

Home-based Exercise Preferences in previously Non-sedentary, Non-athlete Population from Lima and Callao during the Coronavirus Disease 2019 (COVID-19)

JORGE VILLARAN-ZERDA

201926081

**Master's Program in Sport and Olympic Studies
Master's Program in Physical Education, Health and Sport Sciences
Graduate School of Comprehensive Human Sciences
University of Tsukuba**

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ABSTRACT

The State of Emergency in Peru due to the Coronavirus pandemic started on March 15th, 2020. During this period, home-screen hours, eating and sleeping patterns were possibly changed. Sitting, reclining, or lying down postures, while reducing physical activity along with avoidance activities could have great repercussions in health. This current study will help to determine the adopted preferences prevalent for home-based exercise training in previously non-sedentary, non-athlete population during the mandatory quarantine in Lima and Callao, Peru, during the Coronavirus Disease 2019 (COVID-19) pandemic. This is a cross-sectional survey study on non-athlete, non-sedentary, healthy participants from different backgrounds and sex from Lima and Callao. After acceptance of the informed consent, an anonymous questionnaire in Spanish about home-based training preferences was provided online to people from different ages, sexes and professional backgrounds, whose activities were restricted because of the quarantine. Preferred exercises, physical activity patterns and leisure time physical activity were asked. Standard Deviation, Pearson correlation, Cramer's V test and Chi-square tests were used among variables (SPSS 26.0). From the 340 surveys delivered, 215 people replied the home-based training preferences questions. 168 (78.1%) performed home-based exercises. The median time range of training before the quarantine period was more than 4 hours per week (44.2%) with 82% (n = 82) of women and 74.1% (n = 86) of men training during quarantine. There is a relative higher prevalence of physical activity between 26 to 30 years old age ($p < .001$). A combination of cardiorespiratory, resistance-training, flexibility and neuromotor exercises should be designed accordingly to the individual. A fun, intermittent or continuous training plan that includes a proper time during the day, with a proper intensity and progression, and with some of the preferred leisure activities might be of great help to keep the motivation.

Keywords: Home-based training, Quarantine exercises, COVID-19, Health, Exercise prescription, Cross-sectional study

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CHAPTER SUMMARY

CHAPTER I: INTRODUCTION

This chapter provides information about the pandemics in the history of humankind, and their impact on society. The chapter also provides readers with more detailed information about the new SARS-CoV-2 (COVID-19) pandemic, and a brief insight on the virus etiopathogenesis. The new sedentarism is introduced in this chapter and how this study can help one determine the new adopted patterns in relation to home-based exercise.

CHAPTER II: LITERATURE REVIEW

This chapter provides a deeper understanding about physical inactivity, the new Coronavirus pandemic, and its impact on the world. Exercise is defined as a medicine that has been used since ancient times but needs an adequate prescription. Recommendations for this prescription are given, including some recommendations for exercising at home and during the COVID-19 times.

CHAPTER III: METHODOLOGY

This chapter provides a description on the research methodology design, population, objectives, inclusion and exclusion criteria, variable definitions, and type of statistical analysis.

CHAPTER IV: RESULTS

This chapter provides information about the results found in the Peruvian population in relation to their demographic data and home-based training preferences.

CHAPTER V: DISCUSSION AND CONCLUSION

This chapter provides information about the impact of the results, a comparison with previous studies and final comments about the exercise prescription at home and recommendations.

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ABBREVIATIONS

- ‘ACSM’ - American College of Sports Medicine
- ‘AIDS/HIV’ - Acquired Immune Deficiency Syndrome/ Human Immunodeficiency Virus
- ‘COVID-19’ - Corona Virus Disease - 2019
- ‘ExRx’ - Exercise prescription
- ‘IPAQ’ - International Physical Activity Questionnaire
- ‘MERS-CoV’ - Middle East Respiratory Syndrome Corona Virus
- ‘NCD’ - Non-communicable diseases
- ‘PCSFN’ - President’s Council on Sports, Fitness & Nutrition
- ‘SARS’ - Severe Acute Respiratory Syndrome
- ‘SARS-CoV’ - Severe Acute Respiratory Syndrome Corona Virus
- ‘SBRN’ - Sedentary Behaviour Research Network
- ‘VO₂max’ - Maximum rate of oxygen uptake
- ‘WHO’ - World Health Organization

CHAPTER I INTRODUCTION

Humankind has been affected by the pandemic viruses since antiquity. Outbreaks of pandemics have not just decimated populations and influenced how people live, they also have determined outcomes of war and even created new paths for innovations in many sciences and political structures (Huremović, 2019).

The plague (from Doric Greek, “strike” or “blow”) is a polyseme word with 3 possible uses, to describe the *Yersinia pestis* disease, to indicate any epidemic that starts a high mortality rate and also as a metaphor for any sudden outbreak coming from God’s wrath, the devil and due to humanity sins (Huremović, 2019). Plagues can be found in religious scriptures like the Abrahamic Exodus book from the Old Testament, where you could find the ten plagues that affected the Egyptians and in the Chapter 7 from the Qur’an, from the Islamic tradition. In the Apocalypse, plagues will be brought by angels on to Earth by the end of times.

Outbreaks are deeply rooted in human psyche as well as in its history. The most important historically recorded plagues are the Plague from Athens (430 – 26 BCE) killing 25% (75,000 – 100,000 inhabitants) of the population (Littman, 2009; Mark, 2020), the Antonine Plague (165 – 180 AD) documented by Galen, taking the lives of about one-third of the population, 5 million inhabitants (Mark, 2020). The Plague of Cyprian (250 – 266 AD) killed 5000 persons a day, while the Justinian plague (mid-sixth century), a *Yersinia Pestis* plague, reduced the Byzantine Empire by 40% (50 million people). The Roman plague (590 AD), the Near East plagues (562 – 749 AD) and the Columbian Exchange epidemics (1492 – 1550 AD) were notorious plagues, but the Black Plague was the most severe global outbreak that started from China in the year 1334 and arriving in Europe in 1347, reducing the world population more than 150 million people, and possibly up to 60% of the inhabitants from Europe (DeWitte, 2014). During the first decades of the twentieth century the Spanish Flu global pandemic occurred. Named after the first report described in Spain, this origin-unknown virus spread from 1918 to 1920 and became the first global pandemic during modern medicine times. The influenza virus, strain H1N1 had a mortality rate from 10% to 20%, with a 25% of the global population being infected at some point and possibly 100 million dead within a year. In comparison to the amount of dead caused by the Black Death in a century, the Spanish Flu became the deadliest plague in history (Huremović, 2019).

In the following decades other epidemics affected the world, like the HIV/AIDS, which is slowly becoming a global pandemic (Piot et al., 2013). The outbreak started in 1980s in the United States of America within the gay population with a high mortality when it progressed to AIDS, while causing a marked social stigma. It causes around 1 million global deaths per year with a predominance in African countries, with a 25% prevalence in Sub-Saharan African countries. In the USA, about 1.2 million live with HIV with a death rate of 12,000 people per year but which is decreasing every year and now changing into a chronic disease with the advances in treatment. This disease has caused the death of 35 million people since the beginning in the mid 80s (Huremović, 2019; Mark, 2020). Smallpox, an eruptive disease that killed hundreds of million people was eradicated in 1967, through a global effort. However, in 1972 an outbreak of smallpox started in the former Yugoslavia, with the pilgrimage from the Middle East and the lack of experience to diagnose this illness by the healthcare professionals. Due to the rapid measures, the outbreak was contained and lasted for 2 months. Not so far ago, in the 20th century, the Severe Acute Respiratory Syndrome (SARS) began in China affecting less than 10,000 inhabitants, with a mortality rate of 10% but contained by the middle of 2003. The H1N1 pandemic or Swine Flu that began in Mexico in 2009 had a lower devastating effect than expected, with 10% of the population of the world infected and lasting around a year long. It is estimated that the disease killed around 20,000 to over 500,000 people. The Ebola virus outbreak from 2013 started in Guinea in December 2013 with 28,000 cases and 11, 000 fatalities. It was rapidly contained when the pathogen reached the United States (Huremović, 2019; Mark, 2020).

THE QUARANTINE

During medieval times, it was noticed that if enough time was given after the exposure, those who did not present symptoms would likely not spread the disease to the rest of the population. For this reason, a mandatory isolation (from the Latin *insula*, island) was instituted, being the first quarantine given in the port of Ragusa, City-state of Dubrovnik, in 1377. For 30 days, arrivals had to wait on the island of Lokrum before entering the city. This period was called “trentino” (from the Italian 30) by the Venetian authorities, who controlled the port at that time. No person could contact these ships, nor the people from the ships to outsiders. Eventually, these 30 days became 40 days (*quarenta giorni* or quarantine) and adopted by other cities from different countries (Centers for Disease Control and Prevention [CDC], 2013; Mark, 2020).

This public health measure remains used as part of a national and international strategy against contagion diseases.

THE BEGINNING OF A NEW PANDEMIC

By the end of the year 2019, a novel coronavirus was reported in Wuhan, China (Zhu et al., 2020). A mysterious case of pneumonia with cough, fever and fatigue occurred in the Huanan Seafood Wholesale Market, a seafood wet market from Wuhan (Huang et al., 2020; Wu et al., 2020). Starting with 66% of the staff infected by December 2019, the market was shut down in January 2020 with the epidemiologic alert from the authorities as an attempt to contain the transmission. However, this public measure was not enough, and thousands of people were infected in the Beijing, Shanghai, Guangdong, Hubei, Hunan, Henan, Zhejiang and many other cities and provinces. In a very short time, the disease spread to more Asian countries, like Republic of Korea, Japan, Thailand, Vietnam, and Singapore. Thailand was the first foreign country to report a case on January 13th. Eventually, Spain, Italy, Germany and the rest of Europe were rapidly affected, and it did not take long for the virus to reach the United States and the rest of the Americas (Holshue et al., 2020; Wu et al., 2020). As of December 16th, 2020, the World Health Organization (WHO) confirms a total of 72,196,732 confirmed cases and 1,630,521 deaths globally, with the Americas and Europe with the highest cases rate (World Health Organization [WHO], 2020). The pathogen of the outbreak was identified as a novel beta-coronavirus, the SARS-CoV-2. The outbreak of this new, coronavirus impacted many regions of the world while causing death all over the world.

On March 6th, 2020, a 25-year-old man who travelled to Spain, France and Czech Republic arrived in Peru and found positive for COVID-19, with the subsequent country lock-down. By a presidential announcement, the State of Emergency in Peru due to the coronavirus started on March 15th, 2020, followed by a mandatory quarantine period that started on March 16th of the same year, closing the borders, domestic travel restriction and the banning of non-essential business operations. During this period, sport events, gyms and outdoor physical activities were restricted. Peru has a population of 32 million people with a weak health system which was not able to cope with the population demands. By September 2020, Peru ranked 6th worldwide in total confirmed cases, and by October 2020, it was the second country in the world to go above the threshold of 1,000 COVID-deaths per million inhabitants, after San Marino (Duque-Serna, 2020; Reuters, 2020). Even though being initially a 14-day quarantine, it officially finished on

August 31st, 2020, but with ongoing partial restrictions (Gobierno Nacional del Perú, 2020a, 2020b). On August 28th, the Peruvian Government extended for 90 days the National Health Measures, with a Health State of Emergency starting in September 8th (Gobierno Nacional del Perú, 2020c).

THE VIRUS

The coronavirus is a single-strand, positive sense RNA virus within an envelope, part of the *Coronaviridae* family, which means that it looks like a crown, *Orthocoronavirinae* subfamily, *Nidovirales* order and beta-coronavirus genus, a virus that can be found in humans and many mammals. The name was given because in the surface it presents the S (spike) transmembrane protein that gives its solar-corona appearance (Araf et al., 2020; Huang et al., 2020; Kenny & Mallon, 2020; Schoeman & Fielding, 2019; Wu et al., 2020). It is one of the seven (7) corona viruses that cause human disease. The severe acute respiratory syndrome coronavirus (SARS-CoV) had a 10% mortality rate and the Middle East respiratory syndrome coronavirus (MERS-CoV) a 37% death rate according to the WHO (Huang et al., 2020). Although with a mortality not as high as the latter one, the SARS-CoV-2 is still an ongoing process where data is still being collected. From a metanalysis from Li et al. (2021), the clinical features for hospitalized patients in comparison to the 2009 influenza pandemic were similar, suggesting that the actual devastating situation of the SARS-CoV-2 is because of the rapid spread of the disease. Indeed, the SARS-CoV-2 has 10 to 20 times higher affinity for its entrance receptor in comparison with the SARS-CoV. The furin proteolytic sites in the glycoprotein and at least three (3) known mutations in the S-protein receptor-binding domain provide to it a higher transmissibility and varied antigenic recognition (Araf et al., 2020; Li et al., 2021; Wrapp et al., 2020). The S transmembrane homotrimer protein provides the virus affinity to the angiotensin-converting enzyme 2 (ACE2) receptors located in the lower respiratory tract cells in conjunction with the use of the serine protease TMPRSS2 to prime the S protein (Araf et al., 2020).

