

# **The use of digital platforms for adults' and adolescents' physical activity during the COVID-19 pandemic: The Our Life at Home study**

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# The use of digital platforms for adults' and adolescents' physical activity during the COVID-19 pandemic: The Our Life at Home study

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## Abstract

**Background:** Government responses to managing the COVID-19 pandemic may have impacted the way individuals were able to engage in physical activity. Digital platforms are a promising way to support physical activity levels and may have provided an alternative for people to maintain their activity while at home.

**Objective:** This study aimed to examine associations between use of digital platforms and adherence to the physical activity guidelines among Australian adults and adolescents during April/May COVID-19 'stay at home' restrictions.

**Methods:** A national online survey was distributed in May 2020. Participants (adults: n=1,188, 82% female, mean age=37.4±15.1 years; adolescents: n=963, 71% female, mean age=16.2±1.2 years) reported demographic characteristics, use of digital platforms for physical activity over the previous month, and adherence to moderate-to-vigorous intensity physical activity and muscle strengthening guidelines. Multilevel logistic regression models examined differences in guideline adherence between those who used digital platforms (users) to support their physical activity compared to those who did not (non-users).

**Results:** Overall, 39% of adults and 26% of adolescents reported using digital platforms for physical activity. Among adults, moderate-to-vigorous intensity physical activity (OR=2.0, 95%CI 1.5-2.7), muscle strengthening (OR=3.3, 95%CI 2.5-4.5), and combined (OR=2.7, 95%CI 2.0-3.8) guideline adherence were higher among digital platform users relative to non-users. Adolescents' moderate-to-vigorous intensity physical activity (OR=2.4, 95%CI 1.3-4.3), muscle strengthening (OR=3.1, 95%CI 2.1-4.4) and combined (OR=4.3, 95%CI 2.1-9.0) guideline adherence were also higher among users of digital platforms relative to non-users.

**Conclusions:** Digital platform users were more likely than non-users to meet moderate-to-vigorous intensity physical activity and muscle strengthening guidelines during the April/May COVID-19 'stay at home' restrictions. Digital platforms may play a critical role in helping to support physical activity engagement when access to facilities or opportunities for physical activity outside the home are restricted.

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## Original Manuscript

The use of digital platforms for adults' and adolescents' physical activity during the COVID-19 pandemic: The Our Life at Home study

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## Abstract

**Background:** Government responses to managing the COVID-19 pandemic may have impacted the way individuals were able to engage in physical activity. Digital platforms are a promising way to support physical activity levels and may have provided an alternative for people to maintain their activity while at home. This study aimed to examine associations between use of digital platforms and adherence to the physical activity guidelines among Australian adults and adolescents during April/May COVID-19 'stay at home' restrictions.

**Methods:** A national online survey was distributed in May 2020. Participants (adults:  $n=1,188$ , 82% female, mean age= $37.4 \pm 15.1$  years; adolescents:  $n=963$ , 71% female, mean age= $16.2 \pm 1.2$  years) reported demographic characteristics, use of digital platforms for physical activity over the previous month, and adherence to moderate-to-vigorous intensity physical activity and muscle strengthening guidelines. Multilevel logistic regression models examined differences in guideline adherence between those who used digital platforms (users) to support their physical activity compared to those who did not (non-users).

**Results:** Overall, 39% of adults and 26% of adolescents reported using digital platforms for physical activity. Among adults, moderate-to-vigorous intensity physical activity (OR=2.0, 95%CI 1.5-2.7), muscle strengthening (OR=3.3, 95%CI 2.5-4.5), and combined (OR=2.7, 95%CI 2.0-3.8) guideline adherence were higher among digital platform users relative to non-users. Adolescents' moderate-to-vigorous intensity physical activity (OR=2.4, 95%CI 1.3-4.3), muscle strengthening (OR=3.1, 95%CI 2.1-4.4) and combined (OR=4.3, 95%CI 2.1-9.0) guideline adherence were also higher among users of digital platforms relative to non-users.

