



Atração para a Atividade Física, Perceção de Competência Física e Influência da Socialização Parental em crianças

Dissertação apresentada com vista à obtenção do grau de Doutor em Ciências do Desporto de acordo com o Decreto-Lei nº 74/2006 de 24 Março, orientada pelo Prof. Doutor António Manuel Fonseca e coorientada pela Professora Doutora Melissa Parker.

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Dedicatória

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pela força que me dão só por existirem. Com todo o amor.*

*Ao meu marido, André,
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Resumo

A atividade física (AF) regular, para além de estar associada à saúde, à aptidão física, ao bem-estar psicológico e ao comportamento de crianças é um preditor muito importante de estilos de vida ativos e saudáveis na idade adulta. Infelizmente é relativamente elevado o número de jovens que não cumpre as linhas de recomendação para a AF que se traduz na reduzida eficácia dos diversos programas de intervenção que têm como propósito aumentar os níveis de AF. Nas últimas décadas, diversos estudos têm procurado descrever, examinar e sumariar a importância que uma longa lista de determinantes tem nos níveis de AF de crianças. No entanto, a reduzida consistência dos resultados das pesquisas realizadas e a ineficácia de alguns dos programas de intervenção que têm sido desenvolvidos, reforçam a necessidade de se realizarem mais investigações.

Recentemente, investigadores da Saúde Pública e das Ciências do Desporto têm direcionado a sua atenção para outros modelos e determinantes. O *Youth Physical Activity Promotion* (YPAP) tem sido apresentado como um dos poucos modelos sócio ecológicos especificamente desenvolvido para explicar a relação entre fatores psicossociais e a participação em AF de crianças. Os determinantes deste modelo incluem, entre outros, atributos psicológicos (atração para a AF, perceção de competência física) e sociais (influência da socialização parental). Em Portugal, tanto quanto julgamos saber, são praticamente inexistentes as investigações que procuraram descrever a atração para a AF, a perceção de competência física e a influência da socialização parental em crianças, assim como, examinar a possível associação entre esses fatores e os níveis de AF das crianças.

Considerando estes aspetos, a presente dissertação apoiada em saberes da Psicologia do Desporto, da Epidemiologia da AF e da Estatística Multivariada pretende entender, de forma mais elaborada e extensa, a teia de agentes que condiciona a variabilidade interindividual na atração das crianças para a AF, bem como esta influencia a magnitude de um dos seus comportamentos mais universais - a AF.

Pretende, também, verificar a viabilidade de um programa de intervenção em alterar, positivamente e numa magnitude de efeito moderada a elevada, a atração para a AF. Para esse efeito foram realizados seis estudos de natureza observacional-transversal com os seguintes propósitos: (1) validar para a população Portuguesa a escala *Children's Attraction to Physical Activity* (CAPA) desenvolvida por Brustad em 1993 para a população norte-americana;

(2) examinar a invariância fatorial da escala CAPA em duas amostras aleatórias (calibração e validação); (3) descrever a atração para a AF, a percepção de competência física e a influência da socialização parental em crianças, dos 8 aos 10 anos de idade, em função do sexo, do estatuto socioeconómico (ESE) e do índice de massa corporal (IMC); (4) Identificar a associação entre fatores psicossociais e os níveis de AF de crianças; (5) avaliar o modelo YPAP procurando identificar a associação entre fatores que predispõem (atração para a AF, percepção de competência física) e que reforçam (influência parental) e os níveis de AF de crianças; (6) examinar o efeito de um programa de intervenção, baseado na prática de futebol, no bem-estar psicológico e na composição corporal de crianças com excesso de peso.

Dos resultados encontrados emergem as seguintes conclusões: (1) a escala CAPA tem uma estrutura conceptual adequada ao contexto português para avaliar a atração para a AF em crianças e fornece suporte para a validade fatorial da versão portuguesa com 14 itens, em vez dos 15 itens do modelo norte-americano; (2) existem diferenças nas crianças na atração para AF, na percepção de competência física e na influência parental em função do sexo, IMC e ESE; (3) O prazer de participar em AF vigorosas está positivamente associado aos níveis de AF das crianças. A percepção de aceitação dos pares em jogos e desportos e o encorajamento parental em raparigas e a percepção de competência física nos rapazes estão positivamente associadas aos níveis de AF; (4) a atração para a AF tem um efeito direto sobre a AF. A percepção de competência física tem um efeito indireto sobre a AF através da atração para a AF, e a influência dos pais tem um efeito indireto sobre a AF das crianças através da percepção de competência física e atração para AF para a AF das crianças. A percepção de competência física e influência dos pais não têm um efeito direto sobre a AF das crianças portuguesas; (5) o programa de intervenção, baseado na prática de futebol com a duração de 6 meses, produziu mudanças benéficas no bem-estar psicológico de crianças com excesso de peso. Mais especificamente, estas crianças mostraram uma melhoria significativa na sua atração para participar em AF e na percepção de competência física em comparação com o grupo de controlo.

Palavras-chave: crianças, atividade física, determinantes psicossociais, atração, percepção de competência, influência parental, validação

Abstract

Regular physical activity (PA) is associated with several health, fitness, psychological and behavioral outcomes in children, and is predictive of a physically active and healthy lifestyle in adulthood. Unfortunately, large numbers of children do not comply with PA guidelines which reduce the effectiveness of different national programs to increase PA levels. Over the last decades, several studies have attempted to describe, examine and summarize the importance of a long list of correlates of children's PA. However, main conclusions from these studies consistently affirm that further research is needed due to incongruent results across studies, and also because few intervention programs have documented substantial and sustainable effects.

Recently, Public Health and Sports Science researchers have directed their focus to other models and correlates of PA. The *Youth Physical Activity Promotion* (YPAP) has been presented as one of the few socio-ecological models specifically developed to explain the relationship between psychosocial factors and children's participation in PA. The correlates of this model include, among other, psychological (attraction to PA, perception of physical competence) and social (influence of parental socialization) attributes. In Portugal, to our knowledge, no studies have described the attraction to PA, the perception of physical competence and the influence of parental socialization in children, as well as, have examined the association between these factors and children's PA. Therefore, this study supported by knowledge of Sport Psychology, Epidemiology of PA and Multivariate Statistics, aims to understand, the correlates of interindividual variability that affects children's attraction to PA, and how, this latter can influence the magnitude of one of its most universal behaviors - PA. It also intends to verify the feasibility of an intervention program to change positively and in a moderate to high magnitude, the children's attraction to PA.

Taking into account, six observational cross-sectional studies were conducted with the following purposes: (1) to validate, for the Portuguese population, the scale Children's Attraction to Physical Activity (CAPA) developed by Brustad in 1993 for the U.S. population; (2) to examine the factorial invariance of the CAPA scale in two random samples (calibration and validation). (3) to describe the attraction to AF, the perception of physical competence and the

influence of parental socialization of children, 8-10 years of age, by sex, socioeconomic status (SES) and body mass index (BMI); (4) to examine the association between psychosocial factors and children's PA levels; (5) to evaluate the YPAP model, using predisposing (attraction to PA and perception of physical competence) and reinforcing (parental influence) factors and children's PA levels; and (6) to examine the effect of an intervention program, based on the soccer practice, in psychological well-being and body composition of overweight children.

The following conclusions emerge from the findings: (1) CAPA scale has an adequate conceptual framework to the Portuguese context, to evaluate the attraction to PA in children and provides support for the factorial validity of the Portuguese version with 14 items, instead of the 15 items of the American model; (2) there are gender, SES and BMI differences in children's attraction to PA, perception of physical competence and parental influence; (3) Enjoyment of participation in vigorous PA was positively associated with level of PA. Perceived acceptance by peers in games and sports and parental encouragement in girls and perceived physical competence in boys were positively related to PA; (4) the attraction to PA has a direct effect on children's PA levels. The perception of physical competence has an indirect effect on PA, through the attraction to PA, and the influence of parents has an indirect effect on children's PA through the perception of physical competence and attraction to PA; and (5) the intervention program based on soccer participation, with a 6 months follow-up, produced beneficial changes in psychological well-being of overweight children. More specifically, these children experienced a significant improvement in their attraction to participate in PA and perception of physical competence compared to the control group.

Key-words: children, physical activity, psychosocial correlates, attraction, perception of physical competence, parental influence, youth physical activity promotion model.

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Abreviaturas

AF • Atividade Física

AFC • Análise Fatorial Confirmatória

AFMV • Atividade Física Moderada a Vigorosa

AFs • Atividades Físicas

CAPA • *Children's Attraction to Physical Activity scale*

EF • Educação Física

ESE • Estatuto socioeconómico

IMC • Índice de Massa Corporal

IOTF • *International Obesity Task Force*

MG • Massa Gorda

OMS • Organização Mundial de Saúde

p.e • por exemplo

PC • Perceção de competência

TV • Televisão

WHO • *World Health Organization*

Capítulo 1.

Introdução

Nas últimas cinco décadas, o incremento da industrialização, da tecnologia, do urbanismo e do desenvolvimento económico promoveram profundas alterações no estilo de vida marcando uma viragem sem precedentes na vida do homem. Exemplos dessas alterações podem ser facilmente observáveis no plano urbanístico das cidades modernas (elevada densidade residencial, diminuição dos espaços e equipamentos desportivos disponíveis), nos meios de transporte adotados (incremento da mobilidade através de meios de transporte privados), nas atividades laborais desempenhadas (cada vez mais focados no esforço “mental”), nas atividades e equipamentos escolares (espaço físico reduzido resultante de constrangimentos orçamentais e exigências académicas superiores), e no padrão das atividades de ocupação dos tempos de lazer (ver televisão, jogar computador e “navegar” na internet) (Shields & Tremblay, 2008; Tremblay et al., 2011). Este conjunto multivariado e multifacetado de alterações contribuíram, naturalmente, para o aparecimento de estruturas e comportamentos de uma “nova sociedade” cuja marca indelével parece ser o sedentarismo (Pate, Mitchell, Byun, & Dowda, 2011; Pearson & Biddle, 2011). Esta condição nova, aliada à aquisição de comportamentos e hábitos alimentares sem precedentes (elevado consumo de alimentos processados e altamente calóricos) contribuiu para o aparecimento e desenvolvimento de um vasto leque de doenças crónicas designadas como doenças da civilização atual (Sallis & Owen, 1999).

A obesidade pediátrica é uma patologia complexa emergente, à escala mundial, sendo considerada uma das mais preocupantes da civilização atual. O ritmo alarmante do seu crescimento, i.e. as suas proporções epidémicas, contribuiu para que se tornasse na atualidade num sério e grave problema de saúde pública (Wang & Lobstein, 2006).