Considered a zoonotic virus, the probable and natural reservoir of the SARS-CoV-2 are bats (due to the sequence a likeness of the bat-CoV), while the racoon dog and the palm civet could be intermediate hosts for SARS-CoV and the dromedary camel for MERS-CoV. It is suggested that pangolins are intermediate hosts, but this is still under investigation. In order to get infected, people should have contact or eat the reservoir. Currently, the transmission among direct person to person contact is the main way to transmit the disease and many families are getting

infected this way (Huang et al., 2020; Schlottau et al., 2020; Wu et al., 2020; Xiao et al., 2020; Zheng, 2020). Globalization and continuous transportation helped the SARS-CoV-2 virus spread faster (Wu et al., 2020). Previously thought to be only by droplet, contact or fomite routes, new evidence suggests that aerosols, droplet nuclei or also called aerosol droplets (< 5 µm) could also be contagious under favourable conditions, liked confined settings and poor ventilated areas and long hours of exposition and viral load. These aerosols take longer time and distances (farther than 2 m) in the air (Tang et al., 2020; Van Doremalen et al., 2020). The viral (and possibly infective) RNAs can be found in body secretions: throat swab, anal swab, nasal discharge, conjunctival swabs, sputum, and sometimes in blood, urine and faeces (Holshue et al., 2020; Huang et al., 2020; Tang et al., 2020). The survival time from fomites is also thought to be possible, with higher times (up to 72 hrs) of virus survival in plastic and stainless steel (Van Doremalen et al., 2020). The SARS-CoV-2 can enter through mucosal surfaces like the conjunctiva and the lower respiratory tract. It uses the human ACE2 as an entrance receptor. This virus could also be neurotrophic, using the olfactory bulb as an entrance to the brain, possibly increasing neuropsychiatric symptoms among survivors (Vindegaard & Benros, 2020). There are many neurological presentations, most of the time non-specific such as headache, fatigue, and dizziness. Confusion is seen in 15% when severe (Mao et al., 2020). This virus has great affinity for the human lung epithelium, but it is also considered now by many as an endothelial disease, the damage this virus can produce goes beyond the lung parenchyma. The disbalance between the thrombotic and the fibrinolytic actions can cause strokes by peripheral vasculature thrombosis in young people, affecting microvascular arterial beds, the coronary arteries, the brain, even the kidney. Under this concept it would not be strange to have a whole body reaction in the 7000 m² surface area from arteries, veins and microvessels within our body (Libby & Lüscher, 2020; Mao et al., 2020). The manifestations due to coronavirus can be broad and indiscriminately affect multiple organs. The cascade of proinflammatory complications due to the pathogen can be related with the production and cascades of IL-1 α , IL-1 β , IL-6, TNF- α , and other cytokines, a systemic reaction which has been named “Cytokine Storm”. Glucose 6-phosphate dehydrogenase deficiency may cause haemolysis during the infection and other free radicals may also increase as part of a systemic reaction in our body, due to the disease and a pro-oxidant therapy (Ibrahim et al., 2020; Mohammad et al., 2018).

The SARS-CoV-2 can spread from the throat to the saliva without symptoms, transmitting the disease easily from asymptomatic person to person, that in comparison with the SARS-CoV it

has made it more difficult to contain. SARS-CoV and MERS-CoV develop the disease before spreading, but the SARS-CoV-2 can spread for many days before any visible symptom (Araf et al., 2020).

The viral load in relation to complications remains controversial but it has been noted that there is a significant association between mortality and viral load, with a hazard ratio of 1.07 (95% CI 1.03 – 1.11). The viral load can still be found 12 days after the onset of the symptoms, which means that the patient may stay contagious at least for 2 weeks (Pujadas et al., 2020; Tang et al., 2020; Wu et al., 2020). Risk factors to have complications are elders, obese, weak immune systems, and chronic diseases. Males also have an increased death rate and those under testosterone hormone therapy, most likely in relation to the TMPRSS2 increased transcription (Docherty et al., 2020; Guan et al., 2020; Montopoli et al., 2020; Mou et al., 2020).

There is an associated risk of 2.3 times in the risk of severity and a 2.5-fold of mortality in diabetic patients with SARS-CoV-2 and a 2.04 times COVID-19 severity and a 2.21 increase in mortality when referring to blood hypertension, but this is still controversial because of many other risks factors the studied population had (De Almeida-Pititto et al., 2020).

There is a potential 20% of complete asymptomatic infection. When symptomatic, during day one the infected person usually has influenza like symptoms (fever, fatigue, headache, dry cough, and sore throat). Gastrointestinal symptoms are frequent even without the absence of respiratory symptoms, being diarrhoea the most common (19%). Anosmia has been estimated to occur in 55% of the infections with a OR of 7.21 in tested positive health workers. Once the illness starts, the symptoms are most of the time mild and the median time for hospital admission is 7 days (4 – 8). Around 17% of those who are hospitalised will require intensive care unit (ICU). Shortness of breath or dyspnoea occurs 5 to 8 days after the onset of symptoms, and critical acute respiratory syndrome (ARDS) after 9 to 10 days and mechanical ventilation around 10.5 days after the beginning of symptoms in 39% of patients. Patients with ARDS worsen in short time, dying of multiple organ failure. When critical, there is severe interstitial pneumonia with ground glass opacities on CT scan and the need of oxygen. Even after death, there is active viral replication in pneumocytes (Guan et al., 2020; Huang et al., 2020; Kenny & Mallon, 2020; Long et al., 2020; Wu et al., 2020). Supportive treatment is recommended while the medications like Remdesivir and procedures like convalescent plasma have not had the expected clinical impact (Beigel et al., 2020; Pathak, 2020). Vaccines for the SARS-CoV-

2 are, by the time of this publication, being applied, with two (2) promising RNA vaccines and one (1) DNA vaccine from different private-funded companies with promising results (Ramasamy et al., 2020; Walsh et al., 2020).

IMPACTS ON SOCIETY

Plagues have decimated populations, change wars outcomes, and have had many social impacts. The Black Death transformed the medieval European society. The workers who remained alive after the plague had greater benefit demands; women's rights had to change due to the death of their husbands to keep the control of properties. For some, even the Renaissance may have had a great influence after the Black Death, with a more insightful approach about humanity and life on Earth (Mark, 2020). The present coronavirus pandemic changed the way people lived because of the restrictions, quarantine and curfews declared by the different governments in the world (De Vos, 2020). This disease is shutting down economies, closing borders and changing the whole social-economic system, perhaps forever (Harper et al., 2020). The toll of social isolation made people to lose their jobs and businesses to be about to collapse (Sarraf et al., 2020). The world of Sports has also been affected in greatly manner with cancellation or postponement of mega-events, like the Olympic and Paralympic Games, Tokyo 2020 (Parnell et al., 2020).

Recent pandemics like the H1N1 or Swine Flu, have given the world an opportunity to study the Mental Health impact of the outbreak and it has been also included as part of the mitigation policies. The SARS outbreak was one of the first acute outbreaks with mental health studies during the pandemic and at the aftermath, all over the world and in societies, with data from the individuals, families and communities, with insights of isolated patients, survivors of the severe illness, or psychological sequelae (Huremović, 2019; Maunder, 2009). In Lima, Peru, it was found that 35.5% showed mild stress and 9.3% showed severe stress due to COVID-19 and the districts mostly affected were those with greater poverty, but with no association between district or domicile and COVID-19 distress severity values. Age, depressiveness, anxiousness and having a deceased relative were variables that influenced these distress factors (Krüger-Malpartida et al., 2020). Like in the present virus, at the time of the H1N1 pandemic, the WHO and health institutions were not aligned to the feelings of the population. However, in that time, the WHO released many warnings to the public, which did not happen, and health agencies were blamed of seeding panic and boosting pharmaceutical companies' vaccines. In

this pandemic, social media allowed people to express themselves and receive faster information, which made it easier for social researchers to study the public emotions and acknowledge the need of a response to the appearing preoccupations. The new technologies have also distorted the information, becoming sometimes a false trend or “fake news” (Huremović, 2019; Sommariva et al., 2018).

The world now is directing its existence towards a virtual world, limiting human contact and interacting through the digital interface, which decreases our anxieties and fears (Sarraf et al., 2020). The complete coming impacts on society are still to be seen.

THE PANDEMIC AND THE NEW SEDENTARISM

The American College of Sports Medicine (ACSM) and the WHO stated that to pursue a healthy life a person should have the average of 150 to 300 minutes per week of mild to moderate or 75 to 150 minutes per week of vigorous cardiorespiratory exercise, 60 minutes per week of strength training or 2 or more days a week, and flexibility exercises every day for adult and elderly population. It is also recommended that neuromotor exercises ought to be included in aging population routines since they could prevent falls and decrease the hip fracture prevalence. A part of the prescription is also to reduce sedentary behaviours and interchange them for more active habits (American College of Sports Medicine [ACSM], 2017; Bull et al., 2020). Benefits of exercise are broad and very known (Daien et al., 2017; Fletcher et al., 2018; Ozemek et al., 2018; Perez-Terzic, 2012). Exercise could indeed be considered a real panacea based on epidemiological evidence for its preventive and therapeutic effects.

Because of the quarantine circumstances, the amount of time spent at home activities has greatly increased. The new accessibility to facilities and home gadgets has changed home-screen hours as well as eating and sleeping patterns. Sitting, reclining or lying down postures, while reducing physical activity along with avoidance activities could have great repercussion in health (Chen et al., 2020). Certain prevalent diseases like chronic non-communicable diseases or even aging risks like frailty, sarcopenia, dynapenia, risk of falls and dementia can be counteracted with physical activity (Fletcher et al., 2018; Ozemek et al., 2018). Quarantine is also a distressful situation that can affect mental health, like acute stress disorder and even suicide (Brooks et al., 2020; National Police Agency, 2020; Qian & Yahara, 2020). In the USA, 45% adults believed by May 2020, that mental health has worsened because of the pandemic

and this has been shown with the increment of crisis communication lines (Sarraf et al., 2020). Post-traumatic stress disorder and depression increased its prevalence, more depressive and anxiety symptoms were reported, worsening of previous psychiatric disorders, and psychological distress and poor sleep quality have also been described after having the COVID-19 infection (Vindegaard & Benros, 2020).

For these reasons, it is important to determine what kind of exercise and physical activity behaviours were adopted by the inhabitants from an urban city to avoid sedentarism during these pandemic times. These embraced behaviours during the pandemic could let one identify a better approach to home-based exercise prescription. However, this social context is particularly new and the Physical Activities Questionnaires cannot be properly used nor would be useful for the purpose of this research (Cleland et al., 2018). Furthermore, it might be of more practical importance to gather information in relation to the new exercise patterns rather than the METs, to achieve a proper approach to the home-based exercise prescription. For this reason, a pilot study was performed to test the research protocols and strategies for recruitment and to determine how well data collection instruments performed in preparation for a larger study. With this in mind a sample from the Peruvian population was analysed, in an urban setting through a pilot study (Abu Hassan et al., 2006; Villaran-Zerda et al., 2020). The survey questions understanding was improved, as well as the methodology and the stratification system for result analysis.

The primary aim of the present study is to determine the adopted preferences prevalence for home-based exercise training in previously non-sedentary population during the mandatory quarantine in Lima and Callao, Peru, during Coronavirus Disease 2019 (COVID-19) pandemic. As secondary aims, the author wanted to discern the preference prevalence for cardiorespiratory exercises, strength and flexibility, and neuromotor exercises, and home-based exercises as well as other physical activity preferences performed during the leisure time at home.

CHAPTER II LITERATURE REVIEW

PHYSICAL INACTIVITY IN THE WORLD

According to the Global Recommendations on Physical Activity for Health, physical inactivity is the fourth leading risk factor for global mortality, with 6% of deaths, after blood hypertension with 13%, tobacco use with 9% and hyperglycaemia with 6% (Bull et al., 2020; WHO, 2010). By 2010, obesity and overweight had an important 5% increase in global mortality and has tripled since 1975. Physical inactivity prevalence is rising all over the world, increasing non-communicable diseases (NCDs) and health in general. Globally, 1 in 4 adults, and 3 in 4 adolescents are not fulfilling the recommendations for physical activity. Physical inactivity has become one of the leading causes of death in developed countries, a fact that can be prevented (WHO, 2010, 2018). Sedentary lifestyles are risk for coronary artery risk factors (i.e., smoking, hypertension, and hyperlipidaemia) (WHO, 2010). It is of great concern how physical inactivity is growing all over the world, and influencing the prevalence of diseases (Bull et al., 2020; Commission on Ending Childhood Obesity & (ECHO), 2016; Garth & Burke, 2013). By 2008, around 31% of the persons over 15 years-old were not active enough and approximately 3.2 million dead per year were due to not enough physical activity. According to the report, both men and women were physically inactive (28% and 34%, respectively) (Forouzanfar et al., 2016). Physical inactivity in South America is also a concerning problem. In Chile, 18.4% of people between 35 to 70-years-old were considered having low physical activity, 66.0% moderate and 15.6% high physical activity (Serón et al., 2010). In Medellín, Colombia, the prevalence of physically inactive people was of 79%, that is 4 from every 5 persons do not offer an adequate physical stimulus to promote health and in Bogota, and in the same country only 36.8% were physically active (Fernando Gómez et al., 2005; Martinez et al., 2008). In the province of Callao, Peru, 59% inhabitants from 15 to 19 years-old had high physical activity, 25.8% had moderate physical activity and 15.2% were low in physical activity. However, within a Regional Health Administration survey, 88% had low physical activity prevalence (88%), with moderate and high-level physical activity of 9% and 3%, respectively. In a more recent study in the complete Peruvian population, Tarqui-Mamani et al. (2017) observed that there is a high prevalence of low physical activity, especially in young people, starting from 15-years old (Sanabria Rojas et al., 2014; Tarqui Mamani et al., 2017). Physical inactivity is the new, not marketed, pandemic (Khan, 2013).

EXERCISE BENEFITS IN PHYSICAL AND MENTAL HEALTH

The benefits of exercise are wide and well known, intertwined with health and wellness. Sushruta of India (600 BC) was the first physician to prescribe moderate exercise daily, half the maximal capacity. He believed in the 3 humours or “dosa” and that exercising made the body firm and strong, with enhanced growth of limbs and muscles, while giving improved digestion and complexion, stopped laziness, and reduced aging effects. Even though Herodicus from Greece (500 BCE), recently considered as the father of Sports Medicine, and to have used exercise therapeutically, his former student, Hippocrates, is considered by many to be the first physician to have prescribed exercise as part of treatment, since he wrote it down as a prescription for a case of consumption. Hippocrates, from 460 –370 BC, used to say: *‘if we could give every individual the right amount of nourishment and exercise, not too little and not too much, we would have found the safest way to health’*. Galen from Rome united his medical recommendations for multiple diseases with exercise. In the past, breathing exercises were considered medical gymnastics and they were part of Chinese medical therapy as early registered as 2600 BC. In the era of the Yellow Emperor between 1050 and 256 BC this type of exercise was used against fever, chills, and paralysis along with massage. In Greece, physical culture was used as part of training and readiness for war and also as a national duty, with gymnasiums established even before the practice of guild physicians in temples (Tipton, 2015). Between 570 – 490 BCE, Pythagoras, a medical philosopher, mathematician, and astronomer, was the first one from ancient Greece to advocate for daily exercise to be healthy. Exercise, diet, music, and meditation tried to keep the balance among the elements, qualities, and tendencies of the body. Daily walking, running, discus throwing, wrestling, and boxing were part of his regimen. He created a school, described as “philosophical medical centre” in Croton, Italy, to teach philosophy and science following the religious teachings of Orpheus (Philip, 1966).

