MIGUEL RIBEIRO ANES DOS RAMOS SOARES

AN EPIDEMIOLOGICAL PROFILE OF CROSSFIT PARTICIPANTS IN PORTUGAL

Prof. Doutor Rodrigo Ruivo

Universidade Lusófona de Humanidades e Tecnologias

Faculdade de Educação Física e Desporto

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Relatório de Estágio apresentado para a obtenção do Grau de Mestre em Exercício e Bem-Estar, no Curso de Mestrado em Exercício e Bem-Estar, no ramo de Exercício, Nutrição e Saúde, conferido pela Universidade Lusófona de Humanidades e Tecnologias.

Presidente: Prof. Doutor António Labisa Palmeira

Arguente: Prof. Doutor Diogo Teixeira

Orientador: Prof. Doutor Rodrigo Ruivo

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"*It is better to live one day as a lion than 100 years as a sheep*."

– Benito Mussolini

Agradecimentos

Foi uma longa viagem até à concretização deste relatório de estágio. Viagem essa que me desafiou constantemente a evoluir, de forma a concluir com sucesso uma etapa importante na minha vida.

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Índice

Índice de Tabelas

Índice de Figuras

I. Introdução Geral

O estágio de Mestrado em Exercício e Bem-Estar da Faculdade de Educação Física e Desporto da Universidade Lusófona de Humanidades e Tecnologias realizou-se no Club Clínica das Conchas, um estabelecimento com diversos serviços de promoção de saúde, onde vários profissionais da área da saúde atuam de forma interdisciplinar em torno do conceito de medicina do exercício. O estágio teve o seu início em meados de outubro de 2016, prolongando-se até ao final do mês de julho de 2017. O processo de estágio durou 10 meses, havendo uma carga horária mínima semanal de 8 horas, traduzindo-se em 320 horas mínimas ao fim dos 10 meses.

O Club Clínica das Conchas é um espaço localizado no Lumiar, em Lisboa, fundado em 2004, que colocou em prática o conceito de medicina do exercício (MexTM) em Portugal. Trata-se de uma unidade de saúde, de atuação clínica, que interliga os departamentos de medicina, de exercício e de fisioterapia. A medicina do exercício encara o exercício físico como uma técnica com efeito terapêutico que resulta da complementaridade entre o conhecimento de médicos, fisioterapeutas e técnicos de exercício físico. A medicina do exercício é, então, a prescrição de exercício físico para a prevenção e reabilitação de várias doenças e patologias, como as osteoarticulares, as endocrinológicas e as cardiovasculares.

Após a dinamização interna do conceito de medicina do exercício, a Clínica abriu-se ao exterior, com rastreios, workshops, palestras, congressos internacionais e cursos de formação na perspetiva da educação para a saúde. O Club Clínica das Conchas aposta na interdisciplinaridade entre profissionais (medicina, exercício e fisioterapia) para pôr em prática e promover o conceito de medicina do exercício, assim como desenvolver formação e investigação em medicina do exercício. É através desta filosofia e desta metodologia de trabalho inovadoras em Portugal que o Club Clínica das Conchas se distingue dos restantes espaços.

O Club Clínica das Conchas é composto por 5 departamentos que oferecem diversos serviços. Os departamentos são o Centro Clínico, o Centro de Reabilitação, o Centro de Exercício com orientação clínica, o Centro de Bem-Estar e o Centro de Formação (para mais informação, consultar anexos).

Figura 1.1. Sala de Exercício

Figura 1.2. Estúdio de Aulas de Grupo

Os objetivos para o processo de estágio estão relacionados com a minha intervenção de estagiário em tarefas do Centro de Formação e principalmente do Centro de Exercício.

No Centro de Exercício espera-se seguir e cumprir com um planeamento de tarefas na formação teórico-prática, abordando diversas temáticas importantes relacionadas com o exercício e saúde, desde outubro até julho. Para além disto, terei de assegurar a rota da sala de exercício durante determinadas horas, altura em que devo procurar estar atento, intervir e ajudar sempre que necessário, os sócios. Mais à frente, é expectável que passe pela experiência autónoma de treinador pessoal.

No Centro de Formação pretende-se contribuir de forma a dinamizar o Facebook da Formação Clínica das Conchas e Newsletters, através de postagens relacionadas com os formadores e formações da Clínica das Conchas. Para além disso, pretende-se também participar como staff em formações do Centro de Formação.

Objetivos Gerais

Centro de Exercício

- Dominar os processos de avaliação da aptidão física utilizados na Clínica das Conchas

- Estar apto na aplicação, interpretação e utilização da avaliação da aptidão física para a prescrição de exercício

- Desenvolver autonomia no planeamento, prescrição de exercício e acompanhamento dos sócios na sala de exercício

- Desenvolver capacidades e autonomia na prescrição de exercício para populações especiais

- Desenvolver capacidades e autonomia na prescrição de exercício para prevenção de lesões

- Dominar estratégias de comunicação para conseguir uma melhor ligação com o staff e sócios

- Assumir constantemente uma postura de ética profissional, estando sempre pronto para intervir e colaborar com os sócios e o staff

Centro de Formação

- Colaborar no Centro de Formação, aprendendo técnicas e estratégias de divulgação de informação para profissionais de saúde

- Participar em formações do Centro de Formação

Objetivos Específicos

Centro de Exercício

- Autonomia na avaliação da aptidão física:

- Antropometria – Peso, Altura, Bioimpedância e Perímetros
- Aptidão cardiorrespiratória – *Rockport Walk Test*, Teste da Milha, cálculos da FC máxima (*Tanaka, Gellish*), FC reserva e de treino (*Karvonnen*)
- Resistência muscular – *Curl-up Test, Push-up Test*
- Força muscular (estimar 1 RM) – *Leg Press, Chest Press* e *Low Row*
- Flexibilidade – *Sit & Reach*
- Avaliação postural – *Overhead Squat* e Teste de *Adams*

- Autonomia na prescrição de exercício para populações nas seguintes condições:

- Público geral (saudáveis)

- Patologias da coluna
- Obesidade
- Doenças reumáticas
- Idosos
- Osteoporose
- Doença pulmonar obstrutiva crónica (DPOC)
- Diabetes
- Hipertensão
- Grávidas

- Autonomia na prescrição de exercício para prevenção de lesões:

- Trem Superior
- Ombro
- Joelho
- Tibiotársica

- Dinamizar atividade na Clínica das Conchas

- Experiência autónoma de treinador pessoal

Centro de Formação

- Procurar e trabalhar informação relevante para a Newsletter da Formação Clínica das Conchas:

- Artigos recomendados (artigos científicos em destaque)
- Oportunidades (bolsas ou prémios para estudantes e investigadores)
- Curtas (notícias relacionadas com exercício e saúde)

- Identificar congressos para eventual parceria com a Clínica das Conchas

- Criar textos para divulgar formações da Clínica das Conchas no Facebook, fazendo referência ao formador e à formação

- Contribuir para outras tarefas pontuais relacionadas com o Centro de Formação

- Participar como staff em formações do centro de formação

- Receber os formandos

- Entregar e recolher questionários de satisfação
- Tirar fotos ao longo da formação
- Montar e arrumar material

Em relação à minha intervenção direcionada para o Centro de Exercício, propus-me a ganhar empatia e a sentir-me confortável com os sócios e staff, de forma a poder ajudar e ser ajudado sempre que fosse necessário. Desta forma, preparei-me para tirar dúvidas com os colegas e colaborar sempre que fosse necessário, bem como responder a pedidos dos utentes, acompanhá-los e dar feedback sempre que fosse oportuno. Motivei-me também para perceber os procedimentos de avaliação e prescrição de exercício conduzidos na Clínica das Conchas e ganhar autonomia nos mesmos.

Na minha intervenção no Centro de Formação, propus-me a entender a dinâmica em relação à divulgação de informação de forma a promover os serviços do Centro de Formação e a colaborar sempre que necessário em tarefas relacionadas com a organização de formações.

Com o estágio no Club Clínica das Conchas conto poder pôr em prática o que aprendi até agora no Mestrado em Exercício e Bem-Estar e em diversas formações, incluindo da própria Clínica das Conchas. Desta forma, espero poder ganhar mais experiência enquanto profissional e, em simultâneo, contribuir de alguma forma para o desenvolvimento e reconhecimento da Clínica das Conchas. Através da minha intervenção no Centro de Formação, espero também retirar algo de útil, ganhando experiência em técnicas e estratégias de divulgação e procedimentos relacionados.

O conceito de medicina do exercício é algo com que me identifico, pois, considero que em primeiro lugar está a saúde e, como é conhecido, o exercício é uma terapia natural que ajuda a prevenir, a controlar ou até mesmo a tratar determinadas patologias. Neste âmbito, espero também poder aprender mais sobre o exercício na vertente de medicina do exercício.

Paralelamente com o processo de estágio, foram desenvolvidos uma revisão sistemática da literatura e um artigo observacional relacionados com a incidência de lesões na prática de CrossFit.

O CrossFit é um tipo de *Extreme Conditioning Program* (ECP) que tem vindo a crescer nos últimos anos pelo mundo fora, incluindo em Portugal (Bergeron et al., 2011). A parte fundamental da estrutura da sessão de treino de CrossFit, denomidada de *Workout of the Day* (WOD), consiste geralmente em executar um conjunto de exercícios em alta intensidade, com o menor tempo possível de descanso (Glassman, 2007). Os exercícios integrados nesta metodologia de treino podem envolver movimentos usados no power lifting (eg.: peso morto), halterofilismo (eg.: clean and jerk), calisténicos (eg.: burpees ou pull-ups), ou ainda movimentos do treino cardiovascular tradicional (eg.: correr ou remar). O objetivo é terminar o WOD o mais depressa possível (AFAP – *as fast as possible*) ou realizar o maior número de repetições num determinado limite de tempo (AMRAP – *as many reps as possible*). Os WODs costumam demorar entre 10 a 30 minutos e são executados num circuito composto por vários exercícios multiarticulares. O CrossFit é considerado tanto um programa de treino como um desporto de competição, definindo-se como "*constantly varied, high-intensity, functional movement*" (Glassman, 2007).

O CrossFit tem cativado para a sua prática tanto militares como a população no geral. Uma das principais razões para se verificar este interesse geral pelo CrossFit, tem a ver com as melhorias a nível de rendimento e composição corporal que são possíveis de alcançar com este tipo de treino. Alguns estudos comprovaram que são possíveis melhorias a nível do VO_2 máximo, perda de massa gorda, ou mesmo ganhos de força (Haddock, C Poston, Heinrich, Jahnke, & Jitnarin, 2016; Smith, Sommer, Starkoff, & Devor, 2013)

No entanto, apesar de se registarem indicadores de saúde positivos, alcançáveis através da prática de CrossFit, alguns autores estudaram a sua taxa de lesão para perceber qual seria o risco-benefício da prática do CrossFit para a saúde e bem-estar dos seus praticantes (Aune & Powers, 2016; Grier, Canham-Chervak, McNulty, & Jones, 2013; Hak, Hodzovic, & Hickey, 2013; Montalvo et al., 2017; Moran, Booker, Staines, & Williams, 2017; Sprey et al., 2015; Summitt, Cotton, Kays, & Slaven, 2016; Weisenthal, Beck, Maloney, DeHaven, & Giordano, 2014).

Um estudo concluiu que a taxa de lesão no CrossFit é significativa , tendo 75 praticantes (19.4%) sofrido pelo menos uma lesão (84%) derivado da sua prática, nos últimos 6 meses (Weisenthal et al., 2014). Uma taxa de lesão de 3.1 lesões por 1000 horas foi calculada

(Hak et al., 2013). As regiões anatómicas mais afetadas são aparentemente o ombro, seguido da coluna (região lombar) (Hak et al., 2013; Weisenthal et al., 2014). 21 das 84 lesões foram no ombro (25%) e 12 foram na região lombar (14.29%) (Weisenthal et al., 2014). Weisenthal et al. (2014) descobriram também que os sinais e sintomas de lesão mais frequentes são a dor e a inflamação geral (30.8%).

Embora Hak et al. (2015) e Sprey et al. (2015) tivessem encontrado uma taxa de lesão significativa nos praticantes de CrossFit, pode-se assumir que a taxa de lesão do CrossFit é semelhante a outras modalidades: halterofilismo (3.3/1000 horas) (Calhoon & Fry, 1999), ginástica (3.1/1000 horas) (Kolt & Kirkby, 1999), ou mesmo rugby (3.0/1000 horas) (Williams, Trewartha, Kemp, & Stokes, 2013). No entanto, é claramente inferior a futebol americano (140/1000 horas) (Andresen, Hoffman, & Barton, 1989; DeLee & Farney, 1992) ou hóquei no gelo (78.4/1000 horas) (Lorentzon, Wedrèn, & Pietilä, 1988).

Quanto aos fatores de risco de lesão, não existe clara unanimidade entre os estudos atuais. Podem-se destacar potenciais fatores de risco de lesão como: praticar CrossFit há mais tempo, género masculino, pessoas mais altas, excesso de peso corporal, participação regular em competições de CrossFit ou em outras atividades físicas para além do CrossFit, ou ainda a ausência de um treinador (Aune & Powers, 2016; Grier et al., 2013; Montalvo et al., 2017; Moran et al., 2017; Sprey et al., 2015; Weisenthal et al., 2014).

Analisar as lesões associadas ao treino do CrossFit é um tema pertinente e atual, devido à escassa literatura existente até ao momento. Nenhum estudo científico foi publicado até ao momento, analisando o perfil e a incidência de lesões de praticantes de CrossFit em Portugal.

