

The CEREPS consensus statement of physical education and school sport for recovery from the COVID-19 pandemic in Europe

-Scientific Background

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Introduction

Since March 2020, continuing for the last two years, the COVID-19 pandemic has been affecting education and sport systems across Europe. The pandemic has sparked a considerable amount of scholarship across Europe and other parts of the world to turn their interest to scientific studies on a broad range of physical activity and health items of all age groups, but particularly for children and adolescents. COVID-19 based lockdowns, including closures of schools, a ban on using sport facilities for organized sports and restrictions on entering open spaces for informal physical activities, have been executed in different waves, sometimes for several months, throughout 2020 and 2021 in more than 100 countries. Physical education inside schools and physical activities outside schools stopped for a number of months and the lockdowns became a focus of research interest in areas such as physical activity, psychosocial and mental impact on health, sedentary behaviour, nutrition, sleep, social burden and other items of lifestyle in many regional/national surveys and research studies across Europe (Adamakis, 2021; Kornbeck et al. 2022; Naul, 2021; O`Neill et al., 2022). Lockdowns of schools, sport clubs, youth centres for social work etc. for many weeks and months hit children and adolescents hard (O`Brien et al., 2020) in the two main COVID-19 waves of spring 2020 and autumn/winter 2020/21. In many EU-member states physical education classes and school sport events were cancelled via school closure and in some countries, where schools remained partly open for some weeks, restrictions for teaching PE and non-proper online teaching of PE caused severe reductions for the subject (Mittag & Naul, 2021, p.84).

In chapter one of the CEREPS scientific background paper the range of national studies across Europe will be introduced and results of the impact of COVID-19 on different target groups (children, adolescents, young adults, parents and PE teachers) are discussed in alphabetical order of the countries. Another group of Covid-19 studies focussed on comparative developments between different European countries (e.g. Gobbi et al., 2020; Orgiles et al., 2020; Kovacs et al, 2021). A brief summary of the outcomes of these studies will be addressed, along with any recommendations identified.

In chapter two, many regional and national position statements, and recommendations on how to exercise and perform physical activities whilst adhering to hygiene standards during the COVID-19 pandemic will be reported. In addition, other national statements, and recommendations on how to recover physical education, school sports, and other physical activities after the COVID-19 pandemic are documented. Finally, a comparative concept-centric matrix of statements and recommendations will be introduced to highlight common European and special national items from a range of stakeholders who strive for the recovery of quality standards for physical education and school sports.

Last but not least, the outcome of the review analysis is concluded in the third chapter, detailing the design purpose and structure of the CEREPS consensus statement to redesign and recover the quality of physical education and school sports after the COVID-19 crisis.

1 European based Covid-19 studies

1.1 Country reviews of the impact of COVID-19 on physical education and school sports in Europe

Austria

Pieh et al. (2020) published a study on $n = 1005$ (female = 53%) Austrian adults of different age groups (youngest group was 18 to 24 year olds). The study sample was representative of age, gender, education, and region in Austria. The purpose of the study was to detect mental health effects: quality of life; well-being; depression; anxiety; stress; and sleep quality, after four weeks of COVID-19 lockdown in Austria (April 2020). Data and results of the study were compared to a representative pre-COVID-survey (ATHIS, 2014). Main results reveal a major impact of the COVID-19 pandemic and lockdown on different aspects of mental health. Women and younger adults reported a higher burden than men and older adults. The prevalence rates for depression (5.9 vs. 2.5) and anxiety (5.8 vs. 3.6) were significantly higher in comparison with pre-Covid studies (ATHIS, 2014). The quality of life score (69.8 vs. 76.6) and for well-being (60.2) was much lower than in pre-COVID-19 studies. Again, the stress-levels were particularly higher for the young adults in comparison with other age groups, and compared to results of studies in pre-COVID times. Women scored worst in all self-reported questionnaires on mental health items. In another Austrian study (Jarnig et

al., 2021) n= 764 children aged between 7 and 10 (50,1% female) representing 12 schools in southern Austria (Klagenfurt) participated pre-COVID-19 (September/October 2019, t1), during COVID-19 (May/June 2020, t2), and post COVID-19 lockdown (September/October 2020, t3). Mitigation measurements included cardiorespiratory fitness (CRF) measured with a 6 minute run and weight and height calculated for BMI. Gender differences and participation/non-participation in sport club activities were additional variables in the study. The 6 minute run was applied two times (t1 and t3) and was not permitted because of social distance/hygiene rules in May/June 2020 (t2). BMI measurements were conducted three times longitudinally. CRF measurements documented significant changes between pre-COVID-19 (t1) and after lockdown (t3). Distance in the 6 minute run decreased as a mean for all pupils from 917 meters down to 815 metres (boys 963 metres down to 853 metres, girls 871 metres down to 777 metres). Sport club members reduced their record from 967 metres down to 860 meters and non-sport club members from 881 meters down to 782 meters. All in all the mean score was reduced in that time period by -0.57 (boys by -0.64, girls by -0.50). Significant changes occurred for BMI development as well. In total the percentage of all pupils with overweight/obesity increased from 20.3% up to 24.1% but this was lower for sport club members (from 15.8% at t1 up to 20.2% at t3). Girls as non-sport club members increased their BMI from 26.9% pre-COVID-19 up to 29.2% after lockdown, documenting the highest score among all participating study groups. In total BMI development increased up to May/June 2020 by 0.12 and up to 0.16 in September/October 2020. No significant differences between genders in development from t1 to t3 were found and also almost identical declines in CRF performances were observed for sport club and non-sport club members but on a better level for sport club members, particularly for girls compared to non-sport club members.

Belgium (Flanders)

Constandt et al. (2020) conducted an online survey with n=13,515 Belgian adults (50.5% female). Adults were grouped into three age categories: younger adults (18 to 34 years, 27.1%), adults (35 to 54 years, 37.8%) and older adults (55 to 74 years, 35.1%). The purpose of the study was to investigate whether high- (87%) and low-active adults (13%) before COVID-19 lockdown increased exercise, stayed the same as before, or reduced their exercise during lockdown. In addition the participants were asked about their experience of obstacles to exercising during lockdown. Data was

collected two weeks after the lockdown started from March 30th up to April 5th. Results documented for the high-active individuals: 36% increased exercise during lockdown, 41% stayed the same and 23% exercised less during lockdown. The most identified obstacles of this group were: closed infrastructure (47.7%, male 50%), no sport club actions (36.6%, male 38%), cancellation of sport events (29.9%, male 32%), and meeting no friends (29.9%, male 32%). Low-active participants before lockdown increased exercise by 58% during lockdown, 5% stayed the same and 7% exercised less during the lockdown. However, the remaining 30% of this group did no exercise during lockdown and their most important obstacle was fear for contamination by the COVID-19 virus (29%), followed by closed sport infrastructure (27%) and absence of friends (21%). The authors of the study identified Belgium as having “mild lockdown” rules with the promotion by governmental authorities to conduct in-house physical activities and more individual outdoor activities. In this study the majority of the sample indicated, for the first weeks of lockdown, that they exercised as much as before lockdown or even more. However, 46% of the high-active adults and 40% of the low-active adults also indicated that sitting as a sedentary activity did increase during their lockdown, probably due to working from home.

Croatia

Sekulic et al. (2020) published a study on physical activity levels (PALs) of adolescents (n=388, female 32.5%, mean age: 16.4 years) at baseline before lockdown (February 2020) and three weeks after lockdown (April 2020) which was identified as school closures and a ban on sport facilities and organized sport competitions in Croatia. Baseline PALs and lockdown PALs were also compared with anthropometric data and fitness capacity (jumping capacity, abdominal strength, aerobic endurance, and anaerobic endurance) both measured a number of months before baseline data collection of PALs (September/October 2019). PALs were measured online using the PAQ-A questionnaire. Significant differences ($p < 0.001$) were measured for PALs after lockdown in comparison to PALs before lockdown, however, only in boys not in girls. The significant gender differences are interpreted with the fact that 35% of all boys in the sample group were involved in competitive sports before lockdown. Boys and girls also differed in their baseline and lockdown data of PALs. Another important result of the study was that one subscale of the questionnaire (PAQ-A) dropped significantly down from 3.1 to 1.0 for physical education classes due to school closure. Another important

result was linked with the baseline fitness status of both boys and girls. Boys and girls with a better fitness status showed higher PALs at baseline and during lockdown. A better fitness status before lockdown may be linked with a higher intrinsic motivation for adolescents in this age group to reduce physical activity less than their counterparts with lower fitness level and little or no involvement in competitive sports.

Czech Republic

On behalf of the Czech National PE Teacher Association, Vasickova, Vlcek and Valoava (2021) conducted a small online survey in spring 2020. Data from 86 PE teachers was collected mainly from Primary schools (57%) in June 2020. Three closed questions were offered and two open questions. PE teachers responded with their view on the inability to teach face to face; on how much their pupils would miss PE lessons; and the usability of modified PE lessons. The two open questions focussed on the variety of distant teaching methods offered and the teachers' opinions of PE restrictions for lessons. About 78% of the sample group missed face-to-face teaching and only 45% of teachers responded that their pupils would miss PE lessons, but 36% did not provide an answer. Only one-third of the PE teachers either conducted PE teaching regularly (outdoors) or in a modified way with new tools. Over 45% of the PE teachers asked were not engaged in any distant teaching of PE. Distant teaching at schools was mainly supported for key subjects (e.g. math and languages) and most of the schools were not equipped with tools for distant teaching. The predominant responses (56%) about the variety of distant teaching of PE were the application of video clips e.g. from YouTube on pre-recorded exercises, and live streaming of physical activities via internet (27%). Only a minority of the sample group recommended outdoor activities for pupils. The responses to restrictions of PE lessons include 43 different answers to the question. There seems to be four major replies: children missed the gym, physical education, and meeting class mates and friends; children keen on physical activity practised it at home and outdoors; for the majority of children, physical activity decreased and alternative offers in PE cannot replace face-to-face teaching.

Denmark

Schmidt and Pawlowski (2021) analysed the physical activity among Danish citizens (n=1,802, female: 75.8%) before and during COVID-19 lockdown via online platforms (data collection between 5th and 15th of April 2020). The sample was split into four

age groups: teens (15 to 18 years, 7.9%), younger adults (19 to 29 years, 21.5%), adults (30-59 years, 58.7%) and older adults (60 years plus, 11.9%). The average decrease of physical activities dropped during lockdown compared to before lockdown by 16.1%. The greatest decrease was measured for teens (36.6%) and for young adults (21.3%). Some additional changes occurred: for teens with a load of 5 PAs a week, the percentage of physical activity increased during lockdown by 19.1%, and for young adults by 9.1%. However, the percentage for teens who never did physical activities before lockdown increased as well by 71.8% and for young adults by 22.6% during lockdown. Both age groups missed what they regularly did before lockdown, lacked social contact and had no access to facilities during lockdown. On the other side data revealed, for both age groups, that those with a very active lifestyle (5 times PA a week) sustained or even increased slightly their physical activity during COVID-19 lockdown. Mean minutes of physical activity a week for teens (before: 458.9 vs. 290.7 = 36.6%) and young adults (before 281.7 vs. 221.8= 21.3%) were significantly reduced, particularly for adolescents and young adults: the younger they are the greater the effect.

Finland

Kasper Salin (2021) published a study on the experiences of distant teaching of physical education teachers in Finland. With an online questionnaire, 1,349 PE teachers (members of the Finnish Physical and Health Association) were contacted, and n=199 (69% female) teachers completed the questionnaire. The mean age was 46.2 years with 18.4 years as a mean of working experience. Online sessions and assignments were given by 52.7%. Only 2.2% focussed only on online sessions. The absolute majority of PE teachers (about 87%) used social media as a tool for distant teaching, 20% used social network services (Snapchat, WhatsApp) and 91% applied video services. Over 85% identified social media as a regular educational tool not only for the pandemic lockdown. COVID-19 crisis was assessed as a rapid change in PE teaching to digital services. Covid-19 is regarded by Finnish PE teachers as an important facilitator to use media technologies in teaching physical education after the pandemic. Positive experiences were also reported for home-based physical education tasks. In the future, home-based work in physical education should supplement regular school-based lessons in PE.

France

Derigny et al. (2022) investigated changes in PA intensity (LPA=low physical activity, MVPA= moderate to vigorous physical activity, LMVPA= low, moderate and vigorous physical activity) and volume of PA (measured in METs/week) before and during lockdown in France. The purpose was to measure changes in intensity and volume of PA and how far adolescents (n=808, mean age: 16, 32 years) kept resilience in maintaining their PA profile when moving into COVID-19 lockdown. The IPAQ-SV questionnaire was distributed by SNEP to PE teachers at secondary schools, delivered to pupils and completed twice with data before lockdown and after one week of lockdown (data collection between March 18th and 30th, 2020). Cluster analysis revealed three cluster groups of pupils: active, studious and rural adolescents (C1, 37%), inactive, underachieving and rural adolescents (C2, 32.4%) and urban adolescents (C3, 31%). Finally, data analysis included n=644 pupils (418 girls, 226 boys) with 179 students (28%) in C1, 291 students in C2 (45%) and 174 students in C3 (27%). Results showed a decline for all over levels of intensity (LMVPA) for all cluster groups, e.g. for C1 from 4204 METs/week before to 2400 METs/week during lockdown and for C3 from 1016 METs/week before to 488 METs/week during. However, for C1 and C2 rural adolescents their LPA was significantly reduced and changed into higher intensity and volume of METs/week (MVPA) during lockdown: for C1 pupils from 1020 to 1980 METs/week and for C2 adolescents from 810 up to 993 METs/week ($p < 0.05$). In total C1 pupils increased their MVPA during lockdown, for C2 pupils it remained almost stable and for C3 pupils it significantly decreased by more than 50% (1016 METs/week vs. 488 METs/week). For interpretation it must be considered that measurements in the first week of lockdown show better results than after three or four weeks in particular due to the French Federal Ministry of Education, Sport and Health intervention that students keep physical active during lockdown on a private basis.