Aproximadamente 25% das crianças e dos jovens (até aos 18 anos de idade) que residem em países desenvolvidos evidenciam excesso de peso e obesidade (Lobstein, Baur, & Uauy, 2004). Em Portugal continental, entre 1990 e 2000, a prevalência da obesidade duplicou em crianças de 9 anos (47,3% em 2000) e triplicou em crianças de 11 anos de idade (Cardoso & Padez, 2008). Em Portugal, atualmente, a prevalência de

excesso de peso e obesidade em crianças e jovens com idades compreendidas entre os 10 e os 18 anos, é de 17% e 4,6% nas raparigas, e de 17,7% e 5,8% nos rapazes (Sardinha et al., 2010). Estes valores de obesidade em idade pediátrica são particularmente preocupantes, pois parecem estar fortemente associados a um conjunto variado de fatores de risco de desenvolvimento de doenças cardiovasculares (Dietz, 2004) e a uma mortalidade precoce (Franks et al., 2010).

Á atividade física (AF) culturalmente referida, enquanto movimento corporal realizado pela musculatura esquelética e que resulta num aumento de dispêndio energético relativamente à taxa metabólica de repouso (Caspersen, Powell, & Christenson, 1985), tem uma enorme importância na promoção da saúde, sobretudo quando realizada em níveis moderados a elevados. São diversos os benefícios para a saúde das crianças e dos jovens que lhe são reconhecidos, nomeadamente, no crescimento e desenvolvimento, na saúde óssea, em fatores de risco de doenças cardiovasculares, no excesso de peso e obesidade e em variáveis psicológicas e emocionais (Lubans, Morgan, Cliff, Barnett, & Okely, 2010; Strong et al., 2005; Tompkins, Moran, Preedom, & Brock, 2011; USDHHS, 2008). Embora não sendo consensuais, existem algumas evidências de que uma participação regular em AF na infância parece aumentar a possibilidade dessa prática se manter na adolescência (Janz, Dawson, & Mahoney, 2000; Kristensen et al., 2008) e na idade adulta (Telama, 2009; Telama et al., 2005).

Face ao acúmulo de informação sistemática e rigorosa acerca do benefício de práticas formais e informais de AF de intensidade moderada a vigorosa, diversas organizações médico-científicas internacionais (como por exemplo a Organização Mundial de Saúde, o *American College of Sports Medicine*, o *Centers for Disease Control and Prevention*, a *United States Department of Health and Human Services*, a *American Academy of Pediatrics*) têm apresentado, ao longo das últimas décadas, diversas linhas de recomendação para a AF com vista à promoção da saúde das crianças e dos jovens. As propostas mais recentes sugerem a necessidade das crianças e dos jovens acumularem diariamente pelo menos 60 minutos de uma AF aeróbica de intensidade moderada a

vigorosa e de realizarem três vezes por semana programas de exercícios sistemáticos que estimulem o sistema músculo-esquelético (USDHHS, 2008).

Apesar dos evidentes benefícios da AF na promoção da saúde e das atuais linhas de recomendação, é cada vez maior a prevalência de crianças e jovens com estilos de vida pouco ativos. Estudos epidemiológicos realizados em diferentes regiões geográficas do globo têm mostrado que apenas um reduzido número de crianças e jovens cumpre as referidas linhas de recomendação para a AF (Guthold et al., 2011; Riddoch et al., 2007; World Health Organization, 2004a). Um dos retratos mais extenso acerca da prevalência da AF em crianças e jovens norte-americanas e de diferentes países europeus (11 aos 15 anos de idade) constatou que apenas um terço (34%) dos sujeitos amostrados foi considerado fisicamente ativo (World Health Organization, 2004b). Nesse relatório, Portugal é um dos países com menor prevalência de crianças e jovens a cumprir as linhas de recomendação atuais (11 anos - raparigas: 22%, rapazes: 38%; 13 anos - raparigas: 15%, rapazes: 38%; 15 anos - raparigas: 13%, rapazes: 25%). Uma pesquisa mais recente sobre a população infanto-juvenil Portuguesa (10-17 anos, n=6280), do continente e regiões autónomas dos Açores e da Madeira, tendo avaliado objetivamente os níveis e padrões da AF, apresenta especialmente para o período da adolescência, resultados ainda mais preocupantes (Baptista et al., 2011). Enquanto aos 10-11 anos de idade, 36% das crianças cumprem as linhas de recomendação para a AF (rapazes: 51.6%; raparigas: 22.5%), aos 16-17 anos essa prevalência decresce para os 4% (rapazes: 7.9%; raparigas: 1.2%).

Face a este quadro de resultados, as referidas organizações têm vindo a declarar o sedentarismo como um dos maiores problemas de saúde pública das sociedades modernas, e a salientar a necessidade urgente de se criarem e desenvolverem programas de intervenção com vista à promoção da AF em crianças e jovens em diferentes contextos de prática (escola, nas aulas de Educação Física, clubes e organizações desportivas). Todavia, para que tais programas sejam suficientemente

eficazes nos seus resultados é importante identificar o novo relacional de variáveis que possam explicar a enorme variação populacional da AF.

Diversos estudos epidemiológicos têm procurado descrever os níveis e os padrões da AF de crianças e jovens em função de aspetos demográficos e biológicos assim como avaliar, longitudinalmente, os padrões e as tendências de lateração dos seus valores (Caspersen, Pereira, & Curran, 2000; Eaton et al., 2008; Katzmarzyk, Tremblay, Morrison, & Tremblay, 2007; Pereira et al., 2011; Samdal et al., 2007; Seabra, Maia, et al., 2008). Apesar de algumas divergências conceptuais e metodológicas, a investigação em Portugal e em outras regiões geográficas, tende a sugerir que os rapazes e as crianças normoponderais pertencentes a famílias de estatuto socioeconómico mais elevado são fisicamente mais ativos que as raparigas e as crianças com excesso de peso/obesidade de famílias estatuto socioeconómico inferior. Crianças e jovens mais velhas são fisicamente menos ativos, sendo a adolescência uma janela crítica onde o sedentarismo parece instalar-se.

Esta informação de natureza descritiva é particularmente útil na identificação e caracterização de uma população ou grupo de risco e em permitir, conseqüentemente, o desenvolvimento e a implementação de programas de intervenção mais eficazes. No entanto, embora alguns destes fatores demográficos e biológicos sejam capazes de influenciar os níveis e os padrões de AF de crianças e jovens, a generalidade destes fatores não é passível de ser modificado. Daqui que os investigadores tenham procurado identificar fatores passíveis de serem modificados e capazes de influenciar os níveis e padrões de AF de crianças e jovens. Os resultados desses estudos encontram-se plasmados em diversas revisões sistemáticas (Sallis, Prochaska, & Taylor, 2000; Uijtdewilligen et al., 2011; Van Der Horst, Oenema, et al., 2007; Van Der Horst, Paw, Twisk, & Van Mechelen, 2007). Para além dos fatores demográficos e biológicos, alguns outros de natureza psicológica, social, e ambiental têm sido considerados (Sallis & Owen, 1999). Por exemplo, no estudo de Sallis et al. (2000), o sexo (rapazes), o acesso às facilidades desportivas, as barreiras colocadas à participação em AF, e a

preferência por uma determinada AF foram os fatores que mais consistentemente se relacionavam com os níveis de AF de crianças. Na pesquisa de Van der Horst et al. (2007), para além do sexo (rapazes), também a autoeficácia, a AF parental e o suporte parental mostraram ser fatores igualmente importantes na explicação da AF. Na revisão de Ferreira et al. (2007), com enfoque particular em fatores de natureza ambiental, a AF parental, o tempo despendido em atividades no exterior e as políticas escolares relacionadas com a AF foram os fatores que melhor explicaram a variação interindividual da prática regular e sistemática de AF. Mais recentemente, a pesquisa de Uijtdewilligen et al. (2011), apenas acrescenta a intenção de prática como uma variável correlate capaz de se associar positivamente à AF de crianças.

Não obstante este corpo sistemático de informação, os resultados são ainda pouco consistentes não permitindo a identificação precisa de fatores passíveis de serem modificados e simultaneamente capazes de influenciar os níveis e padrões de AF de crianças. Diferentes aspetos parecem ter contribuído para essa inconsistência: (i) a forma, muito diversificada, como a AF tem sido medida e quantificada; (ii) a adoção de delineamentos de pesquisa e dimensões amostrais muito distintas; (iii) bem como de teorias ou modelos a que se associam variáveis correlatas diversas em termos interpretativos da variabilidade populacional na AF. Não obstante o carácter substantivo da informação proveniente das revisões sistemáticas emergem duas grandes conclusões: as variáveis correlatas que têm sido analisadas não explicam mais de um terço da variação dos níveis e padrões da AF, demonstrando que muita da variação deste comportamento permanece ainda por explicar; e a necessidade de se realizarem novos estudos adotando outras teorias, modelos e variáveis correlatas, mais direcionadas para explicar a AF em crianças e jovens.

Recentemente, investigadores de Saúde Pública e das Ciências do Desporto, têm centrado a sua atenção em outras teorias e variáveis correlatas. A abordagem mais atual e promissora é designada de socio-ecológica. Na sua essência assume que, para além de fatores psicológicos (i.e. individuais/intrapessoais), existem outros de

natureza social (i.e. interpessoal) capazes de melhorar a clareza interpretativa e explicativa da AF (Sallis & Owen, 2003). Os modelos socio-ecológicos comumente utilizados examinam uma variedade de fatores contextuais relacionados com a família, escola, trabalho, vizinhança, ou com aspetos culturais que influenciam os comportamentos dos sujeitos e consequentemente o risco para o sedentarismo. No entanto, a generalidade dos modelos socio-ecológicos que têm sido considerados foram desenhados para a população adulta com a assunção de que seriam igualmente desenvolvidos para crianças e jovens (Freedson, Pober, & Janz, 2005).

O *Youth Physical Activity Promotion* (YPAP) é uma versão da perspectiva socio-ecológica especificamente desenvolvida para interpretar o novelo relacional explicativo dos níveis de AF de crianças e jovens (Welk, 1999). Este modelo procura especificamente explicar a relação entre fatores psicossociais e a participação em AF, integrando para esse efeito um conjunto de constructos provenientes de outras teorias identificados anteriormente como importantes determinantes dos níveis de AF de crianças. Esses constructos incluem atributos psicológicos (fatores que predis põem), sociais (fatores que reforçam), e ambientais (fatores que favorecem) (Welk, 1999).

Os fatores que predis põem incluem variáveis que aumentam a probabilidade das crianças serem fisicamente ativas. Refletem o interesse das crianças em participar regularmente em AF e consistem em dois constructos: “Valerá a pena?” e “Serei eu capaz?”. “Valerá a pena?”, representa a expetativa de resultado, e é definido como o desejo e a atração para a participação em AF. “Serei eu capaz?”, representa uma expetativa de eficácia, e é definido como a percepção individual de competência na AF. O modelo YPAP, relativamente a estes dois constructos, sugere como hipótese que as crianças que têm autopercepções positivas e que sentem que a sua participação em AF tem algum benefício são mais propensas a participar regularmente em AF (Welk, 1999).

