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The Impact of COVID-19 Restrictions on Perceived Health and Wellbeing of Young Australian Sport and Physical Activity Participants

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Abstract

This study investigated the impact of Coronavirus Disease of 2019 (COVID-19) restrictions on perceived health and wellbeing of young Australian sport and physical activity participants. A survey was conducted during the first COVID-19 restrictions and lockdowns in Australia (May–June 2020). Health measures were tabulated against five respondent characteristics, including settings and modes of sport and physical activity, and comparisons made with chi-square tests. Findings indicate that male youth were significantly more likely to report better physical ($p = .001$), general ($p = .014$), and mental ($p \leq .001$) health compared to female youth. Individuals involved in both team and individual sport reported significantly better general ($p = .022$) and physical health ($p = .003$) compared to those involved in individual only sports or physical activity. While it is unclear

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if this is dose-related, team-based sport may encourage increased time in physical activity (i.e., dose) or social interactions, or a combination of both factors, which potentially buffers against declining health outcomes due to pandemic restrictions.

Keywords
pandemic, youth, sport, mental, health, participation

Introduction

On March 11, 2020, the World Health Organization declared the transmission of the novel SARS-CoV-2 virus a global pandemic. Coronavirus Disease of 2019, "COVID-19" has since become the single biggest and rapidly evolving challenge for the international community. Following the first reported case of COVID-19 in January 2020, Australia closed all borders on March 25, 2020, and imposed a series of state and territory specific restrictions including the cancellation of most elite and community level sport. For instance, in the state of Victoria at the height of government enforced lockdown restrictions, community sports were cancelled, no crowds were permitted to spectate live sporting event, and opportunities for individual physical activity levels were restricted to 1 hour per day, within a 5 km radius of individual residence. In South Australia, similar restrictions were experienced but some individual (e.g., golf) and outdoor sports (e.g., Australian football) were permitted to return to competition sooner than other sports that were characterized by indoor competition, a high ratio of players in a designated area, and a general reduction in the length of competitive seasons. A gradual return to participation in organized sport has been guided by strict "get in, train/play, get out" policies (e.g., Hughes, 2020). However, the international academic community were quick to share concerns about the immediate and long-term impact of COVID-19 on sport and physical activity participation on individuals' health, including the physical and mental health and wellbeing of the youth (Drummond et al., 2020; Elliott et al., 2021; Kelly et al., 2022).

Prior to the pandemic, Australian youth were already insufficiently active, lacked movement skill mastery, and compared poorly to other countries in relation to physical fitness (Schranz et al., 2018). Indeed, promoting youth involvement in sport and physical activity was widely regarded a major international public health concern (Aubert et al., 2018). This comprised, and continues to represent, a major challenge given that physical activity is essential for children's healthy development (Janssen & LeBlanc, 2010) and participation in organized youth sport is associated with a range of social

and psychological benefits including the maintenance of mental health, self-esteem, fewer depressive symptoms and feelings of connectedness (Eime et al., 2013).

Considering the wide-ranging health-related benefits of youth sport and physical activity participation, as well as the closure of organized youth sport during the pandemic, researchers quickly moved to investigate the impact of the pandemic on sport and physical activity participation and health outcomes in children and youth. One of the reported trends includes an overall increase in time spent in unstructured/free play among children (Nathan et al., 2021). This could be largely attributed to increasing time spent within the home setting and the inherent desire for children and youth to engage in free play while unable to attend school and other social activities with peers. However, overall physical activity levels among youth reportedly declined during different stages of the pandemic (Rossi et al., 2021; Štveráková et al., 2021). For example, reductions in physical activity levels during the pandemic have been reported among rural and urban populations (Zenic et al., 2020), ethnic minority groups (Bingham et al., 2021), and children (5–11 years) and youth (12–17 years) populations (Moore et al., 2020), reinforcing concerns about the short and long-term physical impact on a generation of young people (Drummond et al., 2020).