Germany

A German study published by Schmidt et al. (2021) compared the outcome of lockdown for organised sport activities, compared to participation rates in self-organised sport activities and changes in “habitual physical activities” (HPA) like playing outside, gardening, homework and with the inclusion of changes in children’s and adolescent’s screen time. This study is one of the very rare longitudinal studies over the duration of

the COVID-19 pandemic (retention of up to 85% of the sample of n=1,322 boys and girls between 4 and 17 years old), which compared the status of physical activities at three different measurement times: before COVID-19 (t1), during the first wave of COVID-19 (t2, April-May, 2020) and during the second wave of Covid-19 (t3, November. 2020-February 2021).

The time load for organised sports declined from 28.5 min. per day (t1) to zero minutes in the first lockdown wave (t2) when all schools and sport clubs were closed and to 3.7 minutes in the second lockdown (t3). Self-organised sport activities were measured from 6.6 min. per day (t1) to 24.3 min in the first wave (t2) and to 9.9 min. in the second wave (t3). Compared to the organised sport activities, self-organised sport activities did increase between t1 and t2 (in spring time), but decreased in t3 (due to winter time). Nevertheless, a small increase in daily minutes for self-organised sport still existed within the second wave (t3) compared to pre-COVID-19 (t1). However, if both types of sport activities will be accumulated, there is an important decrease between t1 (35.1 minutes per day), down to t2 (24.3 min. per day) and even more at t3 (13.6 min.) which means in total a reduction of more than 60% compared to pre-COVID-19. The same decline was measured for HPA between 59.1 min a day at t1 compared to only 22.4 minutes at t3, also a reduction of more than 60%. On the other hand, data of measured screen time in minutes per day did increase greatly: from 133.3 min. in pre-Corona to more than 60 minutes in the first wave (t2, 194.5 min.) and another large increase in the second wave (t3, 227.5 min.) which means a total increase in during COVID-19 of approximately 95 minutes.

Another German study reported on psychosomatic behaviours of children and young people. Based on a study of the effects of the first wave of lockdown (COPSY I=Corona-Psychology), Ravens-Sieberer et al. (2021) documented results from a follow-up study conducted six months later, drawing on data from the second wave (COPSY II). This in turn allowed for longitudinal comparisons to be drawn between the psychosomatic behavioural profile of children and young people pre-pandemic (t1), during the first wave (t2) as well as during the second wave (t3) (Ravens-Sieberer et al., 2021). The study identified two age groups, representing children (age 7-10) (t2 n=546; t3 n=503) and young people (age 11-17) (t2=n=1,040; t3=n=1,077), with an average age of 12.25 years (t2) and 12.75 years (t3) respectively. Using various measurement instruments (KIDscreen, SDQ, HRQoL questionnaire, etc.), there was a retention rate of

85% from t2 to t3, suggesting that a veritable longitudinal comparison can be made. A striking finding is a noticeable increase in low 'health-related quality of life' (HRQoL) scores, ranging from 15.3% pre-pandemic to over 40.2% during the first wave to as much as 47.7% during the second wave. Concomitantly, high HRQoL waned from 16.6% pre-pandemic over 5.8% during the first wave towards 5.7% during the second wave, pointing to perfectly reciprocal developments: low HRQoL scores have tripled while high HQRoL values have shrunk towards one third of their initial level. Reported stomach aches (from 21.3% to 30.5% to 36.4%) and headaches (from 28.3% to 40.5% to 46.4%) match this trend closely, as do complaints of anxiety, depressions and general psychosomatic unease in children and young people.

Greece

Bourdas and Zacharakis (2020) conducted a study on a sample of n= 8,495 Greek participants (mean age: 37.2 years; female 61.7%). Sample size of young adults (age 18 to 29 years was n=731, 22.5%). Data on different domains of physical activity was collected under normal life conditions (before lockdown in time of March 1st to 14th) and under lockdown rules between April 4th and April 19th. The domains of physical activity included four items: daily occupation, transport to work and back home, leisure time activities, and regular sport training/exercise. Intensity of doing physical activity was measured by METs-min./week: inactive (0 METs-min./week), low PA (0-499 METs-min./week), moderate PA (500-1000 METs-min/week), high PA(>1000 METs-min./week). Generally and in total, a decline of PA was observed during lockdown: for inactivity (19.9% vs. 28.0 %), for moderate PA (11.3 vs. 9.9%) and for high PA (54.8% vs. 47.6%). Only low PA increased slightly during lockdown (14.0% vs. 14.5%). Greatest reduction was measured for daily occupation for about 53% during lockdown (4502.7 METs-min./week vs. 2119.4 METs-min./week) and for transport to work and back home by 41% (1277.7 METs-min./week vs. 751.6 METs-min./week) due to increase of remote working. Leisure time PA increased by 19% during lockdown (female 21%) from 6266.6 METs-min./week up to 7445.7 METs-min/week. However, regular sport training/exercise declined during lockdown by 24% (male 32%) from 3114.3 METs-min./week to 2369.0 METs-min./week due to closure of sport facilities and fitness centres. For younger adults the decline was even more pronounced.

Italy

A small study from Verona, based on examinations of 41 overweight children as regards their behavioural profile before (May-June 2019) and during (March-April 2020) the pandemic was published by Pietrobelli et al. (2020). Reported sports time dropped from 3.60hrs to 1.29hrs a week, while screen time increased from 2.76hrs to 7.61hrs a week. A consumption of crisps and fizzy drinks rose to levels representing twice their pre-pandemic levels.

Another Italian COVID-19 study was conducted by Füzeki et al. (2021) between the middle of April and the end of June 2020 in the first wave of lockdown. The cross-sectoral online survey included 1,500 individuals (females 75.1%) with an age mean of 43.1years. The study investigated different items of physical activity: work-related PA (WRPA), transport-related PA (TRPA) with walking and cycling minutes per week, leisure-time PA (LTPA) which includes minutes of sport, fitness and recreational leisure time activities, days of muscle-strengthening activities per week (DMSA), and compliance with WHO PA recommendations according the EHIS scoring protocol. All types of PA, except for muscle-strengthening, were significantly reduced compared to pre-COVID levels. TRPA which included walking and cycling were reduced significantly ($p > 0.001$) from 943.3 MET-min./week (before lockdown) to 456.3 MET-min./week during lockdown which was the greatest reduction of about 52%. In total 65% of the sample group reported a reduction in TRPA. Probably the setup of strict rules to stay at home (remote working) caused this decrease. Walking was also reduced by more than 50% generally between pre-COVID and during COVID lockdown. Minutes of LTPA became reduced by 48.2 minutes a week (before: 160.8 min. during: 112.6 min. $p < 0.001$). Compliance with the WHO PA recommendations also dropped from 49.7% to 31.1% ($p < 0.001$). Gender was a significant predictor, but not age. The authors of the study concluded a considerable decline in habitual PA in the first wave of the lockdown in Italy in spring 2020.

Ireland

A study commissioned by Sport Ireland (2020) found that physical activity increased overall during a lockdown period, but sport participation decreased. This can be explained by the lack of access to facilities and the temporary closures of sports clubs (needs to be improved by a published empirical study).

Netherlands

Cloosterman et al. (2021) conducted a questionnaire study on Dutch runners (n= 2,586, male 62%, mean age: 44.4 years) seven weeks after lockdown. There were no significant changes between pre-lockdown and during lockdown running behaviour and habits: number of times running a week was stable (2.6 times), duration (3.1hrs vs. 3hrs) and distance of running (26km vs. 25km) was almost identical, and speed with 5.8 km/hr at both times was identical as well. Almost 94% of the sample continued their running during lockdown and 97.3% practised social distancing during running. Only 9.8% of the runners experienced subjective symptoms of COVID-19. Men and lower age groups were negatively associated with symptoms. Authors conclude that running during lockdown with the inclusions of hygiene rules can foster a healthy immune system. Restrictions for outdoor activities like walking and running during the COVID-19 pandemic should be carefully reflected in order to stabilize regular physical activity with protection of the immune system.

In another Dutch study, the Mulier Instituut (Vrieswijk et al., 2021) investigated primary school children of all grades (grade 1 to 8) aged 4 to 12 years. The purpose was to explore whether after school- and sport club-based lockdowns impacted the status of motor development of primary school children compared to pre-lockdown levels. Data of motor development pre-lockdown was collected between September 2019 and March 2020; after lockdown data was collected between September 2020 and December 2020. Between March 2020 and August 2020 schools were closed except from the middle of May until early July. Even when schools were open there was a regular cancellation of physical education lessons. Sport clubs had to close and cancel any programmes after 20th of March 2020 until end of June. However, in May and June 2020 outside physical activities of sport clubs, with social distancing, were allowed apart from competitive events. The study included two different cohort groups: one cohort with grades 1 to 8 in the school year before lockdown; and the other cohort group of the next school year after lockdown with grades of 1 to 8. The total sample before and after lockdown varied according the different test batteries applied. For better comparison the 8 different grades were grouped into four sample groups: 1 and 2, 3 and 4, 5 and 6, 7 and 8. Three test batteries with different items were applied: BLOC test which included three items of coordination with reference to the German KTK test; VolgMij included seven items of game strategy e.g. give and go, running,

play the ball, and 4S-en with four items, coordination, jumping (strength & coordination) and ball bouncing. The sample of the BLOC-test included 1,187 pupils (n=915 after lockdown); in the VolgMij test n=13,385 pupils participated before and another n=13,974 after lockdown; the participation rate for 4S-en was n=1,709 (n=902 before and n= 807 after lockdown). According to another study by the Mulier-Instituut, approximately 42% of Dutch parents indicated that their children moved less in the first weeks of lockdown (April 2020) and the amount of children who moved less before lockdown (30%) decreased even more. Data comparison of the BLOC-test reveals that the youngest age group (grade 1 and 2) scored significantly lower in coordination (17.2 vs. 14.0) after the lockdown regardless of competence level (low, middle, high). For older groups of graders the low level pupils also declined in their coordination development compared to their counterparts before lockdown. In the VolgMij tests, means for balancing and climbing decreased after lockdown (balancing 1st and 2nd graders 91.3% vs. 84.5; 5th and 6th graders 96.1% vs. 93.4%). In the 4S-en test all pupils of all grades of the lower competence profile performed less in (jumping) strength compared to pre-COVID measurements. In total the authors indicate, for the youngest age group of pupils (grade 1 and 2), a significant decline in motor development after COVID-19 lockdown. They recommended the reshaping of the full load of physical education lessons and to increase opportunities for more physical activities during school days after lockdown.

Norway

Roe et al. (2021) conducted two surveys in Norway on how home schooling during the COVID-19 lockdown affected physical activity among pupils in grade 1 to 10. A sample of n=726 teachers and a sample of n=4,624 parents were involved in the two surveys across the country. Teachers were asked how far school subjects were prioritised for home schooling. Physical education was ranked much lower (by 23%) than most of the other subjects. One main outcome was that pupils who showed greater engagement in physical activity during home schooling also invested greater effort in general school work. Digital offers vary between teachers although 98% of all Norwegian schools are equipped with the digital infrastructure. For the parent's survey the 10 grades were grouped into three clusters (1-4 grade, 5-7 grade, 8-10 grade). In total parents reported on average only one-third of pupils practiced physical activity for 60mins a day and more than one-third did physical activities less than 30mins a day.

With 43% of the youngest cluster of pupils (grade 1 to 4, boys 47%, girls 40%) exercising 60mins a day but only 17% did it in the cluster of 5th to 7th graders. For the 5th to 7th graders and the 8th to 10th graders 30 to 60 minutes was the highest range in percent (between 31% and 37%). The younger the pupils are, the more they practised minutes of physical activity a day which is comparable during lockdown with previous outcomes before lockdown. The study also found that schools differed greatly in the amounts of physical activity offered through online home-schooling. The authors of the study concluded that pupils had too much responsibility on their own PA and it depends more on the parent`s engagement. PE teachers should provide more PA for digital workouts during home schooling.

Poland

Lodzinska & Lelonek (2021) reported on inactivity of Polish school students pre- and during the lockdown due to the COVID-19 pandemic. Physical inactivity has been, and continues to be, a challenge in relation to children and adolescents in Poland. According to Filalkowska (2018), only about 16% of young Polish individuals exercise up to 60 minutes daily before COVID-19 restrictions were ordered by the government. Strict rules to stay at home from morning to 16hrs in the afternoon were setup from October 2020 until Christmas and reintroduced in January 2021. Active travelling and movement outside was forbidden and all school and sport facilities closed during the lockdowns. Surveys conducted by national authorities documented on average 5hrs. of daily screen time in February 2020 which increased up to 9hrs in May 2020. Almost 70% of children and adolescents felt more nervous and irritated since the start of the pandemic and 62% reported on sleep problems. Eating habits changed to more preserved food intake and stress-related higher consumption of sweets. In total the pandemic of COVID-19 exacerbated existing problems prior of the pandemic with lack of physical activity, reduced psychological wellbeing, and sedentary behaviour. Finally, the authors recommended to continue with structured daily routines prior of the pandemic, including active online physical activity and promotion of outdoor activities.

