respondents' experiences. Specifically, we asked respondents how often they have difficulty finding a HIT they can work on (*difficultyFindingHIT*[6]), have difficulty finding a HIT they would enjoy working on (*difficultyFindingEnjoyingHIT*), have difficulty completing a HIT within its allotted time (*difficultyCompletingHIT*), reach out to the requester of a HIT (*contactRequester*), and require assistance from another person in order to complete a HIT (*requireAssistance*). We also asked respondents to estimate how much of the given time they take on HITs that they are able to complete (*timeUsed*). Finally, we asked them to rate the ease of use of MTurk (*useDifficulty*) and indicate their overall satisfaction with the platform (*satisfaction*).

In terms of finding HITs they can work on and finding HITs they would enjoy working on, 46% and 44% respectively of our respondents with disability reported that they have difficulty more often than "sometimes" (i.e., either a 4 or 5 on the 5-point Likert scale). 40% of our respondents with disability indicated that they have difficulty completing a HIT on time more often than "sometimes", and 53% said that of the HITs that they have completed on time, on average they used greater than half of the total allotted time. Also more often than "sometimes", 37% of our respondents with

[6]These "nicknames" serve not only as a reference to the plots with results from the given question, but also to the question itself as found in the supplementary material.

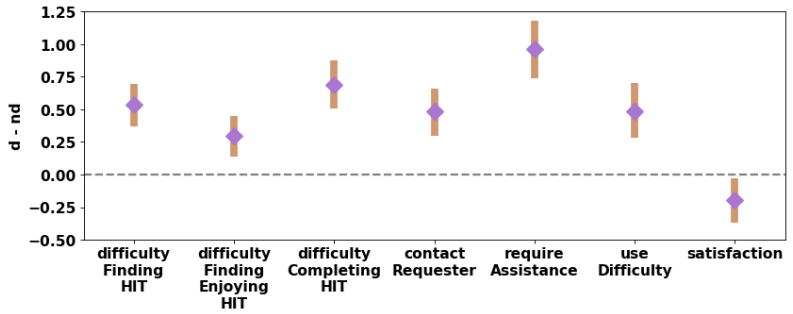


Fig. 1. Comparing responses on various aspects of usability of the MTurk platform between respondents with and without disability. Error bars represent 95% bootstrap confidence intervals. An interval above (or below) the horizontal line indicates a higher (or lower) mean for the disability sub-group, compared to the non-disability sub-group.

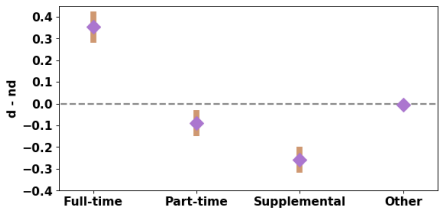
disability reach out to the requester of a HIT, and 38% have required assistance from another person in order to complete a HIT. Regarding the ease of use of the MTurk platform, 66% of respondents with disability indicated their perceptions as neutral or worse, with "neutral" being the answer that was selected most often (35%). All together, while 89% of respondents with disability indicated that they were neutral or better in terms of their overall satisfaction with MTurk, the most common option selected by them was again "neutral" (36%).

We next conducted the confidence interval analysis to compare more directly between the sub-groups of respondents with and without disability. Note that the qualitative values for answer options differ between Likert questions. For the question asking about satisfaction with the platform, a higher value response reflects *greater satisfaction* with the platform. However, for every other Likert question, a higher value response reflects *greater difficulty* with the platform or performing work on the platform. The results for this analysis can be found in Figure 1.

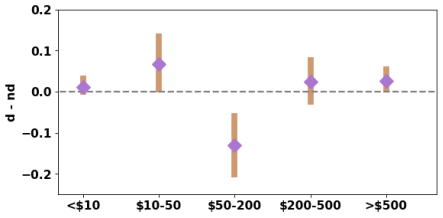
We see that our respondents with disability reported greater difficulty than our respondents without disability when it comes to finding a HIT that they can work on (*difficultyFindingHIT*: Cohen's d=0.52 [0.36, 0.68]), and finding a HIT that they would enjoy working on (*difficultyFindingEnjoyingHIT*: d=0.29 [0.13, 0.45]). Respondents with disability also reported greater difficulty completing a HIT within its allotted time (*difficultyCompletingHIT*: d=0.62 [0.44, 0.79]), though no reliable difference was found between the two sub-groups when it comes to the percentage of allotted time used amongst HITs that are completed on time. In addition, our respondents with disability reported that they need to more frequently contact the requesters of HITs (*contactRequester*: d=0.45 [0.28, 0.63]) and receive assistance from another person in order to complete a HIT (*requireAssistance*: d=0.71 [0.54, 0.88]). Regarding general usability and satisfaction, respondents with disability found the platform overall more difficult to use (*useDifficulty*: d=0.39 [0.23, 0.57]) and had lower satisfaction with the platform (*satisfaction*: d=−0.19 [−0.35, −0.03]) than our respondents without disability.

Overall, our findings suggest that workers with disability may have greater difficulty performing work on MTurk and be less satisfied with the platform than workers without disability.

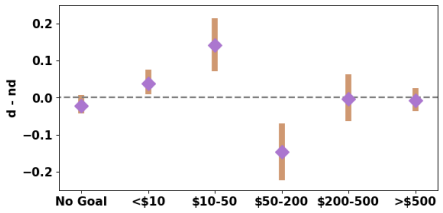
4.3.3 Workers with Disability Indicate Lower Target Wages and a Greater Dependence on Wages. To investigate our respondents' financial experiences and viewpoints, we asked them what portion of their income is earned through MTurk (*incomePortion*), the amount of money that they estimate earning on the platform in a week (*earnedPerWeek*), their goal for the amount of money they aim to make in a week by working on MTurk (*weeklyIncomeGoal*), and the lowest hourly wage that they believe to be fair (*fairHourlyWage*).



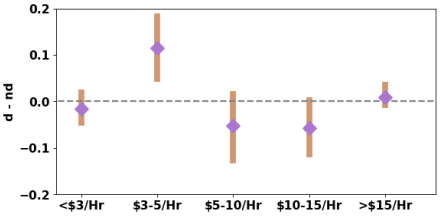
(a) incomePortion



(b) earnedPerWeek



(c) weeklyIncomeGoal

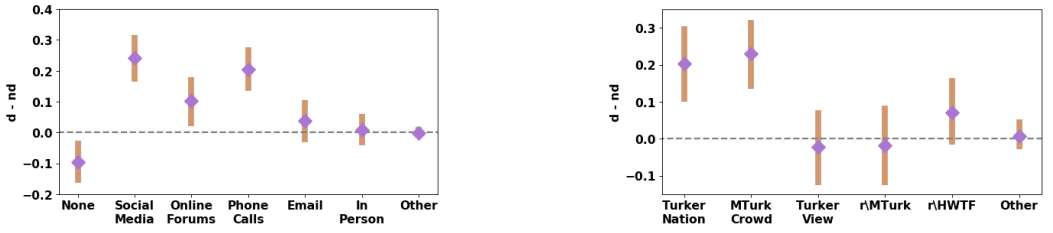


(d) fairHourlyWage

Fig. 2. Comparing responses on respondents' experiences and viewpoints on making money on MTurk. Error bars represent 95% bootstrap confidence intervals. An interval above (below) the horizontal line indicates a larger (smaller) proportion of respondents in the disability sub-group chose that option, compared to respondents in the non-disability sub-group.

