

The Freedom of Choice in the Gig Economy*

Belief in Free Will Positively Predicts Job Satisfaction

Mingjia Chen

Hadi Ahmad

Tianen (Evan) Hao

February 11, 2024

In the area of work and personal beliefs, the concept of free will has a key impact on job satisfaction, with people from different demographic backgrounds having various views based on their unique circumstances. We conducted a replication study of the paper by Feldman et al. (2018) regarding the gig economy within Amazon Mechanical Turk and found a strong positive correlation between individuals' beliefs about free will and their job satisfaction, significantly mediated by perceived autonomy. Since the gig economy is such an essential part of society today, replicating this study will advance the conversation about how beliefs about free will impact job satisfaction in non-traditional work settings.

Table of contents

1	Introduction	2
2	Data	3
2.1	Data Tools	3
2.2	Methodology	4
2.2.1	Study 1	4
2.2.2	Study 2	4
2.2.3	Study 3	6
2.3	Replication	6
3	Results	6
3.1	Main Findings	6
3.2	Reliability of Subscales	6

*Code and data are available at: https://github.com/ShadyEvan4830/Freewill_Analysis/tree/main; Replication on Social Science Reproduction: <https://www.socialsciencereproduction.org/reproductions/26b6954c-44ec-4eba-afbb-e19847958dc8/index>

3.3	Demographic Factors	7
3.4	Detailed Analysis and Trends	8
4	Discussion	9
4.1	Detailed findings	9
4.2	Theoretical Implications	9
4.3	Journal Study: Work and Freedom in the Context of Agency Beliefs and Job Satisfaction	10
4.4	Ethical Considerations in Long-Term Behavioural Studies	10
4.5	Accounting for Bias	11
4.6	Analytical Limitations	11
4.7	Future Research Pathways	12
5	Conclusion	12
	Appendix	13
.1	Study 1 Scale	13
.2	Study 2 Scale	13
.3	Study 3 Scale	14
	References	15

1 Introduction

The intersection of agency beliefs and workplace outcomes has become a focal point of contemporary psychological research, revealing nuanced insights into how deeply held convictions shape our professional experiences. Feldman, Farh, and Wong (2018) seminal investigation into the dynamics of free will beliefs and job satisfaction unveils a pivotal link, positing that individuals' conviction in their autonomy significantly forecasts their contentment at work. Their research amplifies our understanding of the psychological underpinnings of job satisfaction and propels a discourse on the broader societal and cultural factors that sculpt our professional well-being. This paper seeks to build upon Feldman and other scholars' (Feldman, Farh, and Wong 2018) foundational research, extending its theoretical and empirical contributions to examine the implications of free will beliefs in a distinct yet paralleled context. Our focus shifts towards the burgeoning realm of digital workplaces, explicitly examining the phenomenon within Amazon's Mechanical Turk (MTurk) community. Amazon Mechanical Turk (MTurk) is a crowdsourcing marketplace operated by Amazon where individuals and businesses can outsource tasks and processes to a distributed workforce who can perform these tasks virtually. Our study is poised to explore whether the nuanced dynamics of agency beliefs within the digital gig economy can shed light on the positive ramifications of free will beliefs on job satisfaction among a global workforce engaged in micro-tasks.

The gig economy’s rise reshapes work, offering greater autonomy but uncertain income and benefits. This shift necessitates a new understanding of free will’s role in modern job satisfaction as workers navigate the trade-offs between flexibility and stability. Through this lens, we aim to contribute a fresh perspective to the discourse on free will and job satisfaction, underpinned by robust empirical evidence and a comprehensive analysis of its implications in contemporary work environments.