**Conclusion:** Digital platform users were more likely than non-users to meet moderate-to-vigorous intensity physical activity and muscle strengthening guidelines during the April/May COVID-19 'stay at home' restrictions. Digital platforms may play a critical role in helping to support physical activity engagement when access to facilities or opportunities for physical activity outside the home are restricted.

**Keywords:** digital health; moderate-to-vigorous intensity physical activity; muscle strengthening exercise; online platforms; COVID-19





## Introduction

Physical activity plays an important role in the prevention and treatment of non-communicable diseases, which account for 70% of deaths worldwide [1]. A recent study of 168 countries estimated that 3.9 million (15%) premature deaths could be averted annually if more people engaged in recommended levels of physical activity [2]. The World Health Organization recommends adults accumulate at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity, or an equivalent combination of moderate-to-vigorous intensity physical activity (MVPA), each week; and youth aged 5-17 years should accumulate at least 60 minutes of MVPA daily [3]. Adults are also advised to perform muscle strengthening exercises (MSE) at least twice per week, and adolescents at least three times per week [3]. The guidelines are consistent with those in Australia [4,5]. Globally, 19% of adolescents [6] and 73% of adults achieve the MVPA guidelines according to the most recent estimates[7]. National survey data from 2017-18 show that fewer Australians engaged in the recommended physical activity levels than the global average, with 55% of adults (18-64 years) and 10% of adolescents (15-17 years) achieving the MVPA[8], and one in six adults (15%) and adolescents (16%) achieving the MSE guidelines [8]. These prevalence data have been observed in the general population under free-living conditions. However, conditions have changed considerably as a result of Government responses to coronavirus disease (COVID-19), which led to unprecedented and widespread social distancing measures to control its spread [9].

In Australia, for example, the Federal Government announced strict 'stay at home' orders in late March 2020. Although the length of these restrictions varied by state and territory; opportunities to perform some physical activities outside the home, such as at gyms and sport clubs, were impacted nationwide [9,10]. Google Trends data showed that online queries of how to perform physical activity and exercise peaked in Australia during the first two weeks that 'stay at home' restrictions were imposed [11]. Whilst this shows that people were investigating ways to keep active during this

period, it does not provide information on the sort of support or the types of programs people may have used to be active during this time. Over the same period, there was an exponential increase in the use of the Internet and associated digital platforms such as websites and smartphone apps as they became essential for education, work and social interactions [12]. Digital platforms have previously shown promise for increasing physical activity among individuals of all ages in intervention studies [13-15]. However, use among Australians prior to the pandemic was low. Surveys of Australian adults ( $\geq 15$  years of age) in 2018 showed that just 18.7% of adults used apps for tracking activity or training, and engagement with websites or online tools (7.1%) and online videos for sport (2.5%) was low [16].

Understanding the types of digital platforms used during the unprecedented pandemic situation could provide insight into their potential role for supporting individuals in meeting MVPA, MSE and combined physical activity recommendations when individuals are unable to access traditional physical activity settings and facilities. This study aimed to explore the use of digital platforms for physical activity in Australia during April/May 2020, and examined associations between use of digital platforms and adherence to physical activity guidelines among adults and adolescents.

## Methods

Data were drawn from the baseline sample of the Our Life at Home study (OL@H), collected 4<sup>th</sup>-31<sup>st</sup> May 2020. OL@H is a longitudinal study designed to investigate the impact of the Australian Governments' response to managing the COVID-19 pandemic on movement behaviours, and the health and wellbeing of Australians aged 13-75 years over a two-year period. OL@H received ethical approval from the Deakin University Human Ethics Advisory Group-Health (HEAG-H 59\_2020).

## Context

From March 29<sup>th</sup> 2020, strict 'stay at home' orders were imposed by the Australian Government. As a result, all organised and social sport was suspended and gyms and recreation facilities temporarily closed. People were allowed to leave their home to exercise as long as they maintained a 1.5 metre distance from those not living in their household. Each state and territory had the power to decide on and enforce their own restrictions, with several states easing restrictions on organised sport and recreation facilities in early May due to no or low recorded cases of COVID-19 (see Figure 1).

