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Who wears a mask? Gender differences in risk behaviors in the COVID-19 early days in Taiwan

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Abstract

We evaluate mask-wearing behaviors in response to COVID-19 based on 12,208 observations in February 2020 in Taiwan. We find that, compared to men, women are 16 percent more likely to wear masks as a way to protect themselves during the pandemic. The protective behaviors, however, decrease significantly when people are with others. This gender difference in mask-wearing has dropped the most when people are with a mixed-gender group. Our results call for attention to gender differences and peer dynamics when discussing health protection behaviors in the COVID-19 crisis.

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1 Introduction

Are women more risk averse than men? The economics literature generally says yes, but some say the evidence is still mixed (Nelson, 2015). In the meantime, risk preference measurements, commonly measured in surveys and experiments, are not as stable and consistent as expected (Barseghyan et al., 2011; Chuang and Schechter, 2015; Einav et al., 2012; Schildberg-Hörisch, 2018), highlighting the need to observe how the actual social environment may affect individual decisions. Risk preferences are of our interests as they are deeply connected to how people manage their health (Anderson and Mellor, 2008; Galizzi and Miraldo, 2017; Gerking and Khaddaria, 2012; Lundborg and Andersson, 2008), and obviously, how people cope with the COVID-19 pandemic (Barrios and Hochberg, 2020; Fan et al., 2020). Taiwan's unique contexts offer us a rare opportunity to directly observe people's risk preferences through mask-wearing behaviors, as well as provide more diverse reporting in health economics where most data come from North America and Europe (Hirvonen, 2020). More specifically, we highlight that gender and peer dynamics are crucial determinants to risk behaviors.

This article presents data on mask-wearing behaviors by 12,208 individuals during the early days—February 7 to 25, 2020—of the COVID-19 pandemic in Taiwan. Taiwanese citizens show acute awareness to wear masks due to the traumatic experiences with SARS in 2003 (Bennett et al., 2015).[1] In the 2013 Taiwan Social Change Survey, when asked whether they would wear masks during widespread flu, close to 90 percent answered, "most likely" or "very likely." In other words, there is unanimous support in masks' efficacy and the "mask debate" does not exist in Taiwan.[2] This background enables us to observe risk behaviors while not interfered by cultural values or political orientations.

Our study was conducted in a relatively stable time when Taiwan's confirmed cases increased only from 16 to 31. Meanwhile, the supply of masks is sufficient, as Taiwan is the world's second-largest mask producer and massively expanded the capacity due to coronavirus. During our study period, wearing masks was entirely voluntary. The Taiwan CDC advised people to wear masks in three conditions: going to the hospital, having respiratory symptoms, or coping with chronic illnesses; there have not yet been government mandates to wear masks.[3]

Our result shows that women are about 16 percent more likely to wear masks than men. This gender difference is the largest when people are by themselves (21%) and smallest when they are in mixed-gender groups (<10%). There is no gender difference in children's behav-

[1] Bennett et al. (2015) showed that outpatients hospital visit dropped dramatically during SARS as an example of prevalent responses.

[2] Our research does not intend to evaluate the effectiveness of wearing face masks. Yet, Mitze et al. (2020) examine a compulsory mask wearing policy in Germany and find that face masks are effective in slowing down the spread of Covid-19.

[3] Mandate of wearing a mask in public transportation started on April 1, 2020.

iors. In a way, our analysis provides more evidence that women tend to be more risk averse than men. Our study also demonstrates that people are less likely to wear masks when they are in groups compared to when they are alone.

We first contribute to the debate on the gender gap in risk aversion. Many studies have shown that women are, on average, more risk averse than men (Almenberg and Dreber, 2015; Borghans et al., 2009; Charness and Gneezy, 2012; Croson and Gneezy, 2009; Dohmen et al., 2011; Eckel and Grossman, 2002, 2008; Powell and Ansic, 1997; Pulford and Gill, 2014),[4] while others do not find this gender difference (Banerjee, 2014; Binmore et al., 2012; Boschini et al., 2019; Dimmock et al., 2016). Besides, risk aversion may be domain specific (Borghans et al., 2009; Filippin and Crosetto, 2016; Friedl et al., 2017; Pulford and Gill, 2014; Schubert et al., 2000). In this literature, most risk preferences are elicited through surveys or experiments, and we provide additional evidence with actual observed behaviors.