Portugal

Pombo et al. (2021) analysed the motor competence development (MC, according the model of Stodden et al. 2008: Robinson et al., 2015)) of n=114 Portuguese children (girls 56.1%) aged 6 to 9 years old, after almost 6-months of COVID-19 lockdown

(March to August 2020). When schools reopened in September 2020 data of post-lockdown measurements of MC were collected and compared with results from before the lockdown (n=182) measurements in December 2019. The same test items were applied with the same child group but with a lower sample size of n=114. The motor competence assessment (MCA) included six items, two each of the Stability test (shifting platforms, lateral jumps), the locomotor tests (10m shuttle run, standing long jump), and manipulative tests (throwing velocity, kicking velocity). Results showed a decline of biological development in five of the six test items (except for jumping sideways for boys), for all three motor competence scales and for the total score of motor competence development (for boys before lockdown with a score of 56.13 down to 43.06 after lockdown; for girls before lockdown with a score of 56.76 down to 40.58 after lockdown). There were three items with a large decline between before and after lockdown measures: shifting platforms, girls 78.68 vs. 48.51; standing long jump, boys 64.24 vs. 48.04; and kicking velocity, girls 49.86 vs. 25.91. The authors identified a consistent decline in motor competence and recommended solutions to minimize the effects of the lockdown for further motor development.

Slovakia

Ruzbarska & Vaskova (2021) conducted a survey with 824 parents (81.5% women; approximately 44% of parents aged between 41 and 45 years) to investigate their views on physical education at school and values of distance learning in PE after school closures. In Slovakia, schools were closed for more than one year with short interruptive openings. Approximately 54% of the parents held a university degree, and about 46% were high school graduates. The absolute majority live in cities (94%). Data collection was done during COVID-19 lockdown in January/February 2021. Parents indicated that physical education for their children was very important (95%) and was the most favourite school subject (82%). A small majority of the parents opposed school closures and the interruption of physical education classes (54%), whereas 30% supported the interruption because of COVID-19. During school closure, physical activities were very limited during distance learning according parents' assessment (81%). However, more than 60% of the parents also disagreed that PE classes would be the only opportunity for physical activity for their children. Online PE teaching was recommended during lockdown but should also supplement regularly PE teaching after lockdown (almost 64%). Here, only minor differences were found between primary

and different types of secondary schools. Mixed results exist for the offer of information and communication technologies for online teaching in PE during the lockdown: about 40% of the parents confirmed the availability such technologies, but another 30% assessed no offer which might be interpreted that in many schools online teaching of PE did not exist during school closures. More or less online teaching in PE seemed to be restricted in primary schools whereas types of secondary schools (grammar schools, secondary vocational schools) offered online PE teaching up to 60% and 70% in the view of parents. Video technology, as apart of PE online teaching, was accepted by more than 70% of the parents. So, parents recommend PE online teaching as very important during COVID-19 lockdown and the subject of PE should become as important as other subjects with online teaching during the pandemic.

Slovenia

In Slovenia all schools and sport clubs closed in the first lockdown between March and May 2020. A second lockdown started from October 2020 up to February 2021. The nationwide monitoring of all schools and pupils with a physical fitness test battery (SLOfit) includes regular measurements of pupils between 6 and 19 years. Data collection of SLOfit is organized each year in April but was delayed in 2020 because of the lockdown. The 2020 school cohort were measured after the first lockdown between mid-May and June. In an early study, Starc (June 2020) reported on data from 100 schools with children aged 7 to 15. Results were compared with the corresponding age cohort of the previous year of SLOfit 2019. 69.5% of girls and 67.8% of boys were found to have a loss of physical fitness, while 56.8% of girls and 58.4% of boys had put on weight. The 10 and 11 year old boys and girls suffered most in aerobic endurance (10 years old: 75.1% of boys and 77.1% of girls): Experience of body fat growth were highest with the 7 year olds: 70.7% of boys and 62.8% of girls. The greatest performance declines were measured for aerobic endurance and coordination for all age groups. In the standardised physical fitness tests, the 2020 cohort achieved significantly lower scores than the 2019 cohort had obtained one year earlier, especially among boys and girls aged 7-11. In spring 2021 Jurak et al. (2021) documented some more comprehensive results of SLOfit for the 2020 national cohort. It was confirmed that all fitness test items were effected negatively. The total national physical fitness index declined from pre-COVID (2019) of 53.7 down to 46.7 for girls, and for boys from 49.7 down to 43.0 in 2020. In total, an overall decline of 13% was measured. The

authors stated that this was the greatest yearly decline in 30 years of monitoring physical fitness with SLOfit and finally recommended items to stay active with daily structured physical activities during the pandemic.

Spain

Lopez-Bueno et al. (2020) investigated the situation of health risk behaviours (HRBs) in compulsory confinement during the first three weeks of lockdown (March 22nd – April 5th, 2020) in Spain. The study included n=2,741 adults (female 51.8%) with a mean age of 34.2 years. Different health risk behaviours listed are: insufficient physical activity, alcohol consumption, anxiety, stress, depression. Confinement was assessed as a prolonged stay at home with increased sedentary behaviours such as TV viewing, using mobile devices and reduction of physical activity. Extended time of confinement was expected to be associated more with HBRs. The survey applied different questionnaires for measurement of: age, gender, occupation, education, time confined (one week, two weeks, three weeks), physical activity, screen time, sleep duration, alcohol consumption, smoking habits, and fresh fruit and vegetable intake. The sample was split into groups of individuals who had a higher number of HRBs before COVID-19 confinement and who had a fewer or equal status of HRBs than before confinement. In total 26.6% of individuals had more HRBs during COVID-19 confinement than before. Up to almost 98% of adults violated the norm of screen time (>2 hrs) during confinement; reduced odds were reported for insufficient physical activity and fruit and vegetable consumption. Adults in their second or third week of confinement showed lower odds for a higher number of HRBs than participants in their first week of lockdown. Whereas physical activity in the first week of confinement slightly increased, it decreased significantly in the second and third week of confinement compared to the status of physical activity before lockdown.

Sweden

Sweden is the only country across Europe where schools, during the COVID-19 pandemic, did not close for children and adolescents under the year of 16. STARS monitoring (Study of Adolescence Resilience and Stress) is organized every two years. Chen et al. (2020), used baseline data of STARS before lockdown and collected new COVID-19 related data (February to November 2020) of pupils exposed to the COVID-19 pandemic (n=584 pupils, female 56%, 7th graders under 15 years (mean age 13.6

years). The STARS questionnaire included different items of mental health: stress, psychosomatic symptoms, happiness, relationships with peers and parents, school and health behaviours, and norms of 60min. PA daily. Stress and psychosomatic symptoms only slightly increased for the exposed sample group (stress from 15.1 up to 15.8; psychosomatic symptoms from 11.2 up to 12.0) particularly for girls, whereas levels of happiness, peer relations, relation to parents, school satisfaction and sleep duration decreased but without any statistical significance. No real changes in leisure time exercises between the two groups were found. The authors of the Swedish study concluded that differences are not related to the COVID-19 pandemic but are rather age related, particularly between 13 and 15 year olds of their longitudinal cohort studies. Sweden did not decide on a severe lockdown during the COVID-19 pandemic like other countries across Europe and kept schools open for students under 16. According the authors pupils' slight differences in mental health and psychosomatic symptoms are more related to concerns about governmental restrictions than with the spread of the virus itself. Moderate changes in psychosocial wellbeing are linked with difficulties in online learning not with the COVID-19 virus. The COVID-19 exposed group of teenagers in Sweden did not experience worse changes in peer relations, did not really differ in their physical activity profile because they could kept up their daily routine in school and outside of school without lockdown restrictions during the COVID-19 pandemic.

Ukraine

During the Covid-19 lockdown in Ukraine (March 2020 to March 2021), Ivashenko (2021) collected data from 128 Ukrainian young adults between 18 and 25 years. The sample was split into two groups. One group, the control group of 74 participants who experienced deterioration of personal health because of mild corona virus infection and a second group, the main group, of another 74 adolescents who did not suffer from any COVID-19 infection. Both groups were asked during the COVID-19 lockdown whether they maintained their physical activity at usual levels or on reduced levels. Interestingly, males and females with previous COVID-19 infections stayed slightly more active than males and females who were not infected which had a slightly higher score of a reduced PA level. Furthermore, all participants of study were asked to report in a self-assessment journal about health and wellbeing. The entries over one year

were scored with different points, e.g. if an effect on wellbeing did not affect any performance it was recorded with one point; if symptoms became too intense to do habitual activity, the highest point of five was coded. Both sub-groups of study participants scored lower points for individuals maintaining PA levels as usual; both sub-groups who decreased their regular load of physical activity scored higher points. Individuals of the control group (no COVID-19 infection) scored both lower points when maintaining and decreasing PA. So, previous COVID-19 infection may be linked and sustained with lower levels of PA and more problems in recovery from the virus compared with non-affected young adults in Ukraine.

United Kingdom

In England schools were closed during the first lockdown from March to September 2020. Outdoor exercise was permitted for one hour between March and May 2020, but outdoor play ground and sport clubs were closed between March and July 2020 before the summer break. In a large mixed age study, McCarthy et al. (2021) included n=5,395 UK citizens (mean age: 41 years, 61% female; 14-24 year olds = 8.6%; 25-34 year olds = 22.4%) into a study of inactive (0-29 mins per week, 26%), fairly active (30-149 mins per week, 23%) and active persons (>150 mins per week, 51%) before lockdown. Monitoring of smartphone-tracked physical activity outside was measured between January and June 2020. Baseline for pre-lockdown was January 22nd. Lockdown started on March 17th and the first full week of lockdown was March 25th. At baseline 26% were inactive, 23% fairly active and 51% active. In the first week of lockdown 57 minutes less physical activity was measured by the trackers, 37% of the sample group reduced their weekly minutes of PA. Adolescents and younger adults were more active at baseline but had the lowest level after lockdown. The 14 to 24 year olds were active for about 155 minutes per week before lockdown but reduced their amount of minutes at the week of March 25th (after 1st week of lockdown) down to 20 minutes. Inactive people remained the same with zero minutes of activity during lockdown, fairly active reduced their level from approximately 90 minutes before lockdown to almost zero minutes during lockdown, and the active sub-group reduced their level from approximately 300 minutes a week before lockdown to 100 minutes at the end of March. Overall 63% of the sample decreased their PA level between baseline and after 1st week of lockdown, only 16% did not change their level of PA and 21% (only older adults) increased their level of minutes in PA. Particularly adolescents and

younger adults (14-34 years) are the two age groups which did not restore their amount of PA after lockdown in late June compared to their baseline data. Another English study published by Basterfield et al. (2022) was conducted with one primary school based in Newcastle upon Tyne with n= 178 pupils (53.4% male) aged 8 to 10 years old pre-Covid-19 (October 2019, t1) and after the first COVID-19 wave one year later (November 2020, t2). Before and after the first lockdown the traditional EUROFIT test battery was applied with selected items of aerobic endurance capacity (20m shuttle run), handgrip strength (digital hand dynamometer), explosive strength (standing broad jump) and flexibility (sit & reach). Body height and weight were measured and calculated for BMI and BMI-z-score. Participants were asked about sport club participation prior to the COVID-19 pandemic and one year later, after the first lockdown. For health related quality of life (HRQoL) the KIDscreen-27 questionnaire was applied and filled in by the pupils at each time point. Data comparisons of results between first and second measurements reveal mixed results between some test items. Performance decreases were measured for aerobic endurance capacity (-3 laps of SRT) and flexibility (-1.8 cm in sit & reach). Quintile comparisons between SRT results changed. There was, in total, a significant reduction of the mean from 23.4 laps to 20.6 laps ($p < 0.001$), however, the “very low” quintile changed much more than the means: about half of the pupils group changed into the very low quintile compared to one out of three pre-COVID-19. Significant increases were measured for both items of strength (HGS + 1.5 kg; SBJ + 6.8 cm), overweight/obesity (35% baseline t1 vs. 51% at t2). No differences were found in any fitness change between boys and girls. Participation in sport club activities declined during lock down from 87 pupils down to 61; mean time spent in sport club activities declined from 231 minutes to 209 minutes. In the KIDscreen questionnaire only the physical wellbeing domain decreased slightly, psychological wellbeing and school environment remained stable between t1 and t2. The domains of “Parents & Autonomy” and “Social support & Peers” even slightly increased. This is striking as a result after lockdown. The effect is explained by the authors of this study; data collection at t2 was carried out when schools were just re-opened for a few days prior. Results of this English small school study are partly in line with other school studies where aerobic endurance capacity, flexibility and coordination dropped down during COVID-19 lockdowns.

1.2 Comparative COVID-19 studies between European countries

Orgiles et al. (2020) reported the results of a survey of 1,143 parents in 94 Italian and 87 Spanish cities as to the effects of the pandemic on their children (age 3-18). The trend in motor behaviour was regressive across all degrees of intensity. The group practising 30 minutes a day shrank from 13.6% pre-pandemic towards a mere 5.6 %, while the group practising 60-90 minutes a day diminished from 28% to 9.3%. The group with less than 30% screen time (understood broadly as 'media time'), plummeted from 22.1% to 3.4%, while the size of those with 120-180 minutes daily increased from 5.5% to around 30%. Approximately 86% of parent respondents reported that 76% of their children lacked social contacts, while 52% suffered from boredom, 31% from loneliness and 30% from anxiety. For another Spanish-Italian study, see Universidad Miguel Hernández & Università degli Studi di Perugia, 2020.