As we can see, exercise as part of medicine is not something new, but modern Western Medicine has taken time to consider it in a serious manner inside the health care system. In 1880s, a physician called McKenzie considered exercise as a way of treatment for chronic diseases. In the United Kingdom, they have tried to promote exercise and a physical active life to improve health and social welfare. In the year 2007, the ACSM, in adjunct with the Office of the Surgeon General and American Medical Association initiated a public health exercise promotion program called “Exercise is Medicine” by healthcare professionals and providers

and educators (Seth, 2014; Tipton, 2015). Improving exercise skills has been shown to improve the endothelial function, the autonomic nervous system function, decreases blood pressure, reduces abdominal fat, improves dyslipidaemia decreases the inflammatory patterns, decreases osteoporosis progression, helps with aging and cellular regeneration, improves mental health, decreases mortality of all cause, among other benefits that can help us stay alive and healthy with a better quality of life. Indeed, exercise benefits are broad and new research is being done to understand it better. They can bring health outcomes in coronary artery disease; decrease mortality, levels of haemoglobin A1c, blood pressure, body mass index and lipids in adults with type 2 diabetes. We can also see a decrease in risk progression in cardiovascular diseases. People with HIV and the antiretroviral therapy will enhance their quality of life, VO₂max, exercise tolerance, general health and the physical function of their bodies, without adversely changing their viral load, the CD4⁺ count or the disease progression (Brandao et al., 2020; Bull et al., 2020; Pelliccia et al., 2020; Piepoli et al., 2016; Yeung et al., 2018). There is even an increased risk for developing colon, breast, prostate, and lung cancer just by being physically inactive. Even in certain cancers, like breast cancer and colorectal cancer, exercise can lower mortality risks (Bull et al., 2020). Exercise benefits in mental health are wide as well. Anxiety, depression, self-esteem improvement, cognitive function, negative mood, social withdrawal and schizophrenia are just some of the benefits that exercise has (Sharma et al., 2006). Qi gong and Taijiquan (Tai-chi), ancient Chinese practices with slow movements and slow breathing frequency may modulate the hypothalamus-pituitary-adrenal axis towards a parasympathetic dominance, with changes in the prefrontal regions, the striatum and the limbic system, or/and the gene expression for inflammatory reactions and pathways related to stress, becoming mood-stabilizer types of exercises (Yeung et al., 2018). Yoga, the spiritual practice from the orthodox Hindu philosophy, is having a significant attention due to its applications toward the prevention and treatment of medical conditions. Yoga can strengthen the body, increase our flexibility, and regulate the mind through mindfulness, meditation and breathing techniques. It has shown to regulate glycaemia and the cardiovascular system. The psychological benefits have also been described, like increasing the positive feelings, decreasing the feelings of aggressiveness, anxiety, and depression (Gangadhar & Porandla, 2015; Stephens, 2017). Communities, corporations, societies in general can have economic benefits from physical activity programs, as preventive measures.

EXERCISE AS A MEDICAL PRESCRIPTION

Being such an effective tool, we are called into action to work on public health and the promotion on physical activity guidelines and NCDs prevention. Low- and middle-income countries, who would greatly benefit from exercise are usually lacking physical activity guidelines. The new WHO 2020 global recommendations provide us with a basis to support our exercise prescription, but each country and even communities within cities and towns have different daily life contexts, ages and abilities that may affect the barriers and adherence to exercise and be healthy (Bull et al., 2020). It is for this reason of great importance to have more research done on this area, considering all socioeconomic-cultural variables, and addressing relationships among frequency, types, durations, intensities, methodologies, body composition, concomitant diseases, density, volume and so many other related areas from training methodology.

Considering exercise as a medication, a correct prescription is needed. Asking to exercise more or getting obsessed with the patient's weight reduction and BMI is not exercise prescription. The WHO labels exercise as a subcategory of planned, repetitive and purposeful physical activity with sense of improvement of physical fitness (Seth, 2014). With this definition one might very well consider activities as using public transportation, walking, cycling, doing house chores and even some recreational activities. Exercise prescription requires a dose, a type, a frequency, a duration, like any other prescription for medication (ACSM, 2017; Seth, 2014). Guidelines exist in different countries, like those from the Swedish National Institute of Public Health, the Chief Medical Officers from United Kingdom, and the ACSM. Recently, the WHO published the new guidelines on physical activity to be used along with health policies and to be aligned with the WHO Global Action Plan on Physical Activity 2018 – 2030 document to strengthen the surveillance system (Bull et al., 2020; WHO, 2018). Guidelines require, either expressed in hours, days, or minutes per week of a total of 150 minutes per week of mild to moderate of cardiorespiratory exercise, or 75 minutes per week of vigorous cardiorespiratory exercise for young, adult, and elder population to have an adequate amount of exercise impact on health. A combination of both intensities can be done. Ideally this time is to be increased to 300 min per week of mild to moderate or 150 min from vigorous. This most of the time is forgotten, and that is why in the new WHO guidelines state them now as part of the average volume training pursued, instead of the minimum quantity. In spite of the aforementioned, any physical activity is better than doing nothing. Bouts of 10 minutes were

previously recommended, but now anytime given to achieve this exercise volume is considered valid. Increasing the time and frequency and volume must be something done progressively in time, with the need of medical assessment if symptoms in healthy individuals appear (ACSM, 2017; Bull et al., 2020; Luan et al., 2019; Seth, 2014; Tremblay et al., 2017).

Sixty (60) minutes per week or 2 days of week activity of moderate or greater intensity of muscle strength training, involving major muscles groups, and flexibility exercises every day for adult and elderly population are recommended. Exercise practice declines with age and neuromotor exercises or balance and coordination training are also recommended for the aging population to prevent fall and decrease hip fractures. Functional balance and strength training are recommended 3 times per week or more for this population. This could also be achieved through unstructured or programmed exercise like taking the stairs or walking to work. It is also important to consider that the benefits of exercise are dose dependent and require a proper follow up (ACSM, 2017; Bull et al., 2020; Fragala et al., 2019; Ratamess, 2011; Smith et al., 2020).

Chronic medical conditions are also benefited by exercise, and most of the time outweighs the risks. It is common to extrapolate the adult guidelines for physical activity since exercise at this level is usually safe. However, if there is a contraindication, it is better to consult a healthcare professional or physical activity specialist for advice on the quantity of activity aligned to the particular needs, limitations, complications, medications and working treatment plans (Börjesson et al., 2016; Luan et al., 2019; Nugent, 2019; Rausch Osthoff et al., 2018; Schuler et al., 2013).

EXERCISE BARRIERS

Starting to exercise can be a difficult thing to do. Most of exercise barriers studies include not having time to exercise, lack of places to train and no one to exercise with, especially in the case of elder people. Being “too tired”, “already active enough”, “do not know how to do it” and being “too lazy” were common internal barriers for people between 45- and 59-years old in Malaysia. In older people, around half were “too tired”. Two other common causes for this age range were the lack of motivation and “already being active enough” (Justine et al., 2013). In the case of patients with a diagnosis of Diabetes type 1 from United Kingdom, half of the subjects reduced their activity levels around the diagnosis. Within this group, the belief of not

having a positive impact on health, being concerned about the potential harms and even being advised by the healthcare practitioners to not exercise were reported (Kennedy et al., 2018). In Nepal, people with type 2 Diabetes, the perceived social acceptability or lack of social acceptability from others affected the way they eat and exercise. Self-efficacy or the belief of not being able to change behaviour is a strong internal motivation and it was the main exercise barrier to exercise. With a higher perceived self-efficacy, an elevated state of energy, confidence, and the ability to start and continue the physical activity behaviour come along. It is indeed of great importance to adopt a high self-efficacy state in the initial stage of exercise, when a person starts exercising, because the success in the adopting a new phase will reinforce self-efficacy, and a failure might achieve the opposite. It is therefore important to start with small and realistic goals to create self-confidence and become more effective in changing behaviours. The use of motivational counselling by means of role models may be able to help to acquire this self-confidence. When exploring the laziness barrier, many of the participants believed that they had to wake early to exercise. In this same study, the diabetic patients believed that this was not a serious problem and that the repercussions for not having compliance to diet and exercise were not related to serious complications. Lack of power, energy or physical stamina and health issues were also found to be exercise barriers in this population. Perhaps being a paradoxical advice, exercise would change this sensation. These are just examples on how many of the exercise barriers are similar in different populations. The following barriers must be addressed when designing a particular exercise programme (Advika et al., 2017; Baruth et al., 2014; Bethancourt et al., 2014; Ghimire, 2017; Justine et al., 2013; Kennedy et al., 2018; Yang et al., 2017):

- a) Exercise time within physiological needs (e.g., sleep time, eating time), sociocultural contexts (e.g., labour time, weekends, festivities) and if possible, within other pleasurable or leisure behaviours without affecting the rest of parameters within the exercise prescription.
- b) The lack of physical stamina or the feeling of being tired.
- c) The low perceived action efficacy or perception that a behaviour is useful in decreasing the risk of a disease or its complications. Misconceptions about the importance of exercising and the amount of exercise needed to achieve this action efficacy must be addressed, in those with any health problem and healthy people.
- d) The low self-efficacy or self-confidence
- e) The adequate social support and guidance, including health and exercise professionals (especially if there is any disease or health risk), family and friends.

f) Adequate places and/or facilities to safely train.

HOME-BASED EXERCISE ADHERENCE

Home-based exercise can help us addressing many of the barriers previously mentioned. Being done at home, the neighbourhood dangers are controlled. When designing an exercise prescription, it is recommended to use the FFITT VP acronym. One of the Fs is the last improvements of this mnemonic. An exercise should be fun. Without being fun it will not be motivating, and it will be hard to have a proper adherence to the programme. Even though there is not enough evidence to mention standard adherence techniques, addressing barriers and the use of activity monitoring and feedback systems with an adequate progression, to have written instructions and the use of behavioural exercise programmes with booster sessions can help with adherence using activity monitoring and feedback systems, written instructions and behavioural exercise programmes with booster sessions may be effective in promoting adherence (Peek et al., 2016). Feedback graphics from the adopted routines in relation to goals, telecommunication and community exercise have shown better time and attendance to exercise sessions in elder population in comparison with home-based (with the help of DVD) exercise in a community centre for people at risk of falling (Wu et al., 2010). When compared to weekly supervised exercise and motivation against verbal and written exercise had better outcomes and frequency of training in patients with intermittent claudication (Cheetham et al., 2004). In patients with chronic lung diseases in a 12-week adherence intervention with weekly phone calls and home visits for safety and individualised routines, and counselling and encouragement on establishing, monitoring and problem-solving home-based exercise programs was better than the control group but it did not last at the 1-year follow up (Steele et al., 2008). Guidance and supervision have not always provided statistical differences in sessions' frequency in comparative studies, including in relation to home-based exercise with no supervision or self-guided psychoeducation and exercise (Room et al., 2017). The socioemotional selectivity theory, which involves emotions as a reason for exercise, like spending time with loved ones, or stronger muscles. Even though in some studies about the use of these emotions for exercise adherence scores, there was no significant difference against control, highlighting the emotional and meaningful benefits that home exercise can bring better interactions like adding new exercises by the individual, trying to continue exercising. Raposo et al. (2020) recommends us to align the incentives with age-related goals to have better results. From the behavioural theories, cognitive behavioural therapy, social learning theory (learning

by watching), reinforcing self-efficacy, as well as the aforementioned socioemotional selectivity theory are being studied for adherence, however, only the social learning theory has shown statistically significant results (Duncan & Pozehl, 2003; Gallagher, 2016; Raposo et al., 2020; Room et al., 2017). The Behaviour Change Wheel is a framework that considers 3 components to behaviour change: 1) Capability,

- 2) Opportunity, and
- 3) Motivation.

In order to have a result one must target at least one of them to create change, maximising outcomes if using more than one.

To sum up, there are no conclusive strategies for adherence, however, it is necessary the consideration of having a demonstrative application of what is done aligned to age motivations, with a proper monitoring and feedback, written indications, with self or assisted motivation boosters, weekly supervised and accessible for problem solving and physical home visits for safety control and personalised exercise (ACSM, 2017; Burnet et al., 2019; Michie et al., 2011).

HOME-BASED EXERCISE

As previously stated, the FFITT VP can help us to have a better and systematic approach to exercise prescription. Frequency, intensity, time, and type are the basis of this prescription (formerly known as FITT), but volume and progression are also to be considered. These last parts are tools than can help to adjust the time of exercise and the emphasis in some skills fitting the goal of the prescription, and the should be gradual in progression to decrease adverse effects from exercise (ACSM, 2017). Whichever acronym one chooses to use, ExRx must be planned having in mind every physical fitness component. To have a better understanding on the physical components one must understand more what physical fitness is. Even though, there are many definitions, physical fitness is our ability to perform daily life activities with alertness and vigour, without falling into fatigue, remaining energetic enough to enjoy leisure-time and be able to cope with unforeseen emergencies. Physical fitness allows us to become better protected against some diseases, physically and psychologically. In 1983, Pate described 5 components of physical fitness which were dependent on health status:

- 1) Cardiorespiratory endurance, and the ability to carry oxygen and nutrients to body.
- 2) Muscular strength, the maximum force a contracting muscle can develop.

- 3) Muscular endurance, or the ability to perform repeated muscular contractions against a resistance before fatigue.
- 4) Flexibility or mobility, the ability to move a joint in full range of motion.
- 5) Body composition, and in this case the ratio of lean mass to body fat for an individual.

The ACSM, based on the President's Council on Sports, Fitness & Nutrition from the United States (PCSFN) included these components in the health-related physical fitness components with updated definitions. Cardiorespiratory endurance is related to oxygen delivery to the tissues while exercising, muscular strength is not based on maximal force but the ability to exert force, the body composition has more than 3 components, and mobility is only flexibility. Besides the health components, the ACSM includes the skill-related physical fitness components influenced by the 9 components for fitness from Tancred, B (Tancred, 1995):

- 1) Power: the rate or ability of work achievable.
- 2) Agility: the ability to move one's body in space with speed and accuracy.
- 3) Balance: the maintenance of equilibrium both moving and stationary.
- 4) Coordination: the ability to use senses and coordinate them with body parts to perform movements smoothly and accurately.
- 5) Reaction time: the time to respond to a stimulus.
- 6) Speed: the ability to perform movement within a short period of time.

