Does the Effect of Sports Participation on Subjective Well-Being Remain Stable During the COVID-19? National Panel Data from China

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ABSTRACT

Sports participation has a positive effect on subjective well-being (SWB); however, few studies have examined the stability of this effect. The coronavirus disease (COVID-19) outbreak compelled governments to enact lockdown policies to respond to this disaster briefly, causing a huge impact on the residents' lifestyles. This study used the two data sets, the Chinese General Social Survey (CGSS) 2018 and CGSS 2021 (N= 14203), and utilized the unexpected shock of COVID-19 to explore whether the impact of sports participation on SWB had been weakened during COVID-19. The results demonstrated that factors such as sports participation, educational levels, and social capital that were more closely related to lifestyle and cultural shaping had a more stable effect on SWB. Factors such as household income and employment status, which were more closely related to material things, had a significantly weaker effect on SWB during the COVID-19 period. The sex difference in SWB disappeared during this period. The disappearance of sex differences in SWB is related to the different attitudes between men and women regarding the decline in income, based on some previous relevant research. Finally, the rationale for the stable performance of sports participation was analysed as follows: different motivations for sports participation would have different effects on SWB and individuals may adjust their motivation for participation according to different situations; therefore, the overall effect of sports participation on SWB will remain the same. The stable effect identified provides some impetus to public policy looking to promote well-being through sport, and provides a new research perspective on sports participation motivation. We appeal to the government to consider increasing residents' opportunities for sports participation in possible future pandemics and lockdown policies.

Keywords: sports participation; subjective well-being; COVID-19; sports motivation; China; lockdown; resilience; social capital.

INTRODUCTION

Subjective well-being (SWB) is a global assessment of an individual's quality of life based on their own selected criteria (Shin & Johnson, 1978, p478). Improving residents' well-being is an important development indicator recognized by the international community (Liu & Zhong, 2023), and a primary objective of Governments and various international organizations (Liu et al., 2024). The closest domains that are most critical to an individual's personal life are those that influence SWB the most (Andrews & Withey, 1976; Campbell et al., 1976). The activity theory suggests that happiness is a by-product of certain human activities or behaviours, and self-awareness will decrease happiness (Diener, 1984). Some subsequent studies have proved that it is self-defeating to value happiness. The more people value happiness, the more likely they will feel disappointed (Csikszentmihalyi & Figurski, 1982; Mauss et al., 2011). According to the Flow theory, when an individual experiences extreme enjoyment while playing, a state of mind called Flow occurs, where the individual becomes less self-focused and immersed in activities, enhancing an individual's performance and happiness (Csikszentmihalyi, 2000).

Sports activity can undoubtedly bring flow to an individual (Swann, 2016), thereby influencing SWB. The positive impact of sports participation on SWB is supported by extensive research (Rodríguez-Bravo et al., 2020). Steptoe & Butler (1996) used the general health questionnaire and the malaise inventory to examine the relationship between sports participation and emotional well-being in adolescents in England, Scotland, and Wales. They found that participation in sports can reduce negative emotions and promote emotional health in adolescents. Stubbe et al. (2007) studied the monozygotic twins in the Netherlands. They found that after eliminating the interference of the "third factor" (growth environment and genes), those who enthusiastically engaged in sports activity had higher life satisfaction and well-being than non-exercisers at all ages. This effect was also present in dizygotic twins and unrelated individuals. Subsequently, Ruseski et al. (2014) used an individual's proximity to sports facilities and endorsement of the importance of physical activity as the instrumental variables that confirmed the causal relationship between sports participation and SWB. A New Zealand study found that well-being was affected by the breadth of sports, with participation in a wider variety of sports being associated with higher well-being (Wilson et al., 2022). Sports exercise also improves SWB among Chinese adults, which would be moderated by the frequency of Internet use, which decreases the contribution of sports exercise to SWB (Liu et al., 2024). There is group heterogeneity in the effects of sports participation on SWB in China, with older adults being more susceptible to the effects of sports participation than younger adults (Liu & Zhong, 2023). Female individuals located in cities in east-central China were found to have a greater likelihood of promoting SWB through sports exercise in an analysis of regional and sex heterogeneity (Gan & Jiang, 2022). Other relevant studies both in China and in Western countries support the link between sports participation and SWB (Sale et al., 2000; Duan et al., 2022; Liu et al., 2023).