Determinou-se, então, que os objetivos deste estudo observacional são caracterizar o perfil dos praticantes de CrossFit em Portugal, entendendo o seu historial desportivo, rotina de treino e hábitos e identificar a incidência e taxa de lesões na prática de CrossFit, e a sua associação com as características demográficas, de treino e rotina. A identificação de fatores de risco de lesão permitirá elaborar estratégias de prevenção de lesões. Outro dos objetivos é perceber que regiões anatómicas são mais suscetíveis a sofrerem lesão.

Miguel Anes Soares

II. A Systematic Review of the Injury Epidemiology of CrossFit Participants

Prof. Doutor Rodrigo Ruivo

Universidade Lusófona de Humanidades e Tecnologias

Faculdade de Educação Física e Desporto

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Abstract

Objective: CrossFit is a conditioning training program that has been rising worldwide, throughout the recent years. Despite CrossFit-based workouts having demonstrated considerable fitness gains, limited evidence is available concerning the injury incidence of CrossFit practice. The aim of this review was to characterize the epidemiological profile of CrossFit participants and to identify the rate of injury and the most commonly injured body parts among these athletes.

Methods: Electronic databases were consulted (PubMed, PEDro, Medline, Proquest and Science Direct) and the following search terms were chosen to identify the published articles: "CrossFit epidemiology", "CrossFit injury" and "CrossFit injuries". Inclusion criteria included full-text articles published in English, regarding the injury incidence/rate and injured body parts of recreative or professional CrossFit participants. Articles published in the last ten years (2008-2017) were selected.

Results: 8 articles were included in this review. The main findings indicate that the injury rate of CrossFit ranges from 1.94 to 3.1 injuries per 1000 training hours and that the most commonly injured body parts in CrossFit are the shoulder and the spine/lower back.

Conclusion: CrossFit is comparable to other forms of sports or physical activities, regarding injury rates. Some strategies could be adopted in order to reduce the occurrence of injuries, such as the supervison of a qualified CrossFit coach. More scientific research is needed to validate the results showed in these reviewed articles.

Key Indexing Terms: CrossFit; Epidemiology; Injury; Injuries

Introduction

Extreme conditioning programs (ECPs) are high-volume and high-intensity training programs that frequently use "timed maximal number of repetitions with short rest periods between sets" (Bergeron et al., 2011). These conditioning programs have been attracting both military and civilian interests in the recent years, which is reinforced by scientific reports of physical fitness and performance improvements.

CrossFit is a conditioning training program that has been rising worldwide, throughout the recent years. Exercises based on power lifting, such as the deadlift, Olympic lifting, such as the clean and jerk, or bodyweight exercises, including burpees or pull-ups, together with the traditional cardio exercises, as it is the case of running or rowing, are all considered part of CrossFit workouts. The workouts, often called "Workouts of the Day" (WODs), are characterized by their explosive, high-intensity executions, with the least time of rest as possible. The main goal of the CrossFit workouts is to finish the WOD as fast as possible (AFAP) or to perform the maximum amount of repetitions (AMRAP – "as many reps as possible") in a certain time cap. The WODs usually take between 10 to 30 minutes and are performed in a circuit made of a wide variety of multi-joint exercises (Bergeron et al., 2011; Glassman, 2007). CrossFit is considered as a training program, as well as a competitive sport, defined as "constantly varied, high-intensity, functional movement" (Glassman, 2007).

The CrossFit-based workouts have demonstrated impressive fitness gains by improving maximal oxygen uptake (VO_2 max) as well as body composition (fat loss) (Smith, Sommer, Starkoff, & Devor, 2013). Another study found improved levels of cardiorespiratory fitness, endurance and strength in military personnel (Haddock, Poston, Heinrich, Jahnke, & Jitnarin, 2016).

Despite the known fitness benefits that CrossFit can offer, due to the high association balance between the ECPs and the injuries reported, the purpose of this systematic review was (a) to characterize the epidemiological profile of CrossFit participants, identifying the incidence and rate of injury and (b) to report the most commonly injured body parts among these athletes. We hypothesized that the identification of risk factors would enable

the design of effective strategies to reduce injury rates in the future. Accordingly, this review should be able to respond to pertinent questions as:

1. What is the incidence and rate of injury among CrossFit participants?

2. Which are the most commonly injured body parts in CrossFit?

Methods

Literature Search Strategy

This systematic review used the PRISMA statemant (Moher, Liberati, Tetzlaff, Altman, & PRISMA Group, 2009) and several electronic databases were consulted (PubMed, PEDro, Medline, Proquest and Science Direct). The following search terms were chosen to identify the published articles: “CrossFit epidemiology”, “CrossFit injury” and “CrossFit injuries”.

Selection Procedures

After identifying every published article, duplicated records were removed. In addition, the remaining articles were screened, and the majority were excluded according to the determined criteria. Figure 1 presents the process of identification, screening, eligibility and inclusion of studies.

Selection Criteria

Inclusion criteria included full-text articles published in English, regarding the injury incidence/rate and injured body parts of recreative or professional CrossFit participants. Articles published in the last ten years (2008-2017) were selected. Studies that did not report about injuries related to CrossFit, systematic reviews, or any case reports were excluded from this review. Experimental or Observational studies were included.

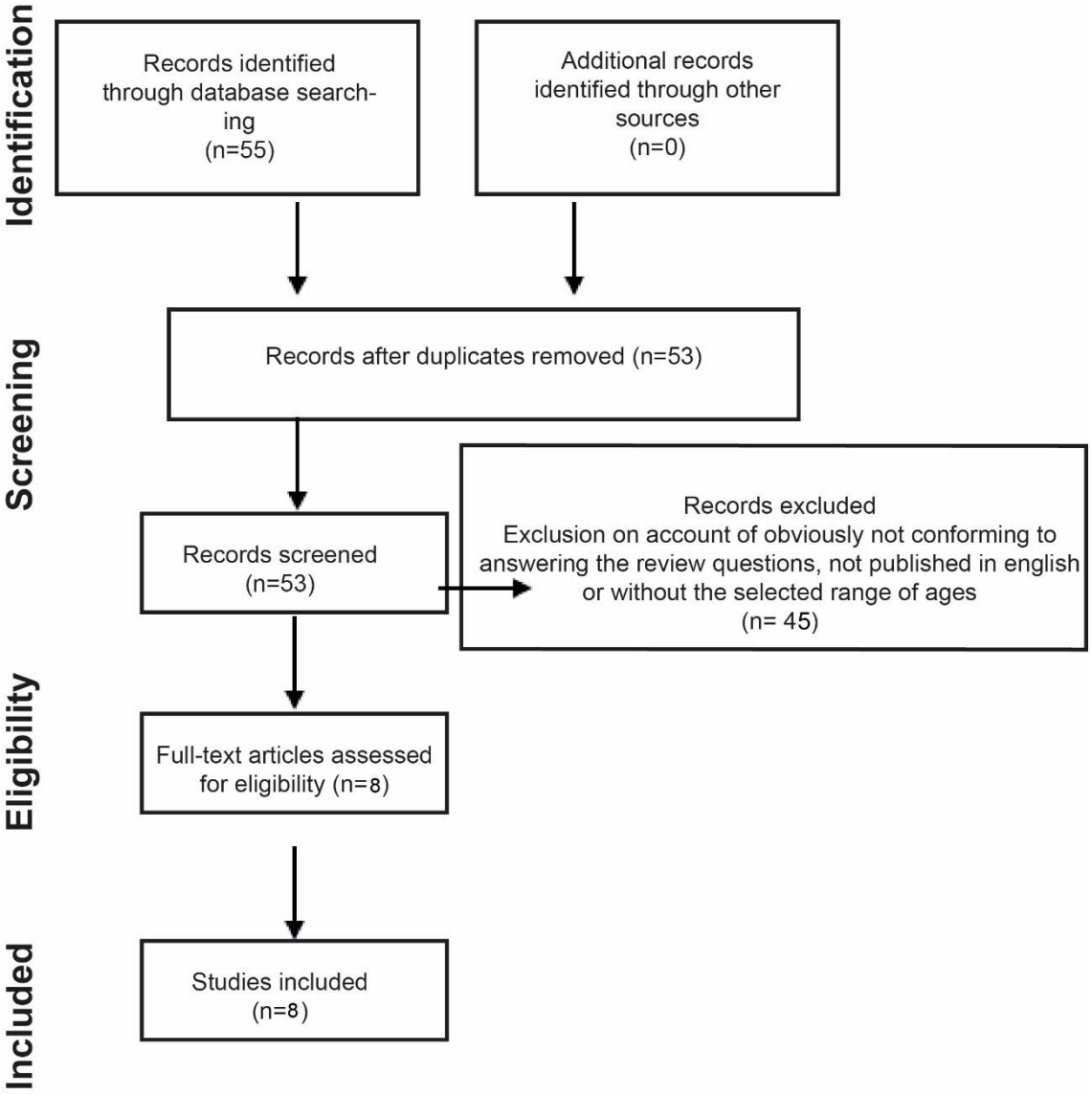

Figure 2.1. Stages of the article selection (model according to PRISMA) (Moher et al., 2009)

Quality Assessment and Level of Evidence

The Effective Public Health Practice Project (EPHPP) Quality Assessment Method or Tool, which is a scale of 6 criteria, was applied in order to evaluate the quality of each article for this systematic review (Thomas, Ciliska, Dobbins, & Micucci, 2004). Each criterion was rated as “Strong”, “Moderate”, or “Weak”. Global rating for each paper was considered as “Strong”, in case no “Weak” ratings were given, “Moderate”, if only one “Weak” rating was attributed, and “Weak”, if two or more “Weak” ratings were given.

The 6 criteria evaluated, are denominated as “Selection Bias” (A), “Study Design” (B), “Confounders” (C), “Blinding” (D), “Data Collection Methods” (E) and “Withdrawals and Drop-Outs” (F).

For “Selection Bias”, a rating of “Strong” was defined as: “The selected individuals are very likely to be representative of the target population (Q1 is 1) and there is greater than 80% participation (Q2 is 1)”. A rating of “Moderate” was defined as: “The selected individuals are at least somewhat likely to be representative of the target population (Q1 is 1 or 2); and there is 60 – 79% participation (Q2 is 2). “Moderate” may also be assigned if Q1 is 1 or 2 and Q2 is 5 (can´t tell)”. A rating of “Weak” was defined as: “The selected individuals are not likely to be representative of the target population (Q1 is 3); or there is less than 60% participation (Q2 is 3) or selection is not described (Q1 is 4); and the level of participation is not described (Q2 is 5)”.

For “Study Design”, a rating of “Strong” was defined as: “will be assigned to those articles that described RCTs and CCTs”. A rating of “Moderate” was defined as: “will be assigned to those that described a cohort analytic study, a case control study, a cohort design, or an interrupted time series”. A rating of “Weak” was defined as: “will be assigned to those that used any other method or did not state the method used”.

For “Confounders”, a rating of “Strong” was defined as: “will be assigned to those articles that controlled for at least 80% of relevant confounders (Q1 is 2); or (Q2 is 1)”. A rating of “Moderate” was defined as: “will be given to those studies that controlled for 60 – 79% of relevant confounders (Q1 is 1) and (Q2 is 2)”. A rating of “Weak” was defined as: “will be assigned when less than 60% of relevant confounders were controlled (Q1 is 1) and (Q2 is 3) or control of confounders was not described (Q1 is 3) and (Q2 is 4)”.

For “Blinding”, a rating of “Strong” was defined as: “The outcome assessor is not aware of the intervention status of participants (Q1 is 2); and the study participants are not aware of the research question (Q2 is 2)”. A rating of “Moderate” was defined as: “The outcome assessor is not aware of the intervention status of participants (Q1 is 2); or the study participants are not aware of the research question (Q2 is 2); or blinding is not described (Q1 is 3 and Q2 is 3)”. A rating of “Weak” was defined as: “The outcome assessor is aware of the intervention status of participants (Q1 is 1); and the study participants are aware of the research question (Q2 is 1)”.

For “Data Collection Methods”, a rating of “Strong” was defined as: “The data collection tools have been shown to be valid (Q1 is 1); and the data collection tools have been shown to be reliable (Q2 is 1)”. A rating of “Moderate” was defined as: “The data collection tools have been shown to be valid (Q1 is 1); and the data collection tools have not been shown to be reliable (Q2 is 2) or reliability is not described (Q2 is 3)”. A rating of “Weak” was defined as: “The data collection tools have not been shown to be valid (Q1 is 2) or both reliability and validity are not described (Q1 is 3 and Q2 is 3)”.

For “Withdrawals and Drop-Outs”, a rating of “Strong” was defined as: “will be assigned when the follow-up rate is 80% or greater (Q2 is 1)”. A rating of “Moderate” was defined as: “will be assigned when the follow-up rate is 60 – 79% (Q2 is 2) OR Q2 is 5 (N/A)”. A rating of “Weak” was defined as: “will be assigned when a follow-up rate is less than 60% (Q2 is 3) or if the withdrawals and drop-outs were not described (Q2 is 4)”.

Results

Search Results

Fifty-five records were identified through database searching, remaining 53 after removal of duplicates. Out of the remaining 53 records, 45 were excluded, due to not match the inclusion criteria. A total of 8 articles were assessed for eligibility and were included in this systematic review. Figure 1 presents the article selection process in its specific stages and the respective number of recovered articles during each phase. Table 1 shows an overview of each study.