An exercise program should be able to address these 11 physical fitness components, health and skill related to improve the exercise prescription. To have an easier approach to the fitness level measurement, the PCSFN segmented 3 specific areas: endurance (cardiorespiratory and muscular), strength and flexibility. Nevertheless, the basis for exercise prescription remains on the previously mentioned physical fitness components. According to the ACSM an optimal exercise response (ExRx) must consider at least the cardiorespiratory fitness, muscular strength and endurance (muscular fitness), flexibility and neuromotor fitness. Usually within these areas, the FFITT VP acronym is applied and most of the time with greater detail in cardiorespiratory fitness, perhaps due to the greater amount of research in this area that emphasises its importance (ACSM, 2017; Liuşnea, 2016).

A proper active warm-up must be done, ideally with myofascial massage, warming up the joint's range of motion and dynamic stretching to increase the temperature of the tissues and a cool down after the exercise session (ACSM, 2017; Cheatham et al., 2015). Training

methodologies and approaches to specific routines and exercises are beyond the scope of this work; however, they should always consider the goals, current physical fitness status, and medical conditions, with the help of an exercise and healthcare professional. Sedentary behaviours should be addressed through education and alternative fun options. During the COVID-19 period, quarantine has not allowed the use of sport facilities and gyms. Outside activities were allowed afterwards, which gave the opportunity to increase the variety of exercises, keeping always in mind the physical distance. The modern technology allows us to play with augmented reality, virtual reality, tele-coaching, exergames, smartphone apps and all what our mind can imagine (Cornelis et al., 2018; Coultas et al., 2018; Granado-Font et al., 2015; Hebden et al., 2014; Kawahara et al., 2018; Spring et al., 2013; Wu et al., 2010). The use of mask within our own house is not needed unless one has the infection (or symptoms), and we want to protect other residents in the house. However, using a mask increases the intensity of our exercise and might change our calculations for intensity in our ExRx, especially if a N95 protection factor or equivalent is used. For low to moderate intensity exercises in a surgical mask is more breathable and should be enough. Sweat will affect filters in most of the disposable masks and they should be changed immediately. Appropriate physical distance according to the type of exercise and intensity, and a place with adequate ventilation should be prioritized (Fikenzer et al., 2020; Johnson, 2016; Tang et al., 2020; Ying-Ying Wong et al., 2020).

RECOMMENDATIONS FOR COVID-19-TIMES EXERCISE

Like in any exercise, home-based exercise also requires a balanced nutrition, good sleep, and a fitting intensity to keep us healthy, even more if we want to keep our immune system regulated. An excess in intensity might even decrease our immune function via activation of the hypothalamic-pituitary-adrenal axis (Walsh, 2018). Quarantine times can affect the way we adapt to exercise, and how active we become, appropriate prescription is needed. It has been proposed that there is great influence of free radicals in the pathogenesis of the SARS-CoV-2. As a matter of fact, many diseases have a disbalance in free radical species, including Diabetes Mellitus, as well as conditions like obesity (Avello & Suwalsky, 2006). The glutathione deficit that helps against Reactive Oxygen Species (ROS) produced during the disease is reversible with IV N-Acetylcysteine (Ibrahim et al., 2020). N-Acetylcysteine in high IV doses (~300 mg/kg), however, does not affect the evolution of severe infections in SARS-CoV-2, but there is still need for evidence for mild cases (de Alencar et al., 2020). The use of other antioxidants

as supplementation is still not known, but they should be considered within our diet for diverse health benefits. Vitamin D, a pleiotropic vitamin that also influences the immune system, has an association of higher circulating 25(OH)D levels with lower positivity SARS-CoV-2 rates. The use of vitamin D during COVID-19 should not be neglected for many SARS-CoV-2 and many other healthy reasons (Kaufman et al., 2020; Pludowski et al., 2018).

When considering a place to train inside the house, it should be safe from slipping, with adequate ventilation, and dangerous objects far from area. SARS-CoV-2 remains viable in aerosols for 3 hours and it was more stable on plastic and stainless steel than on copper and cardboard. A viable virus was even detected up to 72 hours after experimental application to these surfaces (Van Doremalen et al., 2020). One should always clean the area and tools/equipment's/machines appropriately before and after the workout. There are many ingredients that can destroy the virus, like the 70% ethyl alcohol, the sodium hypochlorite (0.1% – 0.5%), the 1% cresol soap, the 50% isopropanol, povidone-iodine (1% iodine), chloroxylenol (0.24%), 0.05% benzalkonium chloride, or even hydrogen peroxide (0.5% – 7.0%) (National Environment Agency, 2020). A 5.25% bleach diluted in 1:10 can clean up body fluids effectively in 10 minutes.

CHAPTER III METHODOLOGY

STUDY DESIGN AND PARTICIPANTS

This was a quantitative, descriptive, and cross-sectional survey study done in non-athlete, non-sedentary, healthy participants from different backgrounds from both sexes (male and female), from Lima and Callao, Peru. Peruvian population in Lima and Callao that were previously non-sedentary were considered. Only non-athletes were included, non-sedentary persons in the past 6 months and with no previous disease or chronic condition diagnosed, including SARS-CoV2 infection. Those who did not follow the civilian Government's policies, legally underaged, or did not accept the informed consent were excluded from this study. Since personal information, although anonymous, is registered, every participant accepted an online Informed Consent to be considered. Although the present study is within the healthy population during quarantine time, there is always a percentage of people with SARS-CoV-2 infection who were not tested and had been asymptomatic or with mild symptoms (Huang et al., 2020; Kenny & Mallon, 2020; Qian & Yahara, 2020).

DATA COLLECTION

An anonymous questionnaire in Spanish about home-based training preferences was provided to persons from Lima and Callao through the social community service networking, from different ages (but older than 18-years old), both sexes (male and female), and diverse professional backgrounds, whose activities were restricted because of the quarantine. The questionnaire asked for demographic information, as well as type of preferred exercises, physical activity patterns and leisure physical activity. The questionnaire was previously validated in Spanish, to determine understanding and possible collection problems (Villaran-Zerda et al., 2020). The survey was sent through the free online survey platform, Google Forms© developed by Google LLC, with information about the approximate time to complete it and that it should be done only once.

VARIABLE DEFINITIONS

The quarantine term has been used in many contexts describing a period of isolation. In Italy, during the "Black Death" period in 1348, individuals and entire ships were detained in the Venetian Lagoon (Conti, 2016). Even though quarantine defined originally as 40 days, the quantity of days will not be a restriction. For this research we used the Peruvian Government

definition for quarantine and the defined restrictions for the State of Emergency, which gives us the knowledge of the kind of restrictions applied in this social context (Gobierno Nacional del Perú, 2020a; Ministry of Health, 2020). During this period, people were only allowed to go out for essential life services, like food, pension, and health. Outdoor sports and exercises were not allowed until June 10th, so we consider the first months of great importance. The quarantine period lasted 107 days.

The sedentary definition is also of great importance because people who did not have exercise at all before the quarantine would have an unknown adaptive behaviour in this new situation (either start exercising or not doing exercise at all), creating a not controllable confounding variable. Sedentary behaviour as defined by the Sedentary Behaviour Research Network (SBRN) consensus, is any behaviour characterized by an energy expenditure ≤ 1.5 metabolic equivalents (METs) per day, while in a sitting, reclining or lying posture (Gibbs et al., 2015; Tremblay et al., 2017). A measure of < 2.5 hours per week of low intensity exercise was proposed by McKinney et al. (2019), but measuring the intensity and volume, as he also stated in his research, may affect the classification (McKinney et al., 2019b). All people that had a previous sedentary behaviour before the quarantine period were not to be considered. Since METs were not previously assessed, and the 2.5 hours per week threshold was also arbitrary, there is insufficient evidence to define quantitative thresholds of sedentary behaviours, or if there is any health benefit by type, domain, frequency and duration of the sedentary behaviour and the related breaks from this conduct (Bull et al., 2020). In this study those who have trained less than an hour per week were considered to have a sedentary behaviour.

Athlete would be the opposite extreme confounding variable. The term “athlete” comes from the Greek “athlos” which means achievement and it is associated to excellence in performance. The behaviour in athletes toward exercises has a broad motivation spectrum, going from obsessive-compulsive personalities to athletes doing exercises because these are mandatory. Since athletes are guided and play sports as part of their daily lives’ income, the preferences would be affected by third parties. The definition of athlete can be broad and relate to many variables, like competition level, experience, popularity of the sport, etc (Araújo & Scharhag, 2016; McKinney et al., 2019a; Pelliccia et al., 2020; Swann et al., 2015). It has been proposed to consider an athlete based on the intent of exercise, the volume of training based on hours per week, and the level of competition (McKinney et al., 2019a). Since we are not considering athletes, the definition for athlete in this study will be those that are:

- 1) actively competing for a Local, Regional or National Federation and to have a sport training and competition as his/her major activity (way of living) or focus of personal interest, and,
- 2) devoting several hours in all or most of the days to these activities, and exceeding the time allocated to other types of professional or leisure activities (Araújo & Scharhag, 2016; McKinney et al., 2019a).

Using a definition based on income would be over-restrictive. They must fulfil both criteria to be considered an athlete. In order to understand the exercises performed by the subjects the author decided to divide them using the nature of the physical fitness health and skill related components adapted by the ACSM as background in the following groups (ACSM, 2017):

Cardiorespiratory exercises

The ACSM defines cardiorespiratory endurance as the ability of the circulatory and respiratory system to supply oxygen during physical activity (ACSM, 2017). According to the WHO, aerobic physical activity or endurance activity is the rhythmic manner in which the large muscles move for a sustained period of time. Aerobic exercises will improve cardiorespiratory system (Bull et al., 2020). The use of the anachronic label of “aerobic” exercises or physical activity has widely spread in scientific literature but it will not be used as part of the definition. Even though the WHO defines anaerobic and aerobic exercises by the oxygen use during their execution and propose the use of “sustained period of time” as part of the definition, it could not be very specific and with a possible ambivalent significance, particularly when different types of training methodologies, like the intervallic ones are used. Exercises that include a comparatively greater use of the heart and lungs to adapt to exertion with a predominant use of the mitochondrial oxidative system as energy requirement will be considered as cardiorespiratory exercises. Examples include walking, jogging, cycling and cycling (Ainsworth et al., 2011; Serrato-Roa et al., 2015).

Resistance training exercises

These exercises relate to the muscular fitness (ACSM, 2017). The WHO considers bone-strengthening activities those designed to increase specific sites in bones, promoting growth and strength. Resistance training will imply any exercise that has a greater component in the use of force, with or without apparatus or weights. Examples are some types of running and jumps and weight lifting (Bull et al., 2020).

Flexibility exercises

Flexibility, sometimes known as mobility, is the ability to move a joint through its complete range of motion (ACSM, 2017; Liuşnea, 2016). Exercises that have a greater emphasis on this type of the conditioning will be considered as flexibility exercises.

Neuromotor exercises

Neuromotor exercise training, as described by the ACSM's Guidelines, incorporates various motor skills, including balance, coordination, gait, agility, and proprioceptive training (ACSM, 2017). Balance training are exercises that help the ability to challenging postural sway forces or destabilization caused by self-motion, the environment, or other objects. Human posture refers to a static placement of the limbs and body parts. Voluntary movements can be differenced from postural reactions usually beyond the ranges of 5 – 10 Hz. To have a static posture or postural equilibrium, the centre of gravity of the body must be positioned over the base of support, while this one is not restricted in dynamic equilibrium. The balance control has internal and external challenges:

- a) the force of gravity,
- b) perturbations arising from volitional movement (e.g., walking, turning, bending, reaching), and,
- c) interactions with the environment (e.g., a slippery surface, obstacles, uneven terrain) (Iqbal, 2011).

Older adults, especially fallers, present impaired control of lateral stability. They tend to use unloaded crossover step to counteract lateral perturbations, making it the most frequent cause of falling due to inappropriate sideways weight shifting. Younger adults use more lateral stepping. Crossover stepping facilitates does not require active unloading of the loaded limb, but it increases the potential for inter-limb collisions and subsequent falls. Lateral side stepping requires neuromuscular hip abductor and adductor control of the centre of pressure (within the base of support). Delayed onset of weight transfer and impaired active loading occurs due to the decrease in cognitive and muscle function (Iqbal, 2011; Ruhe et al., 2011). To enhance their functional skills and prevent falls, it is recommended for older adults to have a multicomponent of exercises (balance, strength, endurance, gait and functional training) at moderate or greater intensity on 3 or more days a week (ACSM, 2017; Bull et al., 2020). Neuromotor training has a mixture of skills, including low volume resistance exercises and flexibility. Some examples are Tai-chi and Yoga.

Besides these structured exercises, it is important to say that not all exercises are programmed, and some are part of leisure time physical activities and other domains of activity. This was considered in non-structured (non-programmed) exercises-related questions.

STATISTICAL ANALYSIS

Demographic data was analysed, and Standard Deviations, prevalence and associations were calculated using the IBM SPSS 26.0 (SPSS, Chicago, IL) software. Parametric and non-parametric Pearson correlation, independent Chi square test and Cramér's V test were used among variables, with a p-value less than 0.05 as statistically significant.

CHAPTER IV RESULTS

From the 340 surveys delivered, 2 subjects did not accept the Informed Consent, 20 were not living in Lima or Callao, 4 were excluded because they spent most of their time in federated sports as sports professionals, 67 of them had a non-specified medical condition and 32 were previously sedentary (15 never exercised before and 17 less than an hour). Finally, 215 people replied the Home-based Training Preferences questions (Table 1).