However, most parts of the globe were severely and negatively affected socially, economically, and in terms of tourism following the COVID-19 outbreak (Chakraborty & Maity, 2020; Wang & Huang, 2021; Naseer et al., 2023; Škare, 2021). In the general population, COVID-19 significantly

reduced SWB. Hu et al. (2020) examined the SWB of mainland Chinese residents during COVID-19 and found that despite an increase in the frequency of vegetable and fruit intake, SWB was still significantly and negatively affected. The same negative trend was observed in other mental health issues (Xiong et al., 2020). The overall well-being and sports participation of the residents have been severely negatively impacted owing to the lockdown policy (Dai, 2021).

With both lifestyle and SWB were negatively affected, some scholars have initiated to examine whether sports participation still has a positive impact on mental health and SWB during COVID-19. The answer is yes; Wang & Li (2022) explored the mental health status of college students in Shanghai during COVID-19, and the results demonstrated that moderate physical activity can significantly reduce depression and anxiety, and fear of COVID-19. In addition to mental health, physical activity can also promote the health-related quality of life in adults (Qi et al., 2020). In older adults, both health status and SWB were positively influenced by physical activity during COVID-19 (Zhang et al., 2024). The effects of sports participation on SWB were also moderated by the environment and form of exercise (Yang et al., 2022).

However, existing studies neglected the regional differences. China's complete lockdown policy began on January 23, 2020, and ended on April 8 of the same year (BBC News, 2020). Following this, the complete lockdown policy was replaced by the "dynamic zero policy," which allowed regional governments to arrange lockdown policies (BBC News, 2022). Consequently, different provinces had different lockdown ways, enforcement intensities and durations. But provinces are not an important factor in the analytical models of past studies. Besides, lockdown policies extremely restricted sports social interaction, which was considered to have a positive effect on social harmony and individual development in existing studies (Harris, 1998; Perks, 2007; Skinner et al., 2008). The effect of sports participation on SWB may also be restricted by lockdown policies, but most studies have only reported that sports participation still positively affects SWB during COVID-19, and no studies reported whether this effect was weakened during COVID-19. Appropriate quarantine is a necessary and effective means of outbreak prevention and control, and most governments will continue to adopt appropriate quarantine policies in the event of other outbreaks in the future. The contribution of sports participation to SWB might be underestimated when the government needs to make policy, if the stability is not proven. COVID-19 was first reported in China, which was the fastest region to adopt the lockdown policy. This study decided to analyse the data before and after the outbreak of COVID-19 in China, by including province-fixed effects in the model and then testing whether COVID-19 weakens the positive impact of sports participation on SWB.

METHOD

Participants and data collection

Using the data from the Chinese General Social Survey (CGSS) 2018 and 2021, the number of respondents totalled 20,935 (12,787 for CGSS 2018 and 8,148 for CGSS 2021). CGSS 2021 surveyed eight fewer provinces and cities than CGSS 2018, possibly because of COVID-19, including Guangdong Province, Guizhou Province, Heilongjiang Province, Jilin Province, Yunnan Province, Tianjin City, Shanghai Municipality, and Shenzhen Municipality, resulting in a substantially

lower sample size in CGSS 2021 than in CGSS 2018. Additionally, the difference in the number of provinces in the two data sets prevented us from adding province-fixed effects for between-group coefficient tests. Therefore, this study excluded the data from the eight provinces and cities aforementioned to maintain the sample size of the two data sets at the same level. After excluding the invalid samples, the number of respondents was 14,203 (7853 and 6350 for CGSS 2018 and CGSS 2021, respectively), with ages ranging from 17 to 118 years and an average age of 51.7 years. Moreover, 6,656 were men, accounting for 46.86% (Table 1 presents variable descriptions).