Gobbi et al., (2020) analysed physical education teacher behaviours when school closure started in the Covid-19 wave in France, Italy and Turkey in April/May 2020. The study included 1,146 PE teachers (59% female), n = 434 teachers from France, n = 497 teachers from Italy and n = 215 teachers from Turkey. The online study focused on three teacher behaviours: a) guidance of pupils in out-of school PA, b) helping the students to set PA goals, and c) encouraging students to self-monitoring PA. Multivariate measurements considered the three items of PE teacher behaviours with two time points (before and during school closure), the three countries (France, Italy, Turkey) and gender (male and female). There were no differences in perceived and mental health of the teacher groups but for years of teaching PE. The most experienced teacher came from Italy, the least experienced from Turkey. Before lockdown, French teachers had the lowest frequency of supporting their pupils for all three kinds of PA behaviour; their Turkish counterparts showed the highest frequency for all three behavioural supports. During school closure French teachers increased guiding students significantly and scored highest on this compared to Italian and Turkish teachers who scored lowest. However, in setting PA goals Italian teachers scored highest and French teachers lowest during school closure. The promotion of self-monitoring PA was supported highest again by Italian teachers and lowest by Turkish teachers during school closure. French and Italian teachers significantly increased their offer of slideshows, videos, and streaming lessons during school closures whereas Turkish

teachers reduced slideshows and videos compared to teaching PE before the lockdown but increased streaming lessons in PE. Comparison between before and during lockdown, French teachers increased their behaviour in all three dimensions whereas Turkish teachers decreased support from before to during lockdown on all items. The authors argue, that only in France special promotion of PE and PA was emphasized by national authorities but this was less so the case in Italy and Turkey. Probably, the positive results for Italian PE teachers during the COVID-19 lockdown are gender related because 68% of the sample were females.

Faulkner et al. (2020) studied n= 6,347 adults (mean age 44.5 years) from the UK (n=2,289), Ireland (n=630), Australia (n=294) and New Zealand (n=3,134) between the 2nd and 6th week of COVID-19 restrictions (April/May 2020). IPAQ-SF, WHO-5 Wellbeing index and the Depression Anxiety and Stress Scale-9 were applied. Participants reported, in an online survey, exercise behaviours before lockdown and during the first six weeks of lockdown. The main purpose of the study was to assess and compare PA, mental health and wellbeing during COVID-19 early lockdown between the four countries. Significant changes in different kinds of physical activities were reported in all of the four countries: during lockdown walking and running outdoors slightly increased, walking more than running; home-based PA and PA in virtual online classes significantly increased likewise Yoga/Pilates for women in the UK and Ireland as well in Australia and New Zealand. Due to closure of Sport and Fitness Centres resistance and circuit training decreased but not circuit training in the UK; frequency of regular fitness classes declined as well. Exercise in all kinds of sporting activities was assessed significantly lower during COVID-19 restrictions: field games, court games, small aside games, racquet games, golf, dance, martial arts particularly in the UK but also on a far lower level in Ireland and overseas in Australia and New Zealand. Before lockdown females had a lower index than men to meet the 60 minute guideline of PA activity. Participants of the study who did not meet the 60 minute recommended guidelines by WHO for daily PA before lockdown more likely changed their amount of minutes during initial lockdown (74% of this group). Sitting time was lower in Ireland compared to other countries under study. However, Irish participants reported higher scores of depression, anxiety and stress compared to UK and other countries. The biggest changes in exercise behaviour were found for citizens of the UK and Australia. Individuals, regardless of the country, who changed their exercise of PA negatively

between pre-lockdown and during initial lockdown reported, in the three applied measurement tools, poorer mental health and wellbeing. On the other hand this documented that active people with PA who did not reduce the amount of their PA during lockdown also maintained their level of mental health and wellbeing. Younger adults (19 to 29 years), however, seem to have more difficulties to maintain this because they reported on more negative changes than other age groups of adults.

A very large comparative study between countries in Europe was conducted by Kovacs et al. (2021). They included 8,395 students between 6 and 18 years old (mean age 13 years, 47% boys, 57.6% urban, 15.5% stayed in self-isolation due to COVID-19). The sample included countries with high COVID-19 cases (Russia, Spain, Italy, Germany, France) and lower COVID-19 cases (Belgium, Portugal, Romania, Hungary, Poland, Slovenia). Data collection was done in the first COVID-19 wave (May, June 2020). Items of measurement were: structured schedule of daily physical activity, percentage of students who meet the 60 min. norm of daily physical activity, and percentage of students who meet the norm of screen time of 2hrs or less a day.

The final outcome of the study was that 66.4% of the sample group remained in structured routines (min. 38.4% Russia, max 69.3% Germany) during the first wave of the pandemic. Important and significant differences occurred for online teaching in physical education. In total 56.6% of the students received online PE in the first wave of COVID-19 (min. 2.1% Germany, max. 79.8% Slovenia). The norm of 60 minutes of physical activity a day was achieved by 19% of the total sample, again significant differences of achievement were measured cross-culturally (min. 7.5% Italy, max. 26.7% Slovenia). And an excess of more than 2hrs of daily screen time was measured for 69.5% of all students, whereas the screen norm was only achieved by 30.5% (min. 20.4% Italy, max. 53.8% Germany). The authors of the study concluded that there exists a “prevalence of insufficient physical activity and unhealthy screen time” (Kovacs, et al., 2021, p.1) during the COVID-19 wave and “consistent daily routines are important in helping children maintain healthy active lifestyle in pandemic situation” (ibid.).

1.3 Outcome of the COVID-19 country and comparative country reviews

A systematic review on changes in physical activity and sedentary behaviours during the COVID-19 lockdown was published by Stockwell et al. (2021). The authors identified in their research (September 2019 to October 2020) a total of 64 studies, but only six of the 64 included studies focussed on the age group of children and adolescents (>18 years). Four of these studies addressed children and adolescents from overseas (Australia, Canada, China) and two studies were European based. Gillic et al. (2020) analysed physical activity levels of n= 688 adolescents between 15 and 18 years from Bosnia-Herzegovina. The amount of active boys and girls dropped from 50% in pre-Covid-19 down to 24% during the COVID-19 pandemic. Another study from Ruiz-Roso et al. (2020) detected changes in physical activity by IPAQ and food consumption (questionnaire) in Italian and Spanish adolescents (n=726) aged 16 to 19 years in comparison with adolescents from South America (Brazil, Chile, Columbia). The majority of the Spanish and Italian sample group were inactive before lockdown (Spain: 59.9%; Italy 68.4%). The South American adolescents were even more inactive. However, during lockdown more boys and girls in the two European countries became active and the ratio for inactivity declined. The results of the Stockwell et al. (2021) systematic review are in line with our main national results of COVID-19 studies for children and adolescents from other European countries.

Our reviewed national and comparative studies across Europe included n=18 studies from Austria, Croatia, Belgium, Denmark, France, Germany, Hungary, Italy, Netherlands, Poland, Portugal, Romania, Russia, Slovenia, Spain, Sweden and the UK which addressed different items of physical activity, motor development and a variety of psychosocial health items of children and adolescents (>18 years) before COVID-19 and during COVID-19 lockdowns. Ten studies (Austria, Belgium, Denmark, Greece, Ireland, Italy, Spain, UK, and Ukraine) addressed younger adults (<14 years up to 34 years). Another four COVID-19 studies with parents were reviewed (Norway, Slovakia, Italy, Spain) who gave proxy reports of their children's behaviour patterns and attitudes during COVID-19 lockdowns. Finally, six studies included PE teachers (Czech Republic, Finland, Norway, France, Turkey) exploring their teaching in home schooling and online teaching of PE during school closures.

As an important consensus between our collections of studies we find throughout the various age groups of children, adolescents and young adults, a decline, partly a significant decline, of time spent on daily and weekly physical activity and within/during home confinement. Lockdown restrictions (closure of schools, sport clubs, no access to playing fields and public spaces) became often linked with an increase in sedentary behaviour patterns, particularly with a significant increase of daily and weekly screen time. Decreases in physical activity and increased sedentary behaviours went alongside increased indicators of psychosomatic/psychosocial problems and reduction of physical and mental health and wellbeing (health-related quality of life, HRQoL). There exists some ambivalences between some studies in how far former inactive youngsters stay at the same level of inactivity during COVID-19 lockdowns or did increase slightly/moderately their physical activity levels in the first weeks of lockdowns. However, research outcomes indicate that the longer, in terms of weeks, children and adolescents experienced school closure and prohibition to enter sport facilities, even outside, with strict rules of social distancing, the more they or their parents report on severe changes to active lifestyles: less daily physical activities but more screen time, malnutrition, psychosomatic issues, social exclusion from friends and class mates linked with isolation and loneliness. Beside the duration of time and amount of experiences with lockdowns, the age of young people becomes important: the younger the children are, in kindergarten or in lower primary school grades, the less time of exercise and the more deficits were measured in their motor and physical fitness development during COVID-19 lockdowns. An important third variable (beside weeks of lockdown and early age of children) is the type and severity of restrictions set up by local, regional or federal government authorities. There were countries with no school closures for children under 16 years (Sweden; Lundvall & Fröberg 2022), some countries with only moderate lockdowns for PA outside in public spaces (Denmark, Netherland, Belgium, Slovenia) and countries with strong and severe lockdown policies for children and adolescents (France, Germany, Italy, Spain) (Ries, 2022a, b). Political interventions to manage and support PA in the school context and outside school during times of lockdowns also differ between countries in Europe. For instance Ministries of Education and Sport on provincial and national level (e.g. in Austria, Denmark, France, Spain) guided schools and teachers on how to maintain some physical exercises under hygiene rules and with digital tools. Other countries like Germany were more or less reluctant to help with coping strategies for promotion of physical education and

youth sport on regional levels through Ministries of Education and Sport and different Sport Confederations. It is striking that there is no EU country beside Germany where the focus of position statements and recommendations by different stakeholders focus much more on recovery on the reopening of youth centres for matters of social youth work than on education, physical education and physical activities (Naul & Dahl, 2022).

1.4 Recommendations as part of the Covid-19 Studies

Between the different studies and surveys there is one important consensus identified: children and adolescents should remain physically active as much as possible during the pandemic with structured daily routines for more individual exercises as prior to the lockdowns (Bentlage et al. 2020; Jurak et al.,2021). Individual types of outdoor physical activities should be practised daily under the conditions of the hygiene rules and social distancing measures. Entry to public spaces should not be forbidden for young people during COVID-19 lockdowns if the hygiene standards will not be violated. Schools and school facilities for physical education teaching like facilities for club sports programmes were locked too extensively and for too long during the pandemic. In most of the EU countries, guidelines for teachers and coaches to offer physical activities with new standards of health protection from the COVID-19 virus were lacking. It is alarming to realize, from the different national and international surveys, that there seems to be a European-wide lack of guidance from regional and national authorities in school education and in the physical education teacher and youth sport sector. It was a failure not to intervene with practical offers of physical education and sport activities during long periods of lockdown from these institutions. A variety of unintended developments of physical deficits and psychosocial burden, with increased weight gain, reduced wellbeing is apparent after strict lock down policies for children and adolescents across Europe. The emergence of more physical inactivity, increased psychosocial problems and reduced mental health of young people during the lockdowns were not successfully counteracted by responsible authorities in education, sport and health. It is apparent that physical education during lockdowns was merely regarded again as an unimportant school subject in many European countries when online teaching was offered to other subjects but not in PE, or only on a very limited basis (e.g. Germany 2%) because the digitalization infrastructure did not exist at many schools or PE teacher were less qualified to offer online teaching. PE was cancelled too much as a part of school life. Some of our reviewed studies recommend regular

online teaching with homework in PE not only during pandemic lockdowns. PE teachers should be regularly trained in teaching with digital devices in PE as part of their university studies and in further education courses. The reported range of reduced motor and physical fitness skills, higher development of BMI values compared to reference norms, restrictions in psychosocial and mental development of primary school children must be addressed in special PE lessons and with more active school opportunities after the COVID-19 lockdowns. Smaller class sizes and more expert teachers are necessary to counteract long-term developments of post-COVID diseases with physical and mental impairments. Decisions on school closures and the ban on sport facilities were not carefully considered and their implications and consequences on health development of children and adolescence in the COVID-19 pandemic were not anticipated. Therefore, on a political level state authorities of education and health should inaugurate, with expert groups, the monitoring and evaluation of the different unintended implications and consequences of their lockdown policies for school-aged children, adolescents and their parents (Sachverständigenausschuss des Ministeriums für Gesundheit (2022, pp.94).

2 National Position Statements and Recommendations on Recovery of Physical Education and School Sports in Europe

A number of organizations and government departments across Europe have released position statements, guidelines, and policies for the return to physical education, activity, and sport during and post-pandemic. Additionally, a number of peer-reviewed publications have also discussed the topic of physical education and sport and provide recommendations on the recovery. Recommendations during the COVID-19 pandemic focus on practical steps to maintain and increase physical activity while also adhering to public health guidelines. The recommendations for post-pandemic focus on building connections in the community, creating a holistic approach to physical activity, education, and sport. These statements, policies, guidelines, and recommendations all highlight the importance of physical education and activity on motor and cognitive development, and health and wellbeing. The European Physical Education Association go as far as stating that there is “no education without physical education” (EUPEA, 2020).

The recommendations from these documents are discussed below, firstly in relation to safely conducting physical activity and sport during the COVID-19 pandemic, and

secondly in relation to recovery post-pandemic. Additionally, concept-centric matrices were created to explore these key recommendations.