Critical Appraisal of Methodological Quality

The methodological quality for eligible articles was considered overall as "Weak" (Table 2**)**. This rating can mainly be justified, because of the predominant cross-sectional study design utilised by the majority of the evaluated studies, affecting negatively the criteria "Study Design" and "Blinding". The criterion "Withdrawals and Drop-Outs" was only applicable to Moran et al. (2017), since this was the only paper which utilised a cohort study design. Control of "Confounders" was not described by any study, so every study was rated as "Weak". "Selection Bias" was the overall highest rated criterion, being every study evaluated as "Moderate". This was achieved, due to the subjects of every study being "very likely to be representative of the target population". Grier et al. (2013) stands out from the remaining studies, when considering the criterion "Data Collection Methods". This paper was rated as "Strong", on account of having implemented a control group, and therefore randomization, achieving not only reliability, but also validity. The other studies did not implement a control group, and thereby could only achieve reliability via distribution of a survey. This differentiation permited Grier et al. (2013) to still achieve the global rating of "Moderate".

Table 2.1. Characteristics of included studies

Author(s)	Aims	Study Design	Sample Size	Age (years)	Injury Incidence/Rate (number of injuries per 1000 training hours)	Injury Location	Conclusions
Grier et al. (2013)	To examine physical training, fitness, and injury rate, and to identify injury risk factors in a light infantry brigade beginning a new physical training program.	Cross-sectional – 4 Months	1032 ECPs (including CrossFit) Soldiers (950 Males; 82 Females)	26.8 ± 5.9	12%		Injury rates were similar between groups of soldiers who participated in ECPs and groups of soldiers who participated in traditional army physical training.
Hak et al. (2013)	To define the risk of injury during CrossFit workout participation and define pattern of injuries sustained.	Cross-sectional	132 CrossFitters (93 Males; 39 Females)	32.3 (19 - 57)	73.5%; 3.1/1000	Shoulder (31.8%), followed by spine	CrossFit injury rates were similar to those of other recreational fitness activities.
Weisenthal et al. (2014)	To establish an injury rate among CrossFit athletes and identify associations between injury rates and demographic categories, gym characteristics and athletic abilities.	Cross-sectional – 6 Months	386 "athlete-level" CrossFitters (231 Males; 150 Females)	18-69	19.4%; 2.4/1000	Shoulder (25%), followed by spine (14.3%)	Injury rates in CrossFit are comparable with injury rates of other recreational or competitive physical activities, with a similar injury profile of gymnasts, Olympic weight lifters and power lifters.
Sprey et al. (2015)	To evaluate the profile, sports history, training routine, and prevalence of injuries of CrossFit participants.	Cross-sectional	566 CrossFitters (323 Males; 243 Females/382 non-competitors; 185 competitors)	31.3 ± 7	31%		CrossFit injury rates are similar to those of other sports, such as weight-lifting or running, which have an injury rate lower than football.
Aune & Powers (2016)	To compare the injury rate between an ECP and regular weightlifting and identify the most frequent injury location.	Cross-sectional	247 ECP Participants (139 Males; 108 Females)	38.9 ± 8.9	34%; 2.71/1000	Shoulder (15.4%), followed by trunk, back, head or neck, and leg or knee (11.7%)	The injury rate of an ECP was similar to weightlifting and most other recreational activities. The shoulder was the most injured body part and new athletes are more likely to sustain an injury.
Summitt et al. (2016)	Evaluate the risk for injury in the shoulder region during CrossFit training and compare injury rates between CrossFit and other sports of similar intensity.	Cross-sectional – 6 Months	187 CrossFitters	18-31	23.5%; 1.94/1000 (only shoulder inuries)		The prevalence of shoulder injuries during CrossFit training is comparable to other types of recreational exercise.
Montalvo et al. (2017)	To examine injury epidemiology and injury risk factors in CrossFit athletes.	Cross-sectional – 6 Months	191 CrossFitters (94 Males; 97 Females/126 non-competitors; 65 competitors)	31.69 ± 9.40	26.2%; 2.3/1000	Shoulder (22.6%), followed by knee (16.1%)	Injury incidence was similar to sports, such as gymnastics and powerlifting. Injury occurrence may be related with an increase in weekly CrossFit participation and training hours.
Moran et al. (2017)	To evaluate the level of injury risk associated with CrossFit training, and examine the influence of some potential risk factors.	Cohort – 3 Months	117 CrossFitters (66 Males; 51 Females)	35 ± 10	12.8%; 2.1/1000	Spine (33.3%), followed by knee (20%)	CrossFit´s injury rate is comparable to other forms of recreational fitness activities. Previous injury and gender are risk factors for injury.

Table 2.2. Methodological quality ratings for each study

Author(s)	Global Rating	A - Selection Bias	B – Study Design	C - Confounders	D - Blinding	E - Data Collection Methods	F - Withdrawals and Drop-Outs
Grier et al. (2013)	**Moderate**	**Moderate**	**Weak**	**Weak**	**Weak**	**Strong**	Not Applicable
Hak et al. (2013)	**Weak**	**Moderate**	**Weak**	**Weak**	**Weak**	**Weak**	Not Applicable
Weisenthal et al. (2014)	**Weak**	**Moderate**	**Weak**	**Weak**	**Weak**	**Weak**	Not Applicable
Sprey et al. (2015)	**Weak**	**Moderate**	**Weak**	**Weak**	**Weak**	**Weak**	Not Applicable
Aune & Powers (2016)	**Weak**	**Moderate**	**Weak**	**Weak**	**Weak**	**Weak**	Not Applicable
Summitt et al. (2016)	**Weak**	**Moderate**	**Weak**	**Weak**	**Weak**	**Weak**	Not Applicable
Montalvo et al. (2017)	**Weak**	**Moderate**	**Weak**	**Weak**	**Weak**	**Weak**	Not Applicable
Moran et al. (2017)	**Weak**	**Moderate**	**Weak**	**Weak**	**Weak**	**Weak**	**Weak**

Study Characteristics

The eight studies covered in this systematic review share the similarity of trying to assess the injury risk and epidemiology related to Extreme Conditioning Programs, mostly CrossFit (Table 1).

All of these studies used a questionnaire to gather information concerning the characteristics of each CrossFit practitioner, with the majority applying a cross-sectional study design (Aune & Powers, 2016; Grier, Canham-Chervak, McNulty, & Jones, 2013; Hak, Hodzovic, & Hickey, 2013; Montalvo et al., 2017; Sprey et al., 2015; Summitt, Cotton, Kays, & Slaven, 2016; Weisenthal, Beck, Maloney, DeHaven, & Giordano, 2014). Only one study used a cohort study design, in which a survey was applied at the beginning, as well as Functional Movement Screen Tests (FMS), and any occured injuries were monitored during a specific time period (Moran, Booker, Staines, & Williams, 2017). Some studies defined a specific period of time in order to determine injury occurrence, before responding to the survey. The period of time included 3 months (Moran et al., 2017), 4 months (Grier et al., 2013) and 6 months (Montalvo et al., 2017; Summitt et al., 2016; Weisenthal et al., 2014).

Most of the cited studies were conducted in the United States (Aune & Powers, 2016; Grier et al., 2013; Montalvo et al., 2017; Summitt et al., 2016; Weisenthal et al., 2014), 2 were conducted in the United Kingdom (Hak et al., 2013; Moran et al., 2017) and only 1 in Brazil (Sprey et al., 2015).

All of the mentioned studies, with the exception of Grier et al. (2013) and Weisenthal et al. (2014), involved the participation of CrossFit athletes of any level. Grier et al. (2013) involved the participation of a light infantry brigade, while Weisenthal et al. (2014) involved the participation of "athlete-level" subjects. Only two studies mentioned the amount of athletes that were non-competitors and competitors (Montalvo et al., 2017; Sprey et al., 2015). The results showed that competitors tend to suffer more injuries, with an injury incidence of 40%, and 19.05% for non-competitors (Montalvo et al., 2017), as well as 38.9% and 27.5% respectively (Sprey et al., 2015).

CrossFit injury incidence percentage ranged from 12% (Grier et al., 2013) to 73.5% (Hak et al., 2013), passing by 12.8% (Moran et al., 2017), 19.4% (Weisenthal et al., 2014), 23.5% (only shoulder injuries) (Summitt et al., 2016), 26.2% (Montalvo et al., 2017), 31% (Sprey et al., 2015) and 34% (Aune & Powers, 2016). CrossFit injury rates ranged from 1.94 (Summitt et al., 2016) to 3.1 (Hak et al., 2013) injuries per 1000 training hours, passing by 2.1 (Moran et al., 2017), 2.3 (Montalvo et al., 2017), 2.4 (Weisenthal et al., 2014) and 2.71 (Aune & Powers, 2016). Out of these 6 studies, Summit et al. (2016) analysed exclusively injuries in the shoulder region (23.5%). With the exception of this study, 6 studies identified the most commonly injured body sites (Aune & Powers, 2016; Hak et al., 2013; Montalvo et al., 2017; Moran et al., 2017; Weisenthal et al., 2014). The majority of injuries occurred in the shoulder region, with the following percentages: 15.4% (Aune & Powers, 2016), 22.6% (Montalvo et al., 2017), 25% (Weisenthal et al., 2014) and 31.8% (Hak et al., 2013), while 1 study found more injuries in the spine/lower back (Moran et al., 2017).

Discussion

Literature regarding injuries related to CrossFit training and overall ECPs is currently limited. Therefore, this review tried to gather information from every available article. This systematic review analysed 8 currently published articles, found in the above mentioned electronic databases, related to injuries in CrossFit training, focusing on the injury incidence/rate and the most prevalent injured body parts.

Some studies did not use CrossFit exclusively as an intervention training program, instead they mentioned having applied ECPs (Aune & Powers, 2016; Grier et al., 2013). Although not every ECP follows exactly the same training methodology or applies the same exercises, overall they share very similar characteristics, like high intensity movements in a short duration workout (Bergeron et al., 2011).

Despite Crossfit has shown to improve physical fitness, injuries may occur due to a high number of repetitions per exercise, high loads and high-speed executions. According to literature, the rate of CrossFit injuries is similar to or even lower than other sports, such as Olympic weightlifting, gymnastics, rugby, or running. The injury rate of CrossFit (1.94 - 3.1/1000 athlete training hours) is comparable to the rate of Olympic weightlifting (3.3 per 1000 training hours) (Calhoon & Fry, 1999), gymnastics (3.1 per 1000 training hours) (Kolt & Kirkby, 1999), or even rugby (3 per 1000 training hours) (Williams, Trewartha, Kemp, & Stokes, 2013). CrossFit has a significant lower injury rate than American football (140 per 1000 training hours) (Andresen, Hoffman, & Barton, 1989; DeLee & Farney, 1992) or ice hockey (78.4 per 1000 training hours) (Lorentzon, Wedrèn, & Pietilä, 1988). Runners have a much higher annual injury incidence (74%) (Daoud et al., 2012) than CrossFit (19.4%) (Weisenthal et al., 2014).

Apparently, competitors tend to be injured more often than non-competitors, however it can be due to a higher length of CrossFit practice and more overall training hours (Montalvo et al., 2017; Sprey et al., 2015).

The high shoulder injury incidence (15.4% - 31.8%) may be due to the gymnastic, Olympic and power lifting movements incorporated in CrossFit training, since other studies reported the shoulder as one of the most injured body parts in athletes of these modalities (Caine & Nassar, 2005; Raske & Norlin, 2002). Overhead movements increase

the risk of injury in the shoulder, due to extreme positions of hyperflexion, abduction and internal rotation (Gross, Brenner, Esformes, & Sonzogni, 1993; Neviaser, 1991). In addition to this, the use of high repetitions, high speed and heavy weights can lead to poor form, which contributes to a higher risk of injury. The snatch is an example of an Olympic style exercise that can put the shoulder in a risk position for injury, when performed with poor form (Hak et al., 2013). Another commonly used exercise in CrossFit is the the "kipping" pull-up, a gymnastic movement, which, due to the kipping motion, puts the shoulder joint in a dangerous position, as seen in the snatch (Hak et al., 2013).

Spine injuries, specially in the lower back, are also frequent among CrossFitters, with an injury incidence of 33.3% (Moran et al., 2017). Powerlifting and weight lifting movements might be the main cause for injuries in this region, since it is a common injured body part of these athletes (Raske & Norlin, 2002). Spine injuries are likely to occure, due to a loss of form, enhanced with fatigue. This happens, because of the metabolic characteristics of CrossFit: high repetitions, high loads and high speed executions. Some of the exercises that are more likely to predispose for spinal injuries include the deadlift or the clean (Hak et al., 2013).

Taking into account these results, some strategies could be followed in order to reduce the incidence of injuries related to CrossFit. Focusing in performing the exercises with good form, prior to implementing high intensity, developing a strong core and rotator cuff, can reduce injuries (Kibler, Press, & Sciascia, 2006; Lee, Kim, O'Driscoll, Morrey, & An, 2000; Niederbracht, Shim, Sloniger, Paternostro-Bayles, & Short, 2008). Programming the WODs, limiting the amount of weekly and daily exercises that require the shoulder and spinal joints, as well as attending to the individualisation of each athlete, can be an important factor in limiting the number of injuries. Another important aspect in order to avoid injuries is the supervision of a qualified CrossFit coach (Weisenthal et al., 2014). This systematic review did not report about the most common nature of injuries related to CrossFit. Identifying the prevalent injured body parts is important, however it is also crucial to determine the nature of the injuries in order to enable effective injury prevention programs, as well as to possibilitate healthcare professionals to develop the adequated measures of reabilitation.