Secondly, we add more empirical results on how social environment may affect risk aversion behaviors. The literature has pointed out that the gender gap in risk aversion can be influenced by socio-environmental factors, such as culture (Gong and Yang, 2012), macroeconomic indices (Cárdenas et al., 2012), professional identities (Drupp et al., 2020), school environment (Booth and Nolen, 2012), parental involvement (Alan et al., 2017), and peer group dynamic (Booth et al., 2014; Lamiraud and Vranceanu, 2018). In our case, we can observe how individual's behavior would differ in various peer groups.

2 Data and Method

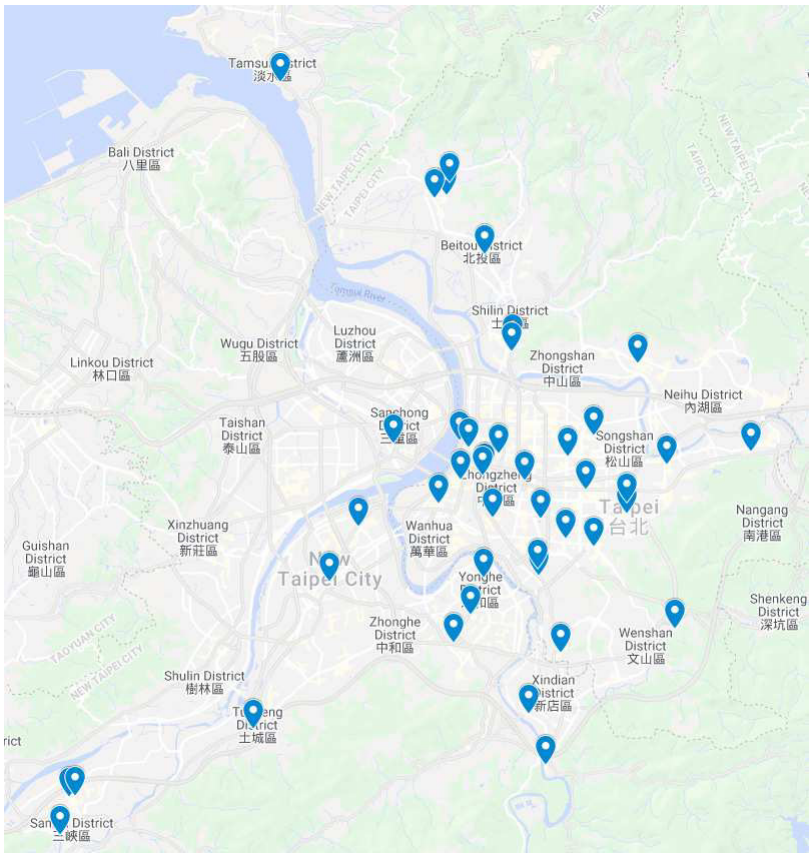
From February 7 to 25, 2020, we collected data on mask-wearing behaviors in Taipei city and New Taipei City, a metropolitan area of more than 6 million residents. The cityscape is exceptionally dense—the population density is more than 9,000 people per square kilometer. To make sure we capture diverse samples, we gather data across various locations (e.g., residential areas, shopping districts, office quarters, etc.) during different times of the day. In the end, the data contains 12,208 observations coming from 43 sites across all 12 districts in Taipei and major satellite cities in New Taipei (Figure 1).

We developed a codebook after a few pilot sessions. In the record sheets, enumerators recorded 1) if the person wears a mask, 2) if the person is an adult or children (2 to 12 years old), 3) the person's gender, 4) if they are with a group, and 5) the number of people and gender in their groups. From the onset of data collection, we specified the rules to exclude individuals in the following situations: people who we cannot visibly identify their genders, babies carried by adults, homeless people, as they may not have access to masks,

[4]We do not separate risk aversion (known probability) and ambiguity aversion (unknown probability to model uncertainty) as separate parameters. Since we observe only risk behaviors, we cannot contribute to this debate on whether these two measures should be treated as distinct. Yet it is reasonable to assume that mask-wearing behaviors are highly correlated with both risk and ambiguity aversion preferences.

and large groups such as class field trips. We do not collect data from people doing exercise, operating vehicles, and taking public transportation. We also excluded children or teenagers in uniforms, as we are concerned that their schools could mandate mask-wearing. In our sample, ninety-five percent of our observations were adults. Our data include 43 percent male and 57 percent female, tracking reasonably closely to the sex ratio of 48 male versus 52 female in Taipei metropolitan, based on the official statistics from the Ministry of the Interior.