\*Insert Figure 1 here\*

## Sample

Individuals living in Australia were recruited via social media advertising (e.g., Facebook, Instagram), researcher and stakeholder organisation networks, and snowballing techniques (participants asked to share the study information with others they know, e.g., word of mouth). Of 14,764 individuals who clicked on the link to the survey, 6,474 provided informed consent (44% response rate), of which 4,079 were adolescents (13-17 years) and 2,395 were adults (18-75 years).

## Measures

### *Demographic characteristics*

Participants reported their age (years), sex (male, female, other, prefer not to say), usual daily responsibilities (paid employment status, home duties/carer responsibilities, and student status; yes/no), number of people living in the household, whether English language was spoken at home (yes/no), and state/territory of residence.

### *Adherence to the physical activity guidelines*

Adherence to physical activity guidelines was assessed using valid and reliable survey items [17-19].

Participants were asked to indicate how many days/week (none, 1 day/week, 2 days/week, 3

days/week, 4 days/week, 5 days/week, 6 days/week, 7 days/week) they performed MVPA during a usual week over the past month (April/May 2020) and in February 2020 (pre-COVID-19 restrictions) for 30 minutes (adults aged  $\geq 18$ ) or 60 minutes (adolescents aged 13-17 years). Adult responses were dichotomised at  $\geq 5$  days/week (i.e., equating to  $\geq 150$  minutes/week), and adolescent responses at seven days/week (i.e.,  $\geq 60$  minutes/day). Participants were also asked whether they performed (yes/no) MSE during a usual week (at home over the past month [April/May], at home or at a gym during February). Those who said yes were then asked to report the number of times/week (frequency) that they performed MSE during a usual week. This was used to determine adherence to the MSE guidelines (adolescents:  $\geq 3$  times/week; adults:  $\geq 2$  times/week). Adherence to the combined guidelines was also calculated for the past month (April/May) and February.

### ***Digital platforms for physical activity***

Participants were asked to respond to the question 'Are you current doing any form of sports or physical activities using any online or digital platforms to assist or guide your activity?' (yes/no). A comprehensive list of digital platforms was identified in collaboration with key stakeholders. Participants who responded yes were asked to report the frequency (number of times per week) and duration (total minutes per week) spent using each of six types of online or digital platforms: streaming services for exercise (e.g., YouTube, Instagram, Facebook); subscriber fitness programs (via an app or online, e.g., Centr, MyFitnessPal); facilitated online live or recorded classes (via platforms such as Zoom, e.g., dance, sport training, fitness class); sport/activity specific apps designed by sporting organisations for participants to keep up their skill (e.g., TeamBuildr); active electronic games (e.g., Xbox Kinect); and/or using an online or digital training/racing platform (e.g., Zwift, FullGaz, Rouvy).

## Statistical analysis

Demographic characteristics, physical activity and digital platform use were presented descriptively. Demographic differences between those who used digital platforms (users) compared to those who did not (non-users) were calculated using chi-square and t-tests. Unadjusted logistic regression models were used to identify associations between sample characteristics (age, sex, English speaking household, number of people in household, employment status, home duties/carer responsibilities and student status) and MVPA, MSE and combined physical activity guideline adherence. Adjusted multilevel logistic regression models were then run to examine associations between use of digital platforms and adherence with MVPA, MSE and both MVPA and MSE guidelines. All multilevel models accounted for clustering by state/territory of residence, and were adjusted for sample characteristics found to be significant in univariate models (see Appendix 1) and guideline adherence during February 2020. Analyses were stratified by age group (adults, adolescents). All analyses were performed using Stata v16 (StataCorp LLC, College Station, TX, USA).