Two studies used samples with specific characteristics compared to the others (Grier et al., 2013; Weisenthal et al., 2014). Grier et al. (2013) used a light infantry brigade as sample, while Weisenthal et al. (2014) used more experienced athletes. Both studies

reported a lower injury incidence comparing to the majority of the studies (12% and 19.4% respectively) and both of them used a large sample, being only exceeded by Sprey et al. (2015). The fact that experienced athletes and soldiers are more likely to be more physically prepared and have more technique, might contribute to these lower injury incidence numbers.

Considering the time restriction applied for injury analysis, 3 studies did not implement a specific time restriction at all (Aune & Powers, 2016; Hak et al., 2013; Sprey et al., 2015). These studies indicate an injury incidence from 31 to 73.5%. Two studies implemented a time restriction of 3 or 4 months, whose results were 12-13% (Grier et al., 2013; Moran et al., 2017). Lastly, 3 studies applied exactly 6 months of time restriction to assess the injury incidence of CrossFit participants (Montalvo et al., 2017; Summitt et al., 2016; Weisenthal et al., 2014). The results varied between 19.4 and 26.2%. As it can be noticed, the studies that did not implement a specific time restriction to assess injury occurrence show the highest variation of injury percentage.

The eight studies included in this review used different criteria to identify the presence of an injury. Two studies do not give a specific criteria for what an injury consists of (Grier et al., 2013; Summitt et al., 2016). These studies mention the nature of the occurred injuries, however they do not specify if the injured subjects had to change their training routine. The injury incidence of these studies varies from 12 to 23.5%. On the other hand, Hak et al (2013) considers that an individual is injured if he/she is prevented from training, working or competing, or has had an injury that requires surgery. The injury incidence of this study was 73.5%. Moran et al. (2017) gives a short definition for injury, considering: any physical complaint preventing a subject from participating in CrossFit. The injury incidence of this study was 12.8%. The remaining studies use 3 different criteria to define injury (Aune & Powers, 2016; Montalvo et al., 2017; Sprey et al., 2015; Weisenthal et al., 2014). A subject is considered injured if (a) he/she is prevented from following any kind of exercise training routine for more than 1 week, (b) any forced modification of the normal training routine for more than 2 weeks, or (c) any physical complaint that justifies a visit to a health professional. Despite sharing the same injury criteria, 2 studies do not quantify the number of weeks for the first and second injury criterion (Aune & Powers, 2016; Montalvo et al., 2017). The injury incidence of these studies varies from 19.4 to 34%.

The analysis of these studies reveals some limitations. An important aspect is the definition of injury given by distinct studies. For example, while Weisenthal et al. (2014) considers 3 specific criteria for what an injury consists, other articles, such as the study from Moran et al. (2017), use a different definition. The fact that not every study follows the same injury criteria, can significantly influence the number of injured participants reported in each study. Another important aspect that can influence the injury incidence is the time restriction that is applied (inclusively in some cases it is not applied at all), in order to quantify the number of occurred cases of injury. Sprey et al. (2015) show that CrossFit athletes with more than 6 months of practice have "significantly higher injury rates than those who practiced for less than 6 months (22.9%)" (Sprey et al., 2015). In the study of Weisenthal et al. (2014), injury incidence is restricted to the 6 months prior to responding to the survey, while Hak et al. (2013) do not restrict injury incidence to a specific time period. Lastly, only two studies (Montalvo et al., 2017; Sprey et al., 2015) indicate the number of athletes that are competitors and non-competitors, which is a factor that could also influence injury occurrence.

More studies are needed, using the same criteria for injury definition and analyzing a specific time period, in order to enable reliability and coherence. There are only 2 studies that mention the number of CrossFit competitors and non-competitors (Montalvo et al., 2017; Sprey et al., 2015). Furthermore, only two studies (Grier et al., 2013; Weisenthal et al., 2014) specify the level of the participants. Grier et al. (2013) used a light infantry brigade as sample, while Weisenthal et al. (2014) characterize the subjects as being "athlete-level". Future research is needed, involving the analysis of injuries present in competitors/elite athletes separately from regular athletes/non-competitors, a factor that could significantly influence injury characteristics. More studies are required, involving CrossFit participants all around the world, since only Hak et al. (2013) included international CrossFit athletes beyond local participants. Current literature used mainly American population as sample.

Conclusion

The results of this review suggest that the injury incidence of CrossFit athletes ranges from 12% to 73.5%, and the injury rate for 1000 training hours ranges between 1.94 to 3.1. These values show that CrossFit is comparable to other forms of sports or physical activities, regarding injury rates.

CrossFit participants tend to suffer from injuries mostly in the shoulder region, followed by the lower back, probably due to the gymnastic, Olympic and power lifting movements commonly included in this training methodology.

Some strategies could be adopted in order to reduce the occurrence of injuries, such as the constant supervison of a qualified CrossFit coach.

Injuries in CrossFit is a recent topic in the current literature and therefore more scientific research is needed to validate the results showed in these reviewed articles.

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Miguel Anes Soares

III. An Epidemiological Profile of CrossFit Participants in Portugal

Prof. Doutor Rodrigo Ruivo

Universidade Lusófona de Humanidades e Tecnologias

Faculdade de Educação Física e Desporto

Lisboa

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Abstract

Background: CrossFit is a conditioning training program that has been rising worldwide, throughout the recent years. Despite CrossFit-based workouts having demonstrated considerable fitness gains, limited evidence is available concerning the injury incidence of CrossFit practice.

Purpose: To characterize the epidemiological profile of CrossFit participants in Portugal and to identify the injury rate during this practice and its patterns of association with participants´ demographic, training and routine characteristics.

Study Design: Cross-sectional study.

Methods: A survey, based on another study (Weisenthal, Beck, Maloney, DeHaven, & Giordano, 2014), was sent via online to CrossFit participants, CrossFit gyms and people who knew any contacts of CrossFit participants or gyms, in order to share the questionnaire with them. Inclusion criteria included having had at least six months of cross-training experience and training at any CrossFit gym exclusively in Portugal. Answers were collected from various regions in Portugal and were received between the 26th of January and the 11th of March 2017. Data analysis was performed using Chi-Square or Fisher´s Exact Tests and independent T-Tests.

Results: A total of 89 responses were approved (63 males (70.79%) and 26 females (29.21%)). An injury incidence of 24.72% was registered (22/89), resulting in a rate of 2.76 injuries per 1000 athlete training hours. The most commonly injured body parts were the shoulder, 34.48% (10/29), followed by the spine, 24.14% (7/29). The most common nature of injury was general inflammation and pain (68%) and joint overuse (24%). A significant difference was found across age ($n = 73$; $p = 0.047$), showing that younger paticipants were more likely to suffer an injury, and higher weekly CrossFit training frequency was linked to injury ($n = 89$; $p = 0.023$).

Conclusion: CrossFit is comparable to other forms of sports or physical activities, regarding injury rates. Some strategies could be adopted in order to reduce the occurrence of injuries, such as the supervison of a qualified CrossFit coach. More scientific research is needed to validate the results showed in our study.

Key Indexing Terms: CrossFit; Injury; Risk factors; Epidemiology

Introduction

Extreme conditioning programs (ECPs) are high-volume and high-intensity training programs that frequently use "timed maximal number of repetitions with short rest periods between sets" (Bergeron et al., 2011). These conditioning programs have been attracting both military and civilian interests in the recent years, which is reinforced by scientific reports of physical fitness and performance improvements.

CrossFit is a conditioning training program that has been rising worldwide, throughout the recent years, including Portugal. Exercises based on power lifting, like the deadlift, or based on Olympic lifting, such as the clean and jerk, or bodyweight exercises, as example of burpees or pull ups, together with traditional cardio exercises, like running or rowing, are all included in CrossFit workouts. The workouts, often called "Workouts of the Day" (WODs), are characterized by their explosive, high-intensity executions, with the least time of rest as possible. The main goal of the CrossFit workouts is to finish the WOD as fast as possible (AFAP) or to perform the maximum amount of repetitions (AMRAP – "as many reps as possible") in a certain time cap. The WODs usually take between 10 to 30 minutes and are performed in a circuit made of a wide variety of multi-joint exercises (Bergeron et al., 2011; Glassman, 2007). CrossFit is considered as a training program, as well as a competitive sport, defined as "constantly varied, high-intensity, functional movement" (Glassman, 2007).

The CrossFit-based workouts have demonstrated impressive fitness gains by improving maximal oxygen uptake (VO_2 max) as well as body composition (fat loss) (Smith, Sommer, Starkoff, & Devor, 203). Another study found improved levels of cardiorespiratory fitness, endurance and strength in military personnel (Haddock, Poston, Heinrich, Jahnke, & Jitnarin, 2016).

Despite Crossfit and other similar conditioning programs have shown to improve physical fitness, because they are caractherized by a high number of repetitions per exercise, high loads and high-speed executions, some authors have studied their association with the injury rate (Aune & Powers, 2016; Grier, Canham-Chervak, McNulty, & Jones, 2013; Hak, Hodzovic, & Hickey, 2013; Montalvo et al., 2017; Moran, Booker, Staines, &

Williams, 2017; Sprey et al., 2015; Summitt, Cotton, Kays, & Slaven, 2016; Weisenthal, Beck, Maloney, DeHaven, & Giordano, 2014).

A study concluded that the injury rate was significant among CrossFitters, having 75 participants (19.4%) suffered at least one injury (84%) resulting from a CrossFit workout in the last 6 months (Weisenthal et al., 2014). An injury rate of 3.1 injuries per 1000 hours was determined (Hak, Hodzovic, & Hickey, 2013). The most commonly injured body parts were the shoulder, followed by the low back (Hak et al., 2013; Weisenthal et al., 2014). Out of 84 injuries, 21 were shoulder (25%) and 12 were low back (14.29%) injuries (Weisenthal et al., 2014). Weisenthal et al. (2014) also found that the most frequent injury diagnose was general inflammation and pain (30.8%).

Although Hak et al. (2015) and Sprey et al. (2015) found a significant injury rate among CrossFit participants, this rate is still comparable to other sports: Olympic weightlifting (3.3/1000 athlete training hours) (Calhoon & Fry, 1999), gymnastics (3.1/1000 athlete training hours) (Kolt & Kirkby, 1999), or even rugby (3.0/1000 athlete training hours) (Williams, Trewartha, Kemp, & Stokes, 2013). In addition, CrossFit injury rates seem to be significantly lower than American football (140/1000 training hours) (Andresen, Hoffman, & Barton, 1989; DeLee & Farney, 1992) or ice hockey (78.4/1000 training hours) (Lorentzon, Wedrèn, & Pietilä, 1988).

With regard to potential risk factors for injury in CrossFit training, different results were reported among currently published studies. Some studies found that higher length of participation in CrossFit, male gender, taller people, being overweight, regular participation in CrossFit competitions and other physical activities outside CrossFit, or trainer absence, could be potential risk factors for injury (Aune & Powers, 2016; Grier, Canham-Chervak, McNulty, & Jones, 2013; Montalvo et al., 2017; Moran, Booker, Staines, & Williams, 2017; Sprey et al., 2015; Weisenthal et al., 2014).

There are not currently any studies published regarding the profile of CrossFit participants in Portugal and the incidence of injury among these athletes. Therefore, the purposes of this study are:

1. To characterize the profile of athletes or regular members of CrossFit fitness centres and gyms in Portugal and their history of sports activities, training routine, and habits.

2. To identify the incidence and rate of injuries during this practice and its patterns of association with participants´ demographic, training and routine characteristics. The identification of risk factors enables the design of effective strategies to reduce injury rates.

3. To determine the most commonly injured body parts in CrossFit.

The hypotheses of this study are:

1. The incidence of injuries and risk factors of Portugal´s CrossFit participants is similar to the ones of other countries.

2. CrossFit´s injury incidence and rate is higher than other strength sports, such as Olympic weightlifting.

3. The most commonly injured body parts of CrossFit participants are the shoulder, followed by the lower back (Hak, Hodzovik, & Hickey, 2015; Weisenthal et al., 2014).

Methods

General Design

This was a cross-sectional study, in which data were collected from January to March 2017 via an online survey (https://goo.gl/forms/fGX5P5ZiHx7hV5mr2). Data collection and management were done using the web-based application "Google Drive", with which it was possible to reach CrossFit participants, easily, in Portugal. The participants had to answer the questions and click on the sending link. CrossFit participants with at least six months of cross-training experience were selected, to ensure they had enough training time in the modality, as Sprey et al. (2015) concluded that athletes with more than 6 months of CrossFit practice suffered significantly more injuries. Only participants from Portugal´s CrossFit gyms were included.

Survey Development

The survey was developed from November 2016 to January 2017. It was created based on the survey applied in the study "Injury Rate and Patterns Among CrossFit Athletes" (Weisenthal et al., 2014). The purpose of the survey was to access information linked to the profile of athletes or regular members of CrossFit fitness centres and gyms in Portugal and their history of sports activities, training routine, and habits. The other purpose was to identify the incidence of injuries during this practice and the patterns of association between the training characteristics, routine, and incidence of injuries. After its development, the survey was modified based on feedback given by some readers, to ensure the questions were all perceptible. The definition used for "injury" was based on the three-fold injury criteria applied by Weisenthal et al. (2014):

1. Total removal from CrossFit training and other outside routine physical activities for more than 1 week

2. Modification of normal training activities in duration, intensity, or mode for more than 2 weeks

3. Any physical complaint severe enough to warrant a visit to a health professional

Before responding to the survey, participants were informed of the purpose, terms and conditions of the survey, and agreed that all responses would remain anonymous and the participation in this study was voluntary.