Looking at our respondents with disability, we find that 68% of them rely on the income they earn from Mechanical Turk as their full-time income. When asked about the amount of money earned in a week from the platform, 47% of respondents with disability estimated that they earn $50–$200 a week, but we also see that another 31% of these respondents only estimated earning $10–$50 a week. Similarly, the most common responses for a weekly income goal were $50–$200 a week and $10–$50 a week, with 40% and 31% of our respondents with disability indicating these goal ranges, respectively. Finally, when asked about the lowest hourly wage that would be considered fair, the most frequent response was $5–$10/hour, as said by 39% of our respondents with disability, but close behind, 33% of our respondents with disability chose an hourly wage between $3 and $5.

Furthermore, Figure 2 shows the results of our confidence interval analysis comparing respondents with disability to those without disability. Based on this analysis, more of our respondents with disability consider their earnings as their full-time income (d=0.76 [0.58, 0.95]), and fewer of them consider the earnings as their part-time income (d=−0.23 [−0.38, −0.06]) or supplemental income (d=−0.61 [−0.78, −0.44]). The comparison between the two-subgroups of respondents in terms of their estimated weekly earnings is somewhat complicated (Figure 2b): Our respondents with disability make up a greater portion of the lowest earners (< $50 a week) and the highest earners (> $200 a week) than our respondents without disability, which seems to indicate a higher level of variance in the income earned by our respondents with disability. In contrast, our respondents with disability seem to have a lower weekly income goal than respondents without disability in general (Figure 2c), as we see a larger fraction of respondents with disability report to aim for an earning of less than $10 a week ($d$=0.22 [0.07, 0.36]) or $10–$50/week (d=0.34 [0.17, 0.50]) while a smaller fraction of them aim for earning a higher level of $50–$200/week (d=−0.30 [−0.46, −0.13]). Finally, as for the lowest hourly wage that is fair, we find that respondents with disability are more likely to believe that an hourly wage between $3 and $5 is fair ($d$=0.26 [0.10, 0.42]), but it is still not entirely clear whether one sub-group believes that their hourly labor is worth more than the other.



(a) communication (b) onlineForums

Fig. 3. Comparing responses relating to interaction with others about work on MTurk between respondents with and without disability. Error bars represent 95% bootstrap confidence intervals. An interval above (or below) the horizontal line indicates a larger (smaller) proportion of respondents in the disability sub-group chose that option, compared to respondents in the non-disability sub-group.

Taken together, workers with disability may aim to make less money than workers without disability, despite the indication that a larger proportion of workers with disability may depend solely on this income than those without disability.

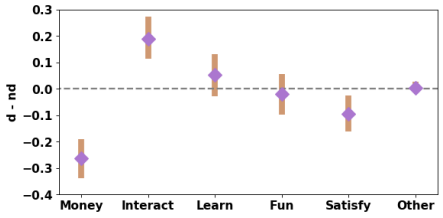
4.3.4 Workers with Disability Interact More with Others. To explore how our respondents interact with others about their crowd work, we analyze their answers to what communication channels they take part in (*communication*), what online forums they typically visit (*onlineForums*), and their level of participation on these forums (*forumParticipation*). Questions *onlineForums* and *forumParticipation* were only asked to respondents if they indicated that they interacted with others via online forums in the *communication* question, so analysis of these two questions does not involve our full population of respondents. Of the 1,097 total respondents for this survey, 549 of them (52%) indicated that they used online forums. This includes 106 of the 181 respondents with disability (59%) and 443 of the 916 respondents without disability (48%).

We find that the most common avenues of interaction for our respondents with disability are through social media and online forums, with 64% and 59% choosing these options, respectively. The top two online forums that are visited most frequently by our respondents with disability are MTurk Crowd (75%) and TurkerView (66%), and 92% of our respondents with disability said that they are active commenters and posters on online forums.

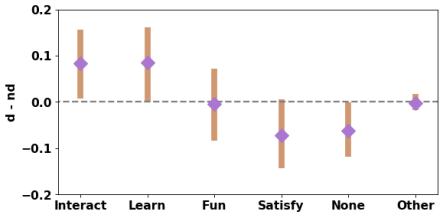
Comparing responses to these questions between the two sub-groups, we can see in Figure 3a that our respondents with disability are more likely to interact with others about their work through phone calls (d=0.52 [0.36, 0.69]), online forums (d=0.21 [0.05, 0.37]), and social media (d=0.50 [0.33, 0.67]) than respondents without disability, who instead are more likely to not interact with anyone about their work (d=−0.22 [−0.38, −0.06]). Moreover, we can also see in Figure 3b that respondents with disability are more likely to use specific forums MTurk Crowd (d=0.50 [0.28, 0.72]) and the TurkerNation Slack channel (d=0.45 [0.23, 0.67]) than respondents without disability. Finally, respondents with disability are also more likely to actively participate in online forums than respondents without disability (d=0.69 [0.48, 0.90]).

Altogether, these findings suggest that workers with disability may be more likely to take part in interaction with others related to their work on the platform, and they may also be more active in these interactions than workers without disability.

4.3.5 Workers with Disability Receive More Benefits from MTurk Beyond Money. Finally, we explore the motivations of our respondents working on the MTurk platform, including why they started working on MTurk (*startingReason*) and what motivates them to continue their work on MTurk (*continueMotivation*), as well as the benefits that our respondents receive from working on MTurk other than money (*additionalBenefits*). When asked about why they started working on the platform,



(a) continueMotivation



(b) additionalBenefits

Fig. 4. Comparing responses relating to respondents' motivations for working on MTurk and benefits they received from MTurk . Error bars represent 95% bootstrap confidence intervals. An interval above (or below) the horizontal line indicates a larger (or smaller) proportion of respondents in the disability sub-group chose that option, compared to respondents in the non-disability sub-group.

83% of respondents with disability chose money as a reason, but in addition, 59% said that they started "for enjoyment or something to do". Money was further indicated most frequently by respondents with disability as the motivation for continued work on MTurk (60%), followed by "the opportunity to learn something new" (52%) and "interaction with others and/or being part of a community" (45%). In terms of additional benefits, the most common answer from 67% of our respondents with disability was "the opportunity to learn something new", followed next by the notion that working on MTurk is "something fun/interesting to do" from 46% of respondents with disability.

Contrasting responses obtained from respondents with and without disability, we see that our respondents with disability were less likely to start working on MTurk for the money (d=−0.29 [−0.44, −0.14]) but more likely for the enjoyment. Moreover, respondents with disability are also more motivated to continue working by interacting with others and/or being part of a community (d=0.41 [0.25, 0.58]), but less likely to indicate money (d=−0.62 [−0.79, −0.46]) or the sense of satisfaction from completing HITs/helping others (d=−0.22 [−0.38, −0.06]) as the motivation for them to continue their work on MTurk (Figure 4a). We also find evidence that respondents with disability are more likely to benefit from interaction with others and/or being part of a community (d=0.18 [0.02, 0.34], see Figure 4b) and from the opportunity to learn something new (d=0.17 [0.01, 0.33]), while respondents without disability are more likely to say that they do not benefit in ways other than through payment (d=−0.17 [−0.33, −0.01]).