Measurement

Analysis was performed using selected data from CGSS 2018 and CGSS 2021. The sports participation was based on 5-point scale, and measured using respondents' answers to the question, "Do you regularly participate in sports activity during your free time in the past year?". In the original CGSS data, higher values imply less frequency of sports participation, which in this study was modified to the opposite: the higher the value, the higher the frequency of sports participation. The respondents' answers to the question, "Do you feel happy in your life?" were used as a measure of SWB, which was based on 5-point scale, a higher value means that the subject feels happier. The value of age was obtained by subtracting the date of birth from the date of the survey. Persons engaged in gainful employment were considered to be in working status (including those in further training), while retired persons and school students who were not working were considered to be in retired status (including those who occasionally perform simple labour), and studying status, respectively. A self-assessment health score was used to measure the health status. In addition to demographic information, social capital was also used as a covariate. Social capital was measured by the frequency of interactions with others, which was calculated by adding the scores of the two questions, "How often do you interact and socialize with friends?" and "How often do you interact and socialize with neighbours?" In the CGSS, the higher the frequency of interaction, the higher the score. Additionally, the education level is complex in the original data, we have recoded it for ease of understanding. It was set as an ordinal variable and was categorised into 5 levels. Household income was selected as the measurement of financial status instead of personal income as in some previous studies for two reasons. Firstly, school students do not have personal income; secondly, many individuals lost their jobs or stayed without pay during the COVID-19 period and relied on financial assistance from their parents to survive. Therefore, the use of household income as the measurement of financial status is more persuasive. Variables such as sex, occupation, and marriage were set as categorical variables. Table 1 shows the variable descriptions.

Table 1. Variable descriptions

Variables	Scale	Score	N/Mean		%/SD	
SWB	Very unhappy	1	193		1.36	
	Unhappy	2	766		5.39	
	Average	3	1910		13.45	
	Happy	4	8236		57.99	
	Very happy	5	3098		21.81	
Sports Participation	Never	0	5752		40.50	
	Several times a year	1	1538		10.83	
	Several times a month	2	1405		9.89	
	Several times a week	3	2507		17.65	
	Almost everyday	4	3001		21.13	
Education	Primary school and below	1	5157		36.31	
	Middle & High school	2	6529		45.97	
	Junior college	3	1007		7.09	
	Bachelor	4	1319		9.29	
	Master or above	5	191		1.34	
Health Status	Very unhealth	1	652		4.59	
(Self-assessment)	Unhealth	2	2072		14.59	
	Average	3	3482		24.52	
	Health	4	5306		37.36	
	Very health	5	2691		18.95	
Social Capital	Never	0	2262	3212	15.93	22.61
(Frequency of socialise with	About once a year	1	1746	1710	12.29	12.04
friends/neighbour)	Several times a year	2	2612	1748	18.39	12.31
	About once a month	3	1177	920	8.29	6.48
	Several times a month	4	2971	1920	20.92	13.52
	Several times a week	5	2217	2387	15.61	16.81
	Almost everyday	6	1218	2306	8.58	16.24
Age	(Continuous variable)	N/A	51.7		16.655	
Sex	Female	N/A	7547		53.14	
	Male	N/A	6656		46.86	
Marital Status	Married	N/A	10817		76.16	
	Divorced	N/A	346		2.44	
	Unmarried	N/A	1681		11.84	
	Bereaved spouse	N/A	1359		9.57	
Household Income (logarithms)	(Continuous variable)	N/A	4.486		1.019	
Employment Status	Working	N/A	7700		54.21	
	Unemployment	N/A	3879		27.31	
	Studying at school	N/A	319		2.25	
	Retired	N/A	23.5		16.23	

The row of social capital shows data on the frequency of sociality with friends and the frequency of sociality with neighbours.

Data analysis

This study is quantitative research, the data were analysed by OLS regression using Stata 17.0, with SWB and sports participation as the dependent and independent variables, respectively. Considering the variability of lockdown policy in mainland China and the vast differences in lockdown policy and time in each province, province-fixed effects were incorporated. Mixed data from CGSS 2018 and CGSS 2021 were analysed first, and then group regression was performed. The formula is as follows:

$$SWB_i = \alpha + \beta sport_i + \theta Z_i + \eta_i + + \varepsilon_i$$

where SWB_i represents subjective well-being; α represents the intercept term; $sport_i$ denotes sports participation frequency in the past year; and Z_i represents a range of covariates, including educational level, health status (self-assessment), social capital, age, sex (reference is male), marital status (reference is unmarried), household income, and employment status (reference is retired). η_i refers to province-fixed effects and ε_i is the residual term.