## Results

Table 1 presents the sample characteristics for adult and adolescent participants. In total, 1,188 adults and 963 adolescents provided complete physical activity guideline adherence and digital platform data, and were included in analyses. Among adults, mean age was late 30's, the majority were female and two thirds had a tertiary degree. In the past month, 33% (n=392), 38% (n=443), and 18% (n=210) of adults met the MVPA, MSE, and both guidelines, respectively, and 39% (n=469) used online or digital platforms to assist or guide their physical activity. Among those who used digital platforms for physical activity, the median frequency was four (interquartile range [IQR]: 2-6) times/week and median duration was 105 (IQR: 60-180) minutes/week. Among adolescents, the mean age was just over 16 years and more than two-thirds were female. In the past month, 7% (n=69), 29% (n=271) and 4% (n=35) of adolescents met the MVPA, MSE, and both guidelines, respectively, and

26% (n=255) used online or digital platforms to guide or assist their physical activity. Among those who used digital platforms for physical activity, the median frequency was four (IQR: 3-7) times/week and median duration was 120 (IQR: 60-260) minutes/week.

Table 1. Sample characteristics

	Adults (n=1,188)	Adolescents (n=963)
Age in years (mean±SD)	37.4±15.1	16.2±1.2
Sex (% females)	980 (82.4)	685 (70.9)
Employment status (% working)	625 (52.6)	248 (25.8)
Home duties/carer responsibilities (% yes)	180 (15.2)	127 (13.2)
Student status (% yes)	258 (21.7)	622 (64.6)
Number of people in household (mean±SD)	3.2±1.4	4.3±1.3
English speaking household (% yes)	1,155 (97.2)	931 (96.7)
<b>State/territory of residence (%)</b>		
Australian Capital Territory	47 (4.0)	23 (2.4)
New South Wales	217 (18.3)	234 (24.3)
Northern Territory	9 (0.8)	4 (0.4)
Queensland	124 (10.4)	197 (20.4)
South Australia	79 (6.6)	71 (7.4)
Tasmania	50 (4.2)	47 (4.9)
Victoria	590 (49.7)	305 (31.7)
Western Australia	72 (6.0)	82 (8.5)

Table 2 presents the demographic characteristics of digital platform users and non-users. Among adults, a higher percentage of users were female and working in paid employment and a higher percentage of non-users had home duties or carer responsibilities. Among adolescents, a higher percentage of users were female.

Table 2. Demographic characteristics of users and non-users of digital platforms for physical activity

	Adults		Adolescents	
	Users	Non-users	Users	Non-users
	n=469 (39%)	n=719 (61%)	n=255 (26%)	n=708 (74%)
Age in years (mean±SD)	36.3±13.2	38.0±16.2	16.2±1.3	16.3±1.2
Sex (% females)	428 (91.3) <sup>a</sup>	552 (76.8)	213 (83.5) <sup>a</sup>	472 (66.7)
Employment status (% working)	281 (59.9) <sup>a</sup>	344 (47.8)	63 (24.7)	185 (26.1)

Home duties/carer responsibilities (%)	56 (11.9)	124 (17.3) <sup>a</sup>	40 (15.7)	87 (12.3)
yes)				
Student status (% yes)	89 (19.0)	169 (23.5)	166 (65.1)	456 (64.4)
English speaking household (% yes)	453 (96.6)	702 (97.6)	245 (96.1)	686 (96.9)
Number of people in household	3.1±1.3	3.2±1.5	4.4±1.3	4.3±1.3
(mean±SD)				

<sup>a</sup> Significantly greater proportion at  $p < 0.05$

Among those who had used digital platforms to guide or assist their physical activity, the most common were streaming services (adults  $n=197$ , 42%; adolescents  $n=102$ , 40%), facilitated online classes (adults  $n=144$ , 31%; adolescents  $n=77$ , 30%) and subscriber fitness programs (adults  $n=139$ , 30%; adolescents  $n=35$ , 14%) (see Figure 2). The types of digital platforms used were generally similar for adults and adolescents, however, proportionally fewer adolescents used subscriber fitness programs.

\*Insert Figure 2 here\*

Table 3 presents the unadjusted and adjusted odds ratios for physical activity guideline adherence, accounting for state/territory of residence and adjusting for significant confounders (Table S1) and guideline adherence during February. In the adjusted models, adults who used digital platforms had two times the odds of meeting MVPA guidelines, over three times the odds of meeting MSE guidelines, and almost three times the odds of meeting the combined guidelines compared to non-users. Adolescents who used digital platforms had more than two times the odds of meeting MVPA guidelines, over three times the odds of meeting MSE guidelines, and more than four times the odds of meeting the combined guidelines compared to non-users.