Overall, these results suggest that workers with disability may receive a greater number of benefits and be motivated by more factors other than payment from MTurk, while workers without disability may be more motivated by strictly the monetary benefits.

5 SURVEY 2: HOW DOES DISABILITY IMPACT CROWD WORKERS?

In our second survey, we focused on the thoughts and experiences of workers with disability with regards to the findings of our first survey in order to better understand how participating in microtask crowdsourcing on MTurk impacts them, as well as how their conditions impact their microtask crowdsourcing experiences.

5.1 Data

We set a qualification such that only the workers who responded to our first survey and self-identified as having one or more disabilities could answer our second survey. From these 181 respondents, 34 finished our second survey within the week and a half that it ran on Mechanical Turk in March 2021. We only allowed workers to take this survey once. After a manual inspection of the provided answers, we removed 3 sets of responses that appeared to be from spammers,

leaving us with 31 total respondents that we considered for this portion of the study. Of these 31 respondents, 42% identified as female, and the average age was 43. For privacy purposes, we assigned an index between 1 and 31 to each of our respondents so their data could be identified anonymously. Throughout this section, we refer to a specific respondent of our second survey with a *P* followed by their index (e.g., *P25*).

We estimated that this second survey would take about 20 minutes to complete, and we provided a base payment of $5. Every worker that completed the survey received a minimum of $5 regardless of the amount of time they spent, and for every additional 5 minutes that they spent on the survey beyond the first 20 minutes, we paid them an extra $1.25 bonus once they completed the task. This resulted in all workers who answered our second survey being paid a minimum of a $15/hr wage. We communicated this information to workers to encourage them to write detailed, thoughtful responses. The average amount of time taken to complete this survey was roughly 26 minutes, with the respondents that took the most time spending close to an hour on the survey (although they did later comment that some of this time was spent taking a break during the task in order to rest or stretch).

Differing from prior studies focusing on crowd workers with disability, we chose to conduct a long-form survey as our follow-up rather than recruiting interview participants. We took this approach both to provide greater flexibility, comfort, and anonymity to our respondents, and in an attempt to counter the difficulty that has been documented when recruiting interview participants, including those with disability on the MTurk platform [63]. In the trade-off between quantity and depth of responses, we believe that our survey allowed us to engage a greater number of respondents to better recognize prevalent themes among workers with disability. For greater insight into the meaning behind these themes, however, future work should be done to interview respondents to probe further.

5.2 Analysis Methods

When identifying important themes among the responses to our second survey, we took a grounded theory approach with the purpose of letting emerging ideas guide our findings [10]. The first author began by performing open coding on the responses of each question in order to recognize and document important observations, and once that was complete, axial coding was used to generate larger categories for each question. Each response to a question could potentially fall into multiple categories at once.

To validate these categories, five secondary coders were enlisted and provided with responses to different questions in order to perform qualitative coding, while the first author acted as the primary coder. Given a survey question, the primary and secondary coder both started with coding the same set of randomly selected set of responses to that question. The responses were blinded so that secondary coders did not have any identifying information about the respondents (e.g., MTurk Worker IDs) nor did they know how respondents had answered other questions. When needed, context about a respondent (such as information about disability shared in an earlier question) was provided to the secondary coder by the primary coder. Once both coders completed their coding, a Cohen's Kappa score[7] was computed to quantify the inter-rater reliability, and the two coders discussed with each other to adjust the category codes and to reach consensus on all responses. If the computed Cohen's Kappa score was lower than 0.8 for a question, the primary and secondary coder went on to additional rounds of coding for another randomly selected set of responses of that question until a Cohen's Kappa score of at least 0.8 was reached, and then the remainder of the

[7]Since each response could fall into multiple categories, a Cohen's Kappa score for each set of codes was computed by calculating a separate Cohen's Kappa score per category and then averaging the scores together.

question's responses were coded by the primary coder. In the case where a Cohen's Kappa score of 0.8 was never reached for a question, all 31 responses were coded by both coders, and a consensus was reached.

5.3 Findings

Our findings present several themes of interest. We first discuss the benefits and challenges that our respondents receive from performing microtask crowd work, segueing into the connection between disability and income earned from MTurk. From there, we delve deeper into our respondents' experiences interacting with others, discuss the improvements to the platform that would benefit them most, and conclude by acknowledging the individuality of our respondents.

5.3.1 Benefits beyond Income. To start, we look into what benefits workers with disability have received from participating in microtask crowdsourcing on MTurk. Our respondents acknowledged a number of aspects of crowd work that they find valuable including benefits financially, from an educational standpoint, and with regards to improving their mental well-being. Echoing prior literature on understanding crowd workers' motives [13, 48, 49], earning money was the most common benefit received among our respondents, with 58% of them indicating that their financial situation has improved since joining MTurk. While some of our respondents indicated that this money is used to pay for essentials such as rent, food, and bills, others utilize their earnings to save for the future and get their life "into a stable place". Crowd work can be used as a stepping stone towards pursuing further endeavors, as one respondent, whose severe anxiety and depression has prevented him from holding a regular job, noted:

> "As of now, I have most of the things I want, and now I am focused on saving and investing most of the earnings I make while I possibly try and look for some other type of work soon. I feel that Mturk is a good starting point for trying to get my life in order." – *P27*

Beyond payment, crowd work can provide benefits that derive from the tasks themselves. For instance, 29% of our respondents conveyed appreciation for the opportunity to help others with research and contribute input on a variety of topics, ranging from customer feedback on brands to more serious topics, such as attitudes towards the COVID-19 pandemic. Many respondents also value the educational opportunities that they encounter from performing tasks: 42% stated that working on tasks gives them the opportunity to develop new skills and learn new things. Topics that our respondents have been able to learn more about include new areas of research, the world in general, and even themselves through psychological surveys.

Perhaps a more meaningful benefit received by our respondents, however, is the bettering of their mental well-being, both on a day-to-day level and considering their prospects overall. From an everyday perspective, our respondents reported that being able to perform crowd work provides mental alleviation, in one way from the monotony and stagnation that can arise from the limitations of disability. 26% of respondents shared that they appreciate having something to do during the day, either to provide them with a task to focus on or to keep their mind active. This last advantage can be especially salient for those who are limited in their mobility, such as for one respondent who misses being active and now uses MTurk to give him a "mental boost":

> "I actually look forward to playing some of the games and I like that I am using my brain. My body is not functioning that well so using my mind gives me a lift." – *P26*

Furthermore, the flexibility of crowd work, including the opportunity to work from home, can provide alleviation from the stress of a traditional work environment. For those with conditions of severe anxiety and depression, working from home can afford a sense of comfort and prevent them

from encountering things that may trigger feelings of anxiety. Likewise, for those with conditions unrelated to mental health, avoiding the challenges of traveling to and navigating a physical workplace can avert stressful situations. Altogether, respondents with a variety of disabilities find that the flexibility of crowd work mitigates their levels of anxiety:

> "I value being able to work independently and working on Mturk has given [me] the ability to do that while working from the comfort of my home, which is something I need while I am dealing with severe anxiety and depression almost daily." – *P27 (severe anxiety and depression)*

> "A lot of the anxiety that I experienced going to my physical workplace has all but vanished since [I] started working on mTurk. My mental health in general has improved remarkably and I feel I don't feel constrained by being tethered to my old job's arbitrary scheduling." – *P10 (hard of hearing and motor skill impairment)*

With regards to lasting impressions of one's prospects, a number of our respondents expressed that their crowd work has helped provide them with a feeling of purpose. For many, physical/mobility conditions prevent them from doing things such as leaving their homes or being active, making it difficult for them to find other work or activities that do not involve using the computer. With limited options for how to spend the day, engaging in crowd work can provide structure and direction, as told by one respondent who suffers from chronic pain and often cannot walk or move unassisted:

> "I think it's also nice to feel purpose. Without this my day would be aimless and I would feel lost. Turking has given that back to me." – *P8*

For another respondent with end stage renal failure, working on MTurk provides both a distraction while he undergoes dialysis three days a week and a sense of importance to his daily activities:

> "Basically, I have been living a Covid-life since 2010. Working on Mechanical Turk gives me someplace to go. It gives me something to do. I spend so much time 'just sitting' that it is good to know that I can be involved in things that are important and make a little cash at the same time. I don't feel like I am just wasting a lot of time now." – *P26*

This sense of importance in one's work can go beyond how workers view themselves and impact how loved ones view them as well. Of our 31 respondents, 9 of them (29%) indicated that their MTurk work improves confidence in their abilities, either from themselves, friends, families/partners, or therapists. For one respondent with executive functioning issues, sharing his work experiences with those around him provides them with assurance:

> "It feels good to do something, anything [to] let my friends and family know that I'm actively doing something." – *P22*

Other respondents noted that their work on MTurk is a way for them to "gain back some self respect" and that it "gives [them] some dignity" through the financial freedom it affords. Hence, making money through crowd work can demonstrate self-sufficiency. In line with this, one respondent detailed how her work on MTurk has improved both her and her partner's perceptions of her contributions to their household in light of her social anxiety and depression:

> "When I do treat it like a job it makes me feel like I am contributing and gives me something to do all day. As I work and save my partner seems proud of me. If he needs money for a broken air conditioner I can pitch in or pay for the whole thing. That feels good. Before I did nothing but the house work. There's not that much house work

> with no kids around. It's good for me to have something productive to do. I think it's healthier for my mental state." – *P30*

Taken together, our respondents receive many benefits from performing their work on MTurk. These benefits range from the money they earn, the knowledge they gain from working on tasks, and the comfort they receive from the flexibility of crowd work and proving their capability to be independent. Although wages and educational attainment can be received by all workers, we suspect that some of the mental benefits, such as a feeling of purpose or expressions of newfound self-reliance, may be more prevalent among the community of workers with disability. This is in part due to the limitations of disability and the impact they can have on one's sense of agency. While crowd work may give a sense of power and meaning back to workers with disability, with the benefits also come the drawbacks, as we discuss next in Section 5.3.2.

5.3.2 A Source of Adversity. Despite the benefits, workers with disability also acknowledge challenges that emerge from engaging in crowd work. Of our 31 respondents, 7 of them (23%) depicted negative impacts that this work has on their lives, with many of these effects relating to the precarity of maintaining one's earning status. One of these challenges is in cultivating a work-life balance, which can be especially difficult in employment models where payment depends on the amount of work completed. As one respondent described, it can be difficult to detach from work when vital expenses depend on it, even at the cost of one's health:

> "Mturk has helped me to earn money to help pay for my medications and health care. I do have more stress because I find I push myself to do it even when I should be taking care of myself and resting. The small amount of pay for a lot of work really takes its toll on you mentally and emotionally." – *P11 (Postural Tachycardia Syndrome)*

The pressure to prioritize work over self-care comes at additional costs for our respondents, including less time to socialize with others, headaches and strained eyes from continuous screen usage, and a general feeling of burnout. Amplifying this pressure further is the asymmetry of the system altogether, such that an imbalance of the MTurk platform stacks the deck in favor of their requesters over their workers. Platform policies give requesters the ability to reject workers' completed tasks at no cost to themselves, but these rejections adversely affect workers' approval ratings. Poor approval ratings can obstruct workers from picking up well-paying tasks, resulting in skepticism from our respondents when considering which requesters to work for and extra effort on their part to rebuild their reputation after rejection.

To summarize, respondents face adversity when depending on the MTurk platform as a consistent source of income. Many push themselves to work harder and longer to meet financial goals, resulting in greater physical and mental strain. On top of this, increased effort is often needed by respondents to maintain their ability to accept a wide range of tasks due to the insecure situation for workers on the platform. While these challenges can be encountered by all workers regardless of their disability status, workers with disability may be disproportionately afflicted due to how their condition impacts their work. Noting MTurk workers' familiar struggle to earn a stable income, workers with disability may suffer further from the limitations that their condition creates atop existing obstacles of the platform, as we discuss next in Section 5.3.3.

5.3.3 The Impact of Disability on Wages. As discussed in Section 5.3.1, the income earned from MTurk is the most widespread benefit received by respondents. In the same vein, money was reported as the most common motivation for continued work on the platform. When asked about the significance of making money through this work, 22 out of our 31 total respondents (71%) stressed that their ability to earn these wages is important. Moreover, when we asked our 19 respondents that indicated that they interact with others if they find greater motivation through

making money or interactions with others, all 19 indicated that they are motivated by money, and 5 of these respondents (26%) went further to say that they find money to be their greatest motivator for continuing this work. True to prior studies of the motivations of crowd workers, our respondents engage in microtask crowd work primarily for monetary reasons, not for enjoyment [48, 49].

Beyond a motivation to earn money, it is also *imperative* for many to earn this money. A few of our respondents said that they perform crowd work to pick up extra cash on top of a separate full-time income (either from their own employment or a spouse's), but 10 of our 19 respondents (53%) who interact with others specifically expressed a *need* for this income when justifying the motivation for money over interactions. For many respondents, the wages earned from crowd work are needed to pay for essential medical costs, and based on the current financial situation that a worker is in, some are not in the position to be able to prioritize anything else:

> "Money has to take a priority for me right now as I do not want to get into debt and have many, many medical bills to pay." – *P16*

Unfortunately, many of our respondents feel that their condition has a negative impact on their ability to work and make money on the platform. When asked about the impact that their disability has on the amount of money they earn from MTurk, 9 out of 31 respondents (29%) mentioned that they have either lost out on tasks or have been rejected and lost out on payment due to an incompatibility of the task with their condition. Losing out on tasks involves either being unable to complete a task due to a condition or being screened out of having the opportunity to complete a task due to a condition. Pertaining to the loss of payment, respondents described the risk involved in picking up subjective tasks when you "do not think like others", a common perception of some of our respondents with Autism Spectrum Disorder and mental health conditions. As told by one respondent with depression, PTSD, and Generalized Anxiety Disorder:

> "I know that I do not think like others and that sometimes I have had Hits rejected by requestors that I think were looking for specific answers, whether they want to admit that or not, and my answers were not mainstream and so they rejected me." – *P5*