Following this, between-group coefficient tests were performed on the analyses of the CGSS 2018 and CGSS 2021 data sets. Since comparing the coefficient and p-value alone may be biased, a specialised between-group coefficient test is required. Seemingly unrelated regression and Fisher's Permutation test are commonly used tests of between-group coefficients and have a wide range of applicability to samples, so they were adopted to test whether there was a difference in the effect of sport participation on SWB.

RESULTS

Regression for the mixed data

Our analyses were initiated with the base model (including only sports participation variables) to better demonstrate the impact of sports participation on SWB, and gradually other individual characteristics variables and province-fixed effects were added, with model 1 including only sports participation as an independent variable, and models 2 and 3 adding more individual characteristics variables as covariates and province-fixed effects, respectively. As observed from the changes in R-square, the statistical model with province-fixed effects has the strongest explanatory power (0.1156), and the results are shown in Table 2.

Table 2. Mixed regression of the effect of sports participation on the SWB

	Model 1	Model 2	Model 3
Sports participation	0.067***	0.035***	0.036***
	(0.004)	(0.004)	(0.004)
Educational level		0.065***	0.061***
		(0.008)	(0.008)
Health status (Self-assessment)		0.180***	0.180***
		(0.007)	(0.007)
Social capital		0.007***	0.012***
		(0.002)	(0.002)
Age		0.008***	0.008***
		(0.000)	(0.000)
Female		0.031**	0.027**
		(0.013)	(0.013)
Widowed		-0.009	-0.039
		(0.037)	(0.037)
Married		0.097***	0.073***
		(0.023)	(0.023)
Divorced		-0.362***	-0.375***
		(0.054)	(0.054)
Household income (logarithms)		0.054***	0.058***
		(0.008)	(0.008)
Studying at school		0.174****	0.152***
		(0.045)	(0.045)
Working		-0.075***	-0.079***
		(0.021)	(0.021)
Unemployment		-0.060***	-0.065***
		(0.022)	(0.023)
Provinces fixed	NO	NO	YES
Constant	3.822	2.350	2.632
	(0.010)	(0.076)	(0.090)
N	14203	14203	14203
F	244.87	93.95	47.96
R²	0.0173	0.0983	0.1156

Robust standard error in parentheses.

* Significant at the 10% level, ** Significant at the 5% level, *** Significant at the 1% level.

The vast majority of variables in the model are strongly correlated with SWB consistent with many previous studies. The effect of sports participation on SWB in the mixed data from CGSS 2015 and CGSS 2017, remained stable and significant (p < 0.01) with or without control variables and province-fixed effects. Subsample regressions were next performed on data from CGSS 2017 and CGSS 2021.

Subsample regressions

As before, the analyses progressively added individual characteristic variables and province-fixed effects from the base model. Models 4, 5, and 6 were analyses of CGSS 2018, and models 7, 8, and 9 of CGSS 2021. Models 4 and 7 both included only sport participation as the independent variable, models 5 and 8 added individual characteristic variables as covariates and models 6 and 9 added province-fixed effects (Table 3).

There is an improvement in the coefficient for educational level (from 0.050 to 0.061). Before COVID-19, women had a higher SWB than men (coefficient is 0.032); however, the significance was lost during COVID-19. Moreover, being married (reference is unmarried) and studying at school (reference is retired) also lost significance. Bereaved spouse was still a significant factor; however, the coefficient changed from positive to negative. The coefficient of household income was still significant over the COVID-19 period; however, there was a large decrease (from 0.078 to 0.034), and the coefficient of sports participation had an extremely slight decrease over the COVID-19 period (from 0.034 to 0.031). Figure 1 shows the overall changes.