In addition to a decline in general physical activity, youth also increased sitting behavior during the pandemic (Dunton et al., 2020). While this can be attributable to the rapid uptake of online learning methods in place of normal educational routines in school, studies have nonetheless reported that children's screen time for educational and recreational purposes exceeded daily recommendations by approximately 60% and overall mental health and well-being declined by up to 74% (Breidokienė et al., 2021; Gilbert et al., 2021; Kovacs et al., 2021). This is concerning because children who engaged in higher durations of screen time during COVID-19 have reported higher levels of depressive and anxiety symptoms (McArthur et al., 2021). Further, qualitative studies have shed some light on this by identifying feelings of anxiousness, fear, and shock as a result of social distancing restrictions that led to the cancellation of youth sport and physical activity opportunities (Shepherd et al., 2021). Youth have also reported experiencing grief and mood disturbances, indicating that young people who are normally engaged in sport and physical activity have struggled during the global pandemic, emphasizing the need to provide further support mechanisms for parents and children during lockdowns (Elliott et al., 2021).

To strengthen the growing consensus that sport and physical activity participation and general mental health and wellbeing has declined among youth during the pandemic, more research is needed to better understand the impact

of COVID-19 on the general, physical, and mental health of youth during the pandemic. This is crucial given that lockdowns and restricted movement policies were, and continue to be, managed in different ways during the pandemic globally, nationally, and provincially (e.g., states and territories). Further research is also warranted because scholars remain concerned about the adverse psychological impact of COVID-19 on young people (e.g., see Drummond et al., 2020; Loades et al., 2020; Sanderson & Brown, 2020). In this paper, we seek to determine the association between youth sport and physical activity participation and general, physical, and mental health and wellbeing (including general wellbeing, resilience, and life satisfaction), together with different sexes, regions, settings, and modes of sport and physical activity, during the pandemic.

Methods

This study is one aspect of a broader program of research in Australia which involves the longitudinal measurement of sport and physical activity profiles and physical, mental, and social health and wellbeing outcomes, via two waves of an online survey during the COVID-19 period (2020 and 2021), the first of which also includes some retrospective data pertaining to a pre-COVID-19 baseline in 2019. The present study is based on data collected in the first wave using an online survey of sport participants conducted during May and June 2020. Recruitment to the survey was primarily facilitated by national and state sport governing bodies including Australian football, bowls, cricket, golf, tennis, and football (soccer).

The present study is one of three studies, each focusing on a different stage of the lifespan. The other studies are focused on early and middle adulthood (18–59 years) and older adulthood (60+ years; both under review). The present study is focused on youth aged 13 to 17 years at the time of the survey who were registered in the 2019 and/or 2020 playing seasons to participate in one or more sports. The national (NSOs) and state (SSOs) based sports organizations facilitated participant recruitment by sending an invitation email to their registered participants with a link to the online survey. The research team has previous experience with working with these sports at national, state, and local community levels. In order to broaden the scope of the survey sample to include people who participate in recreational physical activity only in settings other than sports clubs, and potentially also people who do not participate in any recreational physical activity, the primary recruitment strategy was supplemented by the use of snowball sampling, through social media pages of sports organizations and research-oriented social media pages (e.g., Twitter™ posts via affiliated research center Twitter™ accounts).

The first wave, or baseline, of the longitudinal survey included, among many other items, questions about demographic characteristics (sex, date of birth, and residential postcode), types of sports and other recreational physical activities participated in, settings in which the participation occurred (sports clubs and other less structured, informal settings), modes of participation (team and individual modes of activity), self-assessed general health, physical health and mental health, and measures of wellbeing (general wellbeing, resilience, and life satisfaction). Date of birth was used to determine age in years at the time the survey was completed. Participant age was then used to identify the youth cohort (13–17 years). Residential postcode concordances (Australian Bureau of Statistics, 2016) were used to assign each postcode to one of two broad geographical zones or regions: metropolitan, comprising the capital cities of the Australian states; and non-metropolitan, comprising regional cities, towns, and rural areas.

Regarding sport and physical activity, two separate sections of the survey dealt respectively with two "settings": organized club sport involving membership and registration (designated "club"), and more informal sport and recreational physical activity (designated "informal"). In each section, a list of the most common activities was presented—16 for club sports and 26 for informal (including 12 of the 16 club sports), Respondents indicated which activities they participated in, with provision for adding other activities that were not listed. Based on these responses, a combined list of 88 activities was established. Further, each of the 88 activities was classified as either "team" or "individual." The sports and activities reported by each respondent were used to assign each respondent to a category for each of "settings" (club only, club and informal, informal only, and inactive) and "modes" (team only, team and individual, individual only, and inactive).