Data Collection

The survey was sent via online to CrossFit participants, CrossFit gyms and people who knew any contacts of CrossFit participants or gyms, in order to share the survey with them. This survey was also shared with a portuguese CrossFit Facebook group. Although the most common city involved was Lisbon, answers were collected from various regions in Portugal and were received between the 26th of January and the 11th of March 2017.

All participants selected had at least six months of cross-training experience and trained at any CrossFit gym exclusively in Portugal. Sprey et al. (2015) show that CrossFit athletes with more than 6 months of practice have "significantly higher injury rates than those who practiced for less than 6 months (22.9%)".

The survey applied included information regarding the profile of the CrossFit participants, such as age, sex, weekly frequency of CrossFit training sessions and training routines. It also reported about the injured body parts and the incidence and nature of injuries occurred in the previous 6 months before responding to the survey. This study focused on identifying the incidence of injuries during this practice and its patterns of association with participants´ demographic, training and routine characteristics.

Data Analysis

Data analysis was performed using "IBM SPSS Statistics" software, version 20 (IBM Corporation, Armonk, NY). Descriptive statistics (frequencies, means and standard deviations) were performed to assess the participants´ profile and their history of sports activities, training routine, and habits. In addition, the injury occurrence related to CrossFit was identified, as well as various charcteristics surrounding each reported injury.

Inferential statistics were performed in order to determine patterns of association between injury incidence and participants´ demographic, training, and routine characteristics. In

order to compare uninjured and injured athletes, Chi-Square or Fisher´s Exact Tests and independent T-Tests were applied to evaluate the association between categorical variables and continuous variables, respectively. Injury incidence ((number of injured athletes/total number of athletes) x 100) and rate (injuries/1000 training hours) were calculated, as well as the percentage of injuries per body part ((number of injuries per body part/total number of injuries in every body part) x 100). The calculation of the injury rate was achieved by estimating the number of athlete training hours in the preceding six months. This was obtained by the sum of all athletes´ weekly training hours (frequency x duration). The training duration was reported in time intervals of 15 minutes, in which half of the time interval given was considered for the calculation. "Total weekly athlete training hours reported were multiplied by 26, the number of weeks in six months. Rate was then converted to number of injuries/1000 athlete training hours" (Montalvo et al., 2017). All statistical tests were 2-tailed or 2-sided and a p-value less than 0.05 was considered to be statistically significant.

Results

Demographics/Gym Characteristics

There were 109 responses received and a total of 20 responses were discarded. Nineteen responses were discarded due to incomplete completion of the questionnaire, meaning leaving more than one empty answer, and 1 response was discarded due to the participant training in a CrossFit gym outside of Portugal. 89 responses were approved (63 males (70.79%) and 26 females (29.21%)), which met the inclusion criteria of having more than 6 months of CrossFit practice and training in a CrossFit gym in Portugal. Every reported injury that occurred more than 6 months prior to answering to the survey was excluded. The participants, aged between 21 and 49 years old (31.79 years old ± 6.22), were from 44 different CrossFit gyms in Portugal. In total, 14 out of the 18 Portugal´s districts were involved, with Lisbon containing the majority of the participants (55.1%), followed by Beja (11.2%) and Porto (10.1%). The participants had an average body mass of 74.16kg ± 12.04, an average height of 1.72m ± 0.11 and an average fat mass of 18.39% ± 8.76. The most common reasons for practicing CrossFit were health and well-being (78.7%), increasing strength (43.8%) and improvement of cardiorespiratory fitness (41.6%). The majority of the athletes were involved in CrossFit training for 6 months to a year (30.3%), had a weekly CrossFit training frequency of about 5 days (32.6%), with an average training session duration of 45 to 60 minutes (42.7%), and took 2 rest days per week from any type of workout (41.6%). Fifty two participants (58.4%) mentioned practicing any other physical activity beyond CrossFit, being running (30.3%) and traditional bodybuilding (19.1%) the most common ones. Before starting CrossFit, 8 out of 89 participants (8.99%) did not practice any physical activity, while 81 (91%) mentioned having practiced any other type of physical activity, being once again traditional bodybuilding (50.6%) and running (29.2%), along with football (20.2%), the most frequent ones. Twelve out of 89 athletes (13.5%) were usual CrossFit competitors, of which 5 (41.67%) were usually ranked in the top 10 classificatory places. In relation to the warm-up, the 89 athletes used WOD specific exercises/moves (80.9%), whole body exercises, such as running or rowing (69.7%), dynamic stretches (53.9%), or progressive warm-up up to training load (51.7%). Twenty nine participants (32.6%) claimed that the respective CrossFit gyms required a minimum training period for beginners. In relation

to the questions concerning the trainers´ interventions, 88 athletes (98.9%) reported that coaches were aware of the participant´s exercise limitations or were available to help him/her before starting the WOD, and 86 (96.6%) reported that, during training, there was always a coach present who was constantly alert and ready to intervene, in order to correct the athletes´ form.

Injury Rate by Demographics/Gym Characteristics

Twenty two participants (24.72%) reported having experienced at least 1 injury due to CrossFit training in the previous 6 months. Out of these participants, 19 reported being injured once (86.36%), while 3 were injured twice (13.64%). Taking into account the 29 injured body parts of the 89 athletes and the calculated duration of 10494,12 CrossFit training hours in the previous 6 months, the overall injury rate resulted in 2.76/1000 athlete training hours. Both CrossFit non-competitors (19/77) and competitors (3/12) registered an injury incidence of 13-14% in the preceding 6 months (Table 1). For CrossFit non-competitors the injury rate was 3.1/1000 athlete training hours, while competitors registered a lower injury rate of 1.42/1000.

No significant difference was found for injury based on height ($n = 89$; $p = 0.314$), body mass ($n = 89$; $p = 0.605$), nor fat mass ($n = 66$; $p = 0.903$) (Table 2). However, a significant difference was found across age ($n = 73$; $p = 0.047$), showing that younger paticipants were more likely to suffer an injury. In addition, length of participation in CrossFit training ($n = 89$; $p = 0.687$), duration ($n = 89$; $p = 0.118$) and weekly rest days ($n = 89$; $p = 0.690$) showed no significant relation with injury incidence. On the other hand, a significant difference could be noticed for injury and a higher weekly CrossFit training frequency ($n = 89$; $p = 0.023$). Athletes who practiced CrossFit for more days a week were more likely to suffer an injury. Taking into consideration the injury incidence based on gender, no significant difference was found ($n = 89$; $p = 0.818$) (Table 1). Furthermore, no significant difference was found between competitors and non-competitors ($n = 89$; $p = 1.00$), as well as for athletes who practiced other physical activities outside CrossFit ($n = 89$; $p = 0.355$). When considering the restriction of a minimum training period for beginners, prior to starting CrossFit training, 13 out of the 22 injured athletes (59.09%) reported that their training facilities did not require a minimum training period.

Nevertheless, significance was not reached (n = 89; p = 0.337). Injury occurrence based on trainer´s feedback did not show a significant difference (n = 89; p = 1.00).

Table 3.1. Frequencies and results for Chi-Square/Fisher´s Exact Tests comparing uninjured and injured CrossFit participants with regard to potential risk factors

	Total (n = 89)		**Uninjured (n = 67; 75.28%)**		**Injured (n = 22; 24.72%)**		**sig.**
	n	**%**	**n**	**%**	**n**	**%**	
Gender							0.818
Male	63	70.79	47	70.15	16	72.73	
Female	26	29.21	20	29.85	6	27.27	
CrossFit competitions							1.00 $
Non-competitor	77	86.52	58	86.57	19	86.36	
Competitor	12	13.48	9	13.43	3	13.64	
Physical activity beyond CrossFit							0.355
Yes	52	58.43	41	61.19	11	50	
No	37	41.57	26	38.81	11	50	
Minimum training period for beginners							0.337
Yes	29	32.58	20	29.85	9	40.91	
No	60	67.42	47	70.15	13	59.09	
Trainer´s feedback							1.00 $
Yes	86	96.63	65	97.01	21	95.45	
No	3	3.37	2	2.99	1	4.55	

$ Fisher´s Exact Test instead of Chi-Square (expected counts less than 5)

Table 3.2. Means and standard deviations and results for independent T-Tests comparing uninjured and injured CrossFit participants with regard to potential risk factors

	Total (n = 89)	Uninjured (n = 67; 75.28%)	Injured (n = 22; 24.72%)	p-value
	Mean/SD	Mean/SD	Mean/SD	
Age	31.79 ± 6.22	32.59 ± 6.37	29.18 ± 4.83	0.047*
Height (m)	1.72 ± 0.11	1.73 ± 0.09	1.7 ± 0.14	0.314
Body mass (kg)	74.16 ± 12.04	73.78 ± 11.38	75.32 ± 13.81	0.605
Fat mass (%)	18.39 ± 8.76	18.32 ± 8.64	18.64 ± 9.14	0.903
Weekly CrossFit training days	4.06 ± 1.28	3.88 ± 1.28	4.59 ± 1.09	0.023*
Weekly rest days	1.93 ± 0.93	1.96 ± 0.97	1.86 ± 0.77	0.690

*Statistically significant difference (*P < 0.05)*

Injury Characteristics

The majority of injuries occurred in the shoulder region, with a percentage of 34.48% (10/29), followed by the spine, 24.14% (7/29) (Table 3). Taking into account all 25 injury occurrences, 10 (40%) implied a complete removal from CrossFit training or other outside routine physical activities for more than 1 week, 15 (60%) implied any modification of normal training activities in duration, intensity, or mode for more than 2 weeks, and 16 (64%) implied a visit to a health professional. The most common nature of injury was general inflammation and pain (68%) and joint overuse (24%), which were diagnosed mainly by physiotherapists (52%) and by doctors (32%). Injuries occurred mostly due to low intensity strength training with many repetitions (40%), followed by heavy strength training (28%) and few repetitions with maximum or close to maximum loads (1 – 5 RM) (16%). The main causes of injury include fatigue (60%), performing movements with poor form (28%), and aggravation of previous injury (20%). Only 1 injury occurrence (4%) happened during competition and 9 (36%) were sustained after the feeling of a discomfort or previous injury in the same body site.

Table 3.3. Frequency, percentage, and incidence rate of injured body parts (n = 29)

Body part	Frequency	Percent	Incidence/1000 athlete training hours
Shoulder	10	34.48	0.95
Lower back	3	10.34	0.29
Wrist	3	10.34	0.29
Knee	3	10.34	0.29
Groin	2	6.9	0.19
Upper back	2	6.9	0.19
Cervical spine	2	6.9	0.19
Hip	1	3.45	0.1
Thigh	1	3.45	0.1
Leg	1	3.45	0.1
Head	1	3.45	0.1

Discussion

This study aimed to decipher the profile of Portuguese CrossFit participants, such as their training routines. In addition, the injury incidence and its patterns of association with some of the participants´ demographic, training and routine characteristics were determined. The most prevalent injured body parts and the characteristics of each injury were also identified.

The injury rate of our Portuguese sample of CrossFitters was 2.76/1000 athlete training hours, corresponding to 24.72% injured athletes in a 6 month time period. This rate was similar to those found in other studies. Other publications reported injury rates of 3.1/1000 athlete training hours (Hak et al., 2013), 2.71/1000 (Aune & Powers, 2016), 2.4/1000 (Weisenthal et al., 2014), 2.3/1000 (Montalvo et al., 2017), 2.1/1000 (Moran et al., 2017), and 1.94/1000 (only shoulder injuries) (Summitt, Cotton, Kays, & Slaven, 2016). Published studies indicated an injury incidence of 73.5% (Hak et al., 2013), 34% (Aune & Powers, 2016), 31% (Sprey et al., 2015), 26.2% (Montalvo et al., 2017), 23.5% (only shoulder injuries) (Summitt et al., 2016), 19.4% (Weisenthal et al., 2014), 12.8% (Moran et al., 2017), and 12% (Grier et al., 2013). Taking into account these values, an approximate injury incidence can be noticed between our study and these cited studies. Hak et al. (2013) was the only study that stood out, reporting a much higher injury incidence (73.5%) compared to the others. Runners reported a much higher annual injury incidence (74%) (Daoud et al., 2012) than CrossFit (24.72%). However, when considering the injury rate, 3.1/1000 athlete training hours, it was comparable to other studies, including ours. It is important to mention that Summitt et al. (2016) considered exclusively injuries in the shoulder region, resulting in an injury incidence of 1.94/1000 athlete training hours, being probable to be higher if all body parts had been considered.

In our results, 19 participants reported being injured once (86.36%), while 3 were injured twice (13.64%), while Weisenthal et al. (2014) reported that 84% sustained one injury, 13.3% sustained 2 injuries, and 2.7% sustained 3 injuries. Both our study and Weisenthal et al. (2014) analysed a specific time period of 6 months of CrossFit training. Although our study had a sample more than 4 times lower than Weisenthal et al. (2014) (89 vs 386), the results were very similar between both studies.

The calculated injury rate of 2.76/1000 athlete training hours was similar to the rate of Olympic weightlifting (3.3/1000 athlete training hours) (Calhoon & Fry, 1999), gymnastics (3.1/1000 athlete training hours) (Kolt & Kirkby, 1999), or even rugby (3.0/1000 athlete training hours) (Williams, Trewartha, Kemp, & Stokes, 2013). Our study reported a significant lower injury rate than American football (140/1000 training hours) (Andresen, Hoffman, & Barton, 1989; DeLee & Farney, 1992) or ice hockey (78.4/1000 training hours) (Lorentzon, Wedrèn, & Pietilä, 1988). The similar injury rate between CrossFit and weightlifting or gymnastics could suggest that exercises that fall into these two categories, such as snatches or muscle-ups, are likely to be the most harmful movements when considering CrossFit training.