Os fatores que reforçam consistem em influências sociais que encorajam direta ou indiretamente as crianças a participar em AF e incluem a influência dos pais, pares e as crenças de outros significantes. Os efeitos diretos podem ocorrer através dos esforços realizados no sentido da criança ser ativa, enquanto os indiretos podem ser mediados através de outros processos afetivos ou atitudes (fatores que predis põem).

Os fatores que favorecem incluem variáveis ambientais e biológicas que possibilitam as crianças serem fisicamente mais ativas (disponibilidade de recursos e equipamentos, condições de acessibilidade a programas de AF ou exercício, ou habilidades). A figura 1 ilustra o modelo YPAP proposto e desenvolvido por Welk e as relações que se estabelecem entre os diferentes fatores de influência da AF.

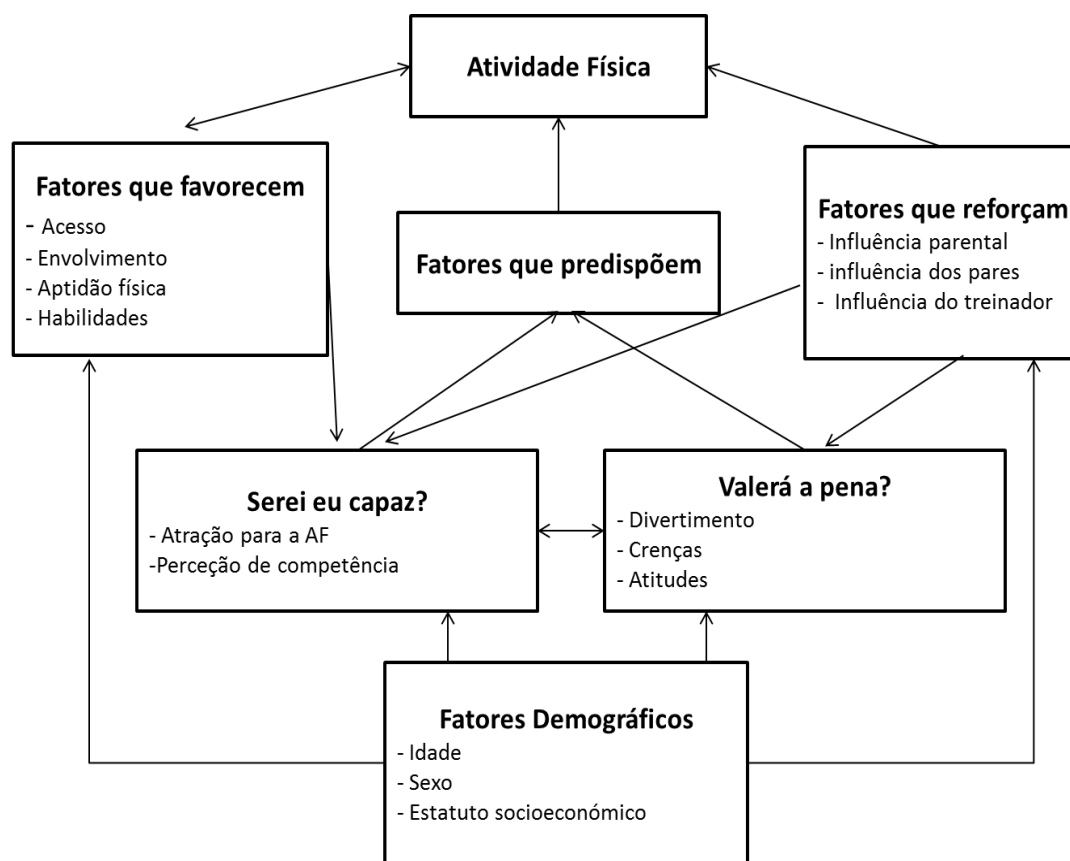


Figura 1. Modelo “Youth Physical Activity Promotion” (YPAP) (Welk, 1999).

Não obstante o carácter interpretativo proposto pelo YPAP e pela novidade da sua aplicação a crianças e jovens, o fato é que ainda são escassos os estudos que o

utilizaram. No entanto, os resultados obtidos são promissores, mostrando uma associação positiva entre os fatores psicossociais e a participação de crianças e jovens em AF (Crimi, Hensley, & Finn, 2009; Davison, Downs, & Birch, 2006; Dollman, 2010; Duncan & Mummery, 2005; Lau, Lee, & Ransdell, 2007; Paxton, Estabrooks, & Dziewaltowski, 2004; Welk, Wood, & Morss, 2003; Welk & Schaben, 2004). Em Portugal, tanto quanto julgamos saber, apenas um único estudo procurou interpretar os níveis de AF de jovens (15 anos de idade) tendo como base teórica este modelo (Silva, Lott, Wickrama, Mota, & Welk, 2011). Contudo, os resultados encontrados apenas permitiram identificar uma associação direta entre o suporte social e a AF de intensidade moderada a vigorosa.

Do conjunto de constructos psicossociais que constituem o modelo YPAP, a atração para a AF reveste-se de singular importância por permitir compreender o interesse emocional antecipado da criança em participar em AF (Brustad, 1993). A possibilidade em identificar, antecipadamente, os motivos que atraem as crianças a adotar estilos de vida ativos, permite estabelecer e desenvolver programas de intervenção mais eficazes e orientados para determinados grupos de risco (por exemplo para as meninas, e crianças com excesso de peso/obesidade e pertencentes a famílias de estatuto socioeconómico mais baixo).

Existem evidências na literatura que as crianças tendem a revelar uma atração positiva quando se encontram motivadas para se envolver em AF, ou pelo contrário, uma rejeição quando evitam participar nessas atividades (Brustad, 1993). É igualmente consensual na literatura da especialidade que muitas das atitudes e comportamentos relativamente à participação e ao envolvimento em AF têm a sua origem na infância podendo ser posteriormente mantidas na idade adulta (Brustad, 1991; Macdonald, Rodger, Abbott, Ziviani, & Jones, 2005). Daqui que responsáveis em políticas educativas, em Epidemiologia e em Saúde Pública tenham manifestado um enorme interesse em compreender melhor e de forma mais extensa o que motiva ou atrai as crianças a serem fisicamente mais ativas. Segundo Brustad (1996), a motivação para a

participação em AF está dependente das reações afetivas a várias dimensões do envolvimento, de que se destacam: o desejo de participar em jogos e desportos, a percepção da importância da participação em AF para a melhoria da saúde, o desejo de participar em AF vigorosas (por exemplo: jogar arduamente ou sensação de cansaço após a atividade), a percepção da aceitação dos pares em jogos e desportos e o divertimento pelo esforço físico (por exemplo: sentimentos de falta de ar ou de ficar suado). Incorporando todas estas dimensões do envolvimento a que a criança está afetivamente sujeita, Brustad (1993) desenvolveu a escala “*Children’s Attraction to Physical Activity*” (CAPA) para avaliar a atração e as atitudes das crianças face à AF. Não obstante o interesse internacional pela temática da atração pela AF de crianças e jovens (Brustad, 1993, 1996; Lau et al., 2007; Paxton et al., 2004; Schaben, Welk, Joens-Matre, & Hensley, 2006; Welk et al., 2003), Portugal parece órfão de um assunto muito importante que percorre todo o espaço de intervenção educativa sobretudo no 1º ciclo do Ensino Básico.

A Lei de Bases do Sistema Educativo determina o carácter universal, obrigatório e gratuito do Ensino Básico, assinalando, no seu artigo 7º, que lhe cumpre “assegurar uma formação geral comum a todos os portugueses”. As áreas curriculares disciplinares de frequência obrigatória no 1º Ciclo são: Língua Portuguesa; Matemática; Estudo do Meio; e as Expressões (Artísticas e Físico-Motoras). A participação das crianças em aulas de expressão físico-motora (Educação Física no 1º Ciclo) oferece aos alunos experiências concretas, necessárias às abstrações e operações cognitivas inscritas nos programas doutras áreas, preparando os alunos para a sua abordagem ou aplicação. É consensual que o desenvolvimento físico-motor da criança atinge estádios qualitativos que precedem o desenvolvimento cognitivo e social (Ministério da Educação, 2004). Deste modo, um dos grandes propósitos de toda a escolaridade obrigatória, sobretudo no lato do domínio da Educação Física Escolar, é envolver crianças e jovens no laço educativo de atividades físico-motoras que tenham um vínculo corporal significativa (Maia & Lopes, 2007). A Educação Física no 1º Ciclo é, inquestionavelmente, uma componente inalienável da Educação. Daqui que as aulas

de Educação Física no 1º Ciclo preencham, também, um forte propósito de educar crianças para a aquisição e manutenção de estilos de vida ativos e saudáveis, repletos de comportamentos gratificantes, a que se associam cuidados nutricionais. Espera-se, deste modo, que os benefícios tendam a manter-se na adolescência e que se prolonguem pela vida adulta.

As crianças tendem a variar muito na sua adesão, sentido lúdico e gratificações interpessoais na prática de jogos e desportos, reflexo claro da sua atração para a AF. Identificar e interpretar esta rede de relações e ações das crianças torna-se essencial para investir de modo mais esclarecido no planeamento das aulas de Educação Física. Experiências positivas, sucesso e o divertimento decorrente da participação nas aulas de Educação Física tendem a constituir-se como fontes de enorme prazer na sua prática (Okley, Booth & Patterson, 2001). A promoção de formas saudáveis de vida deve iniciar-se na escola, dado ser o local ideal para o início da educação para a saúde. A Educação Física é, indiscutivelmente, o principal motor deste processo pedagógico. A Escola é o lugar privilegiado onde todas as crianças, sem exceção, têm oportunidade de beneficiar de tais experiências enriquecedoras do seu desenvolvimento.

A presente dissertação foi então construída em torno de um conjunto de questões que consideramos fundamentais, intersetando saberes da Psicologia do Desporto, da Epidemiologia da AF e da Estatística Multivariada. As interrogações subjacentes a toda esta aventura inquisitiva foram pensadas numa sequência de complexidade crescente. O grande problema desta dissertação é o de entender, de forma mais elaborada e extensa, a teia de agentes que condiciona a variabilidade interindividual na atração das crianças pela AF, bem como esta influencia a magnitude de um dos seus comportamentos mais universais - a AF nas suas múltiplas dimensões, expressa em variadas representações lúdicas, estruturadas ou não, num tempo em que condições e ambientes sedenterogénicos começam a atingir proporções elevadas. Num plano secante a este conjunto de interrogações de natureza mais descritiva e associativa, está uma inquietação emergente de um estudo de intervenção para verificar da sua

viabilidade em alterar, positivamente e numa magnitude de efeito moderada a elevada, a atração pela AF.

Vamos, então, às perguntas, que ligaremos aos propósitos situando-os no contexto da pesquisa atual.