This paper uses the statistical programming language R (R Core Team 2024) and related libraries such as `tidyverse` (Wickham et al. 2019), `janitor` (Firke 2023), `ggplot2` (Wickham 2016), `dplyr` (Wickham et al. 2022), `readr` (Wickham, Hester, and Bryan 2022), `tibble` (Muller and Wickham 2022), `kableExtra` (Zhu 2021), `psych` (William Revelle 2024), `haven` (Wickham, Miller, and Smith 2023), `Hmisc` (Harrell Jr 2023), and `knitr` (Xie 2014) to analyze the gig economy and Amazon Mechanical Turk. It is structured by summarizing the study’s purpose, methods, and results and emphasizing the positive correlation between free will beliefs and job satisfaction. The introduction introduces the background and outlines the structure of the paper. The data and results sections present each study’s design, questions, and variables with figures and tables Figure 2, Table 3, Table 1, and Table 2. We aim to highlight the use of Likert-type scales and the focus on autonomy, job satisfaction, and free will beliefs. The replication process and the tools used for data analysis are also mentioned, providing a foundation for understanding how the study was conducted and analyzed. The discussion explains these findings and points out their theoretical and practical implications; in addition, in order to further confirm the validity of the original paper and our analysis, we selected another peer-reviewed professional academic journal Baldissarri et al. (2017) as a reference for comparison and to support our opinions. Ethical considerations and biases in accounting address research integrity issues. The conclusion reiterates the study’s contribution to understanding job satisfaction in nontraditional work settings. References provide supplementary information and scholarly resources.

2 Data

2.1 Data Tools

The original paper was based on three studies conducted by the authors, with data that can be found on the **Open Science Foundation (OSF)** website. The provided data (Feldman, Farh, and Wong 2018) was replicated in R (R Core Team 2024), with the goal of determining if there are any errors in the models, and what more can be learned and applied in a Canadian context. The libraries mentioned above are used for supplementary analysis. The goal of the original study was to understand if a relationship exists between a belief of free will and job satisfaction in different cultural contexts.

2.2 Methodology

The original paper was based on two studies conducted by the authors, and secondary data comprising the third study. The questions were translated from English to Chinese and back to English by senior researchers fluent in both languages, due to language differences in Study 2. These translations were cross-verified by another senior researcher also fluent in both languages, to ensure the responses accurately captured the sentiments of the respondents.

2.2.1 Study 1

In the first study, eight questions were asked about free will and three questions about job satisfaction using a Likert-type scale. It looked at responses from 252 real estate agents in Taiwan. The goal of the study was to determine if there was a correlation between the belief of free will and job satisfaction for the chosen respondents, and to test if a three-month delay introduced any variation in results. Each variable represents a question that respondents answered, containing the value provided by the respondent from the survey. This value is stored as an integer ranging from 1 (strongly disagree) to 5 or 6 depending on the question (strongly agree) (Appendix Section .1). As a result, the data is available not just as an aggregate, but for each anonymized respondent. Additional variables are included to store the age and gender of respondents.

2.2.2 Study 2

The second study focused on 137 American freelance workers, with a different set of survey questions examining a broader range of metrics on free will and satisfaction using a Likert-type scale (Figure 1). The goal of the second study was to test if the results of the first study could be applied to other contexts, to test if other agency factors affected the results, and to assess if a six-month delay introduced any variation in results. These questions can be broken down into the categories of job satisfaction, job autonomy, self-efficiency, free will, self-control, locus of control, self-esteem, self-efficacy, and implicit beliefs (Appendix Section .2). Data on these additional variables was collected to examine if controlling for differences in factors like locus of control led to any differences in job satisfaction. Each variable represents a question that respondents answered, containing the value provided by the respondent from the survey. This value is stored as an integer ranging from 1 (strongly disagree) to 5 or 6 depending on the question (strongly agree). The answers to the locus of control questions serve as an exception, storing a sum of values by assigning a 0 or 1 depending on which option was chosen for a set of 13 questions. As a result, the data is available not just as an aggregate, but for each anonymized respondent. Additional variables are included to store the age and gender of respondents.