Table 1. Demographic data for the study population of 215 participants. Demographics include gender, age, civil status, occupation in the previous 6 months before the quarantine period and district of residence

| Sex | N | % | Sex | N | % | Age, years | Mean (SD) / Median | Range |
|---------------------------------|-------|------|--------------|-----------------------|------|--------------|-------------------------|-------|
| Female | 99.0 | 46.0 | Male | 116.0 | 54.0 | | 38.0 (10.7) / 36 | 18-65 |
| Civil Status | N | % | Civil Status | N | % | Civil Status | | N |
| Single | 101.0 | 47.0 | Divorced | 7.0 | 3.3 | Cohabiting | | 26.0 |
| Married | 70.0 | 32.6 | Separated | 9.0 | 4.2 | Widowed | | 2.0 |
| Occupation in the last 6 months | N | % | Acc. % | District of residence | N | % | District of residence | N |
| Communications | 6 | 2.8 | 2.8 | Cercado de Lima | 66 | 30.7 | Magdalena del mar | 9 |
| Employee | 36 | 16.7 | 19.5 | Ate Vitarte | 2 | 0.9 | Miraflores | 13 |
| Engineering | 7 | 3.3 | 22.8 | Barranco | 8 | 3.7 | Pueblo Libre | 9 |
| Householder | 8 | 3.7 | 26.5 | Bellavista | 5 | 2.3 | Rimac | 1 |
| Independent & entrepreneur | 15 | 7.0 | 33.5 | Breña | 4 | 1.9 | San Borja | 3 |
| Management and supervising | 25 | 11.6 | 45.1 | Callao | 2 | 0.9 | San Isidro | 10 |
| MD and Nurse | 21 | 9.8 | 54.9 | Chorrillos | 9 | 4.2 | San Juan de Lurigancho | 8 |
| Nutritionist | 5 | 2.3 | 57.2 | Comas | 3 | 1.4 | San Juan de Miraflores | 5 |
| Office worker | 29 | 13.5 | 70.7 | Independencia | 1 | 0.5 | San Luis | 2 |
| Physiotherapist | 5 | 2.3 | 73.0 | Jesús María | 3 | 1.4 | San Martín de Porres | 2 |
| Sales | 8 | 3.7 | 76.7 | La Molina | 5 | 2.3 | San Miguel | 9 |
| Student | 8 | 3.7 | 80.5 | La Victoria | 3 | 1.4 | Surco | 15 |
| Teaching | 8 | 3.7 | 84.2 | Lince | 4 | 1.9 | Surquillo | 9 |
| Technician | 6 | 2.8 | 87.0 | Los Olivos | 3 | 1.4 | Villa María del Triunfo | 1 |
| Others: <5 (Others, Unemployed) | 28 | 13.0 | 100.0 | Lurín | 1 | 0.5 | Total | 215 |

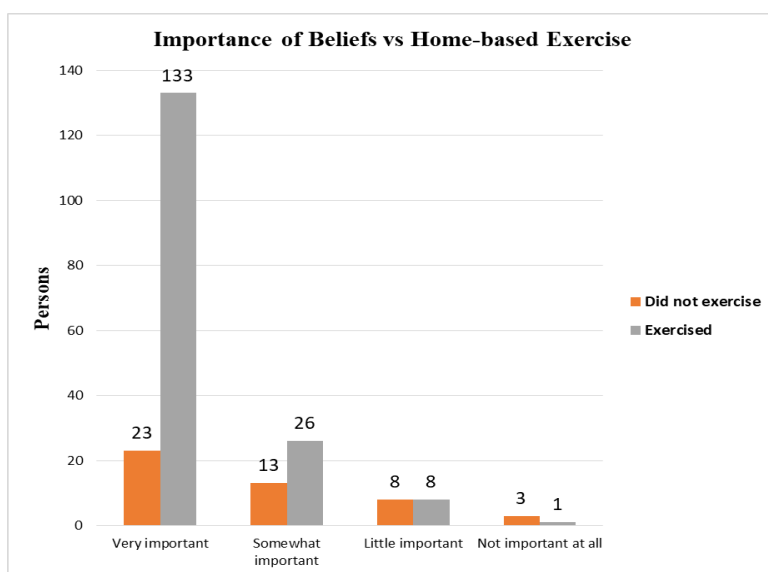


Figure 1. Importance of beliefs about physical activity and genuine home-based training (n = 215)

From 215 subjects, 168 (78.1%) affirm to have performed home-based exercises (Figure 1). The median time range of training before the quarantine period was more than 4 hours per week (44.2%). Physical activity was considered by the study subjects as very important to 72.6% (n = 156), somewhat important to 18.1% (n = 39), little important to 7.4% (n = 16) and not important to 1.9% (n = 4). Before the quarantine started, 44.2% exercise frequency in the previous month was more than 4 hours per week while 24.2% between 2 and 4 hours. There is a very strong association between the perception of how important home exercise is and home-based exercise prevalence ($V = 0.94$, $p < 0.05$).

FREQUENCY, TIME, AND INTENSITY

The average frequency of home-based training was 5.3 ± 3.5 hours per week, with a median of 4 hours. 82% (n = 82) of women did train during the quarantine, while 74.1% (n = 86) of men trained. In case of women, the average training time was 5.7 ± 3.9 hours per week while men trained for 5.0 ± 3.1 hours per week. There was a statistical significance between hours of training and sex ($p = 0.022$). By age, there is a statistically significant result among the hours of exercise and age ($p < 0.001$), with a relative higher prevalence of physical activity (any duration) between 26- to 30-years old (Figure 2). The ratio between exercising and total subjects was the best between 21- to 25-years old and 61- to 65-years old, with every subject being physically active (n =15, n =3).

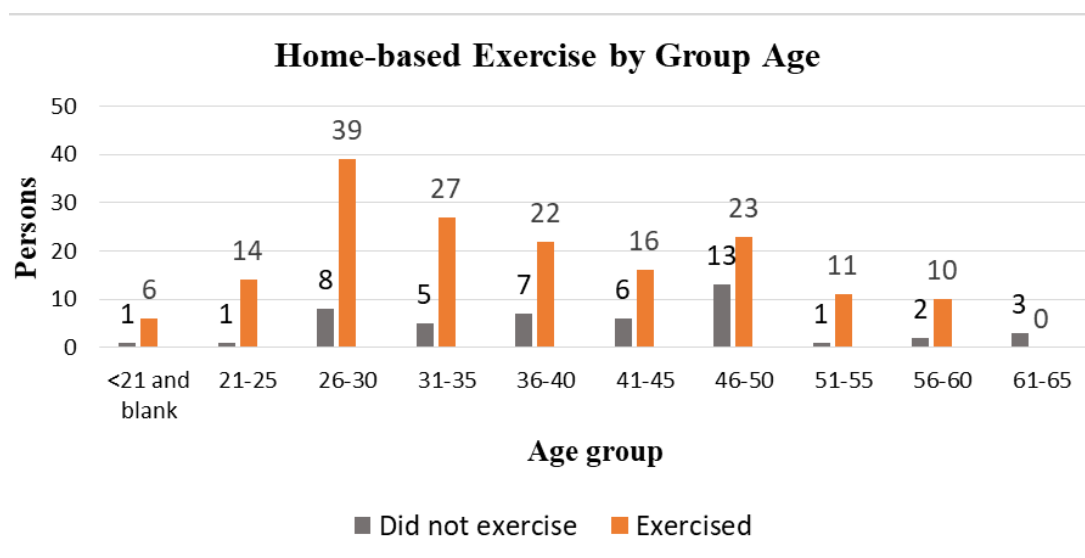


Figure 2. Home-based exercise frequency by age group (n = 215)

Upon analysing the exercise based on the educational level, there was no statistical significance ($p = 0.144$). Because of the higher frequency of some specific groups, it is difficult to determine how prevalent was exercise within each group of education, but we can see that the average of spent hours per week given were: a) complete undergraduate: 5.6 h.wk^{-1} , b) graduate education: 5.6 h.wk^{-1} , c) incomplete undergraduate education: 4.9 h.wk^{-1} , d) primary and secondary school complete 3.4 h.wk^{-1} . The author based as poverty indirect indicator the district where subjects were living. Even though not statistically significant for exercise at home, the prevalence of home-based exercise during the quarantine period was found to be higher in the Lima Centre districts (80.1%) and Callao (85.7%), and in the last position was East Lima (64.7%).

When asked about the time used for lifting any kind of weight for exercise purposes, including unstructured training, an average time of 2.7 (SD 4.0) hours per week was seen. For those who had flexibility exercises in their training routine ($n = 143$), 43% performed them more than 2 times a week, 22.5% twice a week and 34.5% once a week. During the period of isolation time, 39.8% trained more after the first month of the quarantine in comparison to 36.9% who decreased their training starting the second month. Only 23.2% felt that they trained the same in the first month in relation to the following months.

In this study the author tried to measure intensity by the breath pattern, which is also part of the talk test. Around 72.6% ($n = 122$) from those who exercised at home were rarely breathless. 13.1% had a least more than 1 training session per week that left him or her without breath with an average time session of 53 minutes, and 14.3% believed that they lost their breathing with every session of exercise at home with an average session of 52.3 minutes.

TYPES OF EXERCISES

Physical fitness can allow us to group the exercises in 3 main clusters:

- 1) Resistance training exercises,
- 2) Cardiorespiratory exercises, and
- 3) Flexibility exercises.

As discussed previously, a minor group but also important is the neuromotor exercises groups. In this occasion, the flexibility group was grouped with the neuromotor exercises.

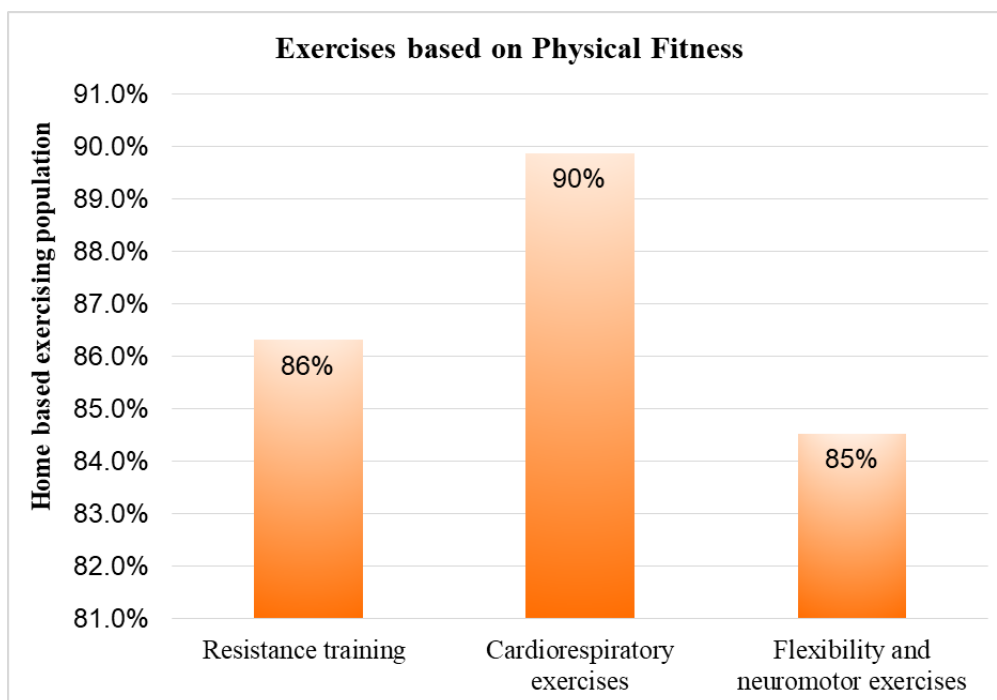


Figure 3. Type of exercises based on physical fitness, performed by those who worked out at home (n = 168)

It was found that the flexibility and neuromotor exercises had the least prevalence among the 3 groups (n = 142), based on physical fitness exercise prescription divisions, with cardiorespiratory exercises being the highest in prevalence during training (n = 151) (Figure 3). 51 subjects (30.4%) acknowledge to have trained a combination of cardiorespiratory, strength training and stretching during the quarantine period alone, and 11.3% the same combination in addition to it what is known as functional training and CrossFit®. Functional training alone has a prevalence of 22.6%. Indoor sports with or without apparatus, that is table tennis, martial arts, weapons, etc, are still performed by 17.8%.

CARDIORESPIRATORY EXERCISES

The heart and the respiratory system are of great importance for physical fitness. “Cardio” machines (n = 30, 19.9%) and machine-less and without any other apparatus (n = 33, 21.9%) were high in prevalence with less prevalence in the practice of running, jogging and cycling, which was expected, considering that quarantine in Peru only allowed basic, necessary commutations (Table 2).

Table 2. Types of cardiorespiratory exercises used during quarantine period (n=151)

| n | Cardio machines (elliptic, treadmill, stationary bike, etc) | Cycling | Rope jumping | Running or jogging | HIIT | Dancing | Without machines or apparatus (includes jumps) | Stairs | Other exercises |
|-----------------|---|----------|--------------|--------------------------|----------|----------|---|----------|--------------------|
| 30 | 30 | | | | | | | | |
| 1 | 1 | 1 | | | | | | | |
| 2 | | 2 | | | | | | | |
| 5 | 5 | | 5 | | | | | | |
| 1 | 1 | | 1 | 1 | | | | | |
| 8 | 8 | | | 8 | | | | | |
| 1 | 1 | | | | 1 | | | | |
| 6 | | | 6 | | | | | | |
| 6 | | | 6 | 6 | | | | | |
| 16 | | | | 16 | | | | | |
| 1 | | | | 1 | | 1 | | | |
| 33 | | | | | | | 33 | | |
| 1 | | | | | | 1 | 1 | | |
| 7 | 7 | | | | | | 7 | | |
| 2 | 2 | | 2 | | | | 2 | | |
| 2 | 2 | | 2 | | | | 2 | | |
| 10 | | | 10 | | | | 10 | | |
| 1 | | | 1 | 1 | | | 1 | | |
| 1 | | | 1 | 1 | 1 | | 1 | | |
| 10 | | | | 10 | | | 10 | | |
| 1 | | | | 1 | | | | | 1 |
| 2 | | | | | | | 2 | 2 | |
| 1 | | | | | 1 | | 1 | | |
| 3 | | | | | | | | | 3 |
| Subtotal | 57 | 3 | 34 | 45 | 3 | 2 | 70 | 2 | 4 |
| Total | n = 151 | | | | | | | | |

Table 3. Combination of exercises used for strength training (n = 70)

| n | Free weight | Resistance bands | Pulleys/CAM Machines | Spring system | Swiss ball | Bodyweight | TRX | Core machines | Other exercises |
|-----------------|---------------|---------------------|-------------------------|------------------|---------------|------------|----------|------------------|--------------------|
| 4 | 4 | 4 | | | | | | | |
| 2 | 2 | 2 | | | | | | | 2 |
| 3 | 3 | | 3 | | | | | | |
| 1 | 1 | 1 | 1 | | | | | | |
| 1 | 1 | 1 | 1 | | | | | | 1 |
| 1 | 1 | 1 | | | 1 | | | | |
| 1 | 1 | | | 1 | | | | | |
| 1 | 1 | | | | | | | | 1 |
| 9 | | 1 | | | | 1 | | | |
| 1 | | 1 | | | | 1 | 1 | | |
| 1 | | | 1 | | | 1 | | | |
| 1 | | 1 | 1 | | | 1 | | | 1 |
| 2 | | | 2 | | | 2 | | 2 | |
| 1 | | | 1 | 1 | | 1 | | | |
| 16 | 16 | | | | | 16 | | | |
| 8 | 8 | 8 | | | | 8 | | | |
| 1 | 1 | 1 | | | | 1 | | | 1 |
| 2 | 2 | | 2 | | | 2 | | | |
| 2 | 2 | 2 | 2 | | | 2 | | | |
| 2 | 2 | 2 | 2 | | | 2 | | 2 | 2 |
| 1 | 1 | 1 | 1 | | 1 | 1 | | 1 | |
| 2 | 2 | | | | | 2 | | 2 | |
| 1 | 1 | | | 1 | | 1 | | | |
| 1 | 1 | | | 1 | | 1 | | 1 | 1 |
| 1 | 1 | | | | | 1 | | | 1 |
| 1 | 1 | | | | | 1 | | | 1 |
| 1 | 1 | | | | | 1 | 1 | | 1 |
| 1 | 1 | 1 | | 1 | | | | | 1 |
| Subtotal | 55 | 27 | 17 | 5 | 2 | 46 | 2 | 8 | 13 |
| Total | n = 70 | | | | | | | | |

RESISTANCE TRAINING EXERCISES

Types of exercises to develop strength (muscular endurance, maximal force, etc) are included in this section (Table 3). Calisthenics and bodyweight training without machines were trained by 17.9% of the exercising subjects (n = 30). 11.9% (n = 20) did not train strength while 1.8% (n = 3) confused cardiorespiratory exercises with strength training. 11.9% (n = 20) used free

weights, and in less percentages were resistance bands (5.4%), home machines and gadgets (3%) and non-specified (6.5%). The highest prevalence was the use of a combination of type of exercises to develop strength (41.7%, $n = 70$), as detailed in Table 3 above.