A primeira pergunta refere-se, precisamente, à etapa inicial deste trabalho: é viável a adaptação transcultural de uma escala para quantificar facetas distintas da atração de crianças pela AF? Esta grande pergunta remete, necessariamente, para o recurso a procedimentos da teoria Clássica dos Testes de que o pensamento e metodologia da Análise Fatorial Confirmatória serão a opção privilegiada. Num primeiro momento será formalmente testada a estrutura conceptual de uma escala desenvolvida nos EUA por Brustad (1993) - *Children's Attraction to Physical Activity* (CAPA). Na hipótese da estrutura multifacetada ser viável, face aos valores das medidas de ajustamento global e local do modelo que circunscreve o território semântico e concetual da atração pela atividade física então, será testada a sua invariância configuracional e fatorial em duas subamostras aleatórias de crianças.

A segunda pergunta, de natureza eminentemente diferencial, é a seguinte: haverá diferenças, em termos médios, nas distintas facetas da escala CAPA em crianças dos dois sexos, de distintas categorias ponderais e pertencentes a famílias com diversidade no seu estatuto socioeconómico? Esta pergunta remete para um modelo relativamente complexo de análise de variância a três fatores com a sua respetiva teia de interações.

A terceira pergunta, embora recorra ao modelo linear sob a forma da regressão múltipla, de natureza descritivo-associativa, é a seguinte: qual é a viabilidade (em termos de hipóteses estatísticas) de um modelo linear para descrever as influências,

independentes e aditivas, de variáveis de natureza psicossocial (atração pela AF, percepção de competências físicas, e influência parental) na AF de crianças? Esta pergunta não tem, em si mesma, qualquer propósito preditivo, não porque não tenha sido possível testar, formalmente, o valor da equação de regressão com base numa estratégia de validação cruzada, mas sim porque esta resposta é a primeira etapa de uma mais complexa que será abordada de seguida.

A quarta pergunta, de natureza mais associativa, e complexa, é a sequência lógica da questão anterior: será que em crianças Portuguesas se mantém viável o modelo relacional de preditores e mediadores da AF de crianças tal como descrito pelo modelo YPAP (Welk, 1999)? Esta pergunta exige o recurso a modelos de estrutura de covariância, conjugando aspetos da análise fatorial confirmatória com a análise de trajetórias (do inglês *path analysis*). Ao lidar com variáveis latentes, o modelo YPAP será submetido a testes estatísticos formais em termos do seu ajustamento global e local, a que se associa, naturalmente, a geração de modelos mais parcimoniosos. Este esforço terá, necessariamente, que ligar os aspetos essenciais do modelo semântico e estrutural do YPAP com a informação proveniente dos distintos constructos utilizados como sejam: (i) a atração pela AF, (ii) a percepção de competência física, (iii) a influência parental e (iv) a AF das crianças.

A última pergunta, que procura fechar uma parte da espiral interrogativa da presente dissertação é a seguinte: será que um programa específico de intervenção, baseado na prática formal de um desporto, tem uma magnitude de efeito elevada na alteração, sempre positiva, na atração das crianças pela AF e na sua percepção de competências físicas? Esta pergunta é, num certo sentido, um dos degraus mais sólidos decorrentes de toda a aventura inquisitiva desta dissertação, porque procura colocar, á prova, aspetos do conhecimento adquirido nas respostas anteriores.

Destas questões emergem, naturalmente, os seguintes objetivos:

(1) Adaptar/Validar transculturalmente a versão curta da escala “*Children’s Attraction to Physical Activity*” (CAPA) e examinar a invariância fatorial em duas amostras aleatórias (designadas respetivamente de calibração e validação).

A escala “*Children’s Attraction to Physical Activity*” foi desenvolvida por Brustad (1993) para avaliar os interesses e as atitudes de crianças norte-americanas do 4º ano de escolaridade relativamente à AF. Brustad (1993) reconheceu a necessidade em construir uma escala, multidimensional, capaz de mapear distintas facetas da atração de crianças e jovens pela AF. Foram desenvolvidas duas versões desta escala: a longa e a curta. A primeira é composta por 25 itens distribuídos pelos cinco fatores identificados com base na análise fatorial exploratória que refletem o que de mais e menos atrativo as crianças e os jovens encontram na AF e prática desportiva e que são: (fator 1) designado por participação em AF vigorosa cujo conteúdo semântico se refere aos sentimentos da criança relacionados com o seu envolvimento em atividades vigorosas; (fator 2) entendido por aceitação dos pares em jogos e desportos e que retrata a popularidade que as crianças têm junto dos seus pares durante a participação em jogos e desportos; (fator 3) entendido como a importância da AF e que diz respeito à perceção que as crianças têm relativamente à importância que a prática de AF poderá ter na sua saúde; (fator 4) refere-se ao gostar de jogos e desportos e entende-se como o divertimento experimentado aquando da participação nesses jogos e desportos; e por último, (fator 6) designado por divertimento pelo esforço físico e que se relaciona com o fato da criança gostar ou não de determinados aspetos da AF (por exemplo suar e ficar com falta de ar).

Esta versão foi concebida para compreender os aspetos específicos da atração que poderão diferenciar as crianças (p.e. gostar de AF vigorosa relativamente ao sexo).

A versão curta, por outro lado, pretende medir o nível geral de atração para a AF sendo composta apenas por 15 itens (três melhores itens das cinco subescalas da versão longa). Esta versão do Instrumento CAPA não compromete a fiabilidade ou a previsão de utilidade deste instrumento. Pois, o autor da escala salienta que as

subescalas foram inicialmente propostas para serem independentes e que a análise de fatores mostrou que os itens “carregavam” num fator único. Portanto, os 15 itens irão representar a média global de atração para a AF. Uma criança pode obter no máximo um score de 60 (15 itens x score 4), sendo a média total do score situa-se entre 44 a 48 e a média por score (de 1 a 4) entre 2.9 a 3.2 (Brustad, 1993).

O formato das respostas desta escala é de estrutura alternativa de resposta com duas opções de resposta opostas para evitar que as crianças forneçam respostas socialmente desejáveis e para evitar respostas corretas aos “olhos dos adultos”. Após selecionar a opção de resposta poderá depois referir se é: “É totalmente verdade para mim” ou se é: “ É mais ou menos verdade para mim”. Por exemplo: “Alguns alunos gostam de praticar jogos e desportos ao ar livre” mas “Outros alunos preferem praticar jogos e desportos dentro do pavilhão”. Desta forma, a atração para a AF é definida como um comportamento reflexo de sentimentos positivos respeitantes a habilidades ou sujeitos.

Não conseguimos localizar em Portugal qualquer instrumento que avalie a atração para a AF de crianças e jovens. É corrente no nosso país, na área da Psicologia do Desporto, o uso de instrumentos desenvolvidos nos EUA e em outros países Europeus. No entanto, na maior parte dos casos desconhece-se a extensão da sua validade transcultural, uma vez que nem sempre são publicados os resultados dos estudos de adaptação/validação nem é feita qualquer menção ao uso dos procedimentos metodológicos mais recentes e poderosos neste tipo de análises (Maia & Graça, 1995). A aplicação de um instrumento, numa qualquer amostra sem que a sua equivalência métrica e estrutural tenha sido demonstrada, está votada ao mais rotundo fracasso. De acordo com Maia e Graça (1995), a equivalência métrica e estrutural torna-se necessária já que, os indicadores de um instrumento podem ter diferentes interpretações em diferentes lugares e culturas no decorrer do tempo, devido a eventos históricos, mudanças em normas sociais, nas condições económicas, etc..

Estas diferenças ao nível económico, social, educacional e profissional exigem que se proceda a uma avaliação transcultural de escalas do domínio psicológico (Maia & Graça, 1995). Tendo em conta que os instrumentos desenvolvidos em outros países são reflexo do seu contexto cultural, não devem consequentemente ser reproduzidos diretamente numa outra cultura. É pois, plenamente justificável a adaptação cultural e a validação da escala “*Children’s Attraction to Physical Activity*” para crianças Portuguesas.

(2) Identificar a magnitude das diferenças na atração para a AF, na perceção de competência física e na influência parental em crianças de ambos os sexos, de distintas categorias ponderais e pertencentes a famílias com diversidade no seu estatuto socioeconómico.

A investigação relativa à identificação de possíveis diferenças na atração para a AF, na perceção de competência física e na influência parental em crianças em função de variáveis demográficas [sexo e estatuto socioeconómico (ESE)] e biológicas [índice de massa corporal (IMC)] é escassa. A informação disponível apenas permitiu identificar diferenças entre sexos na atração para a AF e na perceção de competência física a favor dos rapazes (Brustad, 1996; Lau et al., 2007; Silva et al., 2011; Welk et al., 2003). No que se refere a eventuais diferenças nesses fatores em função do IMC e do ESE das crianças, não foram localizadas na literatura quaisquer investigações. Tal fato é algo incompreensível, quando se reconhece às crianças com excesso de peso/obesidade e de inferior ESE um menor envolvimento e participação em AF relativamente aos seus pares normoponderais e de ESE mais elevado (Katzmarzyk et al., 2007; Pereira et al., 2011; Seabra, Mendonca, Thomis, Peters, & Maia, 2008). Deste modo, equacionam-se eventuais diferenças na atração das crianças pela AF, na sua perceção de competência física e na influência parental em função do IMC e do ESE favorecendo as crianças normoponderais e as que pertencem a famílias de ESE mais elevado.

(3) Explorar a viabilidade de um modelo linear de relações aditivas entre fatores psicossociais (atração pela AF, percepção de competência física e influência parental) e os níveis de AF de crianças.

Na literatura é possível localizar diversos estudos que testaram a relação entre fatores demográficos, biológicos, psicológicos, sociais, e ambientais e a participação das crianças em AF (Sallis et al., 2000; Uijtdewilligen et al., 2011; Van Der Horst, Oenema, et al., 2007; Van Der Horst, Paw, et al., 2007). De entre os fatores psicológicos analisados, a atração para a AF e a percepção de competência física têm sido apontados como potenciais promotores do envolvimento de crianças em AF. Crianças que se mostram mais atraídas a participar em AF e que se percebem como mais competentes fisicamente tendem a envolver-se e a persistir mais tempo em AF (Brustad, 1993; Schaben et al., 2006; Welk et al., 2003). De igual modo, de entre os fatores sociais considerados, a influência parental parece revelar uma enorme importância na aquisição e na manutenção de estilos de vida ativos por parte dos seus filhos. Esta influência parental na AF das crianças pode ser vista através de diferentes mecanismos: encorajamento verbal e reforço positivo, transporte de e para as atividades, assistência às atividades e participação nas atividades sem e com os seus filhos (Welk et al., 2003). A literatura parece ser consensual de que progenitores que acreditam na importância da AF, que são modelos pela sua participação em AF, que incentivam os seus descendentes a serem ativos, ou que fornecem suporte instrumental para essa participação tendem a ter descendentes que são mais ativos do que as crianças cujos pais não são fisicamente ativos (Davison et al., 2006; Dollman, 2010; Duncan, Duncan, & Strycker, 2005; Eriksson, Nordqvist, & Rasmussen, 2008; Moore et al., 1991; Pugliese & Tinsley, 2007; Trost et al., 2003). Em Portugal, apenas conseguimos localizar na literatura, um único estudo que examinou a associação entre a influência parental e os níveis de AF de crianças e jovens (Seabra, Mendonca, Thomis, Malina, & Maia, 2011). Desse trabalho emerge a noção que quando a mãe participa em AF a propensão do seu filho também participar é maior do que a do filho cuja mãe não participa em qualquer AF. Como se constata, as pesquisas e os trabalhos

sobre esta temática são praticamente inexistentes, razão pela qual não existe ainda um conhecimento preciso e suficientemente esclarecedor acerca da associação entre esses fatores psicossociais e os níveis de AF das crianças.