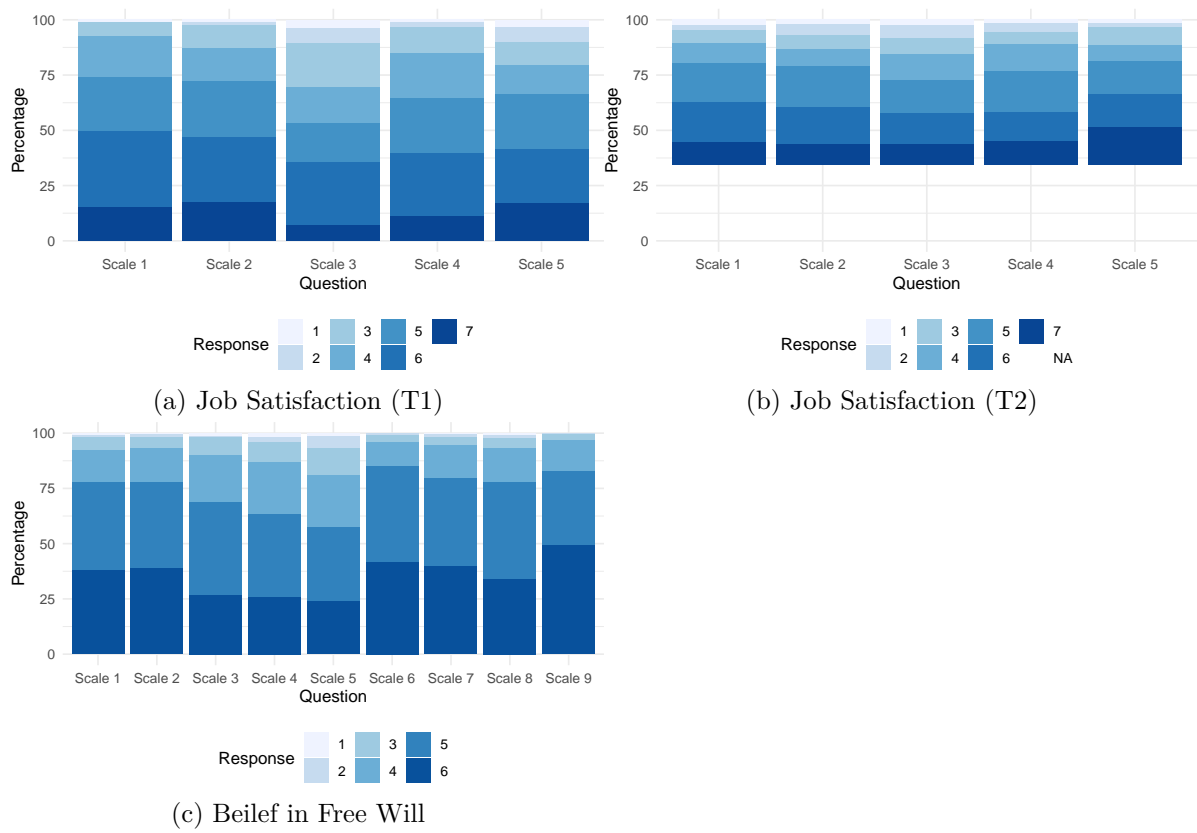


Figure 1: Descriptive summary of Job Satisfaction Likert Scale Results

2.2.3 Study 3

The third study relied on secondary data in the form of the World Values Survey, featuring over 14,000 respondents from 16 countries. The original dataset was not made available, and thus could not be replicated in this paper. Three variables were chosen from this dataset (Appendix Section .3).

2.3 Replication

The original authors used SPSS to run analyses on their findings. Data from studies 1 and 2 was provided in the replication package on OSF as SPS and SAV files, along with a version compiled into a spreadsheet. For this paper, we used R to replicate the findings by using `haven` to read in the data. This caused some incongruencies in the results, with a lower p-value on some variables.

3 Results

3.1 Main Findings

Our analysis revealed a consistent positive correlation between beliefs in free will and job satisfaction across different cultural contexts. For instance, in Figure 2, we observed a clear upward trend among Taiwanese real estate agents, where stronger free will beliefs were associated with higher job satisfaction; this analysis results from Study 1 can be used as a non-same type of worker situation to potentially support the relationship between free will and job satisfaction of Amazon American gig workers. Later, we find similar results for Amazon American gig workers; Figure 2 illustrates the same pattern among American gig workers. These trends suggest that the perception of autonomy can significantly enhance job contentment.