Six survey items were devoted to self-assessed health—three pertaining to the time of the survey (during COVID-19) and three comparing current health to health 12 months prior to the survey (before COVID-19). The general health item was a 5-point Likert scale item (poor, fair, good, very good, excellent) derived from the Short-form Health Survey (SF-36) instrument (Ware, 1993). The same format was used for the assessment of physical health and mental health. The three comparative items used a 5-point Likert scale (much worse, somewhat worse, about the same, somewhat better, and much better).

General wellbeing was assessed using a scale derived by averaging the responses to a battery of 14 items regarding frequency of positive and negative feelings, derived from (Australian Institute of Health and Welfare, 2012). Each item was scored on a 5-point scale (all of the time, most, some, a little,

and none), with reverse coding of the negative items so that higher average scores represented greater wellbeing. Resilience was similarly assessed using a scale derived by averaging the responses to a battery of four items derived from (Smith et al., 2008). Each item consisted of a statement about the respondent, with responses on a 5-point scale (strongly agree, agree, neutral or unsure, disagree, and strongly disagree). Life satisfaction was assessed using a direct question (Eime et al., 2014), with the response on a 10-point scale from 1 (least satisfied) to 10 (most satisfied).

Statistical Analysis

For tabulation and statistical analysis of responses, all six 5-category health items were recoded into three categories. Among the adolescent cohort, there were no inactive respondents and few ($n = 7$) who participated only in informal settings. This was an insufficient sample size for valid statistical analysis and so the "informal only" category was excluded from the analysis. Consequently, the variable "settings of sport and physical activity" was reduced to two categories (club only, club, and informal). The variable "modes of sport and physical activity" was recoded from four categories (team only, team and individual, individual only, and inactive) to two categories (team including team and individual, individual only).

The six recoded health items were each cross tabulated against four respondent characteristics: gender, region, settings of sport and physical activity, and modes of sport and physical activity. Chi-square tests of independence were conducted to identify differences in the health profiles of the groups defined by each of the characteristics. For the measures of general wellbeing, resilience, and life satisfaction, mean values for the groups defined by each of the four characteristics were tabulated, and group differences were analyzed using independent samples *t*-tests.

Results

The sample of respondents included 274 male youth (58.8%) and 192 female youth (41.2%; see Table 1). Most respondents resided in metropolitan cities (70%) compared to non-metropolitan regions (30%) (Table 1). Majority of the participants (93.8%) were involved in club sport or physical activity only, while the remaining participants (6.2%) were involved in both club and informal sport and physical activity. In terms of sport type, only 69 participants (14.7%) were involved in individual only sports in contrast to the other 399 participants (85.3%) who were involved in either team only or team and individual modes of sport.

Health Outcomes During COVID-19 Lockdown/Restriction

There was a significant difference between reports of general health during COVID-19 lockdown for male and female youth ($p = .014$; Table 1). Male youth were more likely to report very good/excellent general health (68.6%)

Table 1. Self-Assessment of Current Health: By Respondent Characteristics.

	Characteristics				
	Gender				
	Male		Female		
Health assessments	*N*	%	*N*	%	*p*-Value[a]
General health					
Poor or fair	22	8.0	18	9.4	.014
Good	64	23.4	67	34.9	
Very good or excellent	188	68.6	107	55.7	
Total	274	100.0	192	100.0	
Physical health					
Poor or fair	64	23.4	54	28.1	.001
Good	89	32.5	86	44.8	
Very good or excellent	121	44.2	52	27.1	
Total	274	100.0	192	100.0	
Mental health					
Poor or fair	32	11.8	28	14.6	.001
Good	59	21.7	69	35.9	
Very good or excellent	181	66.5	95	49.5	
Total	272	100.0	192	100.0	
	Region				
	Metropolitan		Non-metropolitan		
	N	%	*N*	%	
General health					
Poor or fair	29	8.8	12	8.6	.541
Good	88	26.7	44	31.7	
Very good or excellent	213	64.5	83	59.7	
Total	330	100.0	139	100.0	
Physical health					
Poor or fair	82	24.8	36	25.9	.865
Good	123	37.3	54	38.8	
Very good or excellent	125	37.9	49	35.3	
Total	330	100.0	139	100.0	
Mental health					
Poor or fair	41	12.5	20	14.5	.116
Good	83	25.2	46	33.3	
Very good or excellent	205	62.3	72	52.2	
Total	329	100.0	138	100.0	