(4) Avaliar o modelo *Youth Physical Activity Promotion* (YPAP) procurando identificar a associação entre fatores que predis põem (atração para a AF, percepção de competência física) e que reforçam (influência parental) e os níveis de AF de crianças.

O modelo YPAP tem sido apresentado como uma abordagem socio-ecológica capaz de ajudar a compreender as variáveis correlatas da participação das crianças em AF. Uma característica importante deste modelo é considerar os atributos psicológicos (fatores que predis põem), as influências sociais (fatores que reforçam) e as influências ambientais (fatores que favorecem) importantes variáveis correlatas da AF de crianças. Os fatores que predis põem são conhecimentos e percepções individuais que influenciam a participação de crianças em AF e consistem em dois constructos - a atração pela AF e a percepção de competência física (Bandura, 1986). Relativamente a estes dois constructos, o modelo YPAP, sugere como hipótese que as crianças que têm autopercepções positivas e que sentem que a sua participação em AF tem algum benefício estão mais propensas a participar regularmente em AF (Welk, 1999). Os fatores que reforçam são recompensas recebidas ou o feedback de outras pessoas após a realização de um comportamento que podem encorajar ou desencorajar a adoção e/ou a manutenção desse comportamento. Os pais são geralmente considerados um fator de reforço crítico e decisivo no bem-estar das crianças, moldando seus comportamentos saudáveis, incluindo a adoção de um estilo de vida ativo (Duncan et al., 2005). Os fatores que predis põem evidenciam um efeito direto através dos esforços realizados no sentido da criança ser ativa, ou indiretos podendo ser mediados através de outros processos afetivos ou atitudes (fatores que predis põem). Os fatores que favorecem incluem variáveis ambientais e biológicas que possibilitam as crianças serem fisicamente mais ativas (disponibilidade de recursos e

equipamentos, condições de acessibilidade a programas de AF ou exercício, ou habilidades).

Alguns constructos deste modelo têm sido testados em pesquisas com o propósito de explicar a AF de crianças e jovens. A literatura tem identificado a existência de uma relação positiva entre a atração pela AF (Paxton et al., 2004; Schaben et al., 2006; Welk et al., 2003) e a percepção de competência física (Davison et al., 2006; Schaben et al., 2006; Welk et al., 2003; Welk & Schaben, 2004) e a AF de crianças e jovens. Para além disso, também é possível localizar na literatura duas investigações (Lau et al., 2007; Paxton et al., 2004) que mostraram que a percepção de competência física influencia indiretamente a AF através da atração para a AF, e três estudos que identificaram uma relação entre a influência parental, a percepção de competência física e a atração pela AF (Schaben et al., 2006; Welk et al., 2003). Pelo contrário, no que se refere aos fatores que favorecem a generalidade dos estudos realizados não parece mostrar uma relação significativa entre o envolvimento e a AF de crianças e jovens.

Em Portugal, e de acordo com o nosso conhecimento, apenas uma única investigação procurou compreender e explicar os níveis de AF de jovens (15 anos de idade) recorrendo ao modelo YPAP (Silva et al., 2011). Os resultados encontrados apenas identificaram uma associação direta entre o suporte social e a AF de moderada a vigorosa intensidade. No entanto, em crianças de idade mais baixa não foi possível localizar nenhum estudo na literatura. Face a esta escassez de informação, justifica-se a realização de um estudo em crianças portuguesas utilizando como pano de fundo o modelo YPAP. A atração pela AF, a percepção de competência física e a influência parental serão selecionadas como possíveis fatores influenciadores da AF das crianças. A seleção destes fatores resulta da associação positiva e significativa que parece existir entre cada um deles e os níveis de AF de crianças (Davison et al., 2006; Paxton et al., 2004; Schaben et al., 2006; Welk et al., 2003; Welk & Schaben, 2004).

(5) Avaliar o efeito de um programa de intervenção no bem-estar psicológico e na composição corporal de crianças com excesso de peso.

Embora as prevalências de excesso de peso/obesidade em crianças estejam bem descritas, o seu incremento nas últimas décadas bem identificado, e as consequências que a obesidade possui na saúde fisiológica das crianças bem compreendidas, menos bem analisadas são as consequências psicológicas que lhes estão associadas (Cornette, 2008). No entanto, os escassos estudos realizados parecem mostrar que as crianças que possuem excesso de peso e/ou obesidade tendem a perceber-se menos atraídas para participar em AF, e a evidenciar uma menor percepção de competência física, autoestima, imagem corporal e qualidade de vida, para além de um risco acrescido de depressão e discriminação social (Griffiths, Parsons, & Hill, 2010; Wardle & Cooke, 2005).

Considerando este aumento da obesidade em idade pediátrica e as consequências psicológicas que lhe estão associadas, os investigadores têm procurado desenvolver e implementar diversos programas de intervenção com vista a contrariar tais tendências (Brown & Summerbell, 2009; Harris, Kuramoto, Schulzer, & Retallack, 2009). Alguns desses programas parecem mostrar que a participação regular em AF permite aumentar o interesse e a atração pela AF (Welk et al., 2003), a percepção de competência física (Jones, Okely, Caputi, & Cliff, 2010), a autoestima (Ekeland, Heian, & Hagen, 2005), a imagem corporal (Gehrman, Hovell, Sallis, & Keating, 2006) assim como melhorar a composição corporal (Brown & Summerbell, 2009). No entanto, e face a resultados menos conclusivos, os estudos salientam a necessidade de se realizarem mais investigações. A variação no tipo, duração, intensidade dos programas de AF pode ter contribuído para essa inconsistência nos resultados. Os programas de intervenção para crianças e jovens com excesso de peso e obesidade geralmente têm incorporado uma variedade de atividades aeróbicas e de resistência de forma a permitirem responder às eventuais diferenças inter individuais (corrida, marcha, remo,

atividades em circuito), assim como de jogos e desportos de equipa. Contudo, os investigadores salientam que a adesão a estes programas por parte das crianças e jovens com excesso de peso e obesidade é limitada. Na sua opinião a escassa adesão é resultado da impossibilidade de muitos destes programas poderem ser realizados na escola e em outros contextos, e pelo fato de muitas das atividades propostas serem pouco motivadoras. Justifica-se por isso encontrar um conjunto de atividades físico-motoras ou desportivo que seja suficientemente motivadora e consequentemente eficaz na melhoria do bem-estar psicológico e da composição corporal da criança com excesso de peso. O futebol, sendo um dos desportos mais populares e praticados no mundo inteiro, é apontado como um meio eficaz na melhoria de alguns indicadores de saúde na população adulta (Krustrup et al., 2010). Em crianças e jovens apenas foram localizados dois estudos que procuraram analisar a eficácia de um programa de futebol recreativo em indicadores de saúde e na aptidão física de crianças com excesso de peso (Faude et al., 2010; Weintraub et al., 2008). Os resultados sugerem que a prática recreativa de futebol é uma intervenção eficaz no controlo do peso corporal e em diversos indicadores da aptidão física. Assim sendo, e considerando que em Portugal, o futebol é o desporto mais popular e que reúne maior preferência de prática em todas as idades e estratos sociais (Instituto do Desporto de Portugal, 2005) é de equacionar a sua eventual eficácia no incremento da atração para a AF, da perceção de competência física e consequentemente na melhoria do bem-estar psicológico das crianças com excesso de peso.

A **estrutura desta dissertação** foi pensada por forma a responder, sequencialmente, às perguntas colocadas cuja importância procuramos muito brevemente salientar.

No **capítulo I (Introdução)** foi efetuado o enquadramento concetual e apresentada a sequência estrutural da dissertação, justificando os propósitos conducentes à sua realização. Apresenta os principais objetivos.

O **capítulo 2 (Estudos)** contém os estudos parcelares que nada mais são do que respostas às perguntas anteriormente formuladas. O primeiro e o segundo tratam da adaptação/validação transcultural da escala “*Children’s Attraction to Physical Activity*” (CAPA) e da sua invariância para a população Portuguesa; o terceiro procura identificar diferenças na atração para a AF, na percepção de competência física e na influência parental em crianças dos dois sexos, de distintas categorias ponderais e pertencentes a famílias com diversidade no seu estatuto socioeconómico; o quarto identifica a associação entre fatores psicossociais e os níveis de AF de crianças; o quinto testa uma versão do modelo YPAP (Welk, 1999) para interpretar diferenças inter individuais nos níveis de AF de crianças; o sexto avalia a eficácia de um programa de intervenção no bem-estar psicológico e na composição corporal de crianças com excesso de peso. Estes estudos são apresentados sob a forma de artigo em concordância com as normas das revistas para onde foram submetidos.

Quadro 1. Estudos realizados (título, objetivo).

Estudo 1	Confirmatory Factorial Analysis of Children’s Attraction to Physical Activity scale (CAPA) Adaptar/Validar transculturalmente a escala “Children’s Attraction to Physical Activity” (CAPA)
Estudo 2	Validation and invariance of the short version of Children’s Attraction to Physical Activity (CAPA) scale in Portugal Examinar a invariância fatorial da escala “Children’s Attraction to Physical Activity” (CAPA) em duas amostras aleatórias (calibração e validação)
Estudo 3	Gender, weight status and socioeconomic differences in psychosocial correlates of physical activity in schoolchildren Identificar diferenças na atração para a AF, na percepção de competência física e na influência parental em crianças em função do sexo, do estatuto socioeconómico e do índice de massa corporal
Estudo 4	Psychosocial correlates of physical activity in schoolchildren aged 8 to 10 years Identificar a associação entre fatores psicossociais (atração pela AF, percepção de competência física e influência parental) e os níveis de AF de crianças

Evaluating the Youth Physical Activity Promotion model among Portuguese schoolchildren

- Estudo 5 Avaliar uma versão do modelo “*Youth Physical Activity Promotion*” proposto por Welk (1999) tendo em conta os fatores predisponentes (atração para a AF e percepção de competência), o fator de reforço (influência da socialização parental) e os níveis de AF, de crianças dos 8 aos 10 anos de idade.