Table 3. Adjusted odds ratios (95% CI) for the associations of physical activity guideline adherence and use of digital platforms

Digital platform use	Adults			Adolescents		
	MVPA	MSE	Combined	MVPA	MSE	Combined
Unadjusted model	1.97	3.79	3.22	2.43	3.09	5.05
(ref: non-users)	(1.54-2.52)	(2.96-4.87)	(2.36-4.39)	(1.47-3.99)	(2.27-4.20)	(2.50-10.18)
Adjusted model	<sup>a</sup> 1.99	<sup>b</sup> 3.34	<sup>c</sup> 2.73	<sup>d</sup> 2.40	<sup>e</sup> 3.07	<sup>f</sup> 4.32
(ref: non-users)	(1.49-2.66)	(2.49- 4.47)	(1.95-3.81)	(1.32-4.35)	(2.12-4.44)	(2.09-8.95)

All accounted for clustering by state/territory and adjusted for February guideline adherence

<sup>a</sup>Additionally adjusted for age, number of people living in household, home duties/carer responsibilities and student status

<sup>b</sup>Additionally adjusted for employment and home duties/carer responsibilities

<sup>c</sup>Additionally adjusted for home duties/carer responsibilities

<sup>d</sup>Additionally adjusted for student status

<sup>e</sup>Additionally adjusted for sex and home duties/carer responsibilities

<sup>f</sup>Additionally adjusted for home duties/carer responsibilities

Note: MVPA; moderate-to-vigorous intensity physical activity, MSE; muscle strengthening exercise



## Discussion

### Principal Results

Findings from this study showed that digital platforms may play a critical role in supporting physical activity engagement during times when people have limited access to traditional settings or opportunities for physical activity outside the home. Individuals who used a digital platform were more likely to report achieving recommended levels of MVPA and MSE during April/May when strict 'stay at home' orders were imposed for most of the nation.

Data sourced from the Global Digital Overview in January 2020, highlighted the ubiquitous use of digital platforms in Australia; 88% of the adult population had access to the Internet, 71% used social media (e.g., Facebook, Instagram), and 26% of Internet users reported using health and fitness apps [20]. While there are no directly comparable data, data from our study suggest that a higher proportion of Australians used digital platforms for physical activity during April/May 2020 compared 2018 [16], with a higher rate of use observed among adults compared with adolescents. In addition to the established use of mobile fitness programs [21], our findings suggest that people also used digital platforms for facilitated online live or recorded activity classes and for streaming services.

More females than males used digital platforms to guide or assist their physical activity, which is similar to previous research [22,23]. This may reflect the ability of digital platforms to support information sharing, self-monitoring and internal accountability that are often considered important for increasing physical activity motivation among females [24,25]. It may be that females participate more in instructor-led activities (e.g., yoga, Pilates, dance) [26], whereas males tend to engage in more organised sport and weight training [8], both of which are less adaptable to online delivery via digital platforms. Safety concerns when

exercising alone outdoors or after dark, and fear of judgement, are known barriers to physical activity uptake by women [27,28], and may have also informed women's decisions to use digital platforms to undertake physical activity in the home. Alternatives such as digital platforms may play an important role in ensuring that women achieve sufficient physical activity levels. Digital platforms can be used at any time of the day and offer convenience of use in the home, which may explain the larger proportion of adults working in paid employment using digital platforms for physical activity compared to those not working.