FLEXIBILITY EXERCISES AND NEUROMOTOR EXERCISES

Flexibility and neuromotor exercises are important parts of home training. In this study a high prevalence of Yoga ($n = 39$, 27.5%) practice and joint movement and stretching (72.5%) was included as part of the home-based training. The latter is also a common practice for flexibility as a single exercise for flexibility conditioning. Other components are found and showed in the following Table 4:

Table 4. Combination of exercises used for flexibility and neuromotor training ($n = 142$)

| n | Yoga | Tai Chi | Coordination and agility exercises | Balance training | Joint movement and stretching | Proprioceptive exercises | Others |
|-----------------|----------------|----------|------------------------------------|------------------|-------------------------------|--------------------------|----------|
| 16 | | | 16 | | | | |
| 2 | | | | 2 | | | |
| 1 | | | 1 | 1 | | | |
| 61 | | | | | 61 | | |
| 11 | | | 11 | | 11 | | |
| 6 | | | | 6 | 6 | | |
| 2 | | | 2 | 2 | 2 | | |
| 1 | | | 1 | 1 | 1 | 1 | |
| 1 | | | | 1 | 1 | | 1 |
| 16 | 16 | | | | 16 | | |
| 2 | 2 | | 2 | | 2 | | |
| 2 | 2 | | 2 | 2 | 2 | | |
| 1 | 1 | | | 1 | 1 | | |
| 1 | 1 | 1 | 1 | 1 | | | |
| 2 | | 2 | | | | | |
| 1 | 1 | | 1 | | | | |
| 6 | 6 | 6 | | | | | |
| 10 | 10 | | | | | | |
| Subtotal | 39 | 9 | 37 | 17 | 103 | 1 | 1 |
| Total | n = 142 | | | | | | |

EXERCISE HABITS AND DOMAINS OF PHYSICAL ACTIVITY

From those who completed the questionnaire, 78.1% did exercise. 60.7% from the people who exercised preferred the use of videos to exercise. Because of technology and access, videos are easier to find and in different modes, social media perhaps being the broadest way. However, one can find short videos from influencers, online programmes, and other new systems created because of the pandemic, with long routine sessions. Within this questionnaire, we asked about which method was more motivating to perform exercises, with a personal trainer exercising at

the same time, with the use of short videos to include them within personal routines, or with a personalized video, previously programmed. Exercising with long complete routines along with the trainer had almost the same prevalence in comparison with those with short videos with a particular exercise (45.1% vs 44.1%). In a minor percentage, online programmed personal training by video was used (9%). This is might be against some evidence that compared Tai chi exercise programme through an interactive telecommunication in comparison to exercising at home with a DVD in people at risk of falling, where results favoured telecommunication over home exercise training with DVD. The possible live and the sense of interaction within technology should be taken into account for later studies. Exercises during quarantine had a higher prevalence of people mixing previous routines, videos, at will training and following books and articles (37.5%) and with an acceptable average of hours trained per week. Very few organized their trainings based on books and articles but those who did had a higher average of training hours per week during quarantine (Wu et al., 2010) (Figure 4).

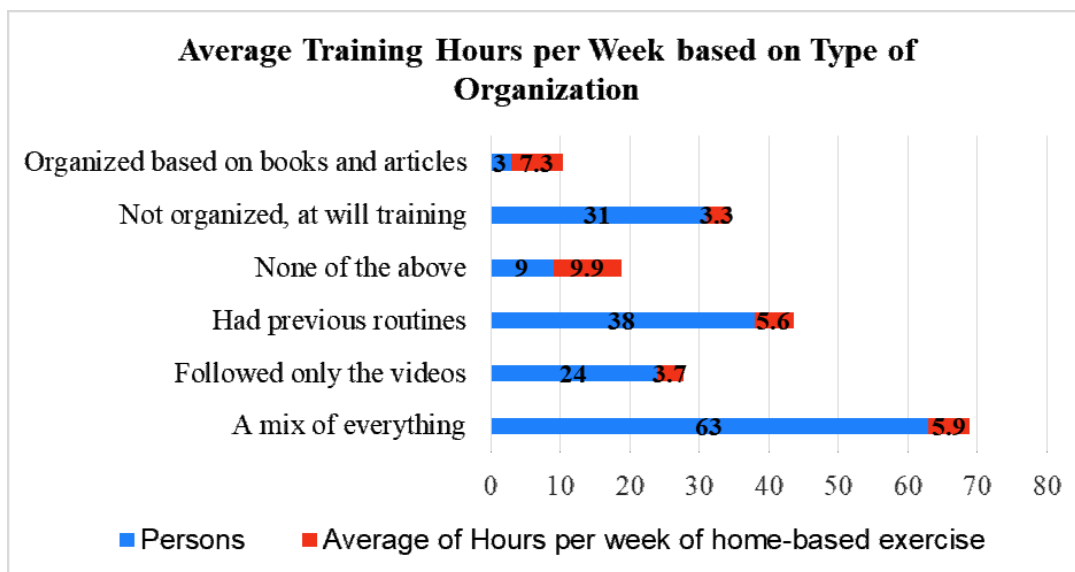


Figure 4. Type of training organization during the quarantine period. Figure shows the average time spent (blue) and the number of persons who adopted this kind of organization (red), within those who exercised during the quarantine time (n = 168)

Even though, 168 subjects stated that they were doing exercise during the quarantine time, we could also see that just doing exercises sporadically to feel physically active was present in the minds of the population. The people who had a structured routine, also had unstructured physical activities (n = 106) and some of the ones that alleged not exercising at all, were having

unstructured exercise ($n = 30$). Quarantine also affects our perceptions, sleep, mood, and decisions. These could create new shifts of motivation in the time of the day for training. Most of the training was preferred in the mornings for the total population (36.3%, $n = 78$) and for those who actually exercise (36.9%, $n = 62$). At the moment of waking up and before breakfast is the second most common preferred option to train if the opportunity was given (Figure 5).

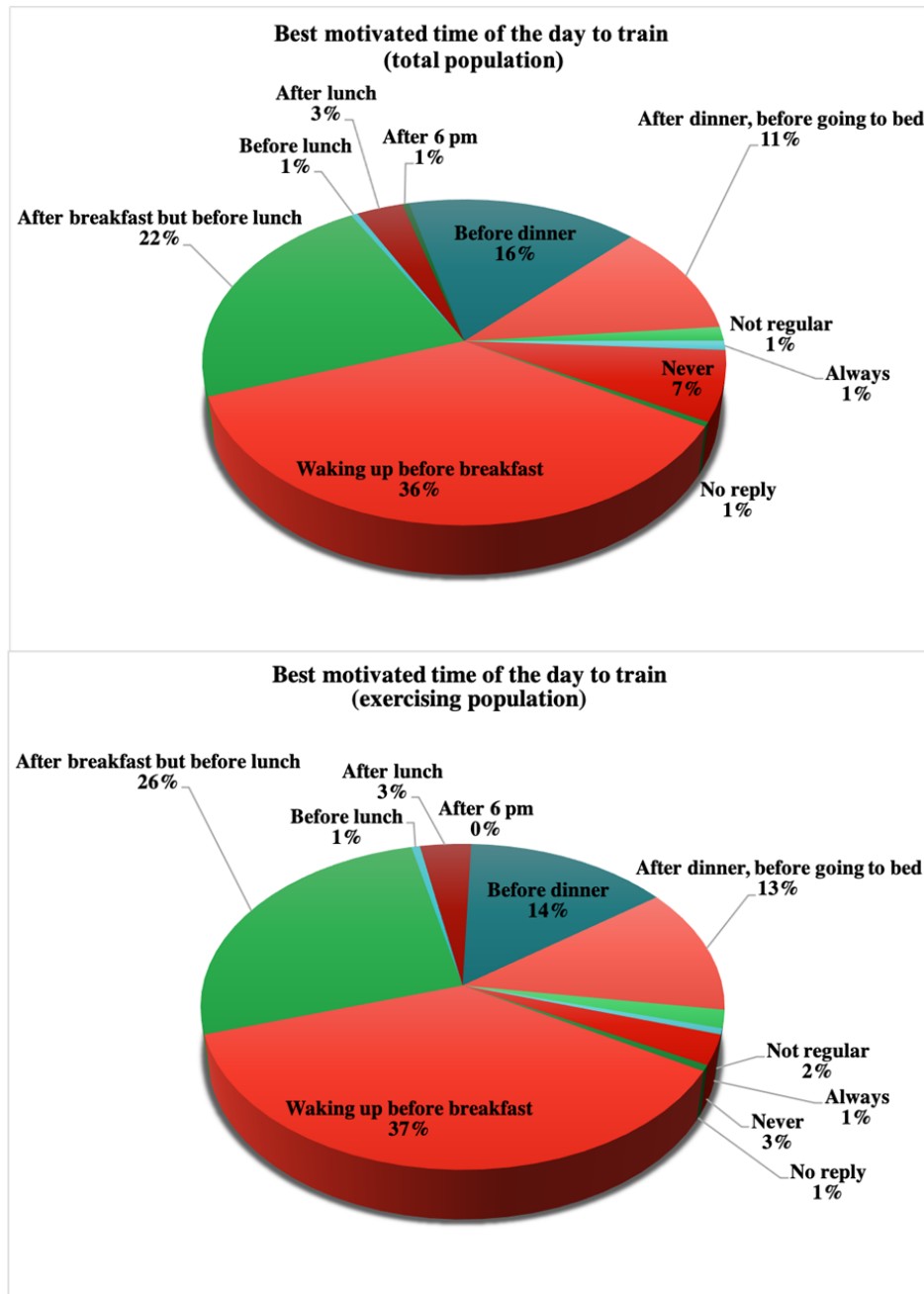


Figure 5. Part of the day where the subject feels more motivated to train. a) The complete population is included ($n = 215$). b) Only those who have acknowledged they exercised during the quarantine period ($n = 168$)

Figure 6 and Table 5 reveal the types of activities performed in the domain of leisure activities. Compound activities combine the single activities that come after within the graphic. Compound individual components prevalence can also be found in the figure. Family games, videogames, dancing, and sexual intercourse are the most repetitive ones in the total registered combinations.

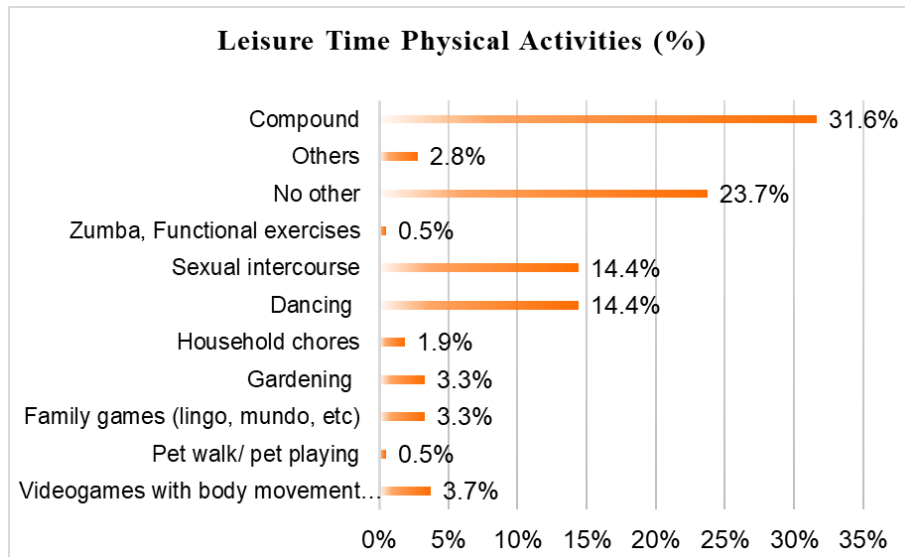


Figure 6. Physical activities done as part of leisure activities during the quarantine period (n = 215)

Table 5. Combination of leisure activities (compound) (n = 151)

| n | Videogames with body movement (Exergames, Wii, Pokemon Go, etc) | Family games (lingo, mundo, etc) | Sexual intercourse | Dog walk | Household chores | Dancing | Gardening | Others |
|----------|---|----------------------------------|--------------------|----------|------------------|---------|-----------|--------|
| 2 | 2 | 2 | 2 | | | | | |
| 4 | 4 | 4 | | | | | | |
| 1 | | | 1 | 1 | | | | 1 |
| 2 | | | 2 | | 2 | | | |
| 1 | | | 1 | | | 1 | 1 | |
| 3 | | | 3 | | | | 3 | |
| 9 | | | 9 | | | 9 | | |
| 1 | | | | | 1 | 1 | 1 | |
| 1 | | | | | | 1 | 1 | |
| 2 | | 2 | | | | 2 | 2 | |
| 3 | | 3 | 3 | | | | 3 | |
| 3 | | 3 | | | | | 3 | |
| 5 | | 5 | 5 | | | | | |
| 2 | | 2 | 2 | | | 2 | | |
| 13 | | 13 | | | | 13 | | |
| 1 | | 1 | | | | | | 1 |
| 1 | 1 | | 1 | | | | | |
| 2 | 2 | 2 | | | | | 2 | |
| 8 | 8 | | | | | | 8 | |
| 1 | 1 | | 1 | | | 1 | | |
| 2 | 2 | | | | | 2 | | |
| 1 | 1 | | 1 | | | | | |
| Subtotal | 21 | 37 | 31 | 1 | 3 | 32 | 24 | 2 |
| Total | n= 151 | | | | | | | |

CHAPTER V DISCUSSION AND CONCLUSIONS

DISCUSSION

Isolation period due to the coronavirus pandemic has demonstrated how the Public Health policies and governance frame lack of proper guidelines for indoor home-exercise that allow to achieve the goal of decreasing sedentarism and improving physical activity behaviours in a safe but effective way as proposed by different organizations. The WHO recommends that all countries establish national guidelines and a physical activity target for the population (Bull et al., 2020).