Disability can also play a more indirect role in limiting the amount of money that workers can earn. 10 of our 31 respondents (32%) lose out on income from either not being able to finish tasks or not being able to work for periods of time due to general discomfort or fatigue. For many of our respondents, especially those with physical/mobility issues, pain can happen at any time and can be debilitating, as detailed by one respondent:

> "Because I hurt a lot and need to take time off to recoup if I'm in a flare it definitely affects my income on Turk. There are days where I can't work and that hugely affects my income from Turk. When I don't feel well it's not just a cold or flu. I simply cannot move my body or lift myself to concentrate on working. Therefore I lose out on income." – *P8*

In addition to pain, another common occurrence that can deter task completion is needing more time to complete tasks than workers without disability, as indicated by 13% of our respondents. This has a two-fold effect on the wages of our respondents with disability: they are not able to complete as many tasks in the same amount of time as the average worker, and they are more likely to run out of time on completing these tasks, either from the task timing out itself or from it expiring in the queue they use to catch HITs from external scripts and tools. For one of our respondents with neuromuscular disease, physical limitations prevent him from working faster, as he describes here:

> "I definitely do not make as much as others because I cannot physically mouse click fast enough. People give estimates how long it takes them and it amazes me how much faster they are. I am usually twice as slow." – *P9*

Apart from physical limitations that constrain wages, some respondents face conditions that make it difficult to focus on their work. This results in either lost time that could be spent making money or reduced quality in their answers to HITs, sometimes leading to a greater number of rejections for these respondents. More rejections, aside from limiting the amount of tasks that they can take on in the future, can also be damaging mentally and emotionally, especially to those who already live with conditions relating to their mental health. As one respondent suffering from social anxiety and depression recounts, positive experiences received from working on the platform can be negated by the disheartening nature of rejection:

> "When I'm depressed [it] is very hard to concentrate. My performance is definitely affected. I'm slower. Sometimes I run out of time before I finish which is very unfortunate. I have made a few mistakes while trying to work through a couple of hits while in this mode and got rejected. I have since taken a break from mturk. This is the first hit I have done in a while. I was discouraged." – *P30*

Putting it all together, money is the most widespread incentive for our respondents to perform crowd work, and for many, this is due to the urgency with which this income is needed. However, those who may need this money the most often find that their work is impeded by their disability. It then does not matter how well a task pays if a worker lacks the ability to complete the task and receive that payment, as expressed by one respondent:

> "There are a lot of well paying jobs that I turn down because they would require a lot of work and I know that I would not have the energy to complete them." – *P26*

5.3.4 Interaction by Necessity, Not Community. Reflecting the widespread usage of online platforms for communication reported in our first survey, 19 of our 31 respondents (61%) indicated that they interact with others about their crowd work, mostly through online forums geared specifically towards MTurk workers. For the rest of this section (i.e., Section 5.3.4), we will only be discussing the responses from these 19 respondents, and we will refer to them as a sub-population of our second survey respondents. We probed further into this sub-population's use of these online communities and other avenues of interaction, both in general and with regards to their disability. We do this to investigate *why* they utilize these communities and whether their disability plays a role in how they utilize them.

Our sub-population of respondents reported that they interact with others for a variety of reasons, most of them with the purpose of facilitating their work. Most commonly, these exchanges with other MTurk workers are used for finding good HITs (37% of sub-population), relaying which requesters are reliable or trustworthy (37% of sub-population), and gaining assistance for general questions about the platform and technical problems (37% of sub-population). Beyond garnering useful information, 26% of the sub-population shared that they use interaction as a means to receive support from others or vent about frustrations with the platform.

Through the shared experiences that crowd workers encounter and the ease of communicating with others through online platforms, there is the potential to amass social connections from around the world. Given that many of our respondents noted that they benefit from the distraction provided by crowd work, one could imagine that building a community with other workers where discussion beyond work could occur may likewise be beneficial. However, only 4 of the 19 respondents (21%) claimed that they have any intention of using these connections as a means to socialize or build community. In fact, multiple respondents specifically went on to tell us how they do *not* utilize these interactions as a way to foster a community:

> "I do have interactions with people, but they're shallow, work related interactions that don't have the possibility to develop into friendships, and wouldn't even if my ability to

> develop such relationships wasn't impaired to begin with. We're all doing this because we need the extra money, and have irregular times in our schedules in which to fit in extra work." – *P12 (Autism Spectrum Disorder)*

Looking deeper into how the conditions of these respondents may impact their conversations, we found that 11 of the 19 (58%) have never mentioned their condition during these interactions with others. Of these 11 respondents, 5 said that their condition "just doesn't come up" or is unrelated to what is discussed on the forums. The other 6 indicated that they are actively concerned about maintaining their privacy and preventing discrimination against themselves, which is why they choose not to disclose their condition to others online, as explained by a few of these respondents:

> "I have not mentioned my disability. Simply put I don't think it's their business. I want to keep my private life private so I don't tend to discuss anything private from my life on the forums." – *P8*

> "I haven't directly explained that I am disabled, but have alluded to it when explaining why I do or do not do something a certain way. One of the joys of the internet, to me, is that I can be treated as an equal and not some poor, frail creature to be pitied." – *P16*

> "God, no. Why would I? I've only recently begun admitting to other people that I'm autistic, even though I'm quite old now. It's just not something to shout from the rooftops. It's something people judge you for, often more harshly than they should, and why would it benefit me in any way to open myself up to that?" – *P12*

Even for those who have divulged their disability, there were mixed responses with regards to how it was done and how they view the decision to do so in retrospect. For those respondents who discuss work with people they are familiar with outside of MTurk, acknowledging their condition is natural, while other respondents who only interact online with strangers noted that they have not actually outright revealed their condition, opting instead to merely allude to it. As for the consequences of disclosure, 4 respondents (21%) indicated that they would do so if it could help another worker in a similar position, while 2 other respondents indicated that they have had negative experiences as a result of divulging this information. The question remains of whether the good of helping others can outweigh the bad of potential judgment and misrepresentation.

Overall, though many of our respondents communicate online with other MTurk workers, building a recreational community is not typically at the forefront. Instead, the focus of these interactions most often is to garner useful information that can assist in their work. While some of our respondents are comfortable disclosing their disability to others, especially if it can help those in a similar position, most of them have not before, either because they do not think that it is relevant to their work or because they want to maintain a sense of privacy. As such, findings illustrating greater use of online communities for workers with disability may have less to do with the interaction itself and more with a strategy for coping with increased difficulty when it comes to earning money (Section 5.3.3). Until improvements can be made that will more directly address their concerns, as discussed next in Section 5.3.5, relying on community assistance may be the best option.