In the current sample, 33% of adults reported meeting MVPA guidelines during the April/May 'stay at home' period, which is considerably lower than the Australian average of 55% of 18-64-year-olds in 2017-18 [8]. It should be noted that the MVPA measure in this study required adults to engage in 30 minutes per day on at least five days per week, whereas the Australian Bureau of Statistics physical activity measure was based on a minimum total of 150 minutes moderate-intensity physical activity, 75 minutes vigorous-intensity physical activity or an equivalent combination per week [8]. Among adolescents, just 7% met guidelines for MVPA, which was slightly lower than the Australian average of 10% of 15-17-year-olds [8]. These differences may have been due to the reduced ability to access traditional settings for physical activity such as schools [29], work [30], fitness and recreation facilities [31], or participate in sport or active travel [32]. In contrast, the proportion of adults and adolescents in the current sample who met the MSE guidelines during the April/May 'stay at home' period was considerably higher than the Australian average [8]. MSE includes bodyweight activities that may not require specialised equipment or facilities, can be performed in a confined space such as at home and may have been promoted via digital platforms (e.g., live streams on YouTube) during the 'stay at home' restriction phase.

Our results showed support for the use of digital platforms to engage in physical activity and MSE when access to traditional settings and facilities for physical activity is restricted. Adults and adolescents who used digital platforms to guide or assist physical activity were more likely to meet the MVPA, MSE and combined physical activity guidelines compared to those who did not use digital platforms. This is consistent with evidence from Germany [33] and the US [22] that showed adults who used physical activity and health apps engaged in more physical activity compared to those who did not. This study builds on the evidence that digital technologies can promote and support physical activity amongst adults and adolescents [13,34-39]. Streaming services were the most frequently used digital platform to guide or assist physical activity so future studies should further explore how they can best support physical activity engagement for all demographic groups and how they can be used as a physical activity promotion tool. Streaming services are mostly free to use, and thus present an opportunity for relevant government or non-government organisations to make use of this platform for education, instruction and promotion of physical activity to the general public.

Overall, the findings highlight a willingness to engage with technology for MVPA and MSE, when access to traditional settings or opportunities for physical activity outside the home are limited, particularly among females and working adults. Further research is needed to explore what motivated or discouraged people from using digital platforms during this period of reduced options for activity outside the home environment. Future work could also explore whether the use of digital platforms for physical activity replaced usual physical activity behaviours from before the restrictions or complemented other physical activities (e.g., attending a fitness class in person), and how digital platforms can best support continued engagement in physical activity once restrictions are reduced.

## Limitations

The large sample size and measures of MVPA, MSE and combined guideline adherence are strengths of this study; however, the majority of participants were female, English speaking, and 50% of adults and 32% of adolescents were from one state (Victoria), and thus are not representative of the wider Australian population. As the survey was completed online, English language proficiency was required, which may have also reduced the generalisability of the findings to culturally and linguistically diverse populations. The measure used to capture MVPA guideline adherence in this study was valid and reliable [17-19], however, may not accurately capture individuals who engaged in shorter durations of vigorous-intensity physical activity yet still met the guidelines (e.g., 30 minutes per day, three days per week). Participants were asked to report on MSE specifically in the home during April/May and at home or a gym in February and as such, this may not have captured all MSE performed (e.g., in other locations). In addition, this study relied on self-report of physical activity, and as such, potential for recall bias must be acknowledged.

## Conclusion

In the present study, fewer than half of the adults and one-third of adolescents reported using digital platforms to assist or guide their physical activity during the COVID-19 April/May 2020 'stay at home' period. Both adults and adolescents who used digital platforms for physical activity were more likely to meet the MVPA, MSE and combined physical activity guidelines compared to those who did not use digital platforms. This suggests that digital platforms can play a critical role in supporting physical activity engagement. There is a need for future research to understand sustained use, gender preferences and motivations for the use of digital platforms to guide or assist physical activity, in particular via streaming

services, given their popularity during COVID-19.



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## Competing Interests

The authors declare that they have no competing interests.

## Abbreviations

MVPA: moderate-to-vigorous intensity physical activity

MSE: muscle strengthening exercise

OL@H: Our Life at Home study

Multimedia Appendix 1: Unadjusted odds ratios (95% CI) for the associations of sample characteristics and physical activity guideline adherence in April/May 2020.