Physical activity includes leisure-time, household chores, transportation, occupational, games and sports or planned exercise. It was recommended that these bouts lasted at least 10 minutes to complete 30 minutes per day (20 to 60 min). Nevertheless, the current WHO guidelines promote any time achievable as long the weekly physical fitness requirements are fulfilled (Bull et al., 2020). Going beyond 150 minutes, like the recommended 300 minutes of cardiorespiratory physical activity for additional exercise benefits (ACSM, 2017; Bull et al., 2020), is an ideal progression that should be considered within the frame of a slow progression and an exercise professional supervision.

In a previous study, it was shown through the International Physical Activity Questionnaire (IPAQ) that the neighbouring country of Chile had the least amount of energy spent (measured in MET-minute/week) in leisure time, followed by home-based activities without a big difference between them (Serón et al., 2010). It could be assumed that the home-based physical activity energy expenditure is kept as low as necessary during leisure physical activities. Accelerometers would be the best option to measure the physical activity behaviour because personal factors like weight, sex or fitness level can misdirect the measurements through charted METs (Garber et al., 2011; Ward et al., 2005). Because of the social and pandemic context, such intervention would be of great risk during the pandemic time. The Rapid Assessment of Physical Activity (RAPA), a questionnaire among older adults, is also a highly useful and validated tool to evaluate previous physical activity (Topolski et al., 2006). However, this tool considers adults older than 50-years old, it is not validated in Spanish, and it stratifies exercises in 2 big groups: aerobic and strength, and flexibility, which does not allow one to understand the home preferences in a more detailed way. In this present study, the adapted

questionnaire for home-based physical activity has been developed focused on the exercise requirements proposed by different guidelines in exercise prescription to avoid sedentarism, including a description of which activities are preferred by the Peruvian population, a part that lacks many of other validated questionnaires (ACSM, 2017; Cleland et al., 2018). When developing a research tool, one looks for the adequacy while considering the feasibility and the design within a realistic and workable protocol that gives efficacy to obtain the goals of the study. A pilot study provided the perspective about the potential problems one might have during data analysis. Training the researcher to collect information and to convince possible funding organizations are also advantages that can be taken from pilot studies (Hassan et al., 2006).

In Peruvian schools (15- to 19-years old) from Callao, the IPAQ questionnaire was applied in 2013, with a high prevalence of high-level physical activity (59%). According to this study, house-hold chores and leisure time had the highest physical activity levels, being the former higher in females and the latter in males (Morales Quispe et al., 2016). In the present study everything was done inside the home, and the period when the data was collected, there was no allowance to go out to run, which makes it difficult to compare between household chores and leisure time physical activity. METs were not included in the analysis and the present study does not include outdoor training. Considering these factors, household chores only received a 1.9% as a single physical activity from the non-structured exercise time and mixed in the compound physical activity 31.6%. In this scenario, household is less than the total leisure activity.

Home-based exercises should be safe, simple and easy to implement (Chen et al., 2020). Exercises at home should include a cardiorespiratory, strength, flexibility and a neuromotor component. Even though people in Peru were able to walk in the house and to the store as necessary, these cannot be considered and were not considered an active behaviour for the research, but more a sporadic activity since they were occasionally done. Most of the population surveyed have performed cardiorespiratory training during the quarantine period. It would be important to deepen the studies on the reason these types of exercises had a higher prevalence. The ACSM recommends flexibility and neuromotor activities such as balance, agility and coordination at least 2 days a week (ACSM, 2017). Neuromotor exercises were performed but compared to the other components of the physical fitness, as there is a gap in the literature about the neuromotor exercises and its recommendations (Fletcher et al., 2018).

Mental and physical health, including our immune system, can be greatly affected due to the quarantine period, especially on those who exercised regularly. Mandatory home permanence is a stressful situation for our health. Outdoor activities have to be replaced by home-based activities (Aoi & Naito, 2018; Hammami et al., 2020). A high percentage of the research subjects believed that physical activity was very important, which was positively correlated with their actual beliefs. Before the COVID-19 pandemic, the prevalence of physical inactivity in a close neighbouring country, Colombia, was 21.2% in Medellin and 36.8% in Bogota for 16- to 85-years old and 18- to 65-years old people, respectively (Fernando Gómez et al., 2005; Martinez et al., 2008). The presence of physical inactivity in previously non-sedentary and non-sports professionals at home during quarantine was low (21.9%). In comparison to previous studies, it was also found that younger (< 21-years old) people had relatively lower levels of physical activity, with a ratio of 4 from 7 subjects being physically inactive, and a ratio of 1 every 5 adult (21- to 65-years old) are inactive (Bull et al., 2020; Smith et al., 2020).

Since this study looks for future studies on adaptative home-based exercise prescription, the author only looked to differentiate between mild-moderate against vigorous exercise, without the use of METs and with the equipment availability and the safety measures. A vigorous exercise was rarely done, and it was assessed by breathing and sweating characteristics, decreasing the chance of overestimation that would happen with a direct question. However, a little more than a 25% of the subjects were not intensively working out, which should also be taken into consideration for the next phase of the study to have a deeper vigorous exercise screening at home-based training using questionnaires. In Chile, from 35- to 70-years old subjects, 18,4% had low, 66% moderate and 15,6% high physical activity levels, based on MET.min.wk, with a cut-off values for high physical activity level above 1,500 MET.min.wk for vigorous activities 3 times a week or 3,000 MET.min.wk for combinations of moderate and vigorous activities. In Peru, 59% had high physical activity, 25.8% moderate physical activity and 15.2% low physical activity in 15- to 19-years old participants, while in a Regional Health Administration, the prevalence was 3%, 9% and 88% respectively (Morales Quispe et al., 2016; Sanabria Rojas et al., 2014).

Home-based activities provide an opportunity for people to stay fit and healthy by practising simple movements while staying at home. Many countries have now implemented lockdowns, forcing people to stay at home and only go out in the event of an emergency. These decisions will affect peoples' mental and physical health, especially those who are used to regular

outdoor physical activities. We are all aware of the importance of our mental health and the need to improve our immune system, which is extremely important for fighting sickness. Staying at home can lead to a lot of stress, anxiety, and mental distress. Japan, a country that provides statistics in suicides per year, pointed out in November 2020, that they had a higher rate of suicides in the month of October in comparison with the previous 10 months, and this number was even bigger than the Corona virus-caused deaths (2,153 vs 2,087), with a higher increase of this suicide rate in women (around 80%) (National Police Agency, 2020).

A way to overcome these problems is to replace restricted outdoors activities with home-based activities (Hammami et al., 2020). With the collected information it is important to include in the home-based exercise prescription the use of training videos with a variety of possible exercises to perform. In Cornelis et al. (2018) study with 99 elderly patients with intermittent claudication, 48% had low physical activity. In this population, 67% showed interest in tele-coaching to support exercise (Cornelis et al., 2018). Some kinds of dancing can help with the home-based training motivation as well (Hammami et al., 2020). The author even suggests a combination of both. However, since there are many types of dancing, this should be done accordingly to a previous assessment of the trainee. As for exercises, bodyweight exercises, without machines were the preferred ones for both cardiorespiratory exercises and resistance training exercises. A study performed about home-based training during the COVID-19 pandemic suggested the use of stationary bikes, rowing ergometers, treadmills, dance and gymnastics for the aerobic exercise group, and bodyweight training for the resistance exercise group. As bodyweight training, the author is considering any work against gravity. Examples of bodyweight exercises are push-ups, pull-ups, squats, lunges, box jumps, jump roping, burpees (Hammami et al., 2020; Harrison, 2010). Time and planning are also of great importance, as suggested by Kawahara in a study done on workers in Japan and other previous studies (Cao et al., 2013; Kawahara et al., 2018; Wiedemann et al., 2009). Education also seemed to have an important role in developing a physical activity custom and therefore important for Public Health policies and addressed in future guidelines in exercise prescription. Replacing sedentary time with more active activities, of any intensity can have health benefits. For this reason, we should address physical activity and sedentary behaviours.

In 2017, Tarqui-Mamani published based on IPAQ questionnaire, that most of the Peruvian population, from coast, highlands, and jungle, have a low physical activity level, being the lowest the population between 15- and 19 -years old in 2011. The study also showed that the elder population (60- to 69-years old) have a reduced risk of low physical activity of 50% (OR

0.5, IC 95%), and the lowest (70%) reduction for low physical activity in the 30-59 years old population (OR 0.3, IC 95%). A better education and nutritional status were associated with higher physical activity. Being female, having a significant other, living in an urban area, living in Metropolitan Lima, in the coast and the jungle were also considered factors to have physical activity levels (Tarqui Mamani et al., 2017). This study found a statistically significant value between hours of training and sex, also reflecting that women train more. However, a district statistical difference with home-exercised exercise during quarantine was not found. Nevertheless, based on the results from Tarqui-Mamani et al. (2017), it would seem that the higher economic active districts would have an increased physical activity. This could be related to the pandemic times and the accessibility to higher technologic stimulus and home exercise tools.

It is important to consider a home-based exercise practice that considers the frequency of the practice, the intensity of the exercise, the time used for that exercise, and the type or modality of it. For increasing training intensity and to be able to progress safely and efficiently, one should be aware how much volume are we demanding and how much more training load can one add per time of practice. One has to remember that as one conditions the body, the Perceived Exertion Rate inversely proportional changes (ACSM, 2017). An exercise too light in intensity could affect the inner interest of the person and would create demotivation. On the other hand, a too straining exercise could bring avoidance patterns on the table. A balance between a fun but properly demanding exercise should be pursued. Being fun or attractive is part of the exercise prescription but we must be aware that compliance to exercise increases extraordinarily when set goals exist and the progress is quantified (Seth, 2014).

Physical activities within the leisure activities should be considered as motivation factors and promoted as additional parts of the exercise prescription, with the proper responsibility and care by the exercise professional. An association with other healthy lifestyles, like diet, should go along with any exercise prescription. Higher level of education usually is considered as higher risk for low physical activity. Additionally, the results in the present study pointed towards an increased number of training hours per week on higher levels of education but less frequency of vigorous exercise in people with complete undergraduate programs (4.3%) and in those with only primary and secondary school completed (0%). Spouses and children can help to exercise; however, friends and other relatives may have an opposing role, and this might be a reason why in a previous study on Peruvian population, people with significant other had

higher frequencies of moderate and high physical activity. A social accepted behaviour facilitates adherence to diet and exercise. Social support helped even those who lacked self-motivation to exercise. A routine where social settings are not considered can affect social and family dynamics. Optimism and self-esteem provide help for daily activities buffering life stressors (Ghimire, 2017; Tarqui Mamani et al., 2017).

The presence of ExRx guidelines alone will not increase the level of physical activity in the population. The guidelines must be supported by distributing it to specific audiences and by an education strategy. Furthermore, policies must develop to support the behaviour change (Bull et al., 2020). A call to action for health and exercise professionals is needed, a simple and inexpensive strategy is: 1) Help doctors to focus on the “exercise vital sign”, registered properly in the patient notes, with the proper linking to the needed professionals, with policies and indicators that reinforce this. 2) Educate and have accessible education. Physical activity prescription can be part of student’s curricula. 3) Role models, from medical students through the ages. “Influencers” have taken the path that health professionals should be walking because they live or appear to live what they preach while giving the excitement and thrill people are looking for. Most the time with detrimental result from their lack of experience and knowledge. “Walk the talk” and “lead the way”, simple and inexpensive (Joy et al., 2013; Khan, 2013; Sallis et al., 2016).

CONCLUSION, FUTURE PERSPECTIVES AND LIMITATIONS

Quarantine has been regarded most of the time as an unpleasant experience. To not have freedom, to be away from the loved ones, to not know about what it is going to happen due to the disease, and also boredom can have a great impact in the mind (Brooks et al., 2020). Mental factors influence how home-based exercise prescription should be designed. A combination of cardiorespiratory, resistance-training, flexibility and neuromotor exercises should be designed accordingly to the individual. A fun, intermittent or continuous training plan that includes a proper time during the day, with a proper intensity and progression, and with some of the preferred leisure activities might be of great help to keep the motivation. Through this study the author assessed the home-based exercise training preferences during the quarantine period. The major limitation of this study is the recall bias and cognitive bias since some definitions were mixed and need to be clarified to the subject for the future. A second limitation is the COVID-19 context with restricts social contact and the possible use of accelerometers. The

pandemic also affects the mind and therefore lifestyles of the people might add unidentified variables, like non diagnosed anxiety or psychotic breakdowns.

Even though the home-based exercise patterns as well as the exercise clusters found on this research are done in an already active population and in forced isolation, they still give a better national perspective on how to approach national guidelines for exercise prescription. General recommendations, advice for sedentary inactive people, recommendations for voluntary home-based exercise, recommendations in chronic diseases, and guidance in other specific populations are required. Along with the Global Recommendations on Physical Activity for Health, WHO, ACSM and other global institutions and initiatives, Peru must establish policies that allow a higher degree of physical activity in the population in a safe environment and with the support of adequate health and exercise professionals.