3.2 Reliability of Subscales

An analysis in terms of the reliability of the subscales used for determining participants' responses regarding different variables is conducted (Table 1). In Table 1, the internal consistency (Cronbach's alpha) of each subscale and the correlations between each combination are calculated to speculate the reliability and validity of the data set we used for the study. According to the results in Table 1, although not strong, the subscales correlate significantly ($p < .01$) with the variables we would like to capture and study for the analysis. This means that these subscales and the data set are reliable to use for this paper.

Table 1: Correlations between free will subscales and job satisfaction

	Job satisfaction T1	Job satisfaction T2
FW T1 Agency and free will subscales	0.31***	0.30***
FW T1 All subscales combined	0.25***	0.14
FW T1 Free will subscale	0.26***	0.28**
FW T1 Personal agency subscale	0.32***	0.29***
FW T1 Moral responsibility subscale	0.30***	0.30***
FW T1 Higher power control subscale (R)	-0.01	-0.22*
FW T1 Personal responsibility subscale	0.28***	0.27**
FW T1 Personal limitations subscale (R)	0.02	-0.21*
FW T1 - Personal	0.26***	0.12
FW T1 - General	0.26***	0.20*

Note. T1 = collected in Time 1, T2 = collected in Time 2

* $p < .05$. ** $p < .01$. *** $p < .001$.

3.3 Demographic Factors

Demographic factors age and gender are speculated as well to see possible influence on job satisfaction with the combination of belief in free will. As the results in Table 2 show, age and gender have a significant impact on belief in free will ($p < .01$); however, without these two demographic factors, belief in free will continues to significantly predict job satisfaction ($p < .001$). This result ensures the significance of the relationship between one's belief in free will and job satisfaction.

Table 2: Controlling for demographics

	Belief in free will (T1)	Job satisfaction (T1)	Job satisfaction (T2)
Belief in free will (T1)	(0.88)	0.31***	0.30***
Job satisfaction (T1)	0.31***	(0.79)	0.73***
Job satisfaction (T2)	0.30***	0.73***	(0.84)
Age	0.15*	0.13+	0.10
Gender	0.16*	0.21**	0.25**

Note. T1 = collected in Time 1, T2 = collected in Time 2; diagonal values are reliability alpha coefficients. Values under diagonal are two-tailed correlations whereas above are partial correlations controlling for age and gender (T1). Gender is coded as 0 = Male, 1 = Female.

+p<.10. *p <.05. **p<.01.***p<.001.

3.4 Detailed Analysis and Trends

The original paper by Feldman, Farh, and Wong (2018) demonstrates that a strong belief in free will results in significant increases in job satisfaction; this correlation is relevant across cultural differences and in different work fields (e.g., from Taiwanese real estate agents to American digital Labor) similar results were maintained.

Through this paper, we conducted a replication study on institutional beliefs in the digital gig economy (specifically the MTurk community) and sought to determine whether there is a positive relationship between U.S. workers’ beliefs about free will and their job satisfaction with Amazon Mechanical. Based on an analysis of information from a six-month focused study of Amazon MTurk workers presented and other related auxiliary analyses of different industries in the original paper, our results confirm a positive relationship, indicating that workers with a stronger belief in free will tend to report higher levels of job satisfaction. Our analysis shows that the correlation between free will beliefs and job satisfaction is more vital in this digital microtask environment than in a traditional work environment. The above reinforces the idea that institutional beliefs in the increasingly prevalent gig economy are not just philosophical abstractions but have real consequences for workforce well-being.