The results revealed that the shoulder was the most frequently injured body part (34.48%), followed by the spine (24.14%), which proved to match various studies (Aune & Powers, 2016; Hak et al., 2013; Weisenthal et al., 2014). For instance, Weisenthal et al. (2014) concluded that the most commonly injured body parts were the shoulder (25%) and the spine (14.3%). On the other hand, other studies concluded that the knee was even more likely to suffer an injury after the shoulder or after the spine (Montalvo et al., 2017; Moran et al., 2017). In fact, Montalvo et al. (2017) found that after a shoulder injury incidence of 22.6%, the knee was followed by 16.1%, while Moran et al. (2017) found an incidence of 33.3% spine injuries, followed by 20% knee injuries. Likewise, these two studies revealed the knee as the second most common injury location.

The high shoulder injury incidence (34.48%%) may be due to the gymnastic, Olympic and power lifting movements incorporated in CrossFit training, since other studies reported the shoulder as one of the most injured body parts in athletes of these modalities (Caine & Nassar, 2005; Raske & Norlin, 2002). Overhead movements increase the risk of injury in the shoulder, due to extreme positions of hyperflexion, abduction and internal rotation (Gross, Brenner, Esformes, & Sonzogni, 1993; Neviaser, 1991). In addition to this, the use of high repetitions, high speed and heavy weights can lead to poor form, which contributes to a higher risk of injury. The snatch is an example of an Olympic style exercise that can put the shoulder in a risk position for injury, when performed with poor form (Hak et al., 2013). Another commonly used exercise in CrossFit is the the “kipping” pull-up, a gymnastic movement, which, due to the kipping motion, puts the shoulder joint in a dangerous position, as seen in the snatch (Hak et al., 2013).

Spine injuries, specially in the lower back, are also frequent among CrossFitters, with an injury incidence of 24.14%. Powerlifting and weight lifting movements might be the main cause for injuries in this region, since it is a common injured body part of these athletes (Raske & Norlin, 2002). Spine injuries are likely to occure, due to a loss of form, enhanced with fatigue. This happens, because of the metabolic characteristics of CrossFit: high repetitions, high loads and high speed executions. Some of the exercises that are more likely to predispose for spinal injuries include the deadlift or the clean (Hak et al., 2013).

Taking into account these results, some strategies could be followed in order to reduce the incidence of injuries related to CrossFit. Focusing in performing the exercises with good form, prior to implementing high intensity, developing a strong core and rotator cuff, can reduce injuries (Kibler, Press, & Sciascia, 2006; Lee, Kim, O'Driscoll, Morrey, & An, 2000; Niederbracht, Shim, Sloniger, Paternostro-Bayles, & Short, 2008). Programming the WODs, limiting the amount of weekly and daily exercises that require the shoulder and spinal joints, as well as attending to the individualisation of each athlete, can be an important factor in limiting the number of injuries. Another important aspect in order to avoid injuries is the supervision of a qualified CrossFit coach (Weisenthal et al., 2014).

The 25 injury occurrences reported in our study fell into the 3 determined criteria: 10 (40%) implied a complete removal from CrossFit training or other outside routine physical activities for more than 1 week, 15 (60%) implied any modification of normal training activities in duration, intensity, or mode for more than 2 weeks, and 16 (64%) implied a visit to a health professional (missing answers: 1). Sprey et al. (2015) registered the same order, but with diferente percentages, which were 24%, 33.5% and 42% respectively. With regard to the most common nature of injuries, our study showed that general inflammation and pain (68%) and joint overuse (24%) were the most frequent injuries. These results were similar to other studies, in which injuries of acute nature were the most prevalent (Montalvo et al., 2017; Moran et al., 2017; Weisenthal et al., 2014). Determining the nature of injuries is important, in order to enable effective injury prevention programs, as well as to allow healthcare professionals to develop the adequated measures of rehabilitation. The main perceived cause for injury was related to fatigue (60%), poor form (28%) and aggravation of previous injury (20%). The same reasons were reported in the same order by Aune & Powers (2016) with a percentage of

46%, 23% and 14%, respectively. Summitt et al. (2016) registered poor form and aggravation of previous injury (33.3%), followed by fatigue (18.2%) as the most common causes for injury. However, Summitt et al. (2016) considered only shoulder injuries. In our findings, 36% of injuries were sustained after the feeling of a discomfort or previous injury in the same body site. A similar incidence (38.6%) was registered by Summitt et al. (2016).

With regard to potential risk factors for injury in CrossFit training, we tried to identify patterns of association between injury incidence and participants´ demographic, training and routine characteristics.

We took into account for comparative analysis CrossFit weekly training frequency, training session duration, weekly rest days and length of participation since the initiation of practice.

Injured athletes reported a significantly higher weekly CrossFit training frequency than uninjured athletes ($n = 89$; $p = 0.023$). However, this finding did not match other studies´s findings, in terms of significance level (Montalvo et al., 2017; Sprey et al., 2015; Weisenthal et al., 2014). Only when considering total weekly athlete training hours, a significant difference was found (Montalvo et al., 2017).

We found no significant difference between injury incidence and training session duration ($n = 89$; $p = 0.118$), and weekly rest days ($n = 89$; $p = 0.690$). Other studies did not reach significance regarding training session duration (Sprey et al., 2015; Weisenthal et al., 2014) nor weekly rest days (Sprey et al., 2015).

When analysing length of participation, we observed no significance ($n = 89$; $p = 0.687$) in agreement with another study (Weisenthal et al., 2014). Nevertheless, other studies concluded that a higher length of participation in CrossFit was associated with a higher injury incidence (Aune & Powers, 2016; Montalvo et al., 2017; Sprey et al., 2015). The fact that our study was restricted to CrossFit participants with a minimum of 6 months of Cross Training experience could justify the absence of a significant difference between injured and uninjured athletes.

Considering demographic characteristics, only age revealed a significant difference regarding injured and uninjured athletes ($n = 73$; $p = 0.047$), showing that injured athletes tended to be younger (29.18 ± 4.83) than uninjured athltes (32.59 ± 6.37). We may

consider that younger athletes were less experienced in training, resulting in a non-appropriate form during exercises. However, these results could have been influenced by the fact that 16 participants missed to report about their age. This finding may not be accurate, since other studies did not find any significant difference regarding injury across age (Montalvo et al., 2017; Sprey et al., 2015; Weisenthal et al., 2014). With regard to other variables: gender (n = 89; p = 0.818), height (n = 89; p = 0.314), body mass (n = 89; p = 0.605) and fat mass (n = 66; p = 0.903), no level of significance was reached. One study did not find any significant difference based on body mass (Sprey et al., 2015), yet 2 studies showed that heavier or overweight/obese athletes sustained significantly more injuries (Grier et al., 2013; Montalvo et al., 2017). Taller athletes may be more predisposed to injury (Montalvo et al., 2017), however Sprey et al. (2015) did not find any significant difference. Analysing gender as a potential risk factor for injury, no conclusive statement can be made, since some studies reached significance (Grier et al., 2013; Moran et al., 2017; Weisenthal et al., 2014), while others did not (Aune & Powers, 2016; Montalvo et al., 2017; Sprey et al., 2015). No significant difference was found between competitors and non-competitors (n = 89; p = 1.00). Two studies found a significant difference regarding competition, considering that competitors were more likely to sustain an injury (Montalvo et al., 2017; Sprey et al., 2015). However, this could be due to a higher length of participation in CrossFit, as well as greater weekly training hours. For injuries across athletes who practiced other physical activities outside CrossFit, we registered no significant difference (n = 89; p = 0.355). Montalvo et al. (2017) found that practicing other activities outside CrossFit was linked to a higher injury incidence. Nonetheless, Sprey et al. (2015) did not register a significant difference. Finally, considering the restriction of a minimum training period for beginners, prior to starting CrossFit training, and injury occurrence based on trainer´s feedback, no significance was reached (n = 89; p = 0.337; n = 89; p = 1.00). Weisenthal et al. (2014) found that a minimum training period for beginners did not reach significance aswell, although the presence of a trainer was crucial to reduce injuries sustained by athletes. Considering the higher sample used by Weisenthal et al. (2014) in comparison to ours, it may be reliable to assume that the presence of a qualified CrossFit coach is important in order to avoid injury occurrences.

Our study analysed the injury incidence in the 6 months prior to responding to the survey. This measure was taken, based on other studies (Montalvo et al., 2017; Summitt et al.,

2016; Weisenthal et al., 2014) and because we considered that a specific time frame was needed in order to enable coherence with the results of other studies. For the same reason, we considered the 3 different injury criteria used in other studies (Aune & Powers, 2016; Montalvo et al., 2017; Sprey et al., 2015; Weisenthal et al., 2014). We included only participants with at least 6 months of CrossFit training experience, to ensure they had enough training time in the modality, as Sprey et al. (2015) concluded that athletes with more than 6 months of CrossFit practice suffered significantly more injuries. These 3 factors: time frame analysed, injury criteria, and minimum training period, may significantly contribute to a higher or lower injury incidence.

To our knowledge, this is the first study examining the injury risk associated with CrossFit training in Portugal, thus, future studies are required to validate the results shown in our study. Scientific research concerning injuries related to CrossFit is a very recent topic, not only in Portugal, but also worldwide. In addition to the characteristics analysed in our study, future research is needed concerning the analysis of injuries present in competitors/elite athletes separately from regular athletes/non-competitors, a factor that could significantly influence injury characteristics. Only Weisenthal et al. (2014) mentioned having used "athlete level" CrossFit participants as sample. Other studies, including ours, did not focus on a specific level of athletes. More studies could be useful, regarding the injury location versus movement performed, in a similar form Weisenthal et al. (2014) analysed.

Limitations

The main limitation is the fact that our sample was lower than the samples of other studies, such as 566 (Sprey et al., 2015) and 386 participants (Weisenthal et al., 2014). The aim was to reach over 100 CrossFit participants, however some surveys had to be excluded and 89 was the final number of collected questionnaires. Although our sample consisted of CrossFit participants from 14 different Portugal districts, Lisbon contained the majority (55.1%). An overall limitation that could occur in any of the currently published studies regarding injuries in CrossFit is the interpretation of injury by each athlete. For instance, an athlete may be perceiving an injury of chronic nature, such as an overuse injury and relating it to any other cause, excluding CrossFit. The opposite could happen too, that

would mean a participant perceiving that a specific injury was related to CrossFit, when in reality it was not.

Conclusion

According to our study, the average Portuguese CrossFit participant is male gender, with age of thirty two, 1.72 meters tall and weighs 74 kg. This group is usually involved in CrossFit training for 6 months to a year, with a training frequency of 5 days a week and 2 rest days, and a duration of 45 to 60 minutes per workout session.

The results of this study showed that the injury incidence of CrossFit athletes in Portugal corresponds to 24.72%, with a rate of 2.76/1000 athlete training hours. These values show that CrossFit is comparable to other forms of sports or physical activities, regarding injury rates.

CrossFit participants tend to suffer from injuries mostly in the shoulder region (34.48%), followed by the spine (24.14%), probably due to the gymnastic, Olympic and power lifting movements commonly included in this training methodology.

Some strategies could be adopted in order to reduce the occurrence of injuries, such as the constant supervison of a qualified CrossFit coach.

Injuries in CrossFit is a recent topic in the current literature and therefore more scientific research is needed to validate the results showed in the currently existing literature, including our study.

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IV. Discussão Geral

O estágio teve a duração total de 373 horas.

No geral, penso que os objetivos do estágio foram alcançados. Enquanto estagiário, ao longo destes 10 meses, consegui entender e integrar-me nas tarefas de staff do Centro de Exercício e do Centro de Formação. No que toca à minha intervenção no Centro de Formação, a parte secundária do meu estágio, penso que fui capaz de colaborar nas tarefas que me foram pedidas, aperfeiçoando-me com o passar do tempo. Em relação às horas de estágio investidas no Centro de Exercício, creio que foram suficientes para perceber os procedimentos a adotar pelo professor responsável pela rota na sala de exercício, protocolos de avaliação mais usados, metodologias de treino e exercícios mais usados na Clínica das Conchas. Outro aspeto positivo que creio ter sido alcançado foi o acompanhamento eficaz aos sócios na sala de exercício, ao explicar os exercícios, dar feedback ou fazer reavaliação através da medição da pressão arterial e bio-impedância. Ao longo das minhas horas de rota na sala de exercício, foi possível ir observando treinos de PT, algo que considero bastante positivo, de maneira a aprender de que forma podemos marcar a diferença quando lidamos com um cliente em contexto de PT. Nas horas de teórico-prática, foi produtivo rever e aprender conteúdos relacionados com a prescrição de exercício para populações especiais e prevenção de lesões.