Figure 1: Study Sites in Taipei Metropolitan



3 Discussion

Table 1 reports on the mask-wearing by gender (yes as 1, no as 0). Column 1 shows that 64.1 percent of men wear masks in our study, while 47.8 percent of women do, roughly a 16 percent difference. The difference is statistically significant in t-test (column 4) and regression of the gender variable (women as 1, men as 0) on the mask-wearing variable with location and enumerator fixed effects (column 5). We found no differences among boys and girls—this may be in part due to that children have not experienced the gendered socialization yet, or

maybe mandated equally by their chaperones.

Besides, we analyze how mask-wearing behaviors vary by people's accompanied peer groups. Table 2 shows that, out of 12,208 samples, 5,681 of them were in groups. The average group size is 2.45 and the maximum size of the group is 8. Table 3 further breaks down the mask-wearing ratios in each category. For women and men by themselves, 70.5 and 50 percent of them wear masks, respectively. Mask-wearing in both men and women drop drastically when they are in groups. For women and men in same-gender groups, the ratios drop to 60.3 and 42 percent. The gender differences are the smallest when women (54.7%) and men (46.5%) were in mixed-gender groups. This pattern provides evidence that women seem to be more easily influenced by peer groups compared to men. All the gender differences are statistically significant in both t-tests and regression analysis.

One could think of two channels that social gatherings could influence mask-wearing behaviors. On the one hand, people might put on extra protection because the supposed risks are higher;[5] on the other hand, people may feel masks hinder regular social interactions and thus wear less. In our analysis, it is clear that the latter "socializing convenience" trumped the former extra risk prevention. We are fully aware that our results cannot identify a clean causal relation between peer dynamics and individuals' behaviors. Our suggestive evidence nevertheless offers crucial insights for future research.

In many societies, masks have become the flashpoint in the cultural wars during the pandemic. Our results show that mask-wearing behaviors exhibit gender differences. Our study also reveals that the intention of such behaviors may drop when in social interactions. Even in Taiwan, a society that fully embraces masks, various social distancing policies could still provide extra protection (Allcott et al., 2020). These insights could be instructive to craft more effective responses to the COVID-19 pandemic. To conclude, our research calls for economics research with more considerable attention to gender and peer dynamics in the pandemic.

References

Alan, S., N. Baydar, T. Boneva, T. F. Crossley, and S. Ertac (2017). Transmission of risk preferences from mothers to daughters. *Journal of Economic Behavior & Organization 134*, 60–77.

Allcott, H., L. Boxell, J. Conway, B. Ferguson, M. Gentzkow, and B. Goldman (2020).

[5]There could also be other mechanisms such as peer learning or imitation to wear a mask. We have tried to analyze whether more women or men in the group would change their mask-wearing behaviors. However, since there are not enough variations in peer group observations and "being with women/men" seem to be highly endogenous, we cannot conclude much.

Economic and health impacts of social distancing policies during the coronavirus pandemic. Unpublished working paper.

Almenberg, J. and A. Dreber (2015). Gender, stock market participation and financial literacy. *Economics Letters 137*, 140–142.

Anderson, L. R. and J. M. Mellor (2008). Predicting health behaviors with an experimental measure of risk preference. *Journal of Health Economics 27*(5), 1260–1274.

Banerjee, D. (2014). Ethnicity and gender differences in risk, ambiguity attitude. Unpublished working paper.

Barrios, J. M. and Y. Hochberg (2020). Risk perception through the lens of politics in the time of the COVID-19 pandemic. Unpublished working paper.

Barseghyan, L., J. Prince, and J. C. Teitelbaum (2011). Are risk preferences stable across contexts? Evidence from insurance data. *American Economic Review 101*(2), 591–631.