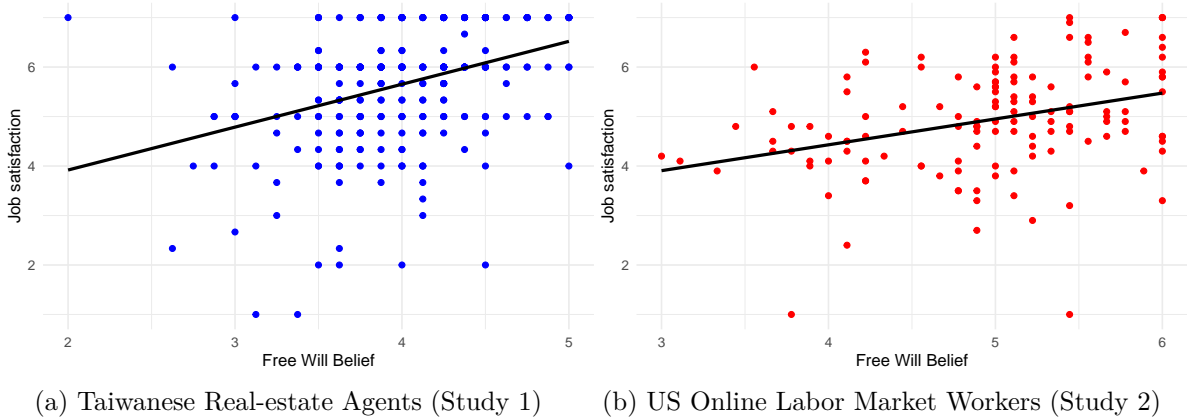


Figure 2: Beliefs in Free will vs. Job Satisfaction between Two Populations

Corresponding to Figure 2, Table 3 presents a quantitative synthesis of the relationship between free will beliefs and job satisfaction at two different time points. For example, the belief in free will at Time 1 (T1) had a correlation of 0.31** with job satisfaction at T1, and this association remained strong at Time 2 (T2). The statistical significance marked by ** (p<0.001) indicates a robust relationship that persisted over time.

Table 3: Study 2 Means, Standard Deviations, and Correlations

	M	SD	Job satisfaction (T1)	Job satisfaction (T2)	Belief in free will (T1)	Job autonomy (T1)	Job autonomy (T2)
Job satisfaction(T1)	4.97	1.05	(0.79)				
Job satisfaction(T2)	4.93	1.22	0.73***	(0.84)			
Belief in free will(T1)	4.98	0.72	0.31***	0.30***	(0.88)		
Job autonomy(T1)	5.61	1.11	0.43***	0.43***	0.46***	(0.83)	
Job autonomy(T2)	5.65	1.18	0.51***	0.59***	0.49***	0.58***	(0.85)
Trait locus of control(T1)	6.89	2.47	0.09	0.06	0.20**	0.03	0.01
Implicit beliefs(T1)	3.03	1.04	-0.10	-0.18*	-0.19**	-0.07	-0.15+
Trait self-esteem(T1)	5.29	1.25	0.35***	0.30***	0.35***	0.33***	0.34***
Job self-efficacy(T1)	6.07	0.96	0.34***	0.31***	0.44***	0.43***	0.52***
Trait self-control(T1)	3.48	0.77	0.30***	0.24**	0.19**	0.17*	0.17*

Note. T1 = collected in Time 1 (n=209), T2 = collected in Time 2 (n = 137); diagonal values are reliability alpha coefficients. Scales in free will 1-6; Scales in job satisfaction, job autonomy, trait self-esteem, implicit beliefs 1-7; locus of control, 1-7; locus of control, 0-13; trait self-control, 1-5. +p<.10. *p<.05. **p<.01. ***p<.001.

4 Discussion

4.1 Detailed findings

The original paper by Feldman, Farh, and Wong (2018) demonstrates that a strong belief in free will results in significant increases in job satisfaction; this correlation is relevant across cultural differences and in different work fields (e.g., from Taiwanese real estate agents to American digital Labor) similar results were maintained.

Through this paper, we conducted a replication study on institutional beliefs in the digital gig economy (specifically the MTurk community) and sought to determine whether there is a positive relationship between U.S. workers' beliefs about free will and their job satisfaction with Amazon Mechanical. Based on an analysis of information from a six-month focused study of Amazon MTurk workers presented in the original paper, our results confirm a positive relationship, indicating that workers with a stronger belief in free will tend to report higher levels of job satisfaction. Our analysis shows that the correlation between free will beliefs and job satisfaction is more vital in this digital microtask environment than in a traditional work environment. The above reinforces the idea that institutional beliefs in the increasingly prevalent gig economy are not just philosophical abstractions but have real consequences for workforce well-being.