2.1 Statements and Recommendations on How to React During the COVID-19 Pandemic

The position statements, policies, guidelines, and publications providing recommendations for maintaining and increasing physical activity and sport during the COVID-19 pandemic, can be categorized by a number of themes. In this section we discuss recommendations in light of these themes: Infrastructure and Social Context; Importance of Qualified Teachers; Hygiene Standards; Communication and Social Distancing; Digital and Blended Teaching; and, Outdoor Physical Education and Sport. The concept-centric matrices (Table 1. and Table 2.), which identify the key recommendations from these themes, can be viewed in section 2.3 below.

2.1.1 Infrastructure and Social Context of the School Environment

The Association for Physical Education in the UK (afPE, 2020) highlight the importance of considering the individual contexts of schools when implementing national and international public health guidelines. They encourage each school to manage their physical education policies in conjunction with the guidelines but by also taking into consideration their class sizes, age demographics, and layout of buildings and facilities (afPE, 2020). Similarly, the Ministerio de Educacion Publica (MEP, 2021) identifies the need for a designated staff member with responsibility for the coordination of COVID-19 measures within the school, including monitoring compliance, communicating hygiene measures, and ensuring sufficient sanitation of materials and equipment. The Federal German Ministry of Health (Bundesministerium für Gesundheit [BMG], 2021) recommended, particularly for early education at kindergarten, the fostering of a movement-friendly environment by promoting more play outside of the building, attending green fields in close proximity to schools, and the removal of furniture in the rooms to increase spaces for indoor activities with adequate social distancing. The Karlsruhe Institute of Technology ([KIT]) Woll et al, 2021) recommend utilising easily reached public spaces for movement, leisure, games, and sport, particularly in high density areas, close to family homes.

The COVID-19 pandemic was also very disconcerting for PE teachers in France. It is important to note that, apart from the rules to prevent the virus spreading, there were

very limited guidelines from the Government (Ministère de l'Éducation Nationale, de la Jeunesse et des Sports, 2021), and very scarce examples of good practices (AE-EPS, 2020). PE teachers reacted very differently, in their teaching practice, in their response to the pandemic. Some stopped teaching PE, others tried to create a work-plan for online teaching, but with not much success. Teachers recommend the adoption of mostly online teaching with frequent feedback and evaluation from the teachers (Multiple Authors, 2020). The French Government have prioritized keeping schools open, but PE has been treated differently, with the Government defining 4 levels of alert (Green, Yellow, Orange, and Red) (Ministère de l'Éducation Nationale, de la Jeunesse et des Sports, 2021). Special restrictions have been set for PE which increase progressively according to the level of alert. These rules remain in place through 2021/2022. Level Green allows physical activities and sports both indoors and outdoors, Level Yellow adds contact sports but social distancing remains. During the Orange Level of alert, physical activities and sports take place outdoors only, in the case of bad weather, face masks must be worn by all. During the Red alert phase, only outside activities are permitted with a 2 meter distance between participants (Académie de Versailles, SNEP-FSU, 2022). The Federal Ministry of Education, Science and Research in Austria have also adopted a 4 phase alert system for physical education identifying the four colors of flashes.

2.1.2 Communication and Social Distancing in Practicing Physical Education and School Sport

Communication between schools, physical education teachers, and students and parents/guardians is essential, ensuring all COVID-19 measures are communicated and understood by all parties (COLEF Canarias & CEUCD, 2021; Department of Education and Skills, 2020); MDSZ, 2020). Public health measures should be communicated in a visible way with all individuals who use or come into contact with school infrastructure (MDSZ, 2020). The afPE (2020) also highlight the need to continually communicate with students on the topic of good hygiene, ensuring they are regularly informed about good practice and any changes at local or national level. Students should be allocated to cohort groups for physical education classes, and movement between groups should be restricted (Department of Education and Skills, 2020). Where necessary class sizes should be reduced to allow for social distancing in line with national guidelines (afPE, 2020).

Similarly, recommendations include the use of clear signage and notices in buildings, physical education spaces, corridors, and changing rooms etc. (afPE, 2020). Related to this, policies and statements also recommend the implementation of one-way systems for entrance and exit to indoor physical education spaces (MEP, 2021). However, the avoidance of information overload has also been highlighted in relation to providing notices and signs (afPE, 2020).

2.1.3 Regular Time Allocation of Physical Education with Inclusive Physical Education Classes and qualified Physical Education Teachers

According to the EUPEA (2020), physical education should be delivered by specialized PE teachers or by generalist teachers who are qualified to teach PE and the duration of physical education classes should be maintained, at a minimum, to pre-pandemic levels. KIT (Woll et al, 2021), also state the need for physical education to be delivered by teachers specifically trained in physical education pedagogies. Similarly, the Hungarian School Sport Federation (MDSZ, 2020) state that physical education and sport activities should be carried out by qualified teaching staff. The Czech Society of Physical Education Teachers (CSPET, 2021) highlight the need for professional school PE management to prevent overload and injuries, ensuring that meaningful and safe programmes are delivered to combat the periods of inactivity from the lockdowns. The University Network of Research in Children and Youth Sport in North Rhine Westphalia (NRW, 2021, Germany) identify the importance of physical education classes and that they should be protected in the school timetable and not postponed due to other subjects.

Physical education must remain inclusive of all students (EUPEA, 2020). It is the policy in some countries to disallow non-vaccinated children from participating in physical education and sport. The Czech Association of Physical Education Teachers (2021) advises against this, stating that all children should have equal access. KIT (Woll et al, 2021) also identifies the need to support access to sport for children and young people from socially disadvantaged backgrounds. A number of statements and guidelines do state, however, that students who are ill should not participate in physical activity (e.g. Department of Education and Skills, 2020).

The German Physical Teacher Association (DSLTV, 2020) published a paper during the first period of lockdown (April 2020). DSLTV criticized school closures and the decline of PE lessons although schools are open in some German regions. PE should be regularly offered under adequate hygiene practices and social distancing rules (DSLTV, 2020). DSLTV (2020) highlight the need for professional pedagogical teaching in PE, and that as part of this professional teaching students should know how to be active at home, outdoors, and during the summer holidays. Additional recommendations from DSLTV (2020) include practicing physical activities with one partner to reduce interactions between students, adhering to national public health hygiene guidelines, and that physical education should be conducted primarily outdoors.

The European umbrella organization, the European Physical Education Teacher Association (EUPEA, 2020) criticized the reluctance of many national physical education teacher associations (75% of 31 associations) like DSLTV, for not consulting with regional or national ministers of education on PE matters in relation to the decline of physical education classes during the periods of lockdown even when schools in some EU countries were offering regular teaching for students (e.g. Austria, Czech Republic, Cyprus, and Luxembourg). On average, 60% of PE classes in Europe were cancelled, and the remaining 40% were either adapted to on-campus teaching or home schooling (Mittag & Naul, 2021, p.84). The MDSZ (2020) highlight the importance of maintaining physical education and go as far as stating that is it unethical to reduce the number of physical education hours.

2.1.4 Hygiene Standards for practicing Physical Activities, use of facilities and equipment

Position statements, policies, and guidelines state that it is essential that physical education is delivered in an environment that adheres to local, national, and international public health guidelines (afPE, 2020; Consejo General de la Educacion Fisica y Deportiva [COLEF Canarias] & Consejeria de Educacion Universidades, Cultura y Deportes [CEUCD], 2021; Department of Education and Skills, 2020; EUPEA, 2020; SVSS 2020). This includes the adoption of safe practices of sanitation and cleaning for students, teachers, rooms, and equipment (EUPEA, 2020). Accordingly, additional time may need to be allocated to allow for the cleaning and disinfection of equipment and sanitation of hands (Department of Education and Skills, 2020). Schools should

ensure that sufficient standard cleaning, sanitizing, and disinfecting equipment and materials are available at all times (afPE, 2020).

The sharing of personal items, for example water bottles and towels, should be prohibited (Department of Education and Skills, 2020). Additionally, the sharing of items that are difficult to sanitise and disinfect should be avoided (Department of Education and Skills, 2020). Where equipment has been used and shared between different people it is important to clean and disinfect the equipment before and after use, and between use by different people (afPE, 2020; Department of Education and Skills, 2020; MDSZ; 2020). Recommendations also advise on the provision of budget for additional physical education equipment, to ensure students have access (COLEF Canarias & CEUCD, 2021). COLEF Canarias and CEUCD (2021) also suggest assigning equipment to students and registering the equipment using codes.

Recommendations for schools also suggest allowing students to attend school in their PE clothes, reducing the need for using changing rooms before and after physical education classes (afPE, 2020; COLEF Canarias & CEUCD, 2021; MEP, 2021). Scheduling physical education classes at the end of the school day has also been suggested, this reduces the need to use changing rooms and showers as students can go home to change (COLEF Canarias & CEUCD, 2021; CSPET, 2021).

A number of statements advise against contact activities, and instead promote the adoption of activities and sports that are non-contact or low-contact ensuring social distancing requirements can be maintained (afPE, 2020; COLEF Canarias & CEUCD, 2021; Department of Education and Skills, 2020; SVSS, 2020). Additionally, recommendations include the implementation of activities that contribute to emotional and physical wellbeing, such as relaxation techniques and conscious breathing (MEP, 2021). Recommended activities include running, throwing, track and field athletics, badminton, cycling, endurance movements, skills development, yoga and contactless sports and games (CSPET, 2021; MDSZ, 2020).

2.1.5 Digital Teaching of Physical Education and Blended Learning

A number of position statements and policy guidelines support the need for innovative digital physical education, both during the COVID-19 pandemic and post-pandemic (e.g. BMG, n.d.; SHARE Initiative, n.d.). The SHARE Initiative (n.d.) highlights the need to continue to develop innovative programmes for physical activity to address

the challenges of the COVID-19 pandemic. Specifically, funding should be allocated to enable the development of guidelines and best-practice digital physical education (SHARE Initiative, n.d.). COLEF Canarias and CEUCD (2021) also highlight the need to continue developing integrated digital physical education in light of potential continued blended learning. The German Sport Youth (DSJ, 2020) highlights the need to focus on digitalization for children and youth in sports clubs, and the potential for digital tools to enhance physical activity should be further developed. Exercise and training units should be designed with digital tools and the DSJ (2020) supports a stronger exchange of digital tools to improve movement development in conjunction with its membership organisations. COLEF (2020a) also created a number of recommendations for physical activity in the “new normal” of the COVID-19 pandemic. Within these recommendations, the need to develop a programme of curriculum of physical education addressing the essential skills that were not developed during periods of lockdown and online learning was highlighted (COLEF, 2020a).

It is important to note that parents have become exhausted with home schooling (AGJ & AGB, 2021). The German AGJ and AGB (2021) have identified the need to create new concepts that provide low parental participation offerings. The provision of digital physical education should also be flexible, allowing students to complete the tasks and activities within the constraints of their own individual circumstances, and these activities should be monitored by PE teachers and students should receive feedback and evaluation (MDSZ, 2020).

French PE teachers significantly increased guiding, helping to set goals, and encouraging self-monitoring of physical activity in school children. They also increased all the pedagogical formats of behaviors promoting students’ out-of-school physical activity. In Franc, PE teachers were asked to contribute to maintain a pedagogical continuity and were encouraged to use a broad range of digital work environments. Moreover, educational authorities supported the key role of PE in fostering an active lifestyle to counteract the adverse consequences associated with lockdown. Several associations recently published guidelines to help stakeholders, school principals, and teachers to “reconstruct” and redesign PE during the COVID-19 pandemic (Gobbi et al, 2020).

2.1.6 The Importance of Integrated Outdoor Physical Education and Sport

The integration of physical activity and physical education across the whole school and all subjects has been recommended by a number of organizations (e.g. EUPEA, 2020; MEP, 2021). Similarly, COLEF Canarias and CEUCD (2021), recommends that physical education should include the development of skills which enable students to incorporate physical activity in their day-to-day lives, outside of the physical education classroom. This is mirrored in recommendations from the German Physical Teacher Association (DSLV, 2020), which states that as part of physical education instruction, students should learn how to be active at home, outdoors, and outside of the school year. Additionally, MDSZ (2020) recommend that students should use active transport when going to and from school, for example walking, using scooters, or cycling.

The use of outdoor spaces for physical education and activity has been recommended by a number of organizations (e.g. BMG, 2020; COLEF Canarias & CEUCD, 2021; Department of Education and Skills, 2020; MDSZ, 2020). Stveráková et al (2021) recommend that physical education teachers should encourage students to participate in physical education outside of the PE class by keeping an activity diary that would be signed by parents and the PE teacher fostering an environment for integrated physical activity throughout the day. In the event that the use of outdoor spaces is not possible (i.e. inclement weather, no outdoor facilities etc.) the indoor spaces should be adequately ventilated and windows and external doors should be opened where possible (Department of Education and Skills, 2020).

In France, maintaining the practice of physical activity and sports is an important objective for the 2021/2022 school year, and these measures are detailed by the health framework which established four levels of alert, as mentioned previously. However, it is still strongly recommended to prioritize outdoor physical education, activity, and sports. When outdoor practice is impossible, low-intensity activities compatible with wearing a mask and social distancing guidelines must be favoured (Ministry of National Education, Youth and Sports, 2022).