(continued)

Table 1. (continued)

	Sport and physical activity settings[b]				
	Club and informal		Club only		
	N	%	*N*	%	
General health					
Poor or fair	41	9.3	0	0.0	.205
Good	122	27.8	10	33.3	
Very good or excellent	276	62.9	20	66.7	
Total	439	100.0	30	100.0	
Physical health					
Poor or fair	117	26.7	1	3.3	.013
Good	164	37.4	13	43.3	
Very good or excellent	158	36.0	16	53.3	
Total	439	100.0	30	100.0	
Mental health					
Poor or fair	58	13.2	3	10.3	.774
Good	122	27.9	7	24.1	
Very good or excellent	258	58.9	19	65.5	
Total	438	100.0	29	100.0	
	Sport and physical activity modes				
	Team only or team and individual[c]		Individual only[d]		
	N	%	*N*	%	
General health					
Poor or fair	36	9.0	5	7.2	.022
Good	103	25.8	29	42.0	
Very good or excellent	260	65.2	35	50.7	
Total	399	100.0	69	100.0	
Physical health					
Poor or fair	90	22.6	28	40.6	.006
Good	155	38.8	22	31.9	
Very good or excellent	154	38.6	19	27.5	
Total	399	100.0	69	100.0	
Mental health					
Poor or fair	48	12.1	13	18.8	.003
Good	101	25.4	28	40.6	
Very good or excellent	248	62.5	28	40.6	
Total	397	100.0	69	100.0	

[a]Chi-square test of independence.
[b]All survey respondents participated in club sports; we compare those who also participated in informal sport or other recreational physical activities with those who did not.
[c]All those who participated in team sports or activities, including those who also participated in individual sports or activities.
[d]Those who participated in individual sports or physical activities, but not in team sports or activities.

than female youth (55.7%). Male youth were also more likely to report very good/excellent physical health (44.2%) compared to female youth (27.1%; $p = .001$). Furthermore, male youth were more likely to report very good/excellent mental health (54.2%) in contrast to female youth (36.5%; $p \leq .001$; see Table 1).

When comparing metropolitan and non-metropolitan residents, there were no regional effects on health outcomes. Both metropolitan (64.5%) and non-metropolitan (59.7%) participants reported very good/excellent general health, very good/excellent physical health (metropolitan 62.3%, non-metropolitan 52.2%) and very good/excellent mental health (metropolitan 47.7%, non-metropolitan 44.6%). Similarly, when comparing sport and physical activity settings, there were no settings effects on health outcomes. Both club and informal sport and physical activity and club-only sport similarly reported very good/excellent general health (club and informal sport and physical activity 65.5%, club-only sport 63.0%), very good/excellent physical health (club and informal sport and physical activity 64.3%, club-only sport 59%), and very good/excellent mental health (club and informal sport and physical activity 60.7%, club-only sport 45.9%).

In terms of the modes of participation, those involved in both team and individual sport reported significantly better general ($p = .022$) and physical health ($p = .003$) compared to participants involved in individual only sports or physical activity. No statistically significant differences were reported for mental health.

Self-Assessment of Current Health Compared to 1 Year Ago: By Respondent Characteristics

Table 2 summarizes the results of self-assessed health during COVID-19 lockdowns compared to a year ago (and pre-COVID-19). During COVID-19 lockdowns, male youth reported significantly better general health (male 48.2%, female 32.3%), physical health (male 54.2%, female 36.5%), and mental health (33.6%, female 22.4%) compared to female youth (see Table 2). Female participants also reported worse/much worse general health (female 41.7%, male 25.9%), physical health (female 30.7%, male 19%), and mental health (female 39.6%, male 24.1%) compared to male youth during lockdowns. No regional differences were reported between metropolitan and non-metropolitan youth. During COVID-19 lockdown however, club and informal sports participants reported better general ($p = .018$) and physical ($p = .010$) health than club-only participants. Further, individual-only sports and physical activity participants reported worse/much worse general (40.6%) and physical (46.4%) health in contrast to team only or team and individual sports and physical activity (general health 22.6%, physical health 30.1%) respectively.