Effects of a 6-month soccer intervention program on psychological well-being and body composition in overweight children

- Estudo 6 Examinar o efeito de um programa de intervenção no bem-estar psicológico e na composição corporal de crianças com excesso de peso.

O **capítulo 3** apresenta as principais conclusões sintetizando a essência dos resultados, ao mesmo tempo que avança um conjunto variado de sugestões e recomendações para estudos futuros.

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Capítulo 2.

Estudos

Confirmatory Factorial Analysis of Children's Attraction to Physical Activity scale (CAPA)

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Abstract

Attraction to physical activity (PA) is an important contributor to children's intrinsic motivation to engage in games, and sports. Previous studies have supported the utility of the children's attraction to PA scale (CAPA) but the validity of this measure for use in Portugal has not been established. The purpose of this study was to cross-validate the shorter version of the CAPA scale in the Portuguese cultural context. A sample of 342 children (8-10 years of age) was used. Confirmatory factor analyses using EQS software (version 6.1) tested three competing measurement models: a single-factor model, a five-factor model, and a second order factor model. The single-factor model and the second order model showed a poor fit to the data. It was found that a five-factor model similar to the original one revealed good fit to the data ($S-B\chi^2_{(67)}=94.270, p=0.01572$; NNFI=.932; CFI=.95; RMSEA=.035; 90% CI=.016;.050). The Portuguese version of the CAPA maintained the original structure and evidence was provided for the validity of the instrument in the Portuguese cultural context. The availability of a valid scale to evaluate attraction to PA at schools should provide improved opportunities for better assessment and understanding of children's involvement in PA.

Regular physical activity (PA) is associated with health, fitness, and behavioural benefits for children and youth and is a predictor of a physically active and healthy lifestyle in adulthood (Strong et al., 2005). For a variety of reasons, relatively large numbers of children and adolescents do not meet PA guidelines (Bouchard, Blair, & Haskell, 2007). As such, identifying the mechanisms by which the social environment affects PA and health may aid researchers and policy makers in developing interventions and programs that promote and sustain PA, which in turn may lead to better health in young people. An improved understanding of the impact of social

relationships on PA and health may contribute to the effective design of interventions for preventing a wide array of diseases.

In order to maximize the effectiveness of such programs, a better understanding of PA correlates in childhood and adolescence is needed. Over recent decades, researchers have examined and identified PA correlates in children and adolescents (Bauman, Sallis, Dzewaltowski, & Owen, 2002; Sallis, Prochaska, & Taylor, 2000; Van Der Horst, Paw, Twisk, & Van Mechelen, 2007; Welk, Wood, & Morss, 2003). Biological and sociocultural factors have regularly been identified as important correlates (Sallis et al., 2000). Significant others, including parents, siblings and peers are also important social agents that can influence children's PA behaviour (Seabra, Mendonca, Thomis, Anjos, & Maia, 2008; Welk et al., 2003). However, much remains to be known about the precursors and correlates of children's PA involvement. One promising social cognitive variable is attraction to PA. Attraction to PA can be defined as an individual's desire to voluntarily participate in a task involving physical exertion or movement, through play, games or sport (Brustad, 1996; Paxton, Estabrooks, & Dzewaltowski, 2004).

In the USA, Brustad (Brustad, 1993, 1996) developed a scale to measure children's attraction to physical activity (CAPA) for use with children (9-12 years). The purpose of this research was to attempt to develop an instrument that would reflect children's interest in PA involvement. A more specific purpose was to identify characteristics of the PA experience that would either attract or repel children from involvement in relation to the types of outcomes that children anticipated through their involvement. The first step in the process of scale development was to interview children in small groups to ask them about the characteristics of PA that made them want to participate, or not want to participate. These discussions led to the development of a 25-item scale that included five separate factors of subscales that reflected differences in the extent of children's attraction to PA according to their liking of vigorous PA,

liking of games and sports, fun of physical exertion, importance of PA to health, and peer acceptance in PA.

Although preliminary studies were encouraging, Brustad (1993, 1996) noted that there was a clear need for further examination of the psychometric properties of the CAPA, particularly with populations differing from the original to ensure that the CAPA was suitable for more widespread use. The CAPA scale focuses on children's feelings about their PA involvement along dimensions that children themselves have identified as being salient features of the PA experience (Brustad, 1993, 1996). The scale is based on the assumption that motivation for participation in PA in children is related to previous and anticipated emotional reactions to various characteristics of the PA experience. Specifically these dimensions include the favorability with which children regard: i) vigorous PA (VPA), ii) their personal involvement in competitive games and sports (LGS), iii) their interactions with peers in the sport and PA context (PAGS), iv) their perceptions of the importance of PA to health (IPA), and v) the exertional characteristics of PA during more structured forms of exercise (FPE). In fact, the forces attracting children to PA are distinct from those that motivate adults, and so this scale reflects children's perspective on their expected participation in PA (Brustad, 1993, 1996).

One of the main limitations in evaluating effectiveness of programs designed to attract children to PA is the availability of scales that are both developmentally and culturally appropriate. In Europe, only few countries have developed valid scales to assess the construct of children's attraction to PA. Ries et al. (2009) translated the 15-item version of the CAPA into Spanish, French and German for use with Spanish and Luxembourgish adolescents (14-15 years). The results from their pilot study showed that some students had problems understanding the 4-point "structured alternative format". As a consequence, the items were rephrased into first person statements and negative phrasing was avoided as much as possible and items were scored on a 5-point

Likert type format that ranged from 1 (strongly disagree) to 5 (strongly agree). After this modification format, the internal consistency was greatly enhanced for all initial subscales (Spanish: .57-.91; French: .60-.91; German: .53-.90). Eleven items of the original 15-item CAPA scale were retained in the Spanish sample and twelve items were retained for use with the Luxembourgish sample.

Outside of the European context, Rose et al. (2009) validated the CAPA scale in Australia with a sample of children (6-8 years) using the longer (25-item) version of CAPA with a Likert-type format. The internal consistency indices were acceptable for three of the dimensions (IPA:.72 , LGS:.75, and FPE:.67), but remained low to moderate in their initial form for liking VPA (.64) and PAGS (.30). Removing the negatively worded items resulted in higher reliability coefficients for liking of VPA (.74) but PAGS remained moderate (.55).

Lau et al. (2007) translated the 25-item version of the CAPA into Chinese for use with a sample of overweight youth (8-12 years), and demonstrated acceptable internal reliability, with Cronbach's alphas (0.62-0.78). Constructs may be measured reliably in one country but not in another, which raises the question of whether, and to what extent, it is possible to measure the same construct with an internationally defined measurement model. Brustad (Brustad, 1993, 1996) noted that attraction to PA can be evaluated with a five factor model (longer version of CAPA scale) and with a single-factor model (shorter version of the scale). However, Rose et al. (2009) in Australia found that a second order factor analysis using the longer version of the scale provided better evidence for the construct of 'attraction to PA' in children.

The purpose of this study was to cross-validate the shorter version of the children's attraction to PA scale (Brustad, 1993) with Portuguese children. The study was conducted in two major steps: (1) the establishment of a preliminary Portuguese version (translation, back-translation and semantic adaptation of items) and (2) the

validation of the Portuguese version using a confirmatory factor analysis (CFA) approach to test three models: (1) a single-factor model; (2) a five factor model, and (3) a hierarchical model with a second order factor model.

PHASE 1

This step aimed at establishing a preliminary Portuguese version of the short CAPA scale, evaluating the clarity and comprehensive content of all items in order to improve the Portuguese version.

The CAPA Scale

The CAPA scale was developed and validated with a North American sample from grades 4 to 7 with children ranging from 9 to 12 years of age. This scale is comprised of 25 items (longer version) or 15 items (shorter version) designed to tap the construct of children's desire to participate in PA through identified characteristics of the PA experience that may attract or repel children from PA. The instrument focuses on children's feelings about PA involvement along dimensions that children themselves have identified as being important factors to their PA involvement (Brustad, 1993, 1996). The CAPA was developed through a process that involved open-ended interviews with children about different aspects that they liked most and least about their participation in PA, physical exercise, games and sports. Children tend to vary considerably in their liking of various aspects of physical exertion (such as sweating and breathing hard) and are also likely to differ in their liking of structured exercise, their enjoyment of games and sports, and their desire to be involved in PA according to their level of peer acceptance in these contexts.

The CAPA scale assesses children's attraction to PA in relation to five underlying considerations: F1=IPA (is related to children's desire to be physically active for health

reasons); F2=liking VPA (refers to the child's favorable feelings related to their involvement in vigorous activities), F3=LGS (refers to the positive experiences through fun games and sports); F4=PAGS (involves the popularity of the children with their peers while participating in games and sport); and F5=FPE (is related to the fact that children like or dislike of certain aspects of the exertional properties of PA, include getting sweaty and breathing hard during more structured exercise). Each dimension is assessed by three items scored on a four-point scale using Harter's (1982) structured alternative approach which gives children two opposing options and asks them to decide which statement best reflects their feelings. To reduce the tendencies for socially desirable responses (Harter, 1982), the response format provides children with two competing choices that are intended to avoid children's tendency to provide a socially desirable answer. CAPA items for this study were formatted as in the original scale (Brustad, 1993). No special problems were encountered for the Portuguese children in understanding the questions and response options, as children were familiarized with the format before they completed the CAPA. A sample item from the original CAPA scale from the VPA subscale (Brustad, 1993) is presented below.

	Really true for me	Sort of true for me			Sort of true for me	Really true for me
1.	_____	_____	Some kids don't like to exercise very much	BUT	Other kids like to exercise a whole lot	_____

The shorter version of the CAPA scale contains the three best items (questions with the strongest factor loadings) from each of the five subscales of the longer version and was selected for use because it can be completed more quickly and is recommended because children are likely to pay closer attention to each question (the shorter version takes between 10 to 15 minutes and the longer version takes 20 to 30 minutes). It is also advantageous in that it expedites the process if repeated measures

will be completed. The CAPA scale has been shown to have acceptable internal consistency when used as a unitary construct ($\alpha=.82$) (Welk et al., 2003) rather than obtaining separate scores on each of the five dimensions.

Portuguese translation and backward translation

In the process of semantic adaptation, the original scale was translated to Portuguese by three independent native speaking translators of the language each of whom had a high level of fluency in the other language. A sport psychologist, a physical education teacher, and a researcher in sport psychology analyzed the quality of their translation. Subsequently, another group of translators back translated the first draft of the Portuguese CAPA version to the original language to ensure the accuracy of language translation and in order to perform semantic adjustments to the instrument. Finally, two developmental psychologists working in the field of physical education in a primary school evaluated and approved the content of the Portuguese version assuring semantic appropriateness. The structure and of the different subscales was maintained in the Portuguese version.

