Hong Kong Journal of Mental Health
2021, *47(1)*, 22-27
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COVID-19 Pandemic and Public Health

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This is a particular honour because the Chair that I hold at the University, the Zimmern Chair, is actually very much related to Dr. Gerald Choa because the Choa family and the Zimmern family are very closely related. They are actually relatives. It is a particular joy to give this lecture in albeit an extraordinary year. So without further ado, let me start.

I shall speak on three related fields. I will first go over the mental health and its emerging determinants in the population section which is somewhat different from the individual patients section. Then I will move on to take a look at two of the most seminal events that Hong Kong has been living with for the last 18 months – the social unrest and now COVID-19.

Population Health & Mental Health

First, if you actually look at Hong Kong through the last 70 years or so, it's been such an interesting laboratory. For somebody like me who studies social medicine or public health, there probably has been no better laboratory than Hong Kong. If you start to take the first peek at our population health, you would be looking at amongst other things our life expectancy. On the left hand axis, you will see life expectancy which is the single most important measure of life's existence. On the right axis you see our world ranking. We have actually come a long way. Blue is for men and red is for women. You can see that we have performed what we call a joint point analysis which basically looks at the trend, the longitudinal, cicular trend in life expectancy, which are the coloured curves and what it says is statistically to decompose it so we look at turning points. You will see that all the turning points have been so labelled for both curves.

I'm now going to take up to speculate on what those inflection points may reflect, both for men and women in terms of life expectancy at birth. Suffice it to say that our life expectancy has been going up inextricably, numerically and in a linear manner for the last 50 years as you can see. In fact, our ranking has climbed from somewhere around the 35th in the world to the first in the world. This is a remarkable achievement, and if you were to look at this, you would think that Hong Kong has done extraordinarily well. And that is very much the case. But since the founding of the World Health Organisation, health has been defined as "a state of complete physical, mental and social well-being". So it's not just looking at physical longevity that we should be concerned about.

We can consider some of the other domains. For example, if you actually now do the same thing and look at meaning in life, the one being full contentment with having meaning in life, and then it goes down on the y axis. If you look at the plot here of the countries of the world and in Hong Kong, we are the one single outlyer, that is at the most extreme. Of course with conversity as well but counting backwards. We are not alone. You see Japanese are not particularly content with having meaning in life either, nor Spaniards, nor French. But we are definitely nowhere near the bunch who seem much more contect. Given our wealth we shouldn't be this huge outline.

If you put the two together, where we come first in life expectancy and then last in finding meaning in life, it gives a really jarring sense. There is obviously a disconnect between physical, mental and social well-being. We then set out to say "are there common factors that are associated with

Transcript of the 11th Dr. Gerald Choa Memorial Lecture on 18th December 2020

better physical, mental and social well-being as per the WHO specification?".

What we did was to borrow a trick from geneticists. Some of you may be familiar with this technique called Genome-Wide Association Study. This is essentially a systematic and agnostic sweep through the full genome after you have sequenced it, and you basically correlate it with phenotypes. So we did the same thing except we are not dealing with genes but we are dealing with a lot of environmental factors. We did not a GWAS (Genome-Wide Association Study) but an EWAS (Environment-Wide Association Study).

We are now in an age of precision medicine where you have multiple layers — the geneo, the epigeneo, the transcripto, the proteome, the metabolome, and so on and so forth. One thing is the exposition, which is basically what we used to call history taking, including all factors of history such as social history. We have 194 such exposes to explore that concern psychosocial factors, physical and mental health conditions, behavioural patterns, access to care and anthropometrics.

This is a study called the Family Study that was initially funded by the Jockey Club Heritage Trust. If you do an EWAS of that, you will essentially find associations that are positively or negatively associated with physical health, mental health and social health. As you get from yellow or light orange to deeper orange (on the chart shown), you get associations with just one of these three domains, two of the three domains or all three of the domains. As you can see, there are only three factors out of 194 in this EWAS sheet which is associated with all three.

We have identified the key associations across the whole spectrum of well-being according to the WHO definition. Only three factors – depressive symptoms, life satisfaction and happiness – were simultaneously associated with subsequent or consequent physical, mental and social well-being. This is really quite surprising because it's not hypertension, it's not diabetes, it's not heart disease. It's not anything you would normally think about when you think about health. But it's depression, satisfaction with life and happiness, that are associated with all three. If you then think again and say, look, that is perhaps why the WHO mantra has been, there is "No Health without Mental Health".