4.2 Theoretical Implications

The findings from our study offer theoretical implications for understanding job satisfaction in the context of the gig economy. Specifically, they suggest that beliefs in free will play a

crucial role in shaping workers' perceptions of their autonomy and, consequently, their job satisfaction. This challenges and extends traditional theories of job satisfaction by incorporating the psychological dimension of free will beliefs, especially in flexible work environments like MTurk. It invites a reevaluation of how autonomy is conceptualized and valued in non-traditional work settings, advocating for a broader understanding of factors contributing to job satisfaction. The result is it highlights the importance of creating an environment that enhances employee autonomy, potentially increasing employee engagement and satisfaction.

4.3 Journal Study: Work and Freedom in the Context of Agency Beliefs and Job Satisfaction

To further confirm the validity of the original paper and our analysis, we selected another peer-reviewed professional academic journal for reference. By analyzing the comprehensive study conducted by Baldissarri et al. (2017), we explored the complex relationship between work activities that trigger self-objectification and subsequent beliefs in personal free will. Through a series of methodologically rigorous studies, this research illustrates that diminished free will beliefs are a result of engaging in repetitive, fragmented, and externally directed tasks. This reduction in belief in free will, mediated by self-objectification, sets up a subtle interplay between the nature of work and the psychological makeup of the worker. Consistent with Feldman, Farh, and Wong (2018). Baldissarri et al. (2017) established a link between free will beliefs and job satisfaction. Further emphasis is placed on the complexity of agency within the professional realm.

Our findings suggest that MTurk employees who perceive greater autonomy and personal agency report greater job satisfaction, which resonates with the implications of the work of Baldissarri et al. Routine and piecemeal tasks on MTurk can lead to some form of self-objectification, potentially undermining belief in individual free will and, in turn, job satisfaction. Therefore, the inherent structure of gig work may require strategies that enhance perceptions of free will and personal agency to increase job satisfaction.

4.4 Ethical Considerations in Long-Term Behavioural Studies

Ethical considerations are crucial in long-term behavioural research, especially when studying beliefs and job satisfaction. In doing so, we focused on the research methods and ethical concerns of the original academic journal (Feldman, Farh, and Wong 2018). Feldman, Farh, and Wong (2018) took a series of steps to ensure the ethics of the study, including ensuring informed consent, protecting privacy and data security, and providing long-term participant support and opportunities for explanation.

We agree with the above ethically appropriate measures of the original academic journal and believe that the research paid particular attention to avoiding any possible adverse psychological effects and ensured that all research standards were met through ethical oversight by the

institutional review board. This approach ensures maximum protection of participant well-being during the research process and reinforces our commitment to ethical standards while also improving research quality and participant trust in the research.

4.5 Accounting for Bias

In addressing bias within the discussion section of our paper, it's essential to acknowledge that while our study expands on the foundational research by Feldman, Farh, and Wong (2018) in exploring the impact of free will beliefs on job satisfaction, particularly within the digital gig economy of Amazon Mechanical Turk, inherent biases in data collection and analysis could influence the outcomes. Ethical implications and biases naturally emerge in both quantitative and qualitative research. For instance, sampling bias can occur when the study participants are not representative of the broader population intended to be analyzed. This type of bias might be mitigated through strategies such as simple random sampling, ensuring that every individual within the target population has an equal chance of selection. However, challenges such as self-selection bias, where individuals with a strong interest in the topic may be more likely to participate, can skew results. Despite efforts to create a representative sample through demographic balancing, such biases may persist, potentially limiting the generalizability of the findings. Thus, acknowledging these limitations and adopting rigorous methodological safeguards are crucial for enhancing the credibility and applicability of research conclusions.

4.6 Analytical Limitations

While our study sheds light on the relationship between free will beliefs and job satisfaction in the context of MTurk, it also highlights several limitations. The unique demographics of MTurk workers and the platform's specific work conditions may not fully extrapolate to the broader gig economy. For instance, platforms like MTurk offer a degree of autonomy by allowing workers to choose tasks; however, this freedom is within the confines of predetermined task parameters and compensation set by the platform.