5.3.5 Progress for Disability is Progress for All. When asked about improvements that they would like to see on MTurk that are relevant to their condition, many of our respondents had strong opinions of what changes they would make. Notably though, despite the question specifically being asked in the context of respondents' disabilities, only a few suggestions were associated with improving accessibility of the platform in the traditional sense. For instance, from respondents with hearing impairments, there was the suggestion for tasks to include closed captioning on videos and audio that have the singular purpose of conveying information to the worker, rather than relying

on the worker to translate something they have heard. Another respondent, whose hands "do not function very well" and relies mostly on voice recognition to navigate the platform, suggested accessibility options that would better facilitate his needs:

> "[MTurk should be] more easily navigated for voice recognition. Each of the links having a label that you can easily call. No more sliders which are becoming popular." – *P9*

The majority of our respondents, however, are not prohibited from executing specific tasks on MTurk, and as a result, the areas of improvement mentioned from them can benefit the broader worker population. Though these changes could be advantageous for all workers, we find that workers with disability could have greater potential to reap these benefits considering that they are disproportionately affected by the issues that would be rectified. For the rest of this Section 5.3.5, we will discuss these areas of improvement and recall how the corresponding issues may either be magnified for workers with disability or how their impacts may have greater consequence for workers with disability.

Of our 31 respondents, 10 of them (32%) mentioned a desire to be able to pause HIT timers or to have requesters extend their HIT timers. Although all workers could benefit (or at least would not be disadvantaged) from having more time to work on tasks, many of our respondents' conditions slow their work and result in them spending longer on tasks, as seen in Section 5.3.3. It is natural then that our respondents feel that the length of time that requesters set when posting a task is often impractical, does not reflect the actual time to complete the HIT, and especially does not consider those with disability, as noted by two of our respondents:

> "Make the requestors have lengthier timers. Why? Because we get requestors that have 20 minute jobs and give us 25 minute timers. That never works. That's because THEY may have decided it takes 20 minutes but some people read slower, someone might have to go to the bathroom in the middle of something, or life in general gets in the way. We HATE racing to beat timers because requestors can't extend it. The timer needs to be AT MINIMUM 3 times the length of the survey. The timer doesn't affect the requestor at all.. it's there for the worker. If a worker is reacing *(sic)* against a timer they aren't providing the best work. That needs taken into consideration." – *P8*

> "This also brings me to my next proposal of allotting more time per HIT for people with disabilities. Some requesters will sometimes have very impractical time limits that make it almost impossible for me to finish tasks." – *P10*

The next most common improvement that our respondents would make to the platform is to have requesters pay higher wages, as mentioned by 26% of our respondents. A desire for higher wages is not new among crowd workers, and is definitely not exclusive to those with disability, but it may be especially pertinent for those with disability. As discussed in Section 5.3.3, workers with disability may be more reliant on their MTurk income to cover essential costs, yet also more likely to be hindered when it comes to earning this income than workers without disability. Wages that more accurately reflect the time spent working as opposed to paying on a task-by-task basis would also prevent workers with disability who take longer to complete tasks from being punished as a result of their condition, as one respondent describes:

> "I would enjoy better-paying HITs, to be honest. Sometimes, my condition doesn't let me work quickly enough so I do struggle to do enough HITs that would allow me to make a more livable wage." – *P10*

Further in line with the power dynamic of MTurk discussed in Sections 5.3.2 and 5.3.4, 16% of our respondents indicated that they would like Amazon to address problematic requesters and

overall be more understanding of their workers with disability. More specifically, respondents wish for Amazon to either set up regulations that requesters must abide by or take greater action to put a check on requesters that "scam" workers out of payment. Considering the impact that our respondents' conditions have on their ability to earn money through MTurk, it is imperative that every task they *can* complete counts towards their earnings. Furthermore, for workers who "think differently" from others due to disability, the support from Amazon could improve both their earnings and their confidence towards picking up different types of tasks, as noted by one respondent with ADHD and Complex PTSD:

> "Find a way to make Amazon care about the Master's qual AND actually step in to help resolve and check requesters. This would make me far less anxious and it would allow me to participate in more because there are things I really don't feel comfortable doing since my opinions are so different than other people's, I think differently so there is a lot of room for 'error'" – *P25*

Finally, 3 of our 31 respondents (10%) suggested specific platform feature additions, such as adding in a tutorial for new, inexperienced workers and incorporating the features of existing tools that are already widely used by many workers, such as Turkopticon and MTurk Suite. Although this integration could assist all workers, providing immediate access to these features could help workers with disability get on the path to earning money more quickly, rather than enduring the platform's learning curve and waiting to find out about these existing tools through other sources.

To summarize, the improvements that most of our respondents want to see for the MTurk platform have the potential to benefit the broader community of workers. However, as we know from our discussion of how the challenges of MTurk are heightened by the limitations of our respondents' conditions, these improvements could have deeper significance for workers with disability.

5.3.6 Individuals, Not a Collective. It can be easy to lump all crowd workers with disability into a category representing unified goals and experiences using the platform. However, if our purpose is to understand them, then we need to acknowledge the differences in their thoughts and opinions. Our respondents are individuals, and the themes expressed earlier do not speak for all of them.

Despite knowing that we were interested in learning more about the broader community of crowd workers with disability, some of our respondents did not feel that their experiences might be relevant to our study because they did not have a condition that they believed could impact their work. Especially for those with conditions that do not affect their ability to use a computer or comprehend tasks, there were worries that they could not appropriately contribute to the conversation, as mentioned by one respondent with a leg amputation when asked about any final comments on the survey:

> "Not having a disability that affects my cognitive function, I hope I didnt *(sic)* waste your time and money" – *P7*

Indeed, many respondents described not having the types of issues with working on the platform that has been captured in previous work about the accessibility of Mechanical Turk. Of our 31 total respondents, 6 said that their condition causes no issues or has no impact on their work (19%), 11 said that their condition has no impact on the amount of money that they make (35%), and 10 have no recommendations for changes that could be made to the platform, or at least none that relate to their condition (32%). Additionally, 7 of our respondents also said that working on the platform has not affected them in any substantial way (23%). All things considered, our respondents are a diverse set of workers with conditions that impact their work and lives in different ways.

Even when accounting for type of condition, we saw variance with how two workers would perceive their experience of the platform and what the work offered to them. This shows that even within the context of a certain type of condition that workers may face, there is no conclusive way to be impacted by it. For instance, we take a look at two of our respondents who both indicated that they have conditions of anxiety and depression. For *P30*, her depression can play a large role in her ability to complete work on the platform, and the effect that it has can be discouraging and cause disruption of her time on the platform (as seen in the quote from Section 5.3.3). However, *P19* detailed the positive effect that working on MTurk can have for his condition:

> "my condition makes me feel positive when i am on mturk because i have less anxiety and can make money at home without being outside and having panic attacks, no impact on quality and doesnt *(sic)* affect payments" – *P19*

With this in mind, our goal was not to identify a unified vision for workers with disability, but instead to delve deeper into their experiences with microtask crowdsourcing. Ultimately, we seek to have our respondents feel heard and understood by the research community, an opportunity that respondents appreciated and acknowledged:

> "Thank you! Thank you for asking the important questions! No one does this and it's important people understand us!" – *P8*

Crowd workers with disability are diverse, as evidenced by the variation of thoughts and opinions expressed by our respondents. The MTurk experience of one worker does not predicate the experience of another, even if there is a resemblance in the conditions that they live with. Greater understanding of the range of impacts brought on by disability in crowd workers is the first step towards creating a more gratifying experience for them.