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**List of figures:**

Figure 1. Australian federal and state imposed restrictions to stop the spread of COVID-19

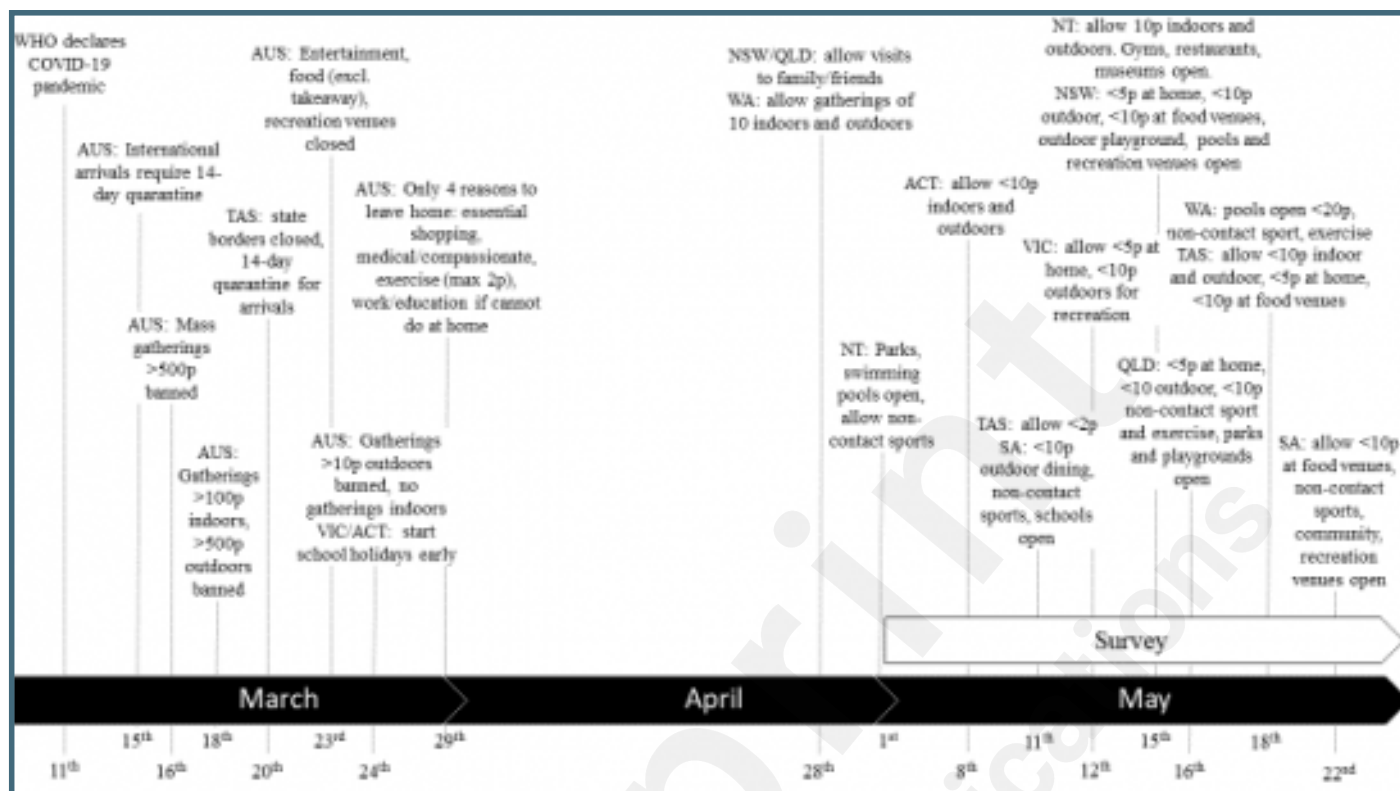
Aus: Australia; ACT: Australian Capital Territory; NSW: New South Wales; NT: Northern Territory; QLD: Queensland; SA: South Australia; TAS: Tasmania; VIC: Victoria; WA: Western Australia