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APPENDICES

APPENDIX A

SURVEY STRUCTURE

Done online, questions were automatized and directed based on response. Sí = Yes

Demographics, inclusion, and exclusion criteria

Marcar con un círculo (Please circle the answer)

Edad (Age)

Sexo (Sex) M F

Estado Civil (Marital Status): a) Casado b) Soltero c) Conviviente d) Divorciado e) Separado f) Viudo

Distrito (Home District):

Grado de instrucción más alto alcanzado (Highest achieved Education Level):

Primaria incompleta

Primaria completa

Primaria y Secundaria Incompleta

Superior incompleta (pregrado)

Superior completa

Post-grado

Ocupación de los últimos 6 meses (Last occupation within the last 6 months):

1. ¿Es atleta profesional (dedica la mayor parte de su tiempo libre y laboral al deporte profesional federado)? (Are you a professional athlete [do you spend most of your free and laboral time dedicated to federated professional sports])

a) Sí

b) No

2. ¿Tiene alguna enfermedad o condición médica diagnosticada por un médico? (Do you have any previously diagnosed disease or medical condition, diagnosed by a Medical Doctor)

a) Sí

b) No

3. En el último mes antes de la cuarentena, ¿cuántas horas por semana se dedicaba al deporte y/o ejercicio? (In the last month before quarantine period, how many hours per week did you spend doing sports and/or exercise?)

Menos de una hora por semana (less than an hour)

a) 1 hora por semana (1 hour per week)

b) 1 a 2 horas por semana (1-2 hours per week)

c) 2 a 4 horas por semana (2-4 hours per week)

d) Más de 4 horas por semana (More than 4 hours per week)

e) NUNCA (Never)

Based on the replies the survey would end or continue

HOME-BASED TRAINING*Frequency*

4. ¿Realizaba ejercicios en casa durante la cuarentena? (Did you exercised at home during the quarantine time?)

- a) Sí
- b) No

Si la respuesta es No pase a la pregunta 13 (if not please go question 13)

Type

5. ¿Usaba videos para entrenar? (Did you use videos for training?)

- a) Sí
- b) No

Si la respuesta es NO continúe con la pregunta 7 (if the answer is NO please go to question 7)

6. Sobre los videos que usaba para entrenar, me motivaban más: (From the videos you used for training, you preferred to use)

- a) Videos cortos de ejercicios para incorporarlos en mis rutinas. (Short exercise videos in order to use them as part of my routines)
- b) Videos con rutinas completas, con el entrenador (a) ejercitando conmigo. (Complete exercise videos, with the coach training with me)
- c) Asesoría online, con programas personalizados. (Online training, with personal training programs)

7. ¿Cómo organizó su entrenamiento? (How did you organise your training?)

- a) No lo organicé, lo hacía cuando quería (I did not organise it, I did it whenever I wanted)
- b) Tenía rutinas previas (I had previous routines)
- c) Lo organicé en base a libros y artículos (I organised it based on books and articles)
- d) Seguí sólo los videos (I just followed videos)
- e) Una mezcla de todo (A mixture of everything)
- f) Ninguno (None of above)

8. ¿Qué actividades realizaba dentro de sus ejercicios? Puede marcar más de una (Which activities did you do within the exercises? You can select more than one)

- a) Ejercicios de fuerza o tensión sin aparatos / máquinas, (incluye peso corporal) (Strength or tension training exercises without apparatuses /machines, including bodyweight)
- b) Ejercicios con pesas y/o barras libres o sueltas (incluye con soporte) (Exercises with weights and/or free bars, including those with supports)
- c) Ejercicios con máquinas de poleas (Pulley-machine exercises)
- d) Ejercicios con Pelota Suiza (pelota grande) (Swiss ball exercises [Big ball])
- e) Ejercicios con resortes (agarre de mano, power twister, etc) (Spring system gadgets exercises [handgrip, power twister, etc])
- f) Ejercicios con bandas elásticas (Resistance band exercises)
- g) Ejercicios con máquinas para abdominales (Core/abdominals machine exercises)
- h) Otros ejercicios para desarrollar la fuerza. Especificar _____ (Other exercises to develop strength, specify)
- i) No hago ejercicios de Fuerza (I do not do Strength training exercises)

9. ¿Qué actividades realizaba dentro de sus ejercicios? Puede marcar más de una (Which activities did you do within the exercises? You can select more than one)

- a) Ejercicios de “cardio” sin aparatos o máquinas, (ejercicios con saltos) (“Cardio” exercises without apparatuses or machines [jumping exercises])
- b) Ejercicios con máquinas “cardio” (ej. trotadora, elíptica, bicicleta estacionaria, etc) (Exercises with “Cardio” machines)
- c) Ejercicios con soga (Exercises with ropes)
- d) Ejercicios corriendo o trotando (Running or jogging exercises)
- e) Otros ejercicios cardiorespiratorios (Other cardiorespiratory exercises)
- f) No hago ejercicios cardiorespiratorios (I do not perform cardiorespiratory exercises)

10. ¿Qué actividades realizaba dentro de sus ejercicios? Puede marcar más de una (Which activities did you do within the exercises? You can select more than one)

Estiramientos y movimiento articular (Stretching and joint movement exercises)

- a) Yoga
- b) Tai chi (Tai Ji Quan)
- c) Ejercicios de balance (Balance training)
- d) Ninguno (None)

11. Ejercicios mezclados y deportes bajo techo ¿Qué otros ejercicios o deportes hacía dentro de casa? Puede marcar más de una (Mixed exercises and indoor sports. Which other exercises and sports did you perform inside your house?)

- a) Deportes bajo techo con aparatos (tenis de mesa, dominadas, armas, etc) (Indoor sports with apparatus [table tennis, pull-ups, weapons, etc])
- b) Deportes bajo techo sin aparatos (artes marciales, boxeo, etc) (Indoor sports without apparatus [martial arts, boxing, etc])
- c) Ejercicios funcionales (incluye crossfit) (Functional training, including Crossfit®)
- d) Una mezcla de Fuerza y Cardiovascular pero sin estiramiento (A mixture of Strength and Cardiovascular but without stretching)
- f) Cardiovascular but without stretching
- g) Una mezcla de Fuerza, Cardiovascular y estiramientos (A mixture of Strength and Cardiovascular and stretching)
- h) Ninguno (none)
- i) Otros: (Others:) _____ Especificar

Intensity

12. ¿Cuántas veces al hacer ejercicio sentía que se le acababa el aire o sentía dificultad para respirar y sudaba profusamente? (ejercicio intenso) How many times were you breathless or you had difficulty breathing and sweat profusely during exercise (intense exercise)

- a) Siempre (Always)
- b) Rara vez (Rarely)
- c) Más de 1 vez por semana (More than once a week)

Si la respuesta es b pasar a la pregunta 14 (If answer is b go to question 14)

Time

13. ¿Cuántos minutos duraba el entrenamiento que le faltaba aire? (no considerar actividades fuera del ejercicio, ni sesiones que no le quitaron el aire) (How many minutes lasted the training where you were lacking breath (do not consider activities outside exercise, nor training sessions where you were not breathless))

_____ minutos

14. ¿Cuántas horas a la semana se dedicaba a ejercitarse durante la cuarentena? (How many hours per the week you used to exercise during the quarantine period?)

_____ horas

15. ¿Cuántas horas a la semana se dedicaba a levantar algún tipo de peso como ejercicio? (How many hours per week did you lift any kind of weight as a type of exercise?)

_____ horas

16. ¿Cuántas veces a la semana se dedicaba a hacer ejercicios de flexibilidad (movimiento de rango completo de las articulaciones)? (How many hours per week did you do flexibility exercises?)

- a) 1 vez por semana (Once per week)
- b) 2 veces por semana (2 times per week)
- c) Más de 2 veces por semana (more than 2 times per week)
- d) Nunca (never)

Leisure time physical activity, preferences, and non-structured exercises

17. Fuera de estos ejercicios, ¿tenía momentos en el que ejercitaba esporádicamente, sólo con la intención de estar activo? (Beside these exercises, did you exercise occasionally in order to remain physical active?)

- a) Sí
- b) No

18. En comparación con el primer mes de cuarentena, usted siente que: (In comparison with the first month of the quarantine period, do you feel that:)

- a) Entrenó más que en el primer mes (Trained more than the first month)
- b) Entrenó menos que en el primer mes (Trained less than the first month)
- c) Entrenó igual que en el primer mes (Trained the same that in the first month)

19. ¿En qué momento del día se siente más animado para entrenar en casa? (In which moment of the day do you feel more motivated to train at home?)

- a) Al despertar, antes del desayuno (when waking up, before breakfast)
- b) Antes del almuerzo (before lunch)
- c) Después del almuerzo (after lunch)
- d) Antes de la cena (before dinner)
- e) Antes de dormir (before going to sleep)
- f) Ninguno (none)

20. ¿Cuán importante fue para usted la actividad física en el aislamiento? (How important was for you Physical Activity during the isolation period)

- a) Muy importante (Very important)
- b) Algo importante (Somehow important)
- c) Poco importante (Little important)
- d) Nada importante (Not important at all)

21. ¿Qué otras actividades físicas hacía frecuentemente dentro casa como entretenimiento? (Which other physical activities you did frequently inside home as part of leisure time?)

Puede marcar más de una (You can select more than one)

- a) Videos juegos con movimientos corporales (Exergames, Wii, Pokemon Go, etc)
(Videogames with body movement [Exergames, Wii, Pokemon go, etc])
- b) Jardinería (Gardening)
- c) Juegos familiares (lingo, mundo, etc) (Family games)
- d) Bailar (dancing)
- e) Relaciones sexuales (Intercourse)
- f) Otros: (Others:) _____ Especificar (Specify)

APPENDIX B

PERUVIAN COLLEGE OF MEDICINE ETHICAL COMMITTEE APPROVAL LETTER



COLEGIO MÉDICO DEL PERÚ

CONSEJO NACIONAL

"Año de la Universalización de la Salud"

Dr. Miguel Palacios Coli
DECANO
Dr. Ciro Maguñá Vargas
MEDICO
Dr. Edén Galán Rodas
SECRETARIO DEL INTERIOR
Dr. César Purtila Díaz
SECRETARIO DEL EXTERIOR
Dra. María Luisa Fajardo Loo
TESORERA
Dr. Alfredo Celis López
VOCA
Dr. Ilduro Aguirre Sosa
VOCA
Dr. Augusto Tarszone Fernández
VOCA
Dr. Mariano Cuentas Jara
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CONSEJO REGIONAL I LA LIBERTAD
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CONSEJO REGIONAL III JUNO
Dr. Wilbert Barzola Huamán
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Dr. Richard Flores Malpartida
CONSEJO REGIONAL XXV AMAZONAS
Dra. Emperatriz Morales Valdivia
CONSEJO REGIONAL XXVI MADRE DE DIOS
Dr. Víctor Rojas Polo
CONSEJO REGIONAL XXVII LIMA PROVINCIAS

CARTA N° 023-CVED-CN-CMP-2020

Miraflores, 09 de julio del 2020

Señor Doctor
JORGE VILLARAN ZERDA
Médico Especialista
Medicina del Deporte
Presente.

Estimado doctor,

Hemos recibido su proyecto de investigación **Home-based Exercise Preferences in Previously Non-sedentary, Non-athlete Population During the Corona Virus Disease 2019 (COVID-19)**, el cual será realizado en población limeña con el objetivo de determinar las nuevas preferencias de ejercicios adoptadas por la población previamente no sedentaria durante el periodo de cuarentena en Lima, Perú durante la pandemia de la enfermedad del Coronavirus (COVID - 19).

El Comité de Ética del CMP ha revisado el proyecto y ha encontrado que este se ajusta a la normativa establecida por este comité para la realización de trabajos de investigación. Por lo tanto, cuenta usted con la aprobación de este comité y puede iniciar su trabajo.

Atentamente,

COLEGIO MÉDICO DEL PERÚ
CONSEJO NACIONAL

DR. ALFREDO CELIS LÓPEZ
PRESIDENTE
COMITÉ DE VIGILANCIA, ÉTICA Y DEONTOLOGÍA MÉDICA

ACL/tianlib

APPENDIX C

INFORMED CONSENT (SPANISH VERSION)

En primer lugar, deseamos que te encuentres bien.

Nos gustaría invitarte a participar en un estudio sobre las preferencias en los hábitos de entrenamiento en casa de los habitantes de LIMA METROPOLITANA y CALLAO. Durante el distanciamiento por la pandemia (COVID-19), se están generando nuevos hábitos de actividades físicas que deseamos conocer para poder en un futuro abordar mejor las rutinas de entrenamiento.

Nuestro estudio comprenderá participantes mayores de 18 años que no estén activos en competencias locales, nacionales o regionales y que no se dediquen al deporte de manera profesional.

Los resultados permitirán avanzar en la investigación en éste área y apoyar investigaciones en el campo de la Medicina del Deporte y la Prescripción del Ejercicio. La encuesta te llevará aproximadamente 15 minutos. Toda la información que proporcionas es confidencial y será anónima para asegurar que no puedas ser identificado en ninguna parte del proceso. Si aceptas responder al cuestionario no significa que tengas, finalmente, que completarlo. Eres libre de retirar tu participación en cualquier momento, sin ofrecer una explicación.

Si necesitas alguna aclaración sobre tu participación, puedes contactar con nosotros a través de villaran.md@gmail.com

Muchas gracias por tu colaboración.

Cuídate mucho,

Colaboradores del equipo "Ejercicios en casa"

Dr. Jorge Villarán Zerda, Especialista en Medicina del Deporte, Universidad de Tsukuba

Lic. Giomar Paredes Rengifo, Magister en Ciencias del Deporte

Dra Yovana Ochoa Carrión, Especialista en Medicina Familiar

Por favor llena la encuesta sólo una vez, en un solo intento

APPENDIX D

INFORMED CONSENT (TRANSLATED VERSION)

First, we wish you are well.

We would like to invite you to be part of the Home-based Training Preferences research from the inhabitants from LIMA METROPOLITANA y CALLAO. During the isolation due to the pandemics (COVID-19), there are many new physical activity habits that we would like to know to be able in the future to approach to better exercise routines.

Our study will involve people over 18 years old that are not active in local, national, or regional tournaments, and that are not devoted to sports professionally.

The results will let us advance with the research in this area and support other studies within this area, while supporting research in the matters of Sports Medicine and Exercise Prescription. The survey will take you to complete around 15 minutes. Every information that you provide will be confidential and anonymous so that you would not be identified in any part of the process. If you accept to answer the questionnaire it does not mean that you have to, finally, complete it. You are free to withdraw your participation at any time, without any explanation. If you need any explanation about your participation, you can contact us through villaran.md@gmail.com

Thank you very much for your help,

Take care,

“Exercise at home” team collaborators

Jorge Villaran Zerda, MD, Sports Medicine specialist, University of Tsukuba

BSc. Giomar Paredes Rengifo, Master in Sports Science

Yovana Ochoa Carrion, MD, Family Medicine specialist

Please, only fill the survey only once, in one attempt.