6 DISCUSSION

In this paper, we have examined the differences in experiences of microtask crowd work between workers with and without disability, going on to explore these trends further and discover themes of the impact that disability can have on performing crowd work. In this section, we first consolidate the findings of our surveys to identify similarities and conjecture as to why we see discrepancies. Next, we extend our discussion by providing implications and future work that would meet the needs of our respondents most, and we connect our findings to issues that are prevalent within the gig economy as a whole. Finally, we end by recognizing our work's limitations.

6.1 Consolidating Survey Findings

We start by consolidating the results of our surveys to make sense of our overall findings. In our first survey, we analyzed the differences between how our respondents with and without disability perceive and interact with the MTurk platform. From this analysis, we discovered four principal differences: workers with disability experience greater difficulty in using the platform, indicate lower target wages, interact more with others, and receive more benefits beyond money, such as interaction with others and being part of a community, than workers without disability.

In agreement with the results of Survey 1, we found that our respondents in Survey 2 encounter several challenges related to their condition that impact their ability to perform work on MTurk. Some of these challenges include difficulty finding work compatible with their condition, working quickly, or working for long periods of time, resulting in our respondents being unable to complete as many tasks, and in some cases, causing tasks that they were actively working on to time out. Overall, this helps provide further understanding as to why workers with disability in Survey 1 were found to have greater difficulty finding tasks that they can work on and completing tasks

than workers without disability, potentially contributing to lower satisfaction and lower ease of use of the platform.

Our findings of Survey 1 are further validated by examining the impact of disability on the wages of our Survey 2 respondents. We found that many of these respondents believe that their condition has a negative impact on the amount of money that they are able to earn on the platform, which directly corresponds to the greater difficulty they experience, as discussed above. By being unable to complete as many tasks as they could without disability, our respondents believe that their condition results in lower overall earnings on the platform. With the knowledge of how their condition handicaps their ability to make money, workers with disability may alter their wage aspirations to fit with this reality, resulting in their lower target earnings found in Survey 1.

We continue to find correspondence between our results with respect to the interactions that our respondents with disability have with others. In Survey 2, we found that a majority of our respondents interact with others about their work on MTurk, potentially echoing our finding in Survey 1 that workers with disability are more likely to engage in interactions related to crowd work. As indicated by many of our respondents, the assistance that these interactions can provide is important to their work, with some going so far as to call it a necessity. Ergo, our Survey 1 finding may be a result of a greater dependence that workers with disability have on these online communities. Moreover, due to the limitations that disability places on the capacity of many of our respondents to find other forms of work, it may be crucial for them to maximize their earnings on MTurk by partaking in these interactions than for those that have alternative employment opportunities.

Lastly, we discuss the apparent discrepancy between stated worker motivations for continuing crowd work in Survey 1 and Survey 2. Although workers with disability in Survey 1 were more likely to consider interaction as a benefit and be motivated by the prospect of community, very few respondents in Survey 2 indicated motivation or enjoyment received from online interactions. A few things may explain this. The first is that even if workers with disability are more likely to consider these interactions a benefit or motivation, it does not mean that they are the *primary* benefit or motivation. We note that in Survey 2 the motivation received from interactions was framed in the context of a comparison to the motivation of earning money. The overwhelming answer was that money is the primary motivation and benefit of the platform, which is consistent with Survey 1 findings. The second consideration is our interpretation of what constitutes a benefit or motivation. Building a worker community can be a benefit if it helps you make more money on the platform, and it can motivate you to keep working if you know that these interactions are protecting you from dishonest requesters, irrespective of social benefits. Finally, "interaction with others" was paired with "being part of a community" in answering Survey 1, and workers may feel part of the MTurk community simply by participating in the same work as others, rather than through social interactions.

6.2 Implications and Future Work for Policy and Design

Based on the findings of our second survey, we propose several implications for bettering the microtask crowd work experience for workers with disability.

6.2.1 Consideration for Better Task and Workflow Design. Although recommendations for greater accessibility are crucial for improving the crowd work experience for workers with disability, such as advising requesters to ensure that tasks meet web content accessibility guidelines [59, 64] and provide closed captioning on audio and video that is meant to convey a message [57], we find that many of these workers' issues stem more broadly from a usability standpoint. Two of the most common issues mentioned in prior literature for workers with disability have related to trouble

finding tasks that are compatible with their condition and task timers that are too short, issues that were addressed in our Survey 2 findings as well. Solutions mentioned in this literature have included introducing metadata for tasks that indicate the types of abilities it would take to complete such a task [51, 72], matching workers with tasks that are similar to tasks that they have already completed [25, 72], and allowing workers with disability to disclose their disability in order to receive special accommodations, such as additional time to complete tasks [63, 72].

Following Liu et. al. [45], we recommend "focusing on abilities, not disabilities", encouraging the identification of needed abilities, such as task ability metadata, rather than the disclosure of disabilities. Given that many of our respondents indicated that they have not disclosed their disability to others and do not wish to for fear of discrimination, solutions that do not rely on revealing disability status to requesters, as well as solutions that can be utilized for all workers regardless of disability status, may be preferred. For example, special time accommodation on tasks could be given by disclosing a condition to the platform, which would then automatically give workers with disability extra time unbeknownst to the requester. Additionally, encouraging requesters to be more flexible with their task timers [4, 71] or enabling the option for workers to be given unlimited time on tasks [64] could benefit all workers without singling out those with disability.

Another solution for the incompatibility of tasks with workers' conditions is allowing workers to subcontract tasks [51, 72]. Outsourcing parts of a task that cannot be completed would be beneficial for all workers as a reduction of invisible labor [61], but workers with disability may especially stand to benefit considering that they may have a greater likelihood of encountering incompatible tasks while also having a greater reliance on the money earned from crowd work. As mentioned above, subcontracting tasks in practice should not single out workers with disability, and as such, should be available for all workers to perform. Care should be taken to prevent requesters from being informed of why workers with disability may be outsourcing parts of their tasks in order to prevent blocks on their worker accounts. Instead, either workers with disability should not have to share a reason as to why they could not complete the task, or if they do, requesters should not be privy to this information.

6.2.2 Improving Financial Experiences. From prior literature, we know that the use of existing tools to assist with microtask crowdsourcing is prevalent among the worker community [35], and workers with disability appear to be no exception. Following the suggestion of multiple of our respondents, we recommend that either platforms integrate the functionality of these external tools and scripts directly into their interfaces [63] or that complimentary tool-sharing becomes more widespread. Adoption of this functionality could not only help facilitate the process of earning money for new workers, but also eliminate imbalances between workers with different financial situations and social connections over the use of private and remunerated tools [68]. Given our findings indicating lower target wages while also being more heavily dependent on these wages, workers with disability may be disadvantaged when it comes to being able to acquire third-party scripts and tools, and as such, they may benefit most from their open-source access.

Low approval rates for completed tasks can also prohibit the earnings of workers with disability by limiting the tasks that they are eligible to complete [35, 50]. As our respondents noted, struggling with one's condition while working on tasks can lead to mistakes, and for those whose condition results in them "thinking differently" than others, their answers to tasks may be considered non-standard. Both scenarios can lead to rejections for workers with disability. As workers with disability learn to navigate the platform, they discover what types of tasks to avoid for fear of rejection, or they refrain from working during times when they know that they may be more prone to rejection. However, their lifetime approval rate for all tasks is forever impacted by their early inexperience.