The use of mental wellbeing to guide public policy and to place mental health at the forefront of the public health agenda has been one of the guiding principles that has steered our work in this area. When you think about it, how would you then dissect out the importance of understanding the presence of life satisfaction and happiness, those three key factors? We look at the population determinants of health, the social determinants of health. We try to go upstream and look at different social, economic, political and physical factors in the environment to see if there is something we can do something about. I must say that in the past 18 months, there has been plenty of material in the social laboratory of Hong Kong for us to study.

Social Unrest and Mental Health

Moving on to my second theme, for the better part of the second half of 2019, Hong Kong was embroiled in social unrest arising from political dissatisfaction. If we take a step back and think about collective actions more generally, collective actions refer to protests, riots, revolutions and social unrest. Colleagues and I did a systematic review. We looked at the number of collective actions from 1967 to 2017, a half century, and the darker the colour the more of these collective actions that had happened in these different countries. As you can see, basically 50% of the world's population actually have registered most of these collective actions in the past half century. Yet if you look at the number of published studies on the collective actions and mental health, there is a little bit of a disconnect.

Let me try to show you this is what actually took place. This is the number of studies that had actually been published on those very same topics. So there is a little bit of disconnect. What we did was this. We have very good cohorts in Hong Kong, and the family cohort is one such cohort where we were supported initially by the Jockey Club Charities to put together this cohort of what the 50,000 people and about 17,000 households, which basically formed 1% of all households in Hong Kong. This was formed back in 2008 and 2009,

and based on this then we studied quite intensively the social unrest of last year as well as the Occupy Central movement back in 2014. In fact, that work actually led to a New England Journal Watch which mentioned in 2017 when these initial studies post Occupy Central were done and came out.

We made it a point to look at the mental and emotional wellbeing aspect of that particular political action. As I said, this cohort was first put together in 2008 and 2009, and we have subsequently done nine waves. On the average one wave a year as follow-up either in person or by telephone. What we found was if you actually look from 2009 to 2020 or 2019, you will see the darker the colour, the more severe the level of depression according to the patient health questionnaire 9-item scale, which is a validated scale used internationally and also validated locally. You will see that this has really gone very very high.

This is one way of looking at the data. Another way of looking at the data, which was published in The Lancet the first week of January this year, is to look at the depression symptoms, which are prevalent starting at around 5 to 10% back in the day before 2012. Then during the Occupy Central Umbrella Movement era, it shot up by 100% to around 20%. Then it actually remained elevated at about 20 to 25% and went way up last year during the social unrest to do with the extradition bill. It was really amazing. But even if you just take a much more stringent look and look at probable depression, not just the presence of depressive symptoms but probable depression, then you are looking at probable 1 to 2% at baseline going up to 6% during Occupy Central, staying elevated at around 6 to 8% in the interim and then doubling again to 11 or 12% at the height of the social unrest last year. PTSD symptoms, post Occupy Central, were 5% and then it dropped over the course of about 12 months back down to about 2%, but then went up, as you would expect during the social unrest which did turn violent towards the latter part of it. It shot up to almost one third. So very alarming numbers.

If you try to look at what are the risk factors one is talking about or at least referring to, you will see that PTSD participation in the June 9 or June 16 rally really had a significant impact with a ratio of 1.6 or 1.7, but nothing else actually dropped out, which tells you that it actually affected everybody, even though you may not actually have shared the views of either side, pro or against the extradition bill. Now if you then look at probable depression, I suppose the only thing which really mattered was if you by yourself were widowed or divorced or separated, you really had a much higher risk of registering probable depression. But with good family support on the flip side you would actually have a much lower probability of experiencing probable depression. But then again, nothing else mattered. This is pervasive. This fits the entire society regardless of which side you may belong to. We try to project out, given these depressive symptoms in terms of PTSD and probable depression and people who suffer from both, which is 2 ½ % of the population. If we really try to look at those who would consider seeking help, which is only about half of the people who suffer, and what types of people they would go to such as health care professionals, and why or why not they did not seek professional attention. Then you try to work out up the chain of referral, what kind of specialist psychiatric care you would need to deal with the excess PTSD or probable depression. You are looking at a burden of an additional 12%, which is a huge amount given the lack of psychiatric or more generally specialist psychological care that we have in Hong Kong. That is what makes your work, the Mental Health Association of Hong Kong, so important.

COVID-19 Pandemic & Mental Health

Now if we turn to the COVID-19 outbreak we have had in Hong Kong, we heard in the 2020 Budget Address that "The social incidents and the novel corona virus epidemic have affected the mental health of many people in Hong Kong". The Government will allocate sufficient resources to the various bureaus for providing appropriate support to people suffering from mental distress. This is part of the basis of our work, part of the basis that actually informed Government policy directly.