Bennett, D., C.-F. Chiang, and A. Malani (2015). Learning during a crisis: The SARS epidemic in Taiwan. *Journal of Development Economics 112*, 1–18.

Binmore, K., L. Stewart, and A. Voorhoeve (2012). How much ambiguity aversion? *Journal of Risk and Uncertainty 45*(3), 215–238.

Booth, A., L. Cardona-Sosa, and P. Nolen (2014). Gender differences in risk aversion: Do single-sex environments affect their development? *Journal of Economic Behavior & Organization 99*, 126–154.

Booth, A. and P. Nolen (2012). Choosing to compete: How different are girls and boys? *Journal of Economic Behavior & Organization 81*(2), 542–555.

Borghans, L., J. J. Heckman, B. H. Golsteyn, and H. Meijers (2009). Gender differences in risk aversion and ambiguity aversion. *Journal of the European Economic Association 7*(2-3), 649–658.

Boschini, A., A. Dreber, E. von Essen, A. Muren, and E. Ranehill (2019). Gender, risk preferences and willingness to compete in a random sample of the swedish population. *Journal of Behavioral and Experimental Economics 83*, 101467.

Cárdenas, J.-C., A. Dreber, E. Von Essen, and E. Ranehill (2012). Gender differences in competitiveness and risk taking: Comparing children in Colombia and Sweden. *Journal of Economic Behavior & Organization 83*(1), 11–23.

Charness, G. and U. Gneezy (2012). Strong evidence for gender differences in risk taking. *Journal of Economic Behavior & Organization 83*(1), 50–58.

Chuang, Y. and L. Schechter (2015). Stability of experimental and survey measures of risk, time, and social preferences: A review and some new results. *Journal of Development Economics 117*, 151–170.

Croson, R. and U. Gneezy (2009). Gender differences in preferences. *Journal of Economic Literature 47*(2), 448–74.

Dimmock, S. G., R. Kouwenberg, and P. P. Wakker (2016). Ambiguity attitudes in a large representative sample. *Management Science 62*(5), 1363–1380.

Dohmen, T., A. Falk, D. Huffman, U. Sunde, J. Schupp, and G. G. Wagner (2011). Individual risk attitudes: Measurement, determinants, and behavioral consequences. *Journal of the European Economic Association 9*(3), 522–550.

Drupp, M. A., M. Khadjavi, M.-C. Riekhof, and R. Voss (2020). Professional identity and the gender gap in risk-taking. evidence from field experiments with scientists. *Journal of Economic Behavior & Organization 170*, 418–432.

Eckel, C. C. and P. J. Grossman (2002). Sex differences and statistical stereotyping in attitudes toward financial risk. *Evolution and Human Behavior 23*(4), 281–295.

Eckel, C. C. and P. J. Grossman (2008). Men, women and risk aversion: Experimental evidence. *Handbook of Experimental Economics Results 1*, 1061–1073.

Einav, L., A. Finkelstein, I. Pascu, and M. R. Cullen (2012). How general are risk preferences? Choices under uncertainty in different domains. *American Economic Review 102*(6), 2606–38.

Fan, Y., A. Y. Orhun, and D. Turjeman (2020). Heterogeneous actions, beliefs, constraints and risk tolerance during the COVID-19 pandemic. Unpublished working paper.

Filippin, A. and P. Crosetto (2016). A reconsideration of gender differences in risk attitudes. *Management Science 62*(11), 3138–3160.

Friedl, A., P. Ring, and U. Schmidt (2017). Gender differences in ambiguity aversion under different outcome correlation structures. *Theory and Decision 82*(2), 211–219.

Galizzi, M. M. and M. Miraldo (2017). Are you what you eat? Healthy behaviour and risk preferences. *The BE Journal of Economic Analysis & Policy 17*(1).

Gerking, S. and R. Khaddaria (2012). Perceptions of health risk and smoking decisions of young people. *Health Economics 21*(7), 865–877.

Gong, B. and C.-L. Yang (2012). Gender differences in risk attitudes: Field experiments on the matrilineal mosuo and the patriarchal yi. *Journal of Economic Behavior & Organization 83*(1), 59–65.

Hirvonen, K. (2020). This is us: Geography of evidence in top health economics journals. *Health Economics 29*(10), 1316–1323.