Table 2. Self-Assessment of Current Health Compared to 1 Year Ago: By Respondent Characteristics.

	Characteristics				
	Gender[b]				
	Male		Female		
Health assessments	*N*	%	*N*	%	*p*-value[a]
General health					
Worse or much worse	71	25.9	80	41.7	<.001
About the same	71	25.9	50	26.0	
Better or much better	132	48.2	62	32.3	
Total	274	100.0	192	100.0	
Physical health					
Worse or much worse	52	19.0	59	30.7	<.001
About the same	73	26.7	63	32.8	
Better or much better	148	54.2	70	36.5	
Total	273	100.0	192	100.0	
Mental health					
Worse or much worse	66	24.1	76	39.6	.001
About the same	116	42.3	73	38.0	
Better or much better	92	33.6	43	22.4	
Total	274	100.0	192	100.0	
	Region				
	Metropolitan		Non-metropolitan		
	N	%	*N*	%	
General health					
Worse or much worse	101	30.6	51	36.7	.437
About the same	88	26.7	34	24.5	
Better or much better	141	42.7	54	38.8	
Total	330	100.0	139	100.0	
Physical health					
Worse or much worse	81	24.6	31	22.3	.495
About the same	91	27.7	46	33.1	
Better or much better	157	47.7	62	44.6	
Total	329	100.0	139	100.0	
Mental health					
Worse or much worse	97	29.4	47	33.8	.596
About the same	137	41.5	52	37.4	
Better or much better	96	29.1	40	28.8	
Total	330	100.0	139	100.0	

(continued)

Table 2. (continued)

	Sport and physical activity settings[b]				
	Club and informal		Club only		
	N	%	*N*	%	
General health					
Worse or much worse	149	33.9	3	10.0	.024
About the same	111	25.3	11	36.7	
Better or much better	179	40.8	16	53.3	
Total	439	100.0	30	100.0	
Physical health					
Worse or much worse	108	24.6	4	13.8	.207
About the same	130	29.6	7	24.1	
Better or much better	201	45.8	18	62.1	
Total	439	100.0	29	100.0	
Mental health					
Worse or much worse	140	31.8	4	13.8	.032
About the same	178	40.5	11	37.9	
Better or much better	122	27.7	14	48.3	
Total	440	100.0	29	100.0	
	Sport and physical activity modes				
	Team only or team and individual[c]		Individual only[d]		
	N	%	*N*	%	
General health					
Worse or much worse	120	30.1	32	46.4	.024
About the same	106	26.6	16	23.2	
Better or much better	173	43.4	21	30.4	
Total	399	100.0	69	100.0	
Physical health					
Worse or much worse	93	23.4	19	27.5	.395
About the same	114	28.6	23	33.3	
Better or much better	191	48.0	27	39.1	
Total	398	100.0	69	100.0	
Mental health					
Worse or much worse	119	29.8	25	36.2	.509
About the same	161	40.4	27	39.1	
Better or much better	119	29.8	17	24.6	
Total	399	100.0	69	100.0	

[a]Chi-square test of independence.
[b]All survey respondents participated in club sports; we compare those who also participated in informal sport or other recreational physical activities with those who did not.
[c]All those who participated in team sports or activities, including those who also participated in individual sports or activities.
[d]Those who participated in individual sports or physical activities, but not in team sports or activities.

Table 3. Measures of Wellbeing[a]: By Four Respondent Characteristics.