2.2 Statements and Recommendations on How to Recover Physical Education and School Sports after the COVID-19 Pandemic

Post-pandemic recommendations for actions focus on different aspects and activities: building community-based networks between kindergarten, schools and sports clubs

with local community offices (education, health sport); quality efforts to further educate and qualify caregivers in kindergarten, no licensed teachers at school; establishment of a regular system of monitoring state and status of school physical education; the development of physical competencies and wellbeing of children; improvements of regular out of school and home-based physical activity; and development of a holistic approach to physical activity, education, and sport via a cross-sectoral pact of movements and cross-institutional pact of digitalization for physical education in all formal and informal educational settings and sports clubs. However, many of the recommendations on how to react to the impact of COVID-19 during the pandemic are pertinent for post-pandemic actions as well.

2.2.1 Networking of schools with different groups of stakeholders in the local community

COLEF (COLEF, 2020b) wrote a letter to the Spanish Minister of Education and Vocational Training highlighting the importance of collaborating on policy and guidelines for physical education post-pandemic, to ensure that the issues arising from COVID-19 (see O'Neill et al, 2022 for a review of the impact of COVID-19 on sport and physical activity), can be successfully solved through expert, collaborative cooperation. Similarly, COLEF Canarias and CEUCD (2021), propose the development of collaborations between schools and local facilities and amenities to enable students to participate in physical education classes outside of their school grounds. The DSJ (2021) also identifies the importance for collaboration between schools and sports clubs to enhance daily physical activity in children and young people. Recommendations also support funding opportunities within the community to support the development of sport and physical activity participation among children and young people (Woll et al, 2021). Lundvall and Fröberg (In Press) state, in their work on the consequences of the COVID-19 pandemic on Swedish children and young people, that it will be important to re-engage students with physical activity and sport to encourage the reduction of sedentary behaviors.

AGJ and AGB (2021) in Germany call for a network of social services for young people and their families who suffered during the COVID-19 pandemic. An extended network for children and young social services with the health system should enhance recovery of family life in family centres, and youth education and leisure centres should either be re-opened or newly established to improve links between family life, school life, and

social support with advice for inner family life. The University Network (NRW, 2021) argues in the same direction for the development of sustainable cross-sectoral networks for the promotion of young people through movement, games, and sports which combine school-based, out of school, political, economic, and scientific staff as a team of supporters.

2.2.2 Further professional training in physical education and school sport for teachers and coaches

KIT (Woll et al, 2021) demanded a “quality offense” for training PE teachers and movement pedagogies with the target of no cancellation of physical education classes and for PE to not be given by non-licensed PE teachers e.g. in primary schools. Additionally KIT (Woll et al, 2021) stated the necessity for the implementation of concepts for high quality digital movement offers across all regions in Germany.

Despite a very significant investment in pedagogical support by the French PE teachers, they remain convinced that the very essence of their profession is played out in the face-to-face pedagogical relationship but requiring more guidance. The remote teaching experience does not seem to have upset their representations of “the essential purposes of the profession” which remain, on the whole, not prioritized (Potdevin et al, 2020).

The Aspire Sports Trust in the UK, along with consultant Vanessa King (2022), have developed a training course for teachers entitled “A Recovery Curriculum – Planning a new approach to Physical Education, Physical Activity and School Sport”. The focus of this programme is to develop teachers’ skills and understanding to effectively respond to the challenges and consequences of the COVID-19 pandemic, in a post-COVID world. One key component of this course is training in how physical education and school sport can be integrated as a whole school platform, embedded throughout the school-day.

2.2.3 Monitoring the Quality of Physical Education and School Sport and Related Interventions

Recommendations have also highlight the need to monitor children and young people in relation to key motor milestones (e.g. Woll et al, 2021). KIT (Woll et al, 2021) are demanding a German-wide, systematic monitoring of motor abilities and movement behaviour of children and adolescents, in order to observe the consequences of the

COVID-10 pandemic and to establish a dataset for interventions post-pandemic. In this respect the WGI (Naul, 2021) propose comparative COVID-19 studies with different age-related intervention studies (kindergarten, primary schools, and secondary schools) on physical abilities and fitness, daily time spent on physical activities and sport, and psychosocial wellbeing of multi-cohorts of children and adolescents, who did not receive movement, games, and sports instruction for approximately one academic year (2020/2021) or even longer due to the COVID-19 lockdowns of schools.

The justifications for educational support in Quality Physical Education (QPE) are significantly based on the promotion of physical activity, healthy lifestyles, and the fight against sedentarism. The context of lockdown seems to have reconfigured the purposes to be prioritized for all PE teachers. The contents relating to energy expenditure of the students were significantly enhanced without being associated with strategies developed to mobilize students. A greater use of individual levers (taking into account the opinion of students to regulate their interventions) and interventions in living environments (solicitation of the family environment or taking into account the available physical environment) has been made as PE teachers perceived their role of promoter of PA and health more rewarding. This pursuit of the objective of getting confined students moving seems to have developed their technological skills allowing them to offer unknown resources. Thus, the impossibility of face-to-face teaching has led to the emergence of new solutions, leading to the development of digital skills and the enhancement of the role of PE in physical activity and health (Potdevin et al, 2020). It has been recommended that these enhancements be rigorously examined through scientific investigations (e.g. COLEF, 2020b; Naul, 2021; Woll et al, 2021).

Additional interventions have been proposed by COLEF (2020a), specifically the development of a program or curriculum of physical education addressing the essential skills that were not developed during periods of lockdown and online learning. Further intervention development recommendations include creating innovative programs for physical activity both face-to-face and online (SHARE Initiative, n.d.).

2.2.4 Policy Making with Administrators and Policy-Makers on Local, Regional and National Levels

The German AGJ (2021) state that the recovery from the impact of the COVID-19 pandemic should not be limited to formal educational institutions like kindergarten and

schools. In order to recover from the impact and consequences of the pandemic on children and young people, the structure of youth social work offices and authorities must be reinvented with an important social infrastructure and a future plan for youth services at both local and regional levels (AGJ, 2021).

A majority of French PE teachers tried to develop strategies to promote physical activity at several levels (individual and living environments) without, however, acting on a large number of levers in this unprecedented context. An analysis of the teacher training curriculum shows a real lack of theoretical training related to phenomenon of sustainable commitment to physical activity and healthy behaviours. French authorities advocate for resolving this problem in the future through adequate policy making at national level (Potdevin et al, 2020). The training strategies of French PE teachers seem to be divided between education in sports, PA, health or citizenship (Morales & Travailot, 2015). The physical activity and health of young people is not a corporate issue, but it seems clear that French PE teachers have a key role to play so that young people today become the active people of tomorrow.

Additionally, the development of policy should focus on increased investment and funding into physical education, activity, and sports participation and promotion. The Swedish Sports Confederation (Eriksson, 2022) highlights the importance for re-engaging young people in sports and physical activity, stating a strong sports movement is needed which needs substantial financial support to restart after the COVID-19 pandemic. Additionally, KIT (Woll et al, 2021) supports the need for funding opportunities within the community to support the development of sport and physical activity participation among children and young people. According to the SHARE Initiative (n.d.) funding should be allocated to enable the development of guidelines and best-practice digital physical education, this includes in the post-pandemic world.

2.3 Comparative Concept-Centric Matrix Analysis on Items of Recovery between Different National Stakeholders in Europe

The following two Tables (Table 1. and Table 2.) detail a concept-centric matrix of key recommendations for physical education and sport both during and post-pandemic. Table 1 focuses on the key recommendations for physical education during the COVID-19 pandemic and Table 2 focuses on recommendations for the recovery of physical education post-pandemic. The main findings of the concept-centric analysis

of position statements, policies, and guidelines have been discussed in detail in section 2.2 above. Additional recommendations from international papers can be found in O'Neill et al., (2022).

Maintaining, and increasing, physical activity and education is a priority for organizations across Europe. Providing opportunities for inclusive, daily activity across the school day is essential for the continued development of wellbeing, health, and motor and cognitive development of children and young people. Recommendations for physical education during COVID-19 include: following national guidelines; hygiene protocols; appropriate communication and signage; non-contact/low contact activity taking place outside; avoidance of sharing items and equipment; and the development of innovative digital, and blended, physical education.

Recommendations for physical education post-COVID include: the development of quality, inclusive physical education strategies and policies in collaboration with key stakeholders; collaboration between schools, physical education teachers, and local community sports and physical activity organisations; development of a culture of physical activity across curricula; and funding of local and national physical activity initiatives.

Table 1. Concept-centric Matrix of European Recommendations from Position Statements, Policies, and Guidelines for Physical Education, Activity, and Sport during COVID-19

	Country/ Region	Impact of Ab- sence of PE and PA	Importance of PE and PA	Promote Physical Activity	Communi- cation	Follow Na- tional/ Inter- national Guidelines	Maintain PE/ PA Lev- els	PE Taught Profession- ally/ Engage help from PE Teachers	Inclusion & Equity (in- cludes con- cerns about Exclusion)	Innova- tive Digi- tal PE	Outdoors PE/ PA. Ventilation Indoors	Blended PE	Avoid Shar- ing Items/ Equipment	Sanitation & Hygiene	Reduce Close Contact Activities	Daily PE/ PA. Inte- grate in classes, at home	Sign- age/ Notices	Wear PE Clothes to School	Develop Policies: Work with Key Stake- holders	In-person PE is Es- sential: No Educa- tion with- out PE
Czech Association of PE Teachers (2021)	Czechia	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	X
Czech Society of Physical Education Teachers (CSPET, 2021)	Czechia	X	X	-	-	X	X	X	-	-	X	-	-	X	X	X	-	-	-	X
EUPEA (2020)	Europe	X	X	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	X	X
SHARE Initiative (n.d.)	Europe	X	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-
Eurochild et al (2020)	Europe	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Association pour l'Enseignement de l'Éducation Physique et Sportive (AE-EPS, 2020)	France	-	-	-	-	-	-	X	X	X	X	-	-	-	X	X	-	-	-	-
Academie de Versailles (2022)	France	-	X	-	-	-	X	-	-	-	X	-	-	-	X	-	-	-	-	-
Ministère de l'Éducation Nationale, de la Jeunesse et des Sports (2021; 2022)	France	-	-	-	-	X	-	-	X	-	X	X	-	-	X	-	-	-	-	-
DSJ (2020; 2021)	Germany	X	X	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	X	-
DSLVL (2020)	Germany	X	X	-	-	-	-	X	-	-	X	X	-	X	-	-	-	-	-	-
DSLVL, BSI, IAKS, BAG (2020)	Germany	X	X	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	X	-
DOSB (2021)	Germany	X	X	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	X	-
AGJ, AGB (2021)	Germany	X	-	-	-	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-
Karlsruhe Institute of Technology (Woll et al, 2021)	Germany	X	-	X	-	-	-	X	X	X	X	-	-	-	-	X	-	-	-	-
NWR University Network (2021)	Germany	-	X	-	-	-	X	-	X	X	-	-	-	-	-	X	-	-	X	-
Bundesministerium für Gesundheit (3 Brochures)	Germany	-	X	-	-	X	X	-	-	X	X	X	-	X	-	X	-	-	-	-
Hungarian Student Sports Association (MDSZ, 2020)	Hungary	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
Department of Education (2020)	Ireland	-	-	-	X	X	-	-	-	-	X	-	X	X	X	-	X	X	-	-
SSI (2021)	Ireland	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-
Health Service Executive (HSE, 2020)	Ireland	-	-	-	X	X	-	-	-	-	-	-	X	X	-	-	-	X	-	-
COLEF (Letter to Minister, 2020b)	Spain	X	X	-	-	-	-	X	-	X	-	-	-	X	-	-	-	-	X	-
COLEF (Recommendations, 2020a)	Spain	X	X	X	X	X	-	-	-	-	X	-	X	X	X	X	X	X	-	-
COLEF, Consejería de Educación, Universidades, Cultura y Deportes (2021)	Spain	X	X	X	X	X	-	-	X	X	X	X	X	X	X	-	X	X	-	-
Ministry of Public Education et al (2021)	Spain	-	-	-	-	X	-	-	X	-	X	-	X	X	X	X	X	X	-	-
PE Teacher Association of Switzerland (SVSS, 2020)	Switzerland	-	-	-	-	X	-	-	-	-	X	-	-	X	X	-	-	-	-	-
afPE (2020)	UK	-	-	X	X	X	-	-	-	-	-	-	-	X	X	-	X	X	-	-

Table 2. Concept-centric Matrix of European Recommendations from Position Statements, Policies, and Guidelines for Recovery for Physical Education, Activity, and Sport after COVID-19

	Country/ Region	Daily PE/ PA. Integrate in classes, at home	Development of Policies: Work with Key Stakeholders	Networking: Collaboration with Communities and Organisations	PE Teacher Professional Development	Monitoring & Interventions	Policy Making: Collaborative	Funding
SHARE Initiative (n.d.)	Europe	-	-	-	-	X	-	X
DSJ (2020; 2021)	Germany	-	X	-	-	-	-	-
AGJ, AGB (2021)	Germany	-	-	X	-	-	X	-
Karlsruhe Institute of Technology (Woll et al, 2021)	Germany	X	-	X	X	X	-	X
NWR University Network (2021)	Germany	X	X	X	-	-	-	-
COLEF (Letter to Minister, 2020b)	Spain	-	X	X	-	X	X	-
COLEF, Consejería de Educación, Universidades, Cultura y Deportes (2021)	Spain	-	-	X	-	-	X	X
Swedish Sports Confederation (2022)	Sweden	-	-	-	-	-	-	X
Aspire Sports Trust (2022)	UK	X	-	-	X	-	-	-

3 Conclusions for the design of the CEREPS consensus statement on recommendations and actions to recover physical education and school sport in Europe

The key findings of the national and comparative COVID-19 studies were analysed and discussed in this paper of the scientific background of the consensus statement. Principles on how to provide physical education and school sport during the COVID-19 pandemic and what must be reshaped and built better for physical education and school sport after the COVID-19 crisis were covered by many statements and recommendations of national stakeholders across Europe. It has been summarised within the concentric-matrix in the last chapter. All items and aspects have to be carefully considered and structured for the COVID-19 consensus statement on recommendations and actions to take. Recommendations and actions must reflect *actions during the COVID-19 pandemic* to sustain formal physical education and school sport at school and outside school under certain hygiene conditions and social distancing rules. However, *recommendations and actions must also reflect the recovery of PE and school sport after the COVID-19 pandemic* to re-establish items which were more or less lost by severe lockdown policies. But also *new efforts for teaching and learning may be necessary by lessons learned via the COVID-19 crisis*.