Pilot Study

The first version of the scale was presented and discussed with a group of students from 2nd grade to 4th grade in order to obtain feedback about their understanding of each item's wording. The scale was formally tested with 15 children (five students in 2nd, 3rd and 4th grades) to assess their responsiveness and understanding of the items. Children from the 2nd grade expressed difficulties in understanding some concepts and wording and had difficulties in understanding the content of all 15 items. Therefore, only 3rd and 4th grade children were used for this study. Additionally a test-retest reliability assessment was conducted two weeks apart with 41 children, as suggested by the author of the scale (Brustad, 1996). Test-retest intraclass correlation coefficients ranged from .974 to 1.00 in all items.

PHASE 2

In this phase, the factor structure of the Portuguese version (CFA) was analyzed.

Method

Participants

The data was collected from a community-based cross-sectional sample of children aged 8 to 10 years selected from 40 public elementary schools, throughout the municipality of Maia in the northern part of Portugal. The administrators of 20 of the contacted schools agreed to participate in this study. Four weeks prior to data collection the families were mailed a passive consent form which instructed the parents to return the form to the school if they did not want their child to participate, which is a customary protocol for research conducted with children through Portuguese educational institutions and which was the approach approved for this research. This provided a sample of 342 children (169 girls, aged 8.8 ± 0.8 ; 173 boys, aged 8.8 ± 0.8 ; 54.7% response rate). Data were collected between February and March of 2010.

Procedures

A meeting with the coordinators and teachers of each of the schools was conducted in order to present the purpose of the study. Later, it was explained to the children involved that the interest was in their personal opinions and feelings and that there were no “right” or “wrong” answers. Students answered the questionnaire in their classroom in about 10 to 15 minutes of time through face-to-face interviews. Data were collected at various times of their school day and on different weekdays. The principal researcher administered the CAPA scale.

Data Analysis

Data analysis was conducted in three steps: (1) descriptive statistics were calculated in order to have information regarding means, standard deviations and normality checks using univariate (D'Agostino tests) and multivariate tests (Mardia Coefficient for multivariate kurtosis); (2) assessment of internal consistency using Cronbach's alpha; and (3) the adequacy of the factor structure of the CAPA was examined using CFA. For purposes of completeness, we will address the issue of CAPA measurement with the following nested models: (1) as a unidimensional single factor model; (2) as a five-factor model as employed by Brustad (1993) in his findings with American children; (3) as a second-order factor model as suggested by Rose et al. (2009) in a CAPA cross-cultural validation in Australian schoolchildren, although this research used the longer version of the scale. All analyses were done in STATA11 and EQS 6.1. Model fit was evaluated with the Satorra-Bentler Scaled Chi-square scaled statistic ($S-B\chi^2$) as well as with Comparative Fit Index (CFI), Non-Normed Fit Index (NNFI) and Root Mean Square Error of Approximation (RMSEA) using cut-off points recommended (Hu & Bentler, 1999).

Results

Descriptive statistics are presented in Table 1 showing means ($\pm$ standard deviations) of all CAPA items, their distributional characteristics as well as Cronbach's alpha values. From an examination of the skewness and kurtosis values and respective p-values, it is evident that distributions were not normal. The multivariate Mardia coefficient also showed a violation of multivariate normality assumptions. This required the use of robust estimation procedures implemented in EQS. In addition, internal consistency values were low-to-moderate, with PAGS showing the lowest value, $\alpha=.200$.

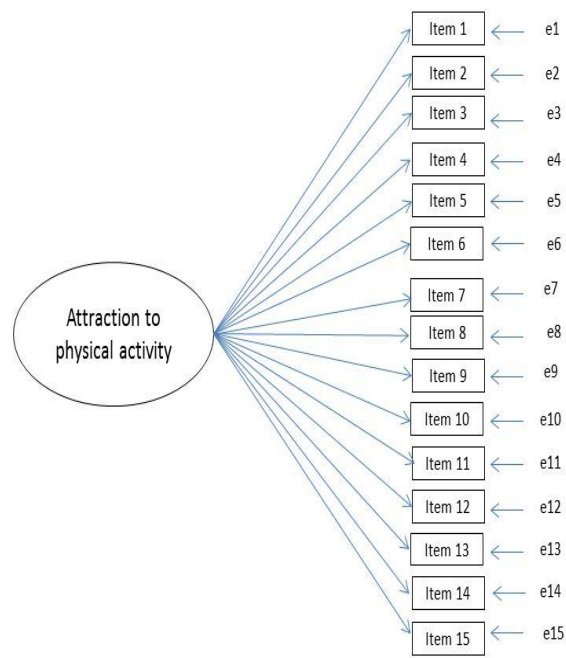
Table 1. Descriptive statistics of responses to CAPA items (n=342).

Subscales	Item	Mean $\pm$ Standard Deviation	Skewness (p-value)	Kurtosis (p-value)	Cronbach's alpha
Vigorous Physical Activity	2	3.42 $\pm$ 1.00	-1.50 (p<0.05)	.87 (p<0.05)	.528
	6	3.23 $\pm$ 1.11	-1.18 (p<0.05)	-.04 (p=0.976)	
	13	3.25 $\pm$ 1.08	-.95 (p<0.05)	-.61 (p<0.05)	
Liking of Games and Sports	1	3.37 $\pm$ 1.04	-1.43 (p<0.05)	.55 (p=0.059)	.503
	10	3.59 $\pm$.80	-2.01 (p<0.05)	3.20 (p<0.05)	
	12	3.57 $\pm$.81	-1.87 (p<0.05)	2.51 (p<0.05)	
Importance of Physical Activity	5	3.61 $\pm$.81	-2.16 (p<0.05)	3.73 (p<0.05)	.534
	9	3.60 $\pm$.79	-2.11 (p<0.05)	3.67 (p<0.05)	
	15	3.61 $\pm$.76	-2.03 (p<0.05)	3.47 (p<0.05)	
Peer Acceptance in Games and Sports	3	2.96 $\pm$ 1.17	-.64 (p<0.05)	-1.14 (p<0.05)	.200
	4	2.86 $\pm$ 1.19	-.43 (p<0.05)	-1.37 (p<0.05)	
	11	2.91 $\pm$ 1.15	-.58 (p<0.05)	-1.13 (p<0.05)	
Fun of Physical Exertion	7	2.99 $\pm$ 1.20	-.66 (p<0.05)	-1.19 (p<0.05)	.470
	8	1.96 $\pm$ 1.15	.75 (p<0.05)	-.97 (p<0.05)	
	14	2.45 $\pm$ 1.23	.11 (p=0.417)	-1.57 (p<0.05)	

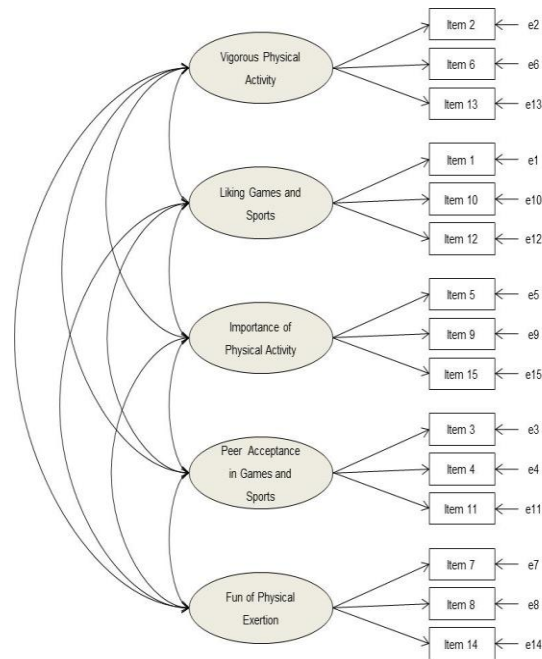
A first-order CFA of the attraction to PA scale was performed (Model F_1). This model specified all CAPA items loading on one single order factor. This single order CFA tested the hypothesis that attraction to PA is a unidimensional conceptualization of the construct composed of 15 items and which reflects the assumption that all items measure a single construct as opposed to five distinct elements.

The Model F_2 tested the hypothesis that attraction to PA is a multidimensional construct composed of five factors: VPA (3 items), LGS (3 items), IPA (3 items), PAGS (3 items), and FPE (3 items). In this model, items were allowed to correlate only with the factor they were proposed to define while their loading on the remaining factors was fixed at zero. The five factors were allowed to correlate freely. A good fit for this model would imply that different items measure theoretically distinct components of attraction to PA.

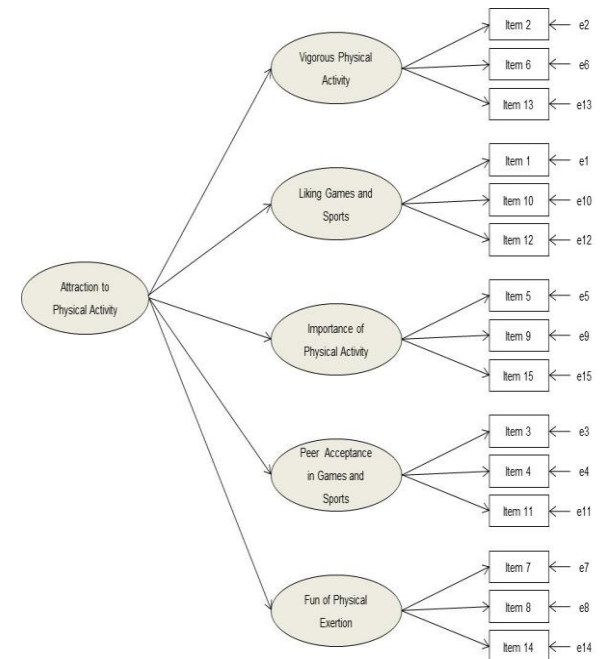
A second-order CFA of the model with 15 items was conducted and then factor analyzed to examine the construct validity of the latent variable of attraction to PA (Model F_3). This model posited that a higher-order factor would explain the intercorrelations among the five first-order factors. Such a model is the more complex in structural terms. A good fit for this model means that the variance in CAPA responses can be statistically represented by one factor, which would be the higher-order factor. This higher order factor reflects the most general concept of attraction to PA.



a) Single factor model



b) Model of five-factor structure



c) Hierarchical Model with a second order factor

Figure 1. Single factor model (a), model with five factor structure (b), and hierarchical model with a second order factor (c).

Table 2 summarizes the results of the three models examined in this study. The hypothesized single factor model was first tested and the goodness of fit values were as follows: $S-B\chi^2_{(90)}=302.5584$; $p<0.0001$; NNFI=.571; CFI=.632; RMSEA=.083 (90% CI=.073; .093). This model showed a poor fit to the data as the NNFI, the CFI and the RMSEA did not reach the desirable cutoff values.

The model that used the five factor structure (multidimensional model) was first tested with three items per factor and the goodness of fit values were $S-B\chi^2_{(80)}=136.0462$; $p<0.0001$; NNFI=.873; CFI=.903; RMSEA=.045 (90%CI=.032;.058), showing a better fit than had been obtained with the previous model.