Looking at COVID-19, this is a diagram that I am very fond of that I drew about a three-way tug-of-war. One is about health protection, one is about economic preservation, and the third concerns mental well-being and social consent of the people

to put up with many of the draconian measures to maintain people's health. That's why we really need to look at this connection in terms of mental well-being.

What are some of the psychosocial and economic stressors during COVID-19? Fear of the disease, of course, loss of loved ones – and we've lost some 120 some odd lives already. We are now all supposed to be isolating at home, try to work from home, and schools have been closed for awhile now. The sense of social isolation has been weighing on all of us. Marital conflicts, perhaps because you are all stuck at home, especially when you have children who may not be the most cooperative when they are cooped up in small apartments that are typical of Hong Kong households, leading in extreme cases to domestic violence. Of course job insecurity. Our latest unemployment numbers have hit 6.3, 6.4%. The Labour and Welfare Minister has already warned us that it is going to go up in the coming quarter. School closures, lockdowns, and economic recession. Huge stresses. Any one of these could have caused major psychiatric or psychological morbidity at the best of times but all of them together, in this extraordinary year, and probably we are only one half or two thirds of the way through COVID-19.

If we look at some of the literature from overseas, mental health studies that people have done in high risk groups, individuals with infection, quarantined individuals who are not actually infected, and health care professionals who have been first responders in many countries. There have been quite a few studies of the mental and emotional toll on these groups. In fact, we are not strangers to this because we actually pioneered what we called Psychobehavioral Population Surveillance during an outbreak. This was actually our work during the time of Severe Acute Respiratory Syndrome (SARS) 17 years ago not only in Hong Kong but actually extending our sample with Singapore.

So what we did, just finished, was to do a meta-analysis on the consequences of COVID-19 and other academics from a mental wellness point of view. This is the flow of our research, the screening process, and so we included six high quality studies that are worthy comparable into a meta-analysis. Lo and behold just like the collective action, the divergence or discordant between the verdant and the intensity of study of COVID-19 case load. The number of published studies that we found on mental health consequences of COVID-19, the top, most burdened countries or places often times had been studied the least and vice versa. What those studies had already found were that those lower income with pre-existing medical conditions, greater perceived risk of infection and those who had exhibited COVID-19 like symptoms, who had had excessive social media use, who had been particularly social isolated and had been under a lot of financial stress. Not surprising factors but confirmed scientifically and systematically to be predictive of poor mental well being.

Our meta-analysis showed that one in five adults had a certifiable mental disorder during COVID-19 so far. This is very comparable to those experiencing large-scale disasters or armed conflicts, the collective actions we had looked at previously. So a health-care question is that you and I should be vigilant of the psychological toll of epidemics, just as we would be for any of these disasters and crises, including among those who have not been inflicted by the COVID-19 pathogen. A fraction of Hong Kong's population has actually been touched or inflicted by COVID-19 or SARS to be precise. And yet everybody's mental health has been affected already.

If you look at this particular paper in The Lancet Psychiatry, it cautions against relying on convenience samples because they are prone to substantial bias. Policy makers, commissioners, and services need to know both the scale of need and who is most vulnerable. We do need research but we shouldn't use convenience samples. We ourselves actually wrote a piece about population mental wellbeing in China, and we said research should prioritise longitudinal population-representative samples with pre-epidemic data.

These are some good examples of the U.K. and the U.S. Let me show you this particular study from Understanding Society, which is a very long-running cohort of sociological phenomenon as they relate to health in the U.K. Our family cohort is a little bit like that. As you can see, the probability of

mental health problems has shot up, almost to the infection point precisely where they started having their first wave in March. If you look on the other side of the Atlantic to the U.S. it is clear before and after – before is the dark blue and after is the lighter blue – there is a shift on the severity spectrum, very clear the shift. You will see that these are the groups that actually had significant association where if you remained employed, you were fairly protected. Younger people were actually particularly highlighted here in terms of the change in their scores. Women of course as well. Looking at the very very young, the age of the youngest child in the household. That probably fits in with childcare responsibilities.