To counter this, we propose that platforms allow there to be the option such that requesters can limit not just by lifetime approval rating, but also by approval rating within a shorter, more recent timeframe.

While the previous design suggestions have been to assist workers with disability in finding and completing more tasks in order to increase earnings, the root of the issue is largely the low wage rates of the platform. Although low wages is a predominant problem across the worker community [23, 31, 61], our findings that workers with disability may be more likely to rely on crowd work as their full-time source of income illustrate their exacerbated need for higher wages. One way to achieve this is for requesters to pay their workers based on the time they spend on tasks rather than for the tasks themselves [67]. For workers with disability who take longer to complete tasks, this could help alleviate concerns of not meeting financial goals, allowing them to rest and practice self-care when their condition requires it.

6.2.3 Tailoring Social Experiences. Due to the significant impact that interactions with other workers is able to have for workers with disability, we propose solutions that could help facilitate, personalize, and assuage concerns of these interactions. As proposed by Ma et al. [46], integrating existing online crowd communities into the MTurk platform directly could provide benefits to workers, especially newer workers with disability who may be more likely to utilize these communities, as well as benefit from the assistance they provide. Intertwined with platform integration, a direction of future work to pursue could involve exploring multiple options for social intervention tailored to workers' preferences given the diverse attitudes that we heard from our respondents about their desire for social interaction and the different natures of their interactions. These tailored interventions could include adjusting the types of interaction that workers are prompted with, as well as when and how frequently these prompts would occur.

Finally, creating an online platform that is solely dedicated to crowd workers with disability could provide a number of benefits [72]. A community specifically created with disability in mind may not only help workers receive assistance on tasks from a disability perspective, but also help workers feel more comfortable opening up about their conditions to receive support from others in a judgment-free space [54]. For a tighter-knit community that shares common experiences and challenges, peer coaching from other workers with disability on task-specific guidance [8] and general crowdsourcing suggestions [30, 60] may have greater benefit than advice taken from the larger crowd work communities, and this mechanism may further provide workers with disability a sense of purpose and belonging within the community [45]. Such peer coaching systems could match workers to others who have similar difficulties that they do, providing a more individualized mentorship experience.

6.3 Connecting to Larger Issues within the Gig Economy

We now broaden the scope of our findings to connect them to larger issues that impact the gig economy today, including inclusion and accommodations for underrepresented groups, algorithmic control, and collective action.

6.3.1 Inclusion and Accommodations for Underrepresented Groups. Many underrepresented groups in the crowdsourcing and gig economies have been studied in prior literature, including workers with disabilities [25, 43, 63, 72], elderly workers [4, 38, 39], and workers living in rural, low-resource areas [9, 16, 22, 64]. In this work, we connect to this existing literature with findings on accommodating gig workers with disability in two distinct ways. First, there is the concern that crowd workers with fewer economic opportunities may engage in unhealthy behaviors, such as working too long without a break [9]. Indeed, we saw similar findings in our own study, which

can be detrimental to workers with conditions that require greater rest. It is important then to find a trade-off for workers in disadvantaged communities between earning enough money to support their needs and not over-working to the point of harming their health. As such, different interventions should be explored that take a worker's physical and mental conditions and economic situation (including local cost of living [16]) into account before making a recommendation to take breaks. This trade-off should also consider short-term productivity (productivity of a single day) vs. long-term productivity (productivity across a time-span of a week or month).

Second, we see in both our work and prior literature that workers within the same underrepresented group have different needs. For instance, for rural workers with varying computer and technology skills, training will look different depending on how advanced the user is prior to the training [22]. In the same way, workers with disability require different levels of support when it comes to performing different activities, such as finding appropriate tasks to work on and completing tasks within the time limit, even when two workers live with the same condition. Having a one-size-fits-all approach to supporting crowd workers with disability will likely not provide enough assistance for some workers, while proving to be overbearing for others. Determining which aspects of crowd work prove difficult to individual crowd workers and providing them the right level of support is a direction to be explored as future work.

6.3.2 Algorithmic Control and Collective Action. The trials and tribulations faced by workers in the gig economy have been well-documented, from the power imbalance that workers experience against the influence and protection that requesters receive [35, 41, 50, 58], to the inadequate and inconsistent wages that they earn [23, 49]. Beyond the lack of support that they often receive from platforms, gig workers are also frequently on the receiving end of algorithmic control. We see algorithmic control in the way that reputation points and ratings impact the tasks that workers are eligible to complete [18, 33, 35, 47, 50] with reputation directly tied to workers' productivity and skills, allowing gig platforms to effectively manage, evaluate, and discipline workers [36]. As with the obstacles faced when performing crowd work, we believe that crowd workers with disability (and likely gig workers with disability as a whole) may be disproportionately impacted by algorithmic control. Given our findings that crowd workers with disability require greater time and assistance to complete tasks, as well as often have conditions that can affect the quality of their work, these data-driven interventions may be unintentionally harming workers with disability.

In our own findings, we have found that online worker communities play an important role in helping workers with disability navigate the imbalances and algorithmic control of the MTurk platform, going so far as a form of collective action against requesters with poor intentions [34]. Beyond the typical interactions of these online communities, prior research has explored a number of directions that provide crowd workers power collectively over the platforms, such as community platforms with the explicit purpose of collective action [27, 32, 40, 56] and self-governed crowdsourcing organizations [17, 66]. In the absence of the coverage of traditional labor laws [33, 65], however, gig workers must engage in a new economic relationship that lacks worker rights and considerations [69], including disability insurance and protections under the Americans with Disabilities Act (ADA) [28]. For this reason, workers with disability may have much to gain from participating in larger organization towards the improvement of rights for gig workers, and in addition, may find greater purpose in this movement from the support that they can provide to other workers with disability [45].

6.4 Limitations

Many of our limitations stem from the population of workers that we both chose to include and were able to gather to participate in our study. We only allowed workers from the United States to participate in our first survey, meaning that a large portion of the MTurk worker population were excluded from contributing to our findings. Exploring the experiences of workers with disability who are outside the U.S. is one aspect of future work. Furthermore, 31 respondents with disability out of 181 from our first survey completed our follow-up survey, albeit this sample size is likely higher than if we had attempted to conduct interviews for the second phase of our study. By choosing to conduct a long-form survey rather than interviews, we presumably sacrificed depth of the responses we would receive. Future work should be done to probe deeper into the experiences of crowd workers with disability through interviews.

7 CONCLUSION

In this work, we investigate how microtask crowd workers with and without disability differ in their experiences using the Amazon Mechanical Turk platform. These differences inspire us to delve deeper into the crowdsourcing experience for workers with disability, including their financial and social experiences, as well as the benefits and challenges they encounter through this work. From these findings, we learn that workers with disability receive benefits from performing crowd work; however, they also encounter challenges that can hinder their ability to earn a livable wage on the platform, overall influencing how and why they choose to interact with other crowd workers. We find that although our respondents share many of the same challenges as crowd workers without disability, the effects on those with disability may be magnified as a result of the limitations of their conditions and the disproportionate impact of the platform's challenges. We hope our study serves as an initial attempt to gain greater understanding of the broader community of workers with disability, ultimately with the intention of promoting greater usability of crowd and gig platforms and achieving a more valuable experience for those with a diverse range of conditions.

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