In the CEREPS consensus statement - recommendations and actions comprising *six items* will be proposed to sustain physical activities *during the COVID-19 pandemic* and *four items* will be proposed for the recovery of physical education and school sport *after the COVID-19 crisis*. The six principles to be addressed within the pandemic are: infrastructure and social context of the school environment; communication and social distancing in practicing PE and sport; to keep regular time allocation of PE with inclusive classes and qualified PE teachers, hygiene standards for types of physical, facilities and equipment, digital teaching of PE and blended learning; importance of integrated outdoor PE and sport. The four recommendations and actions which should be considered after COVID-19 lockdowns are: networking between schools, sport clubs, local authorities and partners from the private sector; further professional education and training of school personnel (CPD); monitoring the quality of PE and school sport with related interventions; policy making with administrators and policy makers on local, regional and national level.

As the COVID-19 studies addressed different target groups of investigation (children, adolescents, young adults, parents, PE teachers etc.) inclusive of policy makers, these different target groups should be addressed within different recommendations and actions. Special attention is needed for children in kindergarten age (3 to 6 years) and in primary schools (4 to 12 years). Both groups suffered most in their daily lives due to lockdown restrictions. The most important burden for young people during the COVID-19 pandemic was, and still is, the interruption of their daily routine through closure of their schools and lockdown of local sport facilities for any organized sport programme, followed by the ban to enter open spaces for informal physical activities. Lost minutes of daily PA (time allocation of PE and school sport) and delayed development of fundamental motor skills and physical fitness components must be restored as much as possible after the COVID-19 pandemic. Smaller sizes of PE classes are necessary to build up skills and qualified PE teachers (with further education courses) should try to compensate basic abilities in coordination and muscle strength of school-aged young people as much as necessary taking into consideration age and gender related challenges. More emphasis is needed for outdoor teaching in PE and the inclusion of digital tools for more individualised health development.

When it comes to health promotion through physical education and school sports at least three dimensions of health must be addressed and considered in teaching: the physical domain, the psychosocial domain and the mental domain. Our reviewed COVID-19 studies reveal that some groups of children and adolescents, often reported also by parents, had much more difficulties in coping with losses of social ties and communication with friends and school classmates than with the restrictions on doing sport and physical activities. So, modern and quality PE after COVID-19 needs a balanced curriculum structure which addresses the three different domains of health development more fundamentally and equally.

References

A: References of COVID-19 studies

- Adamakis, M. (2021). Resurgence of physical education and physical activity in the COVID-19 era: Policy inconsistencies, implications and future considerations. *International Journal of Physical Education*, LVIII, (2), 29-40.
- Basterfield, L, Burn, N.L., Brook, G., Batten, H., Goffe, L., Karoblyte, G. Lawn, M. & Weston, K.L. (2022). Changes in children`s physical fitness, BMI and health-related quality of life after first 2020 COVID-19 lockdown in England: A longitudinal study. *Journal of Sports Sciences*, DOI: 10.1080/02640414, 2022, 2047504.
- Bentlage, E., Ammar, A., How,D., Ahmed,M., Trabelski, K., Chtourou, H. & Brach, M. (2020). Practical recommendations for maintaining active lifestyle during the COVID-19 pandemic: A systematic literature review. *International Journal of Environmental Research and Public Health*, 17, 6365.
- Bourdass, D.I.,Zacharakis, E.D. (2020).Impact of CVID-19 lockdown on physical activity in a sample of Greek adults. *Sports*, 8, 139
- Chen, Y., Osika, W., Henriksson, G., Dahlstrand, J., & Friberg, P. (2022). Impact of COVID-19 pandemic on mental health and health behaviors in Swedish adolescents, *Scandinavian Journal of Public Health*, 50, 26-32.
- Cloosterman, K.L.A., van Middelkoop, M. & Krastman, P. (2021). Running behavior and symptoms of respiratory tract infection during the COVID-19 pandemic. A large prospective Dutch cohort study. *Journal of Science and Medicine in Sport*, 24, 332-337.
- Constandt, B., Thibaut, E., De Bosscher, V., Scheerder, J., Ricour,M. & Willem, A. (2020). *Exercising in Times of Lockdown: An Analysis of the Impact of COVID-19 on Levels and Patterns of Exercise among Adults in Belgium*. *International Journal of Environmental Research and Public Health*, 17 (11), 4244, doi.org/10.3390/ ijerph17114144.
- Derigny, T., Schnitzler, C. Gandrieau, J. & Potdevin, F. (2022). *Resilience of adolescents in physical activity during the covid-19 pandemic: a preliminary case study in France*. *Physical Activity Review*, Vol. 10 (1).
- Dohmen, D. & Hurrelmann, K. (eds.). (2021). *Generation Corona? Wie Jugendliche durch die Pandemie benachteiligt werden*. Weinheim/Basel: Beltz

- Faulkner, J., O'Brien, W.J., McGrane, B., Wadsworth, D., Batten, J., Askew, Ch .D., Badenhorst, C. et.al (2021). Physical activity, mental health and well-being of adults during initial COVID-19 containment strategies: A multi-country cross-sectional analysis. *Journal of Science and Medicine in Sport*, 24, 320-326.
- Fijalkowska, A., Mazur, J., Oblacinska, A., Nalecz, H., Jodkowska, M., Korzycka, M. Kolipinska, E. et al. (2018). *Aktualna ocea poziomu aktywnosci fizycznej dzieci il mlodziezy w wieku 3-19 lat w Polsce*. Warszawa: Instytut Matki i Dziecka.
- Füzeki, E., Schröder, J., Carraro, N., Merlo, L., Reer, R. Groneberg, D.A. & Banzer, W, (2021). Physical activity during the first COVID-19-related lockdown in Italy. *International Journal of Environmental Research and Public Health*, 18, 2511, doi 10.3390
- Gillic, B., Ostojic, L., Corluka, M. Et al. (2020). Contextualizing Parental/Familial influence on physical activity in adolescents before and during COVID-19 pandemic: a prospective analysis. *Children*, 7 (9):125, doi:10.3390/children7090125
- Gobbi, E., Maltagliati, S., Sarrazin, P., di Fonso, S., Colangel, A., Cheval, B., Escriva-Boulley, G et al. (2020). Promoting physical activity during school closures imposed by the first wave of the COVID-19 pandemic: Physical education teachers' behaviors in France, Italy, and Turkey. *International Journal of Environmental Research and Public Health*, 17, 9431, doi: 10.3390/9431
- Ivashenko, S.(2021). The impact of physical activity on mental health during the COVID-19 pandemic on youths in Ukraine. In: D. Knjaz, D. Novak & B. Antala (eds). *Physical Activity and Health Aspects of COVID-19 Pandemic* (pp. 125-132). Zagreb: Recom d.o.o.
- Jaring, G., Jaunig, J. & van Poppel, M.N.N (2021). Association of COVID-19 mitigation measures with changes in cardiorespiratory fitness and body mass index among children aged 7 to 10 years in Austria. *JAMA Network Open*, 4(8): e2121675.
- Jurak, G., Morrison, sh. A., Kovac, M., Leskosek, B, Sember, V. Strel, J. & Starc, G. (2021). A COVID-19 crisis in physical fitness: Creating a barometric tool of public health engagement for the Republic of Slovenia. *Frontiers in Public Health*, 9: 644235.
- Knjaz, D. Novak, D., Antala, B.(eds). *Physical Activity and Health Aspects of COVID-19 Pandemic*. Zagreb: Recom d.o.o.

- Kornbeck, J. (2022). Post-pandemic policy priorities for financing sport and physical activity in the EU. *Acta Facultatis Educationis Physicae Comenianae*, 62 (1), 83-95.
- Kornbeck, J, Petkovic, S. & Naul, R. (2022). The impact of the COVID-19 pandemic on physical activity and health of children and adolescents in Europe. *Acta Universitatis Carolinae – Kinanthropologica*, 58 (1), 5-17.
- Kovacs V.A., Starc, G., Brandes, M. Kaj, M. Blagus, R. Leskosek, B. Suesse, Th. et al. (2021). Physical activity, screen time and the COVID-19 school closure in Europe. An observational study in 10 countries. *European Journal of Sport Science*, 1-10. doi.org/1080/17461391.
- Krieger, J., April, H., Parks-Pieper, L. & Dimeo, P. (eds.) (2021). *Time out. Global perspectives on Sport and the COVID-19 lockdown*. Champaign/Ill.: Common Ground.
- Lodzinska, A. & Lelonek, M. (2021) The past, the presence and possible future. The physical inactivity of Polish students during the COVID-19 pandemic and its impact on health. in: D. Knjaz, D. Novak & B. Antala (eds). *Physical Activity and Health Aspects of COVID-19 Pandemic* (pp. 39-46). Zagreb: Recom d.o.o.
- Lopez-Bueno, R., Calatayud, J., Casana, J., Casajus, J.A., Smith, L., Tully, M.A., Andersen, L.L. et al. (2020). COVID-19 confinement and health risk behaviors in Spain. *Frontiers in Psychology*, 11, 1426, doi: 10.3389
- Lundvall, S. & Fröberg, A. (2022). *Influences and consequences of the Covid-19 pandemic on Swedish children and adolescents with a focus on physical education, organised club sport and leisure time sport, daily physical activity, and health and well-being - an overview*. Gothenburg University: Department of Food and Nutrition and Sport Science.
- McCarthy, H., Potts, H.W.W., Fisher, A. (2021). Physical activity behaviour before, during, and after COVID-19 restrictions. Longitudinal smartphone-tracking study of Adults in the United Kingdom. *Journal of Medical Internet Research*, 23, e23701.
- Mittag, J. & Naul, R. (2021). *EU sports policy: assessment and possible ways forward*. European Parliament, Research for CULT Committee – Policy Department for Structural and Cohesion Policies. Brussels: European Parliament.

- Naul, R. (2021). COVID-19 Studien im Vergleich. Aktives Sporttreiben und passive Bildschirmzeiten in der Pandemie und die Auswirkungen auf das körperliche und psychosomatische Wohlbefinden in Deutschland und Europa. *Forum Kinder- und Jugendsport*, 2(2), 137-144.
- Naul, R. & Dahl, St. (2022). German position statements, recommendations and declarations on post-COVID-19 recovery. Münster: WGI
- O'Brien, W., Adamakis, M. O'Brien, N., Onofre, M., Martins, J., Dania, A., Makopoulou, K. et al. (2020). Implications for European Physical Education Teacher Education during the COVID-19 pandemic: a cross-institutional SWOT analysis. *European Journal of Teacher Education*, 43 (4), 503-522. doi: 10.1080/02619768.
- O'Neill, S., Chambers, F.C., Adamakis, M. & Carty, C.M. (2022). Sport and physical activity arising from COVID-19: A desk study and concept-centric matrix. In: D. Knjaz, D. Novak & B. Antala (eds). *Physical Activity and Health Aspects of COVID-19 Pandemic* (pp. 247-261). Zagreb: Recom d.o.o.
- Orgiles, M. Delveccio, E, Mazzeschi, C. & Espada, J.P. (2020). Immediate psychological effects of COVID-19 quarantine in Youth from Italy and Spain. *Frontiers in Psychology*, doi.org/10.3389/fpsyg. 579038.
- Pieh, C., Budimir, S. & Probst, T. (2020). *The effect of age, gender, income, work, and physical activity on mental health during coronavirus disease (COVID-19) lockdown in Austria. Journal of Psychosomatic Research*, 136, 110186
- Pietrobelli, A., Pecorano, L., Ferruzzi, A., Heo, M., Faith, M., Zoller, T., Antoniazzi, F., Piacentini, G., Fearnbach, S.N. & Heymsfield, S.B. (2020). *Effects of COVID-19 lockdown on lifestyle behaviors in children with obesity living in Verona, Italy: A longitudinal study. Obesity*, 28, 1382-1385.
- Pombo, A., Luz, C., de Sa, C. Rodrigues & Cordovil, R. (2021). *Effects of the COVID-19 Lockdown on Portuguese Children's Motor Competence. Children*, 8, 199, doi/org.10.3390.
- Ravens-Sieberer, U., Kaman, A., Erhart, M., Devine, J. Schlack, R. & Otto, C. (2021). Impact of the COVID-19 pandemic on quality of life and mental health in children and adolescents in Germany. *European Child & Adolescent Psychiatry*, 1-11. doi:org./10.1007/s00787.