Table 3. Subsample regressions of the effects of sports participation on the SWB

	2018			2021		
	Model 4	**Model 5**	**Model 6**	**Model 7**	**Model 8**	**Model 9**
Sports participation	0.062***	0.032***	0.034***	0.062***	0.030***	0.031***
	(0.006)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)
Educational level		0.059***	0.050***		0.064***	0.061***
		(0.011)	(0.012)		(0.027)	(0.013)
Health status		0.179***	0.178***		0.186***	0.182***
(Self-assessment)		(0.008)	(0.009)		(0.009)	(0.010)
Social capital		0.005**	0.012***		0.012***	0.014***
		(0.002)	(0.002)		(0.002)	(0.002)
Age		0.007***	0.007***		0.009***	0.009***
		(0.000)	(0.000)		(0.000)	(0.000)
Female		0.043**	0.032*		0.010	0.009
		(0.018)	(0.018)		(0.020)	(0.020)
Widowed		0.109**	0.084*		-0.129**	-0.154***
		(0.047)	(0.047)		(0.051)	(0.051)
Married		0.154***	0.131***		0.053	0.029
		(0.034)	(0.034)		(0.034)	(0.034)
Divorced		-0.390***	-0.398***		-0.345***	-0.351***
		(0.069)	(0.069)		(0.065)	(0.065)
Household income		0.073***	0.078***		0.032***	0.034***
(logarithms)		(0.010)	(0.010)		(0.010)	(0.010)
Studying at school		0.232***	0.212***		0.120	0.093
		(0.077)	(0.077)		(0.076)	(0.076)
Working		-0.066**	-0.071**		-0.087***	-0.087***
		(0.030)	(0.030)		(0.032)	(0.033)
Unemployment		-0.027	-0.031		-0.109***	-0.114***
		(0.031)	(0.031)		(0.034)	(0.034)
Provinces fixed	NO	NO	YES	NO	NO	YES
Constant	3.879	2.620	2.54	3.879	2.484	2.652
	(0.015)	(0.101)	(0.126)	(0.017)	(0.104)	(0.134)
N	7853	7853	7853	6350	6350	6350
F	97.41	65.85	32.66	93.35	56.79	26.72
R²	0.0151	0.0970	0.1211	0.0163	0.1025	0.1225

Robust standard error in parentheses.

∗ Significant at the 10% level, ** Significant at the 5% level, *** Significant at the 1% level.
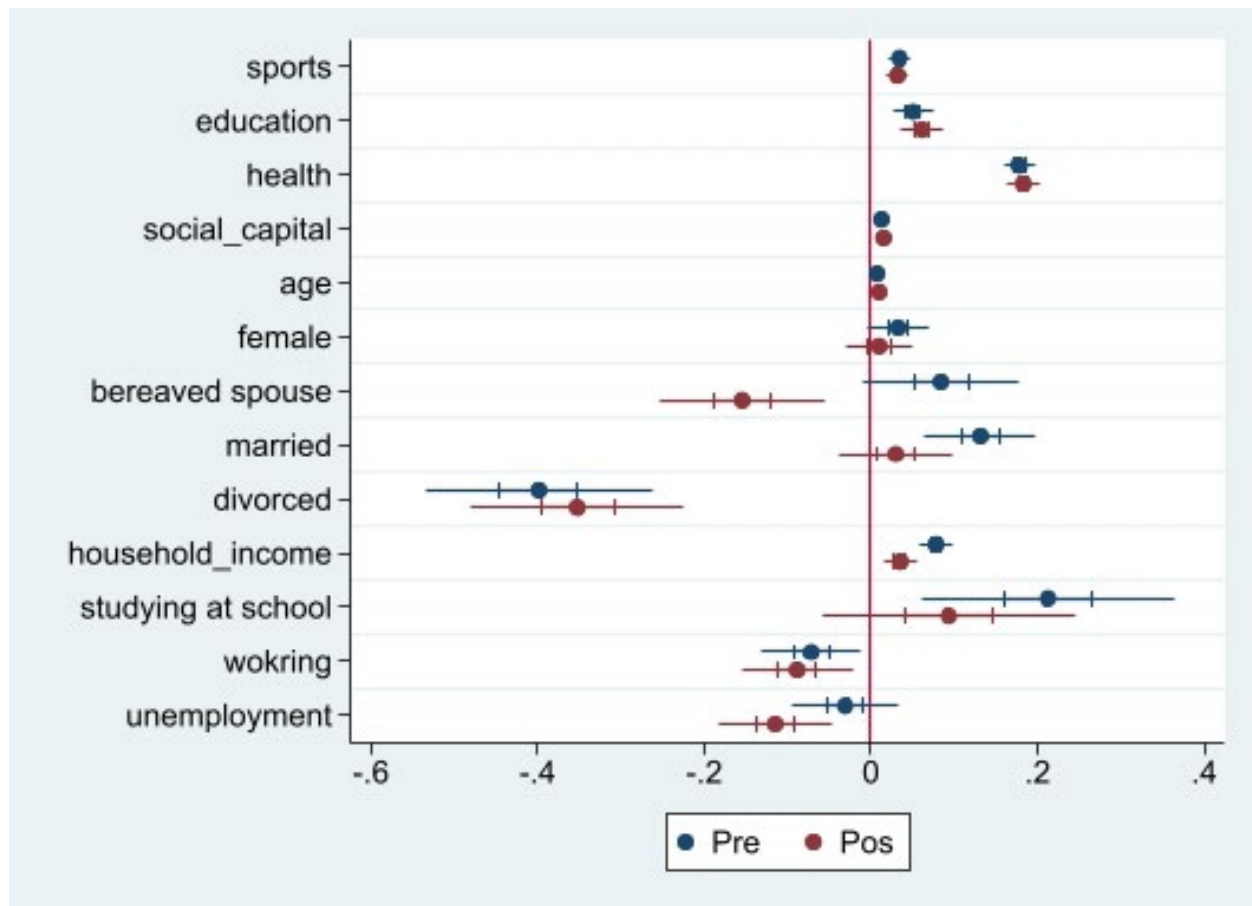
Figure 1. The overall changes in variables before and after COVID-19