Apesar de, maioritariamente, concordar que o estágio foi bem-sucedido, existem alguns aspetos que poderiam ter sido melhores. Um dos pormenores que poderia ter sido melhor tem a ver com a observação de avaliações iniciais aos utentes. Ao longo do meu estágio, só tive a oportunidade de observar uma avaliação física inicial. Não foi possível assistir a mais avaliações, como gostaria, devido à impossibilidade de horários ou devido ao utente avaliado não permitir ser observado. No entanto, penso que deu para ficar com uma ideia de como funcionam os procedimentos nas avaliações iniciais. Continuado no assunto sobre as avaliações, tinha a expectativa de poder assistir à avaliação inicial feita pelo médico, o que, infelizmente, não aconteceu. Embora tenha observado uma avaliação física e termos falado sobre os protocolos de avaliação, não tive a oportunidade de fazer nenhuma avaliação a um utente, apenas as reavaliações básicas de medição da pressão arterial e bio-impedância. O último ponto que poderia ter sido mais positivo, prende-se com o facto de não ter tido a oportunidade de acompanhar nenhum sócio, enquanto

treinador pessoal, ou ter acompanhado ao pormenor o processo de treino de algum sócio durante um determinado período de tempo.

Para finalizar, penso que o meu desempenho como estagiário no Club Clínica das Conchas foi satisfatório. Tentei, da melhor forma possível, superar-me nas minhas dificuldades, estabelecendo boas relações com qualquer pessoa, empenhando-me nas minhas tarefas de forma responsável, procurando mostrar-me sempre disponível para ajudar no que fosse necessário.

Considero que foi extremamente útil ter experienciado todo o processo de estágio no Club Clínica das Conchas, bem como o desenvolvimento de todo o trabalho relacionado com a revisão sistemática da literatura e o meu artigo observacional, com a temática de lesões no CrossFit.

O processo de estágio foi fundamental para começar a colocar em prática parte do que tenho vindo a aprender na área do exercício e bem-estar, não só conteúdos abordados nas aulas de mestrado, mas também em diversas formações complementares que vou realizando. Foi importante estar inserido numa equipa de trabalho, de forma a desenvolver as minhas competências no contexto de trabalho em equipa, assumir responsabilidades, depositarem confiança em mim e desenvolver as minhas capacidades de comunicação com o staff e utentes. No fundo, foi importante estar inserido no processo de estágio, sentindo que as minhas três necessidades psicológicas básicas estavam a ser respeitadas: competência, autonomia e relacionamento positivo. Com o passar do tempo, fui-me sentindo cada vez mais confiante e à vontade, tornando o processo de estágio mais descomplicado.

Através do estágio, sinto que aprendi ou reforcei conhecimentos relacionados com a avaliação e prescrição de exercício para diversos contextos, incluindo patologias e prevenção de lesões. Uma das grandes vantagens em ter estado associado à Clínica das Conchas foi a possibilidade de usufruir de formações promovidas pelo seu Centro de Formação, passando em simultâneo pela experiência e responsabilidade de fazer de staff em determinados dias de formação. Os conteúdos desenvolvidos no Centro de Formação também foram positivos, de forma a aprender diversas formas de divulgação de informação, ao contribuir para a promoção da Formação Clínica das Conchas. No futuro, poderei sair beneficiado por ter tido esta oportunidade de colaborar em tarefas do Centro

de Formação, seja a promover alguma empresa, negócio, ou até mesmo a mim mesmo, como profissional.

A elaboração dos artigos científicos, com a revisão sistemática da literatura e com o estudo observacional, foi outro aspeto fundamental no mestrado. Um Mestre é uma pessoa que é capaz de, autonomamente, pesquisar e argumentar, sob o ponto de vista científico, qualquer temática relacionada com a sua área, neste caso relacionado com o exercício e bem-estar. O trabalho desenvolvido foi em torno da incidência de lesões no CrossFit, através de uma revisão sistemática que tentou englobar toda a literatura existente até ao momento, bem como estudar a incidência de lesões no CrossFit, exclusivamente em Portugal. Este é um tema pertinente para ser estudado, pois, trata-se de uma modalidade recente, que tem vindo a crescer bastante ao longo dos últimos anos, incluindo em Portugal. Havendo poucas publicações sobre o assunto, inclusive, com praticantes em Portugal, não existindo qualquer estudo publicado, tornou-se num trabalho interessante e importante a realizar. Depois de mais de um ano envolvido na temática das lesões no CrossFit, sinto que me tornei mais especialista no assunto, comparativamente à grande maioria dos profissionais da área do exercício e bem-estar. Com a literatura que fui recolhendo, tenho muito suporte científico em que me posso basear para argumentar, seja com quem for, se é mais perigoso praticar CrossFit ou futebol, por exemplo. Assumir por alto que a prática de CrossFit é perigosa sem suporte científico é limitativo. Ao desenvolver este trabalho científico, levou a que, hoje em dia, seja mais crítico, sob o ponto de vista da credibilidade, das diversas fontes de informação que os profissionais e o público em geral possam estar a consultar. Desta forma, aprendi a recorrer constantemente à ciência para justificar qualquer decisão ou posição que decida tomar relacionada com a minha área de intervenção: exercício e bem-estar. Na ciência, geralmente, não há certezas absolutas, no entanto, procura-se sempre uma linha orientadora, de forma a estarmos mais perto da tal certeza. É com base nessas linhas orientadoras que qualquer profissional, especialmente um Mestre, se deverá guiar para fundamentar as suas decisões ou tomadas de posição.

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VI. Anexos

Caracterização da Entidade de Acolhimento de Estágio

O Club Clínica das Conchas é composto por 5 departamentos que oferecem diversos serviços. Os departamentos são o Centro Clínico, o Centro de Reabilitação, o Centro de Exercício com orientação clínica, o Centro de Bem-Estar e o Centro de Formação.

O Centro Clínico tem à disposição médicos especialistas em diversas áreas, cujo benefício na atividade física foi demonstrado. O Centro Clínico fornece consultas de acupuntura, cardiologia, cirurgia vascular, dermatologia, endocrinologia, ginecologia, medicina do exercício e desportiva, medicina estética, medicina física e de reabilitação, medicina geral e familiar, medicina interna, mesoterapia clínica, neurologia, nutrição clínica, nutrição desportiva, ortopedia e traumatologia, pneumologia, psicologia clínica, psicologia desportiva, psiquiatria, risco cardiovascular, reumatologia, reumatologia pediátrica e urologia.

O Centro de Reabilitação tem como finalidade a recuperação musculoesquelética, neurológica e cardiovascular, sob estreita vigilância clínica. O Centro de Reabilitação tem serviços de fisioterapia, fisioterapia uroginecológica, reeducação postural global, avaliação e correção postural, ligadura funcional (kinesiotaping), reabilitação cardíaca, terapia da fala, osteopatia e podologia.

O Centro de Exercício com orientação clínica encara o exercício físico como uma ferramenta essencial, que resulta num efeito terapêutico na prevenção, correção ou reabilitação. Através da multidisciplinaridade da equipa, composta por médicos de medicina desportiva, fisioterapeutas e especialistas em exercício e saúde, garantem-se as condições necessárias para dar resposta às necessidades dos clientes. O cliente recebe o seu "Plano de Saúde Mex", que se trata de um programa de saúde completo, considerando a ferramenta de medicina do exercício num regime personalizado sob orientação médico-desportiva. Este plano de saúde inclui vários serviços. Estão incluídas consultas de medicina do exercício, onde se determina o estado de saúde global do cliente e respetiva segurança para o início de prática de exercício físico com fim terapêutico. Na presença

de diagnósticos concretos, serão prescritas linhas orientadoras num âmbito interdisciplinar, para o seu regime de exercício terapêutico, consoante a situação clínica em questão. Poderá ser necessário a referenciação para outras especialidades para melhor se objetivarem determinadas patologias ou fatores de risco cuja presença determina planos de treino específicos. Todas as reavaliações estão incluídas no seu programa de saúde e poderão ser realizadas segundo marcação, de segunda a sexta, sempre que necessário clinicamente. Será elaborado um relatório clínico (se cumprido contrato terapêutico) com periodicidade dependente da situação clínica. Estão também incluídas consultas de medicina geral e familiar (1 consulta por semestre). O "Plano de Saúde Mex" dá também acesso a acompanhamento de fisioterapia/fisiologia do exercício, onde são avaliados dados antropométricos, de aptidão cardiorrespiratória e funcional. Daqui resulta a prescrição e supervisão clínica conjuntas de um plano de exercício personalizado com finalidade terapêutica, a ser executado por fisioterapeutas consultados por especialistas do exercício. A reavaliação periódica e ajuste do plano de treino terapêutico (mediante objetivos de atuação, após integração da informação clínica) está incluída gratuitamente, sem limite de frequência. O plano de saúde possibilita a prática de atividades individuais e em grupo. As atividades individuais consistem em sessões individuais de treino terapêutico sob coordenação médica, com o intuito de prevenção secundária e terciária. As atividades em grupo consistem em diferentes modalidades, direcionadas para distintos objetivos e necessidades dos clientes. Estão à disposição aulas que promovem o treino aeróbio (Cardio Cycle e Cardio Aero), o treino de estabilidade (Fisio Core, Fisiopilates, Alongamentos e Fisio Core Express) e o treino funcional (Fisio Localizada, Treino em Suspensão, Cross Funcional, Boot Camp e Circuito). Para além destas atividades associadas à medicina do exercício, estão também disponíveis aulas de artes marciais (Krav Maga) e de exercício pré e pós-parto. Os aderentes ao "Plano de Saúde Mex" têm a possibilidade de frequentar workshops educativos trimestrais. Estes workshops visam educar para um estilo de vida saudável, contando com a presença de médicos de várias áreas, nutricionistas, enfermeiros, fisioterapeutas, psicólogos, assistentes sociais, especialistas de exercício, etc. Além dos workshops, os clientes também têm acesso a rastreios clínicos, que são conduzidos gratuitamente e que têm impacto na saúde pública comunitária (cancro da pele, varizes, hipertensão, diabetes, obesidade, dislipidemia…), sob a responsabilidade de clínicos especializados. Haverá também uma linha de aconselhamento médico permanente que estará disponível diariamente para os titulares do programa de saúde. Por último, por um preço mais reduzido, é possível o cliente ter

acesso aos mesmos serviços que o plano de saúde oferece, com exceção das atividades individuais e em grupo, ao aderir ao "MEX To Go". Este serviço permite todo o acompanhamento médico-desportivo incluído no plano de saúde, mas transportado para a prática de exercício no local de treino familiarizado do cliente, ou em sua casa. Na consulta de orientação clínica para o exercício é feita a avaliação da condição física do cliente nos vários parâmetros de saúde, sendo realizada a medição da frequência cardíaca de repouso, da pressão arterial de repouso, da percentagem de massa gorda, do índice de massa corporal, do VO2 máximo (predição) e avaliação funcional. O Centro de Exercício com orientação clínica tem também disponível serviço de treino personalizado, conduzido por um especialista de exercício e saúde, permitindo ao cliente atingir os seus objetivos de treino de uma forma ainda mais acompanhada, saudável, rápida e eficaz. Existente nos formatos de 30 ou 60 minutos, para uma ou duas pessoas simultaneamente, o treinador pessoal ajudará o cliente a otimizar o seu treino através de uma avaliação médico-desportiva e da condição física minuciosa, prescrição de um programa de exercício e sua monitorização em tempo real. Consoante os objetivos, a prescrição pode recorrer a plataformas/técnicas de treino mais específicas, como o treino por vibração, a eletroestimulação ou o treino funcional. O treino personalizado é aconselhado a pessoas que desejem melhorar a sua forma física, perder peso e massa gorda, apresentem necessidades específicas de controlo/tratamento de diferentes patologias (diabetes, hipertensão, risco de doença cardiovascular, etc.) ou necessitem de uma preparação específica para uma determinada modalidade desportiva. Por fim, é possível aceder ao treino com plataforma vibratória com a finalidade de melhorar a flexibilidade e otimizar a contração muscular. Esta metodologia recorre à realização de exercício numa plataforma com uma base mecânica que gera oscilações a uma velocidade elevada e em vários planos, que provocam instabilidade no corpo, levando o organismo a reagir através de uma resposta reflexa com um elevado número de contrações musculares, de forma a manter o corpo estável na posição pretendida. Os principais benefícios comprovados deste estímulo de treino apontam para as áreas do bem-estar, saúde e preparação física, com a particularidade de ter sessões de treino curtas, o que poderá ser visto como uma arma contra o sedentarismo e a falta de tempo da sociedade atual.

O Centro de Bem-Estar preocupa-se em oferecer aos clientes o equilíbrio entre o corpo e a mente, através de variados tratamentos e terapias de estética. Os tratamentos ou terapias destinam-se ao rosto, ao corpo, aos homens e às grávidas. Também inclui tratamentos

essenciais, como a limpeza de pele, fisioterapia dermatofuncional (rosto, corpo, massagens terapêuticas e fototerapia), diversas massagens, como anti-stress, ou ainda terapias complementares, como mesolift.

O Centro de Formação foi criado com a missão de amplificar o conceito de medicina do exercício e os seus benefícios associados, com o objetivo de contribuir através de oferta de formação especializada para o aperfeiçoamento e otimização das competências dos profissionais de saúde. O Centro de Formação do Club Clínica das Conchas tem como visão ser referência na área do exercício e saúde, possibilitando o acesso a formações de elevada qualidade a todos os profissionais de saúde, sejam médicos, fisioterapeutas ou técnicos de exercício físico. Pretende-se difundir o conceito de medicina do exercício e contribuir de alguma forma para o bem-estar e saúde de todas as pessoas. Os valores da "Formação Clínica das Conchas" são a interdisciplinaridade, a qualidade, os resultados, o rigor técnico-científico, a inovação e a ética.