What do we do in Hong Kong? We use a validated series of PHQ-9 (Patient Health Questionnaire), Depressive Symptoms, and a score of 10 or above reflecting Probable Depression. We use GAD 7 (Generalized Anxiety Disorder) to assess anxiety, and a score of 10 or above indicating probable generalized anxiety disorder. If you then look and go from base line all the way through to the present, you can see that this is really hot off the press. We just finished the analysis a couple of days ago. You are looking at Probable Depression, blue, and Anxiety is red. You can see the baseline is here and when you read the prevalent, you have to come to the right hand axis. The left hand axis actually refers to the epicurve in black in the background to show you the relative pilot. You can see that this is baseline and it is about 2%, as I said, in terms of Probable Depresssion. It went up during Occupy Central to about 5 or 6%, stayed up and then in the latter part of last year went up to 12 or 11%. It stayed up in the very first months of COVID-19 but then actually came back down to about 6 or 7% throughout, and it is now just over 5%. Whereas anxiety reached its peak when we had our first case, and then as we have come to understand more and more about the disease, the level of anxiety went up again. With the third wave, the large third wave in June and July, and then came back down as things got better again. I dare say that if we would repeat it in January and this would probably have gone up because people got very fed up with the fourth wave. You can see how this really affected Hong Kong people more generally, with Probable Depression and Probable Anxiety.

This is another way of looking at the same data. These are depression shadings and the darker the colour, the more severe it is. Here we tried to divide by age group, by marital status, by household income for both depression and anxiety. You can see by looking at these graphs, whom we should actually target our attention to. Clearly, if you are by yourself, widowed, divorced or separated, much worse than even married men. If you were in the older age group, you generally don't do very well. If you were very economically disadvantaged, you don't do very well either. Not unexpected, but nevertheless, it is important to note especially in terms of the magnitude of the difference. The space between the curves tells you how much difference it is.

Again, depression and anxiety. This is really trying to look at different age groups who may or may not be living alone in the higher age groups. Once you actually look at these older folks who live at home, because of their home support their risk is probably no higher than others. But if you are living alone and are in the 65 plus older adult group, then you don't do very well.

If you look at the sources of stress and mental health during the first wave of COVID-19, back in January or February, you can see that the shortage of masks, shortage of disinfectants, household disinfectants and shortage of even toilet paper really made a difference for personal anxiety. School closure also was one of the largest stresses. Here is something else. Again you are looking at prevalence and this really relates particularly to the issue of school closure. I'll show you the data. This is mental health following the third wave after prolonged school closure. The shading in the back actually shows you when schools actually were closed. If you live with a child who was in kindergarten, your adjusted odds ratio of having probable anxiety was almost five times, as you can see here.

So it's a huge multi-dimensional decision you need to make, not just thinking about health protection in terms of exposure risk to COVID-19 but the mental health consequences of those decisions are immense. Here if you look at health status and psychosocial stressors during the 4th wave

of COVID-19 (this is data that was surveyed just a mere two weeks ago), you can see that whether you have pre-existing psychiatric mobility or your health generally, your perceived stress, the number of COVID-19-related stressors or getting unemployed and whether you are able to sleep, you can tell that these actually can either reduce or increase the risk of depression and anxiety.

Similarly, you have other factors such as whether you have a job, how the finances in the family are, whether there is domestic violence in the family, what have been the disruptions in your life, whether you felt lonely or not, whether you have pandemic fatigue and would the family support help you. And of course family support is protective and anything else tends to give you a lot of trouble.

Now, public trust. Health care providers - compared to media, traditional and social, compared to academics even and government types - have the highest public trust of everybody. So that is why we have an awesome responsibility to be open, transparent and professional when we give health advice about the pandemic in the public sphere. This is quite interesting because overseas they have identified that different people react differently and there are different trajectories for the types of people. Similarly, we actually find the same thing. People who have persistent psychiatric morbidity, people who are mildly but definitely affected from a psychiatric morbidity point of view, people who are resilient or completely resistant to these psychosocial stresses deal very differently. It is important that we recognize that for the patient sitting in front of us or the social groups that policy makers are trying to target to aid, there are different types of people who deal with these stresses very differently and have different needs.

Epilogue - a small note of big thank you

I'm not going to spend any more time giving you more data because this is a data-packed talk. It only needs me to thank our funders who have supported us from our very beginning. 13 years ago the Hong Kong Jockey Club Charities Trust who helped us put together the family cohort, which subsequently received support from the Jessie Ho Charitable Foundation and the RGC of the Government as well as the Health and Medical Research Fund of the Food and Health Bureau, and also very importantly our biggest supporter the WYNG Foundation for the last two or three years. They have committed to help us succeed for the coming three years and hopefully many more to come. So thank you to all our sponsors, particularly the WYNG Foundation.

Finally, these are the people who toil day and night to collect the data to allow us to offer science-based advice to Government as we continue our fight on this COVID-19 pandemic. Thank you very much indeed. I very much look forward to hearing your comments and listening to your questions. Thank you.