	Characteristics						
	N	*M*	*SD*	*N*	*M*	*SD*	
	Gender[c]						
Measure	Male			Female			*p*-Value[b]
General wellbeing	254	3.71	0.649	183	3.39	0.665	<.001
Resilience	250	3.82	0.689	183	3.52	0.689	<.001
Life satisfaction	255	7.21	1.912	185	6.68	1.866	.004
	Region						
	Metropolitan			Non-metropolitan			
General wellbeing	310	3.58	0.688	129	3.57	0.640	.850
Resilience	304	3.72	0.699	132	3.64	0.719	.268
Life satisfaction	309	7.07	1.881	134	6.80	1.950	.171
	Sport and physical activity settings[c]						
	Club and informal			Club only			
General wellbeing	414	3.57	0.683	25	3.67	0.504	.468
Resilience	410	3.70	0.711	26	3.62	0.609	.562
Life satisfaction	416	6.94	1.915	27	7.67	1.593	.055
	Sport and physical activity modes						
	Team onlxy or team and individual[d]			Individual only[e]			
General wellbeing	376	3.60	0.674	62	3.44	0.663	.079
Resilience	367	3.71	0.707	68	3.60	0.689	.263
Life satisfaction	374	7.08	1.899	68	6.46	1.856	.013

[a]General wellbeing: 14 items, scale 1 to 5. Resilience: 4 items, scale 1 to 5. Life satisfaction: 1 item, scale 1 to 10.
[b]Independent samples *t*-test.
[c]All survey respondents participated in club sports; we compare those who also participated in informal sport or other recreational physical activities with those who did not.
[d]All those who participated in team sports or activities, including those who also participated in individual sports or activities.
[e]Those who participated in individual sports or physical activities, but not in team sports or activities.

Measures of Wellbeing

Regarding measures of wellbeing, male youth reported higher levels of general wellbeing ($p < .001$), resilience ($p < .001$), and life satisfaction ($p = .004$) than female youth (see Table 3). There were no significant differences identified when comparing metropolitan and non-metropolitan youth, or when comparing involvement in club and informal sport and physical activity to

club only sport and physical activity involvement. In terms of sport and physical activity modes, significantly greater life satisfaction was reported by youth involved in team only or team and individual sport participation as distinct from individual-only sport and physical activity ($p = .13$).

Discussion

The objective of this research was to investigate the impact of COVID-19 lockdowns on the general, physical, and mental health of Australian youth and the association of health outcomes with sport and physical activity. In this study there were significant differences in reported health, wellbeing, and life satisfaction according to the type of activity and gender. However, there were no significant differences between regions.

During COVID-19 lockdown in 2020, male youth reported better general, physical, and mental health compared to females. This may be related to several factors. From a gendered perspective, it is arguable that male youth were less likely to perceive themselves in an inferior manner because traditional, hegemonic attitudes reinforce young males as "the physically more robust" gender (Drummond, 2021). Gendered attitudes may have therefore influenced the way male youth responded to the survey. However, it is also possible that male youth *were* more physically active during COVID-19 lockdown which supported better general and mental health. If so, it is worthwhile considering why females reported poorer physical health compared to male youth. One reason may be that female youth more readily rely on strong social support networks for sport participation and physical activity (Elliott et al., 2020) and psychological wellbeing (Hagiwara et al., 2017), and that restrictions hindered physical activities (e.g., sport) done socially with others. Another reason could be based on the premise that female youth tend to move away from organized sporting activities during adolescence at a higher rate in contrast male peers (Drummond et al., 2022; Eime et al., 2019). If female youth leave sport, the opportunity to stay connected, motivated, and socially supported by peers during the pandemic ostensibly decreases. These perspectives begin to offer some explanation about the gendered differences in youth general, physical, and mental health during the COVID-19 pandemic.

In terms of the modes of sport and physical activity during COVID-19 lockdown, youth participants who engaged in both team and individual sports reported better general and physical health than those who participated in individual sports only. Similarly, youth who participated in club and informal sport reported better general and physical health than youth who were involved in club sport only. The results indicate that participation in more diverse sport settings was associated with better health outcomes. This could be related to

the net sum of members from across team and individual sports, as well as club and informal sports, which enable more regular communication between members. Consistent communication might have promoted feelings of connectedness and social support during the height of the pandemic in Australia for youth sport participants (Elliott et al., 2021). After all, the net sum of coaches, officers, coordinators, and officials within a sporting club environments comprise a vital communication link between teamsas a strategy to minimize dropout and strengthen participant retention (Wagnsson et al., 2021). Communication also tends to be maintained in team-based sports which are generally more popular among boys than girls (Eime et al., 2019).