Morada: Rua Luís Pastor Macedo, 27-C, Lumiar, 1750-156, Lisboa

Horário: 2ª a 6ª feira: 08:00 às 22:00

Sábado: 10:00 às 15:00

Análise SWOT do Club Clínica das Conchas

Forças

- Interdisciplinaridade (medicina, exercício, fisioterapia)

- Foco na saúde (medicina do exercício) com vários serviços

- Presença de um espaço exterior na sala de exercício

- Localizado perto do metro

- Site bem organizado

- Workshops e educação para a saúde aos sócios

Fraquezas

- Estabelecimento pequeno (por exemplo, a sala de exercício)

- Dificuldade em estacionar o carro

- Visto do exterior, pode passar despercebido

Oportunidades

- Eventualmente, usar o parque Quinta das Conchas para a realização de algum evento

Ameaças

- Existência de ginásios de maiores dimensões e com mais equipamento, que poderão servir de motivo de escolha das pessoas relativamente à Clínica das Conchas

Análise SWOT do Centro de Formação

Forças

- Certificado pela DGERT

- Boa relação qualidade/duração/preço das formações

- Formações de 5h parece-me boa estratégia (mais baratas e permitindo ao formando não perder o foco)

- Formadores de renome a nível nacional e internacional

- Boa complementaridade prática à formação teórica

- Feedback dos formandos através de questionário

- Site e página de Facebook próprios

Fraquezas

- Ausência de formações na categoria de "Terapias Manuais" e "Medicina Desportiva" (no site)

- Espaço pequeno

Oportunidades

- Para além de formações na área do exercício e da nutrição, promover formações na área da medicina, bem-estar, fisioterapia e outras áreas de reabilitação

Ameaças

- Concorrência de outras empresas com formações semelhantes (Bwizer, por exemplo)

Tarefas Realizadas

Centro de Exercício

As tarefas de estágio no Centro de Exercício foram contabilizadas como horas de prática e de teórico-prática.

As horas iniciais de teórico-prática foram dedicadas à explicação sobre os procedimentos de abertura e fecho da sala de exercício e o comportamento a adotar pelo professor que está responsável pela rota na sala de exercício. De seguida, falou-se um pouco sobre princípios de cinesiologia, enquanto eram apresentadas as máquinas de musculação presentes na Clínica das Conchas. Abordaram-se diferentes temáticas e estudos de caso

sobre avaliação da aptidão física, postura/coluna, obesidade, doenças reumáticas, gravidez, idosos e osteoporose, diabetes, e prevenção de lesões. Os procedimentos de avaliação física e reavaliação foram abordados e foi feito o registo de dados de uma primeira avaliação de um sócio com base na PAFMEX (avaliação inicial feita pelo médico) e avaliação física. Mais à frente, assistiu-se à avaliação física inicial de um novo sócio e ao processo de venda de treino personalizado associado. Durante o período de estágio, houve ainda uma tarefa complementar que envolveu atualizar o Manual de Exercícios da Clínica das Conchas. Esta tarefa incluiu discutir que exercícios deveriam integrar o novo manual, fotografar a execução inicial e final de vários exercícios e estruturar o novo manual, inserindo índice, edição de imagens/fotos e descrições/erros comuns associados a cada exercício. O propósito da elaboração deste manual foi de possibilitar um documento de rápida consulta que integrasse os exercícios mais usados na Clínica das Conchas e servisse para retirar dúvidas a qualquer professor.

As horas de estágio de prática estavam relacionadas com as tarefas de rota na sala de exercício. Estas horas foram dedicadas a dar apoio aos sócios nos seus treinos, retirando dúvidas quanto aos exercícios e corrigindo a sua execução técnica, acompanhamento de sócios que treinavam pela primeira vez, reavaliações (medição da pressão arterial e bioimpedância). Por fim, havia um evento todas as primeiras quartas-feiras de cada mês, denominado "Challenge Day", que envolvia um desafio a quem quisesse participar. O "Challenge Day" é uma prova de curta duração, de esforço intenso, cujo objetivo é sempre terminar o mais depressa possível, pois, o participante mais rápido ou o que consegue produzir mais em menos tempo tem direito ao primeiro lugar.

Realizei um total de 107 horas teórico-práticas e 187,5 horas práticas.

Centro de Formação

No Centro de Formação, as minhas tarefas estavam direcionadas maioritariamente para a dinamização do Facebook da Formação Clínica das Conchas e na pesquisa de conteúdo pertinente para a Newsletter. Os conteúdos para a Newsletter envolviam a pesquisa e elaboração de textos de introdução a artigos científicos, prémios/bolsas, congressos ou notícias relacionadas com a área do exercício e saúde. As tarefas para o Facebook da Formação Clínica das Conchas envolviam criar textos para publicações de promoção de formações. Outras tarefas executadas incluíam identificar possíveis congressos para

parceria com a Clínica das Conchas, preenchimento de base de dados das respostas aos questionários de satisfação do evento "Médico Ativo Paciente Ativo", base de dados com contactos de federações desportivas, introdução a entrevista a um formador e organização de pastas para formações. Por último, recebi toda a informação necessária relacionada com os procedimentos para o staff durante os dias de formação e participei como staff em três formações

A minha intervenção em tarefas relacionadas com o Centro de Formação resultou em 78,5 horas.

Eventos

Ao longo do ano, estive envolvido em três eventos: Open Day, 1ª. Corrida Club Clínica das Conchas e Semana de Rastreios Anual.

O Open Day trata-se de um evento que ocorre algumas vezes por ano e visa cativar o público a conhecer as instalações e os serviços da Clínica das Conchas. A tarefa envolveu criar um circuito de força e um cardiovascular e, consequentemente, estar presente no dia para abordar pessoas interessadas em participar.

A 1ª. Corrida/Caminhada Club Clínica das Conchas foi um evento que decorreu pela primeira vez, com o propósito de promover o convívio entre o staff, utentes e outras pessoas interessadas em participar. A corrida ocorreu no Lumiar, ao longo de um percurso de 10 km. Neste evento não havia nenhuma tarefa em concreto da minha parte, visto que participei apenas como corredor, no entanto, contribuí como orientador do percurso durante corrida.

Por último, teve lugar a Semana de Rastreios Anual, uma semana de rastreios de saúde gratuitos para a comunidade local. As Galerias Quinta do Lambert foram o local escolhido para a realização dos rastreios. Participei nos rastreios de Obesidade e de Nutrição. No rastreio de Obesidade tinha como tarefa tentar cativar pessoas para participarem no rastreio e conduzir o próprio rastreio que envolvia determinar o peso da pessoa, IMC e dados da bioimpedância. No rastreio de Nutrição a minha tarefa envolvia apenas cativar as pessoas para participarem, uma vez que a abordagem nutricional era feita por nutricionistas.

Reuniões Centro de Exercício

Tiveram lugar duas reuniões (12 de janeiro e 30 de março) que reuniram o staff do Centro de Exercício, visando fazer um balanço das atividades decorridas até ao momento e aspetos a melhorar.

Relatórios Mensais

Prática (Rota)

Novembro: 14,5 horas

- Apoio aos sócios nos planos de treino

Dezembro: 14 horas

- Apoio aos sócios nos planos de treino
- "Challenge Day"

Janeiro: 22 horas

- Apoio aos sócios nos planos de treino
- Medição PA e bioimpedância
- "Challenge Day"
- Open Day 28 janeiro 2017 (desafio circuitos força e cardio)

Fevereiro: 19 horas

- Apoio aos sócios nos planos de treino
- Medição PA e bioimpedância

- “Challenge Day”

- Acompanhar sócio pela primeira vez, com plano de treino provisório feito por mim

Março: 17,5 horas

- Apoio aos sócios nos planos de treino

- Medição PA e bioimpedância

- “Challenge Day”

Abril: 27 horas

- “Challenge Day”

- Medição PA e bioimpedância

- Apoio aos sócios nos planos de treino

Maio: 26,5 horas

- “Challenge Day”

- Medição PA e bioimpedância

- Apoio aos sócios nos planos de treino

Junho: 21 horas

- “Challenge Day”

- Apoio aos sócios nos planos de treino

Julho: 21 horas

- Apoio aos sócios nos planos de treino

<u>Total</u>: 187,5 horas

Teórico-Prática

<u>Outubro</u>: 2 horas

- Introdução ao Centro de Exercício (abertura e fecho, leitura de documentos)

<u>Novembro</u>: 18 horas

- Princípios de cinesiologia (planos de movimento, movimentos)

- Avaliação da aptidão física (medições em repouso, av. apt. cardiorrespiratória); estratificação de risco

- Praticar prescrição cardio

<u>Dezembro</u>: 10 horas

- Teste Adams, Overhead Squat; distúrbios posturais e prescrição coluna

<u>Janeiro</u>: 14 horas

- Obesidade e doenças reumáticas (teoria e estudo de caso)

<u>Fevereiro</u>: 15 horas

- Gravidez (teoria e estudo de caso)

- Prevenção de lesões no ombro

- Idosos e osteoporose (estudo de caso)

- Início da atualização do Manual de Exercícios CCC

Março: 13,5 horas

- Atualização do Manual de Exercícios CCC

- Prevenção de lesões no joelho

- Prevenção de lesões na tibiotársica

- Cuidados no exercício para o diabético

- Discutir exercícios a integrar e excluir do Manual

- O que fazer no treino personalizado para o idoso

- Perceber os procedimentos de avaliação física e reavaliação, incluindo em PT

Abril: 12 horas

- Continuação do Manual de Exercícios CCC

- Assistir a avaliação física e processo de venda de PT

- Pensar numa ideia para atividade na sala de exercício durante o Open Day de dia 13 de maio

- Registo de dados de 1ª. avaliação de sócio com base na PAFMEX e avaliação física

- Definir dias de participação nos rastreios (22-25 maio)

- Definição de exercícios a integrar no Manual

Maio: 14,5 horas

- Fotografar exercícios para integrar no Manual CCC

- Estruturar Manual CCC

- Semana de Rastreios Anual: Obesidade (6h) e Nutrição (2,5h)

Junho: 9 horas

- Índice, edição de imagens/fotos e descrições/erros comuns para o Manual CCC

Julho: 0 horas

Total: 107 horas

Centro de Formação

Novembro: 20 horas

- Textos para publicações de promoção de formações no Facebook da Formação Clínica das Conchas

- Congressos para parceria CCC

- Preenchimento de base de dados no Excel de respostas aos questionários de satisfação do evento Médico Ativo Paciente Ativo

Dezembro: 23 horas

- Introdução para entrevista a Xavier Melo

- Textos para publicações de promoção de formações no Facebook, referenciando artigos científicos do formador

- Introdução a textos/notícias sobre oportunidades (prémios, bolsas) na área da saúde para a newsletter

- Base de dados no Excel com contactos de federações desportivas

- Introdução a textos/notícias com informações relacionadas com exercício e saúde para a newsletter

Janeiro: 13 horas

- Congressos para parceria CCC

- Introdução a textos/notícias com informações relacionadas com exercício e saúde para a newsletter

- Introdução a textos/notícias sobre oportunidades (prémios, bolsas) na área da saúde para a newsletter

Fevereiro: 11,5 horas

- Organização de pastas para formações

- Textos para publicações de promoção de formações no Facebook, referenciando artigos científicos do formador

- Introdução a textos/notícias com informações relacionadas com exercício e saúde para a newsletter

- Introdução a textos/notícias sobre oportunidades (prémios, bolsas) na área da saúde para a newsletter

- Identificação de artigos científicos interessantes para a newsletter

Março: 10 horas

- Staff na Formação: "Estratégias para melhorar a performance dos clientes PT" (9-14h)

- Formação de procedimentos para staff nas formações

- Introdução a textos/notícias com informações relacionadas com exercício e saúde para a newsletter

- Introdução a textos/notícias sobre oportunidades (prémios, bolsas) na área da saúde para a newsletter

- Congressos para parceria CCC

Abril: 2 horas

- Staff na Formação: “Mitos em Nutrição” (9-14h)

- Estudos científicos sobre exercício na gravidez e de anatomia palpatória (para a newsletter)

- Congressos relevantes para a newsletter

Maio: 1 hora

- Staff na Formação: “Exercício clínico para doenças reumatológicas” (15-20h)

- Estudos científicos sobre exercício na gravidez e de anatomia palpatória (para a newsletter)

- Congressos relevantes para a newsletter

Junho: 0 horas

Julho: 0 horas

Total: 78,5 horas

Eventos

- Open Day 28 janeiro 2017 (Desafio circuitos força e cardio)

- 1ª. Corrida CCC: 25 março 2017

- Semana de Rastreios Anual: 22 e 24 de maio 2017: Obesidade e Nutrição

Reuniões Centro de Exercício

- 12 janeiro 2017

- 30 março 2017

Plano Anual de Estágio

Tabela 6.1. Plano anual de estágio

Tarefas	2016			2017						
	Out.	Nov.	Dez.	Jan.	Fev.	Mar.	Abr.	Mai.	Jun.	Jul.
Definição dos Objetivos Gerais										
Definição dos Objetivos Específicos										
Inventário de Equipamentos e Leitura de Dossiers										
Interação com os Clientes/Sócios										
Princípios de Cinesiologia										
Realização de Rotas										
Avaliações de Aptidão Física										
Estudo e Ação sobre Patologias/Populações Especiais										
Estudo e Ação sobre Prevenção de Lesões										
Observação/Seguimento de um PT										
Ministrar/Supervisionar autonomamente aulas de PT										
Participação em Formações										
Dinamizar Atividade										
1ª Conferência										
2ª Conferência										
3ª Conferência										