Upon revisiting the original paper by Feldman, Farh, and Wong (2018), we have identified certain unclear in the correlation coefficients about the variable **Beliefs in Free Will (T1)** in Table 3 and Table 2. Unlike other variables used for the tables, the 'Beliefs in Free Will (T1)' components are not explicitly defined in the original paper and other supplementary documents. Such discrepancies could lead people replicating this paper to unclear definitions and calculation errors, thus necessitating a closer examination of the computational processes employed in the original study. Another variable, 'FW T1 All subscales combined' in Table 1, has a similar problem.

In addition, in Table 1, we found that the significance label is more robust, where the p-value is smaller ($< .001$) compared to the original paper ($< .01$). The difference could result from differences between statistical tools we used for the analysis (R versus SPSS).

4.7 Future Research Pathways

In light of the above limitations, future research should explore this relationship across diverse gig platforms and investigate the longitudinal effects of free will beliefs on job satisfaction to establish the relation. Additionally, examining the interplay between personal autonomy and platform policies could offer insights into optimizing job satisfaction in gig work.

To address these concerns in some unclear variables in correlation coefficients, we recommend thoroughly re-evaluating the data computation methods used, including a detailed review of the data transformation steps described by Feldman, Farh, and Wong (2018). Enhanced validation procedures and sensitivity analyses will be instrumental in clarifying these differences. This approach will bolster the credibility of our replication study and contribute to the scientific community’s ongoing efforts to refine research methodologies in the study of free will beliefs and their impact on job satisfaction.

A closer examination of the statistical tools and methodologies is essential to solve the observed differences in significance levels and p-values between our study and the original research. The discrepancy, particularly in the robustness of the significance label observed in correlation tables, suggests a variation in the statistical analysis approach due to the utilization of R in our study as opposed to SPSS in the original research. Therefore, future endeavours should involve a detailed comparison and calibration of analytical techniques across different statistical software to ensure consistency in findings.

Finally, we believe it is imperative to consider the potential of datasets like the one from Study 3, which presents a valuable opportunity for comprehensive analysis with its large sample size and cross-cultural scope. Unfortunately, this dataset was not made available in the original paper, leading us to focus our efforts on Study 2. Moving forward, we are particularly interested in leveraging such diverse, cross-cultural, and large-scale datasets to deepen our understanding of the impact of free will beliefs on job satisfaction across different global contexts. This approach promises to enrich our insights and enhance the generalizability of our findings, opening new avenues for investigation in the gig economy and beyond.

5 Conclusion

In summary, our investigation based on the original paper from Feldman, Farh, and Wong (2018) affirmed a strong positive link between the belief in free will and job satisfaction within the dynamic sphere of the gig economy, notably on Amazon’s Mechanical Turk platform. Central to this relationship is the role of perceived autonomy, which significantly elevates job satisfaction levels. These findings underscore the importance of nurturing autonomy within gig work, advocating for a work environment that acknowledges and bolsters personal agency. As the gig economy continues to evolve, future research should delve into the broader application of these insights, aiming to enhance the well-being and job satisfaction of the diverse gig workforce.

Appendix

.1 Study 1 Scale

Free will

- * I am in charge of the decisions I make.
 - * I actively choose what to do among the choices I have.
 - * I am in charge of my actions even when my life's circumstances are difficult.
- (Five additional questions relating to free will were asked.)

Job satisfaction

- * Generally speaking, I am very satisfied with my job.
- * I am generally satisfied with the feeling of worthwhile accomplishment I get from doing this job.
- * I am satisfied with the kind of work I do in this job.

.2 Study 2 Scale

Free will

- * I have free will
 - * Free will is a part of the human spirit
 - * Free will is a basic part of human nature
- (Six additional questions relating to free will were asked.)

Job satisfaction

- * I feel fairly well satisfied with my present job doing MTurk tasks
 - * Most days I am enthusiastic about the work I do on MTurk
 - * Every time I work on tasks on MTurk it feels like forever
- (Two additional questions relating to job satisfaction were asked.)