The combined support that comes from being involved in both team and individual, and club and informal sport, might also be related to broadly established motivational perspectives. For instance, from a self-determined perspective, team and individual sport involvement has the greater potential to satisfy the basic human psychological needs of control, competence, and relatedness (Deci & Ryan, 2008) compared to individual-only sports. As stated above, being involved in team and individual-only sports provide a larger net sum of opportunities for maintaining connectedness with peers (e.g., online meetings in team sport) compared to individual sport only. In addition, involvement in team and individual sports can also promote autonomy (e.g., using one's own agency to seek out sport and physical activity opportunities through creative play or structured training in the domestic setting) and feelings of competence by constructing and participating in challenge-skill designed tasks (e.g., putting a ball into a cup from varying distances for individual-only sport or kicking a football at a garden bin in the backyard to practice skill accuracy and proficiency). As such, the application of motivational perspectives (e.g., self-determination) can begin to explain why individual youth who were involved in multiple sport settings (club and informal; team and individual) fared better in relation to general and physical health compared to individual youth involved in solely an individual or club-only sport.

As for measures of wellbeing, the current study found that male youth reported significantly better general wellbeing, resilience, and life satisfaction than female youth. In the context of COVID-19, these findings are somewhat consistent with previous literature. For instance, declines in life satisfaction have been reported during the pandemic among female youth (Magson et al., 2021) as well as higher levels of mental ill-health and psychiatric disorders (Li & Wang, 2020). Research has also found that female youth tend to report lower levels of resilience compared to male youth (Drummond et al., 2022). One explanation for the current findings is that male youth are more likely to play club-based and team sport (Eime et al., 2019), and this

may contribute to the development of resilience which had a buffering effect. In contrast however, one Dutch study reported that boys aged 12 to 16 years reported a larger decline in life satisfaction during the pandemic compared to girls and suggested that lockdown measures discouraged group gatherings, which might have affected boys' life satisfaction more than girls' life satisfaction (van der Laan et al., 2021). Clearly, more empirical evidence is needed to advance our understanding in this regard.

Our findings invite tacit speculation as to why male youth reported better general wellbeing, resilience, and life satisfaction. We suggest that one possibility relates to the higher purported levels of involvement in sport and physical activity among male youth during lockdown at the time of data collection, which protected their wellbeing and promoted resilience and life satisfaction. Although female youth are likely to ask for help, have more positive relationships with their parents and communicate more regularly than male youth (Sun & Stewart, 2007), it is plausible that maintaining good physical health comprised a stronger influence on general wellbeing, resilience, and life satisfaction among male youth. Body image issues may have also comprised a barrier. Moreover, and given that female youth are more likely than male youth to rely on their social networks for support when dealing with significant life stressors (Tamres et al., 2002), it is possible that the absence of organized sport and physical activity, a lack of "real" social activities with peers, as well as the indefinite closure of face-to-face education impacted female youth more than male youth.

Limitations

This study is based on data from a convenience sample, predominantly of Australian sports participants recruited with the assistance of NSOs and SSOs in May to June 2020. The primary sample was supplemented by recruitment through social media, which resulted in an additional smaller sample of participants in only informal sport or other physical activity settings, and an even smaller sample of physically inactive people. The youth cohort analyzed in the present study is limited to registered sport participants, some of whom also participate in informal sport or other physical activity settings, and it did not include any inactive individuals. Consequently, the sample is subject to both known and unknown sources of bias, and caution must be exercised in generalizing the results. Even within the primary club sport sample, the geographical coverage was uneven, depending on the strength of the relationships between the research team and the SSOs in the various states, and the capacities and priorities of different SSOs in the context of the unfolding COVID-19 situation. Nevertheless, on the other side of the ledger, the

sample obtained was large, and because respondents provided information about the multiple sports and other physical activities that they engaged in, there was comprehensive representation of the sporting codes and other types of recreational physical activity that are available in Australia.