The Pre in Figure 1 represents CGSS 2018 (blue), and the Pos represents CGSS 2021 (red). The change in sports participation is very small, and further analyses are needed to see if this difference is significant. Next, to explore whether the effect of sports participation on SWB has been weakened during COVID-19, we conducted between-group coefficient tests (Table 4).

Table 4. Between-group coefficient tests for analysis results of CGSS 2018 and CGSS 2021

	Sports participation × Time	Educational level × Time	Health status × Time	Social capital × Time	Age × Time	Female × Time	Widowed × Time
Seemingly unrelated regression	0.09 (p = 0.758)	0.43 (p = 0.511)	0.09 (p = 0.769)	0.33 (p = 0.567)	2.65 (p = 0.103)	0.72 (p = 0.394)	10.26*** (p = 0.001)
Fisher's Permutation test	-0.003 (p = 0.386)	0.011 (p = 0.250)	0.004 (p = 0.375)	0.002 (p = 0.267)	0.002* (p = 0.050)	0.023 (p = 0.213)	-0.239*** (p = 0.000)

	Married × Time	Divorced × Time	Household income × Time	Studying at school × Time	Working × Time	Unemployment × Time
Seemingly unrelated regression	4.63** (p = 0.031)	0.19 (0.666)	6.98*** (p = 0.008)	1.73 (p = 0.188)	0.15 (p = 0.698)	3.28* (p = 0.070)
Fisher's Permutation test	-0.101** (p = 0.012)	0.047 (p = 0.359)	-0.043*** (p = 0.005)	-0.119* (p = 0.099)	-0.017 (p = 0.341)	-0.084** (p = 0.031)

Seemingly unrelated regression shows the chi-square statistic.

Fisher's Permutation test shows the variation of coefficient, which is equal to the coefficients of model 9 minus that of model 6.

Fisher's Permutation test sampled 1000 times via bootstrap.

P-value in parentheses.

Table 4 presents the results of the seemingly unrelated regression (SUR) and Fisher's permutation test (FPT). The SWB of individuals who had a bereaved spouse and married both decreased during COVID-19 (reference is unmarried), with coefficient differences being -0.239 and -0.101, respectively, and the results of both the SUR and FPT proved significant. Household income still had a significant positive effect on SWB during COVID-19; however, this effect had been significantly weakened, with the coefficient decreasing from 0.078 to 0.034 ($p < 0.01$). In contrast, the negative effect of unemployment on SWB was exacerbated during COVID-19, with a coefficient difference of -0.084 (p 0.070 and 0.031 for SUR and FPT, respectively). Age and studying status passed the FPT test; however, both were only at the 1% significance level, and neither passed the SUR (p 0.103 and 0.188, respectively).