Job autonomy

- * I have significant autonomy in determining how I do my job on MTurk
- * I can decide on my own how to go about doing my work on MTurk
- * I have considerable opportunity for independence and freedom in how I do my job on MTurk

Controls

- * I am good at resisting temptation.
 - * I have a hard time breaking bad habits.
 - * I am lazy.
- (10 additional questions relating to controls were asked.)

Self-esteem

- * I feel that I am a person of worth, at least on an equal basis with others.
- * I feel that I have a number of good qualities.

* All in all, I am inclined to feel that I am a failure.

(Seven additional questions relating to self-esteem were asked.)

Self-efficacy

* I am strong enough to overcome life's struggles.

* At root, I am a weak person.

* I can handle the situations that life brings.

(Five additional questions relating to self-efficacy were asked.)

.3 Study 3 Scale

- Indicate how much freedom of choice and control you feel you have over the way your life turns out (1 = No choice and control to 10 = A great deal of choice and control)
- Overall, how satisfied or dissatisfied are you with your job? (1 = Dissatisfied to 10 = Satisfied).
- How free are you to make decisions in your job? (1 = None at all to 10 = A great deal)

References

- Baldissarri, C., L. Andrighetto, A. Gabbiadini, and C. Volpato. 2017. “Work and Freedom? Working Self-objectification and Belief in Personal Free Will.” *British Journal of Social Psychology* 56 (2): 250–69. <https://doi.org/10.1111/bjso.12172>.
- Feldman, Gilad, Jiing-Lih Farh, and Kin Fai Ellick Wong. 2018. “Agency Beliefs over Time and Across Cultures: Free Will Beliefs Predict Higher Job Satisfaction.” *Personality and Social Psychology Bulletin* 44 (3): 304–17.
- Firke, Sam. 2023. *Janitor: Simple Tools for Examining and Cleaning Dirty Data*. <https://CRAN.R-project.org/package=janitor>.
- Harrell Jr, Frank E. 2023. *Hmisc: Harrell Miscellaneous*. <https://hbiostat.org/R/Hmisc/>.
- Muller, Kirill, and Hadley Wickham. 2022. *Tibble: Simple Data Frames*. <https://CRAN.R-project.org/package=tibble>.
- R Core Team. 2024. *R: A Language and Environment for Statistical Computing*. Toronto, Canada: R Foundation for Statistical Computing. <https://www.R-project.org/>.
- Wickham, Hadley. 2016. *Ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag New York. <https://ggplot2.tidyverse.org>.
- Wickham, Hadley, Mara Averick, Jennifer Bryan, Winston Chang, Lucy D’Agostino McGowan, Romain François, Garrett Golemund, et al. 2019. “Welcome to the tidyverse.” *Journal of Open Source Software* 4 (43): 1686. <https://doi.org/10.21105/joss.01686>.
- Wickham, Hadley, Romain Francois, Lionel Henry, and Kirill Muller. 2022. *Dplyr: A Grammar of Data Manipulation*. <https://CRAN.R-project.org/package=dplyr>.
- Wickham, Hadley, Jim Hester, and Jennifer Bryan. 2022. *Readr: Read Rectangular Text Data*. <https://CRAN.R-project.org/package=readr>.
- Wickham, Hadley, Evan Miller, and Danny Smith. 2023. *Haven: Import and Export ‘SPSS’, ‘Stata’ and ‘SAS’ Files*. <https://CRAN.R-project.org/package=haven>.
- William Revelle. 2024. *Psych: Procedures for Psychological, Psychometric, and Personality Research*. Evanston, Illinois: Northwestern University. <https://CRAN.R-project.org/package=psych>.
- Xie, Yihui. 2014. “Knitr: A Comprehensive Tool for Reproducible Research in R.” In *Implementing Reproducible Computational Research*, edited by Victoria Stodden, Friedrich Leisch, and Roger D. Peng. Chapman; Hall/CRC.
- Zhu, Hao. 2021. *kableExtra: Construct Complex Table with ‘Kable’ and Pipe Syntax*. <https://CRAN.R-project.org/package=kableExtra>.