Figure 2. Use of each type of digital platform for physical activity among users

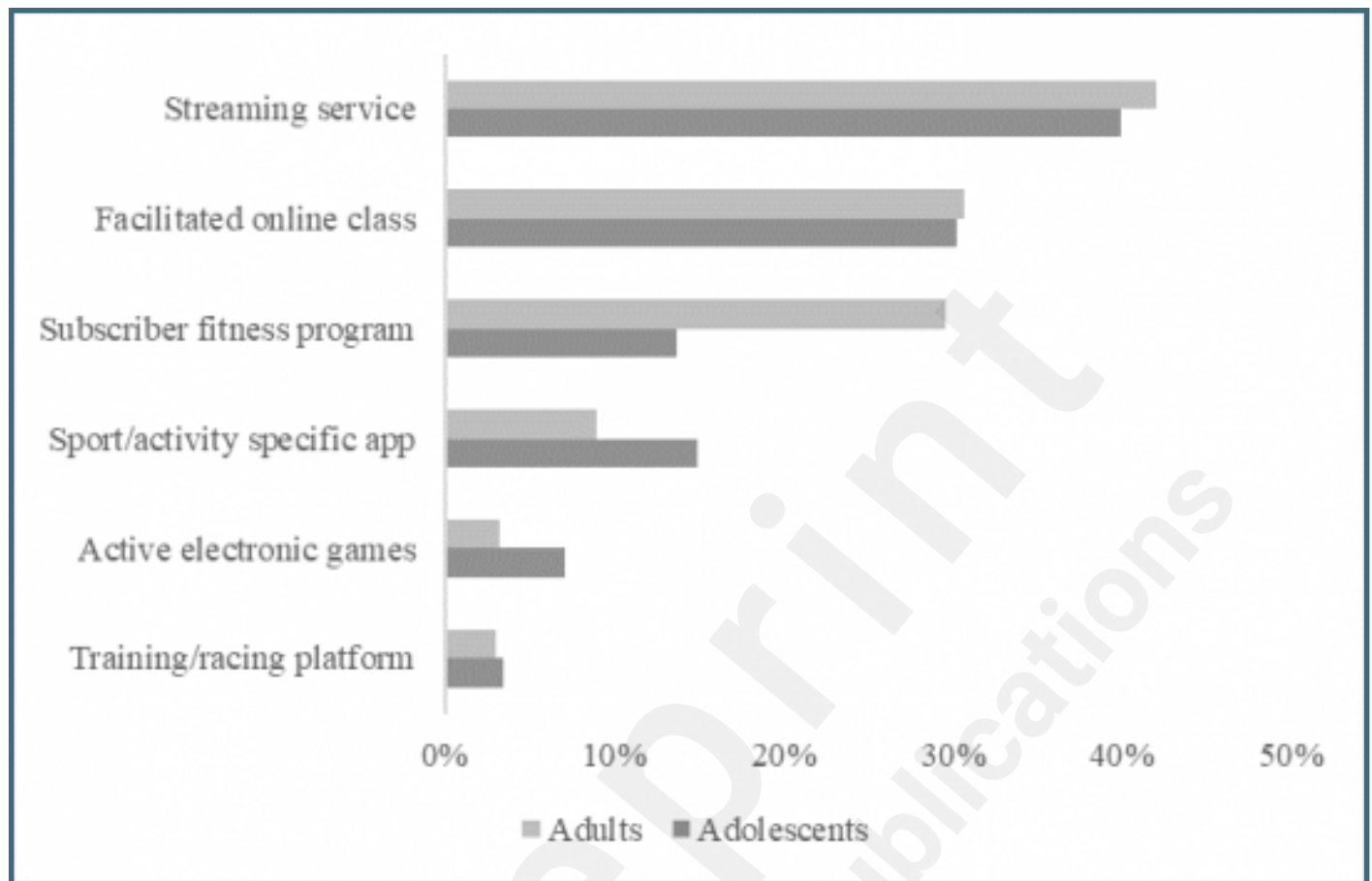
## Supplementary Files

## Figures

Australian federal and state imposed restrictions to stop the spread of COVID-19.



Use of each type of digital platform for physical activity among users.



## Multimedia Appendixes

Unadjusted odds ratios (95% CI) for the associations of sample characteristics and physical activity guideline adherence in April/May 2020.

URL: <https://asset.jmir.pub/assets/aa77cebf77e924af66d4a5ec16559075.docx>