Lamiraud, K. and R. Vranceanu (2018). Group gender composition and economic decision-making: Evidence from the kallystée business game. *Journal of Economic Behavior & Organization 145*, 294–305.

Lundborg, P. and H. Andersson (2008). Gender, risk perceptions, and smoking behavior. *Journal of Health Economics 27*(5), 1299–1311.

Mitze, T., R. Kosfeld, J. Rode, and K. Wälde (2020). Face masks considerably reduce COVID-19 cases in Germany: A synthetic control method approach. Unpublished working paper.

Nelson, J. A. (2015). Are women really more risk-averse than men? A re-analysis of the literature using expanded methods. *Journal of Economic Surveys 29*(3), 566–585.

Powell, M. and D. Ansic (1997). Gender differences in risk behaviour in financial decision-making: An experimental analysis. *Journal of Economic Psychology 18*(6), 605–628.

Pulford, B. D. and P. Gill (2014). Good luck, bad luck, and ambiguity aversion. *Judgment and Decision Making 9*(2), 159–166.

Schildberg-Hörisch, H. (2018). Are risk preferences stable? *Journal of Economic Perspectives 32*(2), 135–54.

Schubert, R., M. Gysler, M. Brown, and H.-W. Brachinger (2000). Gender specific attitudes towards risk and ambiguity: an experimental investigation. Unpublished working paper.

Tables

Table 1: Mask Wearing Behaviors by Gender

		Mask Wearing			Difference between Women and men	
		Mean	Sd	N	T-test of the difference	Regression coefficient
		(1)	(2)	(3)	(4)	(5)
Adult	Female	0.641	0.48	6653	0.163***	0.148***
	Male	0.478	0.50	5027	(0.009)	(0.011)
Children	Girl	0.504	0.50	262	0.018	0.011
	Boy	0.485	0.50	266	(0.044)	(0.043)

Note: *** p<0.01, ** p<0.05, * p<0.1; This table reports the mask wearing behaviors by gender. Mask wearing is defined as 1, and 0 otherwise. The third and fourth columns are to compare the average mask wearing between women and men using different tests. Column 4 reports the result of the difference using t-test to test the average difference in women minus men's mask wearing. Column 5 reports the regression coefficient of the women dummy on mask wearing. All regressions are controlled for location and enumerator fixed effects. Standard errors are clustered at the location level.

Table 2: Peer Group Information

	Mean	sd	Min	Max	N
	(1)	(2)	(3)	(4)	(5)
Average group size	2.45	0.85	2	8	5,681
Average number of male in a group	0.87	0.94	0	8	5,681
Average number of female in a group	1.32	0.86	0	5	5,681

Note: This table reports the basic information of the peer group. All the calculations include individual herself/himself. Sample includes both adults and children.

Table 3: Mask Wearing Behaviors by Gender and Peer Group

		Mean	Sd	N	T-test of the difference	Regression coefficient
		(1)	(2)	(3)	(4)	(5)
Solo	Women	0.705	0.456	3499	0.205***	0.175***
	Men	0.500	0.500	3015	(0.012)	(0.013)
In a group	Women	0.570	0.495	3154	0.125***	0.115***
	Men	0.444	0.497	2012	(0.014)	(0.017)
By group type						
Same-gender group	Women	0.603	0.489	1590	0.183***	0.169***
	Men	0.420	0.494	700	(0.022)	(0.035)
Mixed-gender group	Women	0.547	0.498	1180	0.081***	0.079***
	Men	0.465	0.499	1159	(0.020)	(0.017)
With children	Women	0.503	0.501	384	0.103**	0.076**
	Men	0.399	0.491	153	(0.047)	(0.042)

Note: *** p<0.01, ** p<0.05, * p<0.1; This table reports the mask wearing behaviors by gender and peer group. Mask wearing is defined as 1, and 0 otherwise. Columns (1)-(3) report the summary statistics. Columns (4) and (5) report the difference in average mask wearing between women and men using different tests. Column (4) reports the result of the difference using t-test to test the average difference in women minus men's mask wearing. Column (5) reports the regression coefficient of the women dummy on mask wearing. All regressions are controlled for location and enumerator fixed effects. Standard errors are clustered at the location level.