- Reimers, F.M. (ed.) Primary and Secondary Education during COVID-19. Cham: Springer.
- Ries, F. (2022a). Global Situation in Spain during COVID-19 pandemic. Sevilla: Univ. of Sevilla.
- Ries, F. (2022b). Global Situation in France during COVID-19 pandemic. Sevilla: Univ. of Sevilla
- Robinson, L.E., Stodden, D.F., Barnett, L.M., Lopes, V.P., Logan, S.W. Rodrigues, L.P. & D'Hondt, E. (2015). Motor competence and its effect on positive developmental trajectories of health. *Sports. Med.*, 45, 1273-1284.
- Roe, A., Blikstad-Balas, M. & Pedersen Dalland, C. (2021). The Impact of COVID-19 and homeschooling on students' engagement with physical activity. *Frontiers in Sports and Active Living*, 2., doi.org/10.3389/fspor.
- Ruiz-Roso, M.B., de Carvalho, P.P., Matilla-Escalante, D.C et al. (2020). Changes in physical activity and ultra-processed food consumption in adolescents from different countries during COVID-19 pandemic: an observational study. *Nutrients*, 12: 2289.
- Ruzbarska, B. & Vaskova, M. (2021). *Online physical education classes in different types of schools in Slovakia from the parents' perspective*. In: D. Knjaz, D. Novak & B. Antala (eds). *Physical Activity and Health Aspects of COVID-19 Pandemic* (pp. 25-38). Zagreb: Recom d.o.o.
- Sachverständigenausschuss des Bundesministeriums für Gesundheit (2022). *Evaluation der Rechtsgrundlagen und Maßnahmen in der Pandemiepolitik. Bericht des Sachverständigenausschusses nach § 5 Abs. 9 IFSG*. Berlin: BMG.
- Salin, K. (2021). Experiences of teaching physical education during the COVID-19 pandemic in Finland. in: D. Knjaz, D. Novak & B. Antala (eds). *Physical Activity and Health Aspects of COVID-19 Pandemic* (pp. 97-108). Zagreb: Recom d.o.o.
- Schmidt, S.C.E., Burchatz, A., Kolb, S., Niessner, C., Oriwol, D., Hanssen-Doose, A., Worth, A. & Woll, A. (2021). Zur Situation der körperlich-sportlichen Aktivität von Kindern und Jugendlichen während der COVID-19 Pandemie in Deutschland. *KIT Scientific Working Papers* 165. Karlsruhe: KIT.

Schmidt, T. & Pawlowski, Ch.S. (2021). Physical activity in crisis: The impact of COVID-19 on Danes physical activity behaviour. *Frontiers in Sports and Active Living*, 2: 610255, doi: 10.3389/fspor.

Sekulic, D., Blazevic, M., Gilic, B., Kvesic, I. & Zenic, N. (2020). Prospective Analysis of Levels and Correlates of Physical Activity during COVID-19 Pandemic and Imposed Rules of Social Distancing; Gender Specific Study among Adolescents from Southern Croatia. *Sustainability*, 12. (10),4072, doi.org/ 10.3390

Starc, G. (2020). *Physical fitness of Slovenian children after the COVID-19 lock-down*. Ljubljana: Univ. of Ljubljana.

Stockwell, St., Trott, M, Tully, M., Shin, J., Barnett, Y, Butler, L., McDermott, D., Schuch, F. & Smith, I (2021). Changes in physical activity and sedentary behaviours from before to during the COVID-19 pandemic lockdown: a systematic review. *BMJ Open Sport & Exercise Medicine*, 7:e000960. DOI 10.1136.

Stodden, D.F., Goodway, J.D., Langendorfer, S.J., Robertson, M.A., Rudisill, M.E., Garcia, C., Garcia, L.E. (2008). Developmental perspective on the role of motor skill competence in physical activity: An emergent relationship. *Quest*, 60, 290-306.

Universidad Miguel Hernández & Università degli Studi di Perugia. (2020). *Immediate psychological effects of the COVID-19 quarantine in youth from Italy and Spain*. <https://psyarxiv.com/5bpfz>.

Vasikova, J., Vlek, P. & Valova, M. (2021). Czech PE teachers during the spring 2020 COVID-19 pandemic: Results of an online survey. In: D. Knjaz, D. Novak & B. Antala (eds). *Physical Activity and Health Aspects of COVID-19 Pandemic* (pp. 262-272). Zagreb: Recom d.o.o.

Vrieswijk, S., Balk, L. & Singh, A. (2021). *Gevolgen van de coronamaatregelen voor de motorische ontwikkeling van basisschoolkinderen*. Utrecht: Mulier Instituut.

B: Documents and papers on recovery of COVID-19 pandemic across Europe

Academie de Versailles (2022). EPS et COVID 19: FAQ du 06 janvier 2022 et les éclairages de l'IGESR. Retrieved from: <https://eps.ac-versailles.fr/spip.php?article186>

AE-EPS (2020). Enseigner en EPS pendant le Covid 19 - Exemple dans le Grand Est. <https://www.aeeps.org/productions/1373-enseigner-en-eps-pendant-le-covid-19.html>

Arbeitsgemeinschaft Jugendämter (AGJ) (2021). Jugendarbeit und Jugendsozialarbeit in Corona-Zeiten: Eine Zwischenbilanz zu den Auswirkungen auf Jugendliche, und Erwachsene und die Strukturen der Jugend(sozial)arbeit. Berlin: AGJ

Aspire Sports Trust (n.d.). A Recovery Curriculum: Planning a new approach to Physical Education, Physical Activity and School Sport. <https://www.aspire-ed.co.uk/vanessarecoverycurriculum>

Association for Physical Education (afPE, 2020). COVID-19: Interpreting the Government Guidance in a PESSPA Context. A Practical self-review tool for risk assessment.

Bundesverband der deutschen Sportartikelindustrie, International Association for Sports and Leisure Facilities, Deutscher Sportlehrerverband, Bundesarbeitsgemeinschaft für Haltungs- und Bewegungsförderung (BSI, IAKS, DSLV & BAD) (2020). Positionspapier zur Förderung von Sport und Bewegungn. Bonn: BSI.

Bundesministerium für Gesundheit (BMG)(2020).Bewegungsförderung von Kindern und Jugendlichen in der Pandemie- körperliche Aktivitäten ermöglichen in der Lebenswelt Kindertagesstätte, (Lebenswelt Schule), (Lebenswelt Sportverein). Berlin: BMG.

Consejo General de le Educacion Fisica y Deportiva (COLEF, 2020a). Recomendaciones Docentes Education Fisica para una Escolar Segura y Responsable ante la Nueva Normalidad.

Consejo General de la Educacion Fisica y Deportiva (COLEF, 2020b). Carta a la Ministra de Educacion y FP Sobre le EF post COVID-19.

Consejo General de la Educacion Fisica y Deportiva Canarias & Consejeria de Education Universidades, Cultura y Desportes (2021). Orientaciones para una Education Fisica Segura y de Calidad en los Centros Educativos de la Comunidad Autonoma de Canarias.

CSPET (2021). Position Statement. <https://www.csutv.cz/>

Department of Education and Skills (2020). Return to School Guidance for Practical Subjects in Post-Primary Schools and Centres for Education. Government of Ireland.

Deutscher Olympischer Sportbund (DOSB) (2021) Offener Brief des organisierten Sports an die Bundeskanzlerin Merkel. Frankfurt: DOSB.

Deutsche Sportjugend (DSJ) (2020). Digitalisierung in Bewegung bringen! Frankfurt: dsj.

Deutsche Sportjugend (DSJ) (2021). „Grau ist alle Pandemie – Entscheidend ist auf'm Platz: das Leben mit Sport ist bunt – mental gesund. Forderungen der dsj. Frankfurt: dsj.

Deutscher Sportlehrer Verband (DSLTV) (2020). Der Deutsche Sportlehrerverband fordert, dass Sportunterricht in der Schule – angepasst an die Situation vor Ort und unter Beachtung der Hygiene- und Abstandsregelungen – qualifiziert erteilt wird!. Krefeld: dslv.

Eriksson, B. (2022, March 22). Great concern for the teenagers after two years with corona. Swedish Sports Confederation. <https://www.rf.se/Nyheter/Allanyheter/stororofortonaringarnaeftertvaarmedcorona>

Eurochild, International Step by Step Association, Roma Education Fund, & European Public Health Alliance (202). COVID-19 Position Statement.

European Physical Education Association (EUPEA, 2020). Position Statement on Physical Education in Schools, During the COVID-19 Pandemic.

Lundvall, S., & Fröberg, A. (2022). Influences and consequences of the COVID-19 pandemic on Swedish children and adolescents with a focus on physical education, organized club sport and leisure time sport, daily physical activity, and health and well-being – an overview. Gothenburg: Univ. of Gothenburg

Ministère de l'Éducation Nationale, de la Jeunesse et des Sports (2022). Covid19 Mesures pour les écoles, collèges et lycées: modalités pratiques, continuité

pédagogique et protocole sanitaire. Retrieved from: <https://www.education.gouv.fr/covid19-mesures-pour-les-ecoles-colleges-et-lycees-modalites-pratiques-continue-pedagogique-et-305467>

Ministerio de Educacion Publica, Viceministerio de Planificacion Institucional y Coordinacion Regional, Direccion de Planificacion Institucional & Departamento de Control Interno y Gestion del Riesgo (MEP, 2021). Protocolo para la Prevencion del Contagio del COVID-19, Durante el Desarrollo de las Lecciones de Educacion Fisica en los Centros Educativos Publicos y Privados del pais.

MDSZ (2020). A Magyar Diáksport Szövetség állásfoglalása és iránymutatásai az iskolai testnevelés és diáksport megvalósítására a COVID-19 pandémiával összefüggő járványügyi készültség időszakában. <https://www.mdsz.hu/hir/a-magyar-diaksport-szovetseg-allasfoglalasa-es-iranymutatasai-az-iskolai-testnevelés-es-diaksport-megvalositasara-a-covid-19-pandemiaval-osszefuggo-jarvanyugyi-keszultseg-idoszakaban/>

Multiple authors (2020). N°50 - L'EPS à l'épreuve du confinement. Revue EPS, 388.

Naul, R. & Dahl, St. (2022). German position statements, recommendations and declarations on post-COVID-19 recovery. Münster: WGI

Potdevin, C.L., Gandrieau, J., Dieu, O., Derigny, T., Porrovecchio, A., & Schnitzler, C. (2020). Prof d'EPS 2.0 ou comment les enseignants d'EPS ont reconfiguré leur mission de promoteur d'activité physique et de santé pendant le confinement. Retrieved from: <https://doi.org/10.4000/rechercheseducations.10317>

SHARE Initiative (n.d.). Position Paper on the Impact of the COVID-19 Crisis on the Sport Sector.

Student Sport Ireland. (2021). SSI Position Statement – COVID-19. <http://www.studentsport.ie/ssi-position-statement-covid-19-april-2021/>

SVSS (2020). Hilfestellung zur Wiederaufnahme des Sportunterrichts. Május 3

Woll, A., Scharenberg, S., Klos, L., Opper, E., & Niessner, C. (2021) Fünf Thesen und elf Empfehlungen zur Bewegungs-und Sportförderung für Kinder und Jugendliche vor dem Hintergrund der Corona-Pandemie „Es ist bereits fünf nach Zwölf – wir fordern einen Bewegungspakt!“. Karlsruhe Institut für Technologie (KIT). Karlsruhe, Germany.

Glossary

AEEPS	Association pour l'Enseignement de l'Education Physique et Sportive
AGB	Bundesarbeitsgemeinschaft der Landesjugendämter
AGJ	Arbeitsgemeinschaft für Kinder- und Jugendhilfe
afPE	Association for Physical Education
BMG	Bundesministerium für Gesundheit
BMI	Body Mass Index
CEREPS	European Council of Research in Physical Education & School Sport
CEUCD	Consejería de Educación, Universidades, Cultura y Deportes del Gobierno de Canarias
COLEF	Colegio de la Frontera Norte
COPSY	Corona-Psychology
CPD	Continuing professional development
CRF	Cardio respiratory fitness
CSPET	Czech Society of Physical Education Teachers
DMSA	Days of muscle-strengthening activities per week
DSJ	German Sport Youth
DSLJ	German Physical Teacher Association
EHIS	European Health Interview Survey
EU	European Union
EUPEA	European Physical Education Association
FSU	Fédération syndicale unitaire
HPA	Habitual physical activities
HRB	Health risk behavior
HRQoL	Health related Quality of Life
IPAQ-SV	International Physical Activity Questionnaire
KIDscreen	Health Related Quality of Life Questionnaire for Children and Young People and their Parents
KIT	Karlsruhe Institute of Technology
KTK test	Körperkoordinationstest
LMVPA	Low, moderate, vigorous Physical Activity

LPA	Low physical activity
LTPA	Leisure-time Physical Activity
MC	Motor Competence
MCA	Motor Competence Assessment
MDSZ	Magyar Diáksport Szövetség
MEP	Ministerio de Educacion Publica
MET	Metabolic Equivalent Task
MVPA	Moderate to vigorous Physical Activity
NRW	North Rhine Westphalia
PA	Physical Activity
PALs	Physical Activity Levels
PAQ-A	Physical activity questionnaire - adults
PE	Physical Education
QPE	Quality Physical Education
SDQ	Strengths and Difficulties Questionnaire
SHARE	SportHub: Alliance for Regional development in Europe
SLOfit	Slovenian national surveillance system for physical and motor development of children and youth
SNEP	Syndicat National de l'Éducation Physique
SRT	Sitting-Rising test
STARS	Study of Adolescence Resilience and Stress
SVSS	Schweizerische Verband für Sport in der Schule
TRPA	Transport-related Physical Activity
VolgMij test	Physical Fitness Test in the Netherlands
WGI	Wilibald Gebhardt Institute
WHO	World Health Organization