There was an extremely slight decrease in the coefficient of variation for sports participation, with a coefficient of variation of -0.003; however, the results were not significant for either the SUR or the FPT (p 0.758 and 0.386, respectively), suggesting that the effect of sports participation on SWB was stable, and was not significantly weakened, even during the COVID-19 period.

DISCUSSION

Differences in the effect of individual characteristics on SWB

The relationship between education and SWB was validated again in this study, even during the COVID-19 period. Education still had a significant positive effect on SWB, and this effect was highly stable. Some individuals believe that higher educational levels will lead to high aspirations and thus lower SWB; however, studies exhibit that high educational levels can improve SWB (Dang & Sukontamarn, 2020; Yakovlev & Leguizamon, 2012). This correlation is even more stable than income, which does not lead to higher SWB when it is above a certain point (Striessnig, 2015). Simultaneously, higher levels of education have other benefits, such as lowering the risk of depression and death (Ross & Mirowsky, 2006; Balaj et al., 2004). The reason for the stability of this effect may be related to psychological resilience. Some studies showed that people with higher education usually have higher levels of psychological resilience and better disaster preparedness, and they typically respond better in disasters when facing disasters (Ang et al., 2018; Castañeda, 2020; Frankenberg, 2013; Muttarak & Pothiriri, 2013). Consequently, higher educational attainment could maintain the positive effect on SWB during COVID-19 and lockdown.

The results showed that there is a significant sex difference in SWB in Chinese society and that women had higher SWB than men, similar to other studies from China (Wang & VanderWeele, 2011; Bian et al., 2015; Zhou & Peng, 2018). This is in contrast to studies from other countries, such as Germany, which state that men can "have it all," but women must still choose between career and family (Trzcinski & Holst, 2012). Some findings suggest that the extent of sex differences in SWB depends on the level of social and gender inequalities in the region or country and that in countries with less sex inequality, there are also fewer or no significant differences in gender in SWB (Tesch-Römer, 2008; Batz-Barbarich et al., 2018). However, we were surprised to find that sex differences in SWB disappeared during COVID-19. The findings of Asadullah et al. (2018) may explain it, which found that the SWB of Chinese women and the poor is more likely to be influenced by absolute

income, while men and the rich find it difficult to derive satisfaction from higher absolute incomes. With China's rapid economic development, absolute incomes of all classes have been rising rapidly over the past few decades. Therefore, despite being poorer, women are happier in China, which is influenced by socioeconomic differences. The negative impact of COVID-19 on residents' absolute income was more pronounced, and the SWB of women was more susceptible to absolute personal income. Consequently, women's SWB advantage declined, leading to the disappearance of sex differences in SWB during COVID-19. This phenomenon also occurs in other regions as well, with Mutz (2021) finding a greater decline in SWB in women than in men during COVID-19.

Although the coefficient of bereaved spouses remained significant during COVID-19, it changed from positive to negative. This may be because a large number of bereavements during COVID-19 were from unexpected shocks of the virus, which made people think that they were highly likely to be infected with the virus as well. Thus, the uneasiness of the bereaved population was amplified, and the SWB was reduced.

In the employment status comparison (reference is retired), no significant difference in SWB before and after COVID-19 was observed for those in working status; however, there was a significant decrease in SWB for those in unemployment status. We speculate that this is because COVID-19 caused individuals who were working to lose their jobs, thus increasing the proportion of those who were involuntarily unemployed and exacerbating the negative coefficient of unemployment on SWB. For school students, although the results of the FPT showed that COVID-19 also negatively impacts their SWB, it is only significant at the 1% level and fails the significance test of the SUT.

The effect of household income on SWB is also significantly weakened during the COVID-19 period (coefficient of variation is -0.043, p 0.0005), demonstrating that household income has a significant effect on SWB. But, this effect is also susceptible to interference from other factors, COVID-19 and lockdown weakens the household income's ability to bring SWB to individuals.

Differences in the effect of sports participation on SWB

Both sports participation, educational level, and social capital variables exhibited a stable effect on SWB, even during the COVID-19 period. The coefficient of the effect of sports participation on SWB was reduced only by 0.003, and this difference does not pass either the SUT or the FPT (p 0.758 and 0.386, respectively). These results showed that the effect of sports participation on SWB was not significantly weakened during the COVID-19 period. Sports participation, educational levels, and social capital, which are closely linked to individual lifestyles and cultural shaping, have a more stable impact on SWB than material things like money and employment status.