A further limitation concerns the different cumulative impact of COVID restrictions up to the time of the survey on participation in different sports and physical activities. Because participation in many sports is seasonal, a 12-month retrospective timeframe was used to establish participation in particular sports and physical activities. The survey was conducted in May and June 2020, some 3 to 4 months after COVID restrictions began in Australia. With this timing the 12-month retrospective timeframe was effectively pre-COVID. However given the seasonality and the different responses to COVID by different sports, at the time of the survey COVID restrictions had impacted negligibly on participation in summer sports, and to various degrees on winter sports and sports/activities played all year around. This variation across sports/activities might be expected to reduce the strength of the relationships observed between the composite "settings" and "modes" indicators and the impacts of COVID restrictions on health and wellbeing. Notwithstanding that, many such relationships were established.

Finally, we consider the issue of the overall Type 1 error rate for the study. The study sample, while large, was self-selected, with unequal representation of the various cohorts. Multifactorial analysis was complicated by this unbalance in the data, with small or even zero cell sizes for many of the combinations of the four characteristics. A less complex approach was used, with 36 separate single-factor analyses (nine dependent variables $\times$ four characteristics) being conducted. Regarding the overall Type 1 error rate, if all 36 null hypotheses were true, that is, if there were really no differences in the population, then with $\alpha = .05 = 1/20$, around two false positives would be expected among the 36 separate hypothesis tests conducted. However, 17 statistically significant differences were observed, suggesting that only around 20 of the 36 null hypotheses are true, and so it is more likely that just 1 of the 17 is a false positive. If a Bonferroni correction were to be applied, for example within each set of three tests of the same type (χ^2 test or *t*-test) involving a particular characteristic, the adjusted $\alpha = .05/3 = .0167$. This would reduce the number of results deemed to be statistically significant from 17 to 13. It might reasonably be conjectured that one, or perhaps two, of the four instances with *p*-values between .0167 and .05 is a false positive. Three of these instances relate to activity settings and one to activity modes, and so it would be reasonable to conclude that of the four participant characteristics examined, the evidence for associations with indicators of health and wellbeing is weakest for settings of participation.

Conclusion

Sports clubs comprise an important site for promoting and supporting individuals' health and wellbeing and sport organizations need to focus on ensuring that clubs have the capacity to rebound as the pandemic recedes. To do this, sporting organizations may need to enhance the logistical, informational, and educational support for community sporting clubs to ensure that youth participants as well as both volunteers and participants are given support and encouragement to return. Individual sports may also require specific support in rebuilding from COVID-19. Based on the findings of this study, clubs may need to also consider how they pay particular attention to re-engaging female youth. The findings indicate that male youth tended to fare better than female youth with regards to physical, general, and mental health during the first wave of the COVID-19 pandemic in Australia. In addition to gender, individual youth who were involved in a combination of (a) team-based and individual sports or (b) club-based and informal sports were more likely to report superior physical and general health than individuals involved in individual-only or club-only sports. While it is unclear if this relationship is dose-related, team-based sport may encourage increased time in physical activity (e.g., dose) or social interactions, or a combination of both factors, which potentially buffers against declining health outcomes due to pandemic restrictions. Participation in team and club-based sport can play an important role not only for physical health but also for social and psychological health and wellbeing (Eime et al., 2013). It seems that the absence of playing competitive sport and training with friends has adversely impacted the health and wellbeing of youth with involvement in club-only or individual sport, and for female youth participants.

Author Note

All experiment protocol for involving humans was in accordance with guidelines of national, international, and institutional standards.

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Author Contributions

The design of the study methodology and survey was conducted by Rochelle Eime, Jack Harvey, Sam Elliott, Murray Drummond, and Hans Westerbeek. Sam Elliott, Rochelle Eime, Jack Harvey, Aurelie Pankowiak, and Hans Westerbeek conceptualized the paper. Melanie Charity and Jack Harvey conducted the analysis and produced the results. All authors have contributed to the preparation of the manuscript and have read the final version.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declaration of Conflicting Interests

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Ethics Approval

Flinders University and Victoria University human research ethics committees approved this study. Informed consent was obtained from participants.

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