Some research suggests that sports activities with social-interaction and social identification would have a more pronounced effect on the promotion of SWB (Downward & Rasciute, 2011; Graupensperger et al., 2020). During COVID-19, the social activities of the residents were severely restricted by the lockdown policy, indicating that sports activities with sociality (team sports) were also restricted. However, the results showed that the effect of sports participation on SWB remained unchanged. Jetzke & Mutz (2020) examined the sport motivations and found that, in addition to sociality, other intrinsic sport motivations like enjoyment, relaxation, and fitness also had a significant effect on SWB. Based on it, we speculate that when the sociality needs in sports

were not adequately satisfied during the COVID-19 period, the equivalent SWB can be obtained by adjusting sport motivations (such as fitness motivation for improving immunity). Consequently, the effect of sports participation on SWB was not attenuated in general. But this idea requires further research. In addition, many studies have found that regular sports participation during COVID-19 reduces psychological stress and negative emotion (Jacob et al., 2020; McGuine et al., 2022; Mladenović et al., 2021; Nazari et al., 2023; Sokić et al.,2021; Zhang et al., 2020). We believe that this also plays an important role in maintaining the effect of sport participation on SWB.

LIMITATIONS

This study has some limitations. In terms of data, the CGSS could not cover enough general character variables for this study. For instance, the personal industry. Generally, the lockdown policy reduced residents' income, but this influence was very different in different industries, with even enhancing the income for those who worked in pharmaceutical companies. However, due to the data limitation, we could not control the influence of industry differences.

Regarding the analysis methods, the province-fixed effect may not respond to the complex variety in lockdown policy. For example, during the post-dynamic zero policy-period, the lockdown polices could be executed precisely at the district and county level, which may lead to a huge difference in lockdown policy between different districts in the same province.

Finally, the results from this study may not be applicable to other countries and regions. This is because this study only involved data from the Chinese mainland, which is hugely different from other countries in lockdown policies, culture and economics. At present, little attention is paid to the stability of the effect of sports participation on SWB, which should be encouraged to be carried out in different countries and regions.

CONCLUSION

This study aims to test whether the impact of sports participation on SWB weakens during the COVID-19 pandemic in China. Using data from the CGSS 2018 and CGSS 2021 and including province-fixed effects to consider different lockdown policies, this study provides new insights into the factors that influence SWB during the global health crisis. The results demonstrated that sports participation is a highly stable contributor to SWB, similar to educational levels and social capital, and is not significantly weakened even during the COVID-19 period and under the lockdown policy. In contrast, the variables with stronger material ties, such as household income and employment status, are more susceptible to COVID-19 shocks. The sex difference in SWB was similarly attenuated during the COVID-19 period. Based on the previous studies, it was speculated that the disappearance of the sex difference in SWB is related to different perspectives on the comparison of wealth between men and women. There were different perspectives on wealth comparisons, with a larger decline in SWB during COVID-19 experienced by women who focus more on absolute income than men who focus more on relative income.

Finally, the stable performance of sports participation was discussed. The literature suggested that sports with sociality have a higher promotion effect on SWB. Although the lockdown policy prohibited residents from team activities to some extent, the promotion effect of sports participation on SWB was not weakened. This may be because individuals enhance their SWB through other intrinsic sports motivations under the lockdown policy, such as participating in sports activities for fitness motivation and to improve immunity. Therefore, in general, the effect of sports participation on SWB is not weakened.

Based on this result, we recommend that sports exercise be considered as an important measure to promote the SWB of residents during a pandemic. The government could introduce and encourage people to do some easy exercises at home through the Internet or other public media. In the post-pandemic, national and local governments should consider promoting sports participation opportunities as part of recovery policies to enhance the public well-being. In addition, it is equally important to emphasise the correct way of exercising, otherwise negative cases can occur. After the end of the complete lockdown in China, for instance, there were some cases of students dying suddenly after wearing masks in physical education classes (Wan, 2020; Zhang, 2020).

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