The hierarchical model with second order was tested with three items per factor and the goodness of fit values were $S-B\chi^2_{(85)}=207.3587$; $p<0.0001$; NNFI=.738; CFI=.788; RMSEA=.065 (90%CI=.054;.076). This model also did not show an adequate fit to the data.

Table 2. Fit indices of the three tested models.

Model	$S-B\chi^2$	df	p-value	NNFI	CFI	RMSEA	(90% CI)
Single factor model (F_1)	302.5584	90	<0.0001	.571	.632	.083	(.073 to .093)
Five factor model (F_2)	136.0462	80	<0.0001	.873	.903	.045	(.032 to .058)
Hierarchical model with a second order (F_3)	207.3587	85	<0.0001	.738	.788	.065	(.054 to .076)

Note: $S-B\chi^2$ =Satorra-Bentler scaled chi-square test statistic, df=degrees of freedom, p-value=probability value, Bentler-Bonett Non-Normed Fit Index=NNFI, CFI=comparative fit index, RMSEA=root mean square error of approximation.

In an effort to improve the fit indices of the five-factor model, the model was re-specified because one item had a poor fit (item 11: the factor loading was not statistically significant) and was dropped out from the factor "PAGS" (Model of five

factor structure). The results of the re-fitted model showed a much better fit: $S-B\chi^2_{(67)}=94.270$, $p=0.01572$; NNFI=.932; CFI=.95; RMSEA=.035 (90% CI=.016;.050).

A χ^2 difference test to compare these two models (with and without item 11) showed that they differed significantly (χ^2 difference=41.776, df difference=13). Therefore, this model was considered the best descriptor of attraction to PA.

The Figure 2 represents the results for the CFA, factor correlations and factor loadings, of the final Portuguese model of CAPA. The single-headed arrows indicate the standardized factor loadings, which represent the correlation between each observed variable and corresponding factor; and the double-headed arrows indicate the correlations between factors.

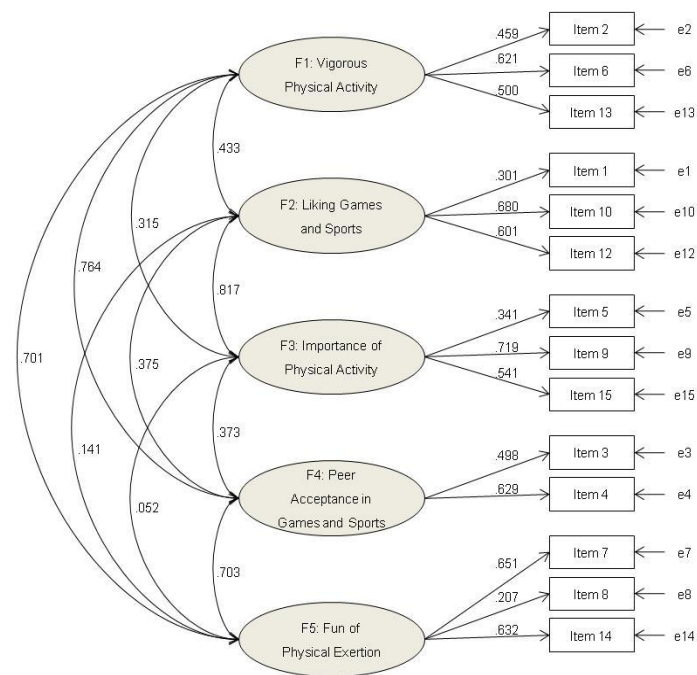


Figure 2. Factor correlations and factor loadings of the final Portuguese model of CAPA with 14 items.

Discussion

The CAPA is an instrument that measures children's attraction to PA. Understanding children's interest and motivation for participation in PA and sport, in both structured and unstructured forms within the school system and/or in leisure activities, is an important issue because of its implications for children's subsequent motor development and general health.

Therefore, it is important to understand the factors that influence children's PA behaviors so that practitioners can better plan for future interventions designed to increase PA in children. The existence in Portugal of a valid scale to evaluate the attraction to PA will provide a starting point toward a better understanding and assessment of children's involvement in PA and sports as well as the promotion of adequate programs within the school system and at the community level.

The aims of this project were to develop and validate a Portuguese version of the CAPA scale with a satisfactory degree of conceptual equivalence of items with the original English-language scale. Previous research with the longer version (Brustad, 1993, 1996) indicated acceptable internal consistency for each of the CAPA subscales ($\alpha=.62-.78$ and $\alpha=.70-.74$ in the two studies, respectively). Rose et al. (2009) also found an acceptable level of internal consistency ($>.60$) for three of the dimensions: IPA, LGS, and FPE. The remaining two subscales: the VPA and PAGS subscales were low-to-moderate in their initial form; however, when the negatively worded items were removed resulted in higher reliability coefficients for VPA, although PAGS remained moderate ($\alpha=.30-.55$). In contrast to Brustad's (1996) validation study with a sample of older children, the present study and the study conducted by Rose et al. (2009) showed lower internal consistency on the subscale PAGS in comparison to the original scale. In the study by Rose et al. (2009) the lower internal consistency was due in part to the inclusion of two negatively worded items and in the present study with the

presence of item 11. When item 11 was eliminated, the alpha increased from .200 to .477. It is important to note that Rose et al. (2009) used the longer version of the CAPA scale while in this study the shorter version was used. This may be one of the reasons for the low internal consistency given that in the present study there were only three items per factor, while the longer version has five items. When using the children's CAPA scale for further statistical analysis, factor scores may be more useful than summed scores of equal weight. As such, the absence of item 11 would be minor in the description of this factor - PAGS. Nevertheless, it remains a challenge for rewording this item in future studies.

The Portuguese version of CAPA fit the data relatively well when item 11 was eliminated, although in Brustad's study (1993) the same item, "popular with others in games and sports", had a loading of .62. The problem may be linked to the term "popular". Although Portuguese children understood the term in the pilot study, the fact is that it is not used on a daily basis in Portugal. Similar and more frequent wording would be "most famous, most cherished, most admired" of the class. The poor fit of this item might, therefore, be attributed to conceptual dissimilarity with the original meaning of the item. As such, we simply decided to eliminate the item.

All estimated parameters in the model were significant and the entire model had an acceptable level of fit, suggesting that the CAPA scale can be used to evaluate the attraction to PA of Portuguese children. Correlations among factors supported the construct validity of the instrument, showing positive and significant values with the exception of the subscales "FPE with LGS" ($r=.141$), as well as "FPE with IPA" ($r=.052$). The strongest correlation found in the current study was between the factors of "IPA and LGS" (.817). These general results are not in full agreement with the findings obtained by Brustad's (1993) exploratory factor analysis because reported correlations among all subscales of CAPA's longer version were lower than .70. These differences may be linked to different sampling frames, data analysis techniques, number of items

per subscale and to differences in cultural domains. The existence of a shortened version of the CAPA scale can help researchers test social cognitive theoretical models of exercise behavior and aid in the design of effective interventions for the promotion of children's involvement in PA. More specifically, this version may be more appropriate if lengthy and expensive population-based research designs are to be implemented.

Some limitations with the current study suggest further research. Given that the study was conducted in only one district of Portugal, it can be complemented by further investigations that expose CAPA to other samples from different regions as well as to other Portuguese-speaking cultural contexts.

This study presents the Portuguese version of the short CAPA scale as a suitable tool for the assessment of attraction to PA of children. The results of CFA demonstrated a suitable conceptual structure of CAPA to the Portuguese context and provided support for the factorial validity of the Portuguese version of the CAPA. It is therefore proposed that the new model (Portuguese: 14 items), instead of the original (American: 15 items) could be used to assess the attraction to PA in Portuguese children. We conclude that this adapted scale can provide valid assessments that can be used in research or school interventions designed to assess or increase PA during childhood.

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Validation and invariance of the short version of Children's Attraction to Physical Activity (CAPA) scale in Portugal

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Abstract

The Children's Attraction to Physical Activity (CAPA) scale measures interest in, and attraction to, physical activity (PA). The original (25 items) and short form (15 items) of the scale have been developed and validated with American children. The aims of this study were to cross-validate the short version of the CAPA scale for use with Portuguese school children and to verify the invariance of the factor structure of the scale in two random samples. The sample included 683 children (331 girls, 352 boys) 8-10 years of age (8.8 ± 0.8) from 22 public primary schools in the north of Portugal. The sample was randomly divided into calibration and cross-validation groups. The CAPA scale was administered in the classroom setting. The scale was translated into Portuguese and subsequently validated using forward translation, synthesis of the translation, backward translation, and expert committee review, a pretest and reliability assessment. Internal consistency for each of the five subscales within the a priori five-factor structure was evaluated using Cronbach's alpha (α), followed by a series of CFAs of the CAPA scale independently in the calibration and cross-validation samples. The Maximum Likelihood robust estimation method was used. Only minor modifications were made to improve the fit of the model. The CFA demonstrated that a 5-factor structural model of the Portuguese translation of the CAPA scale was invariant across the calibration and cross-validation samples. The construct analyzed had the same basic meaning and structure and item differences in the two groups. The results thus indicate that the scale is appropriate for use with Portuguese children. The availability of a valid and reliable scale to evaluate attraction to PA among Portuguese children should provide improved opportunities for better assessment and understanding of children's involvement in PA. However, the CAPA requires further evaluation with other Portuguese-speaking samples and in varied settings.

Introduction

Assessments of objectively measured physical activity (PA) in Portuguese children aged 6-10 years indicate that physical activity has declined among these children (Lopes, Rodrigues, Maia, & Malina, 2010; Lopes, Vasques, Maia, & Ferreira, 2007), which is consistent with knowledge that many European children do not reach recommended levels of PA (Currie et al., 2004). In addition, the prevalence of overweight and obesity have increased in Portuguese children (Carmo et al., 2006; Coelho et al., 2008) and these increases have been attributed to reduced levels of PA (Pereira, et al., 2010). In this context, there are discussions of national health intervention programs to promote the adoption and maintenance of physically active and healthy lifestyles in children and youth. However, one of the first steps toward the achievement of this goal is the identification of the motivational factors that contribute to behavior change specific to an active lifestyle. Understanding motivation for PA and attraction to PA in children is an important step.

Children's attraction to physical activity refers to children's intrinsic interest and desire to engage in physical activity behavior (Brustad, 1996). It is presumed that many different attributes of physical activity can attract children to physical activity or, conversely, can diminish their interest in involvement. Higher levels of attraction to physical activity are believed to result when children have favorable cognitions about the benefits and importance of physical activity and also occur when children anticipate that they will experience pleasurable emotional states through their physical activity involvement (Brustad, 1993, 1996). Higher levels of attraction to PA have also been significantly related to more extensive physical activity (Paxton, Estabrooks, & Dzewaltowski, 2004) and sport involvement (Brustad, 1991) and to higher levels of physical fitness (Brustad, 1994). In short, children who have a stronger attraction to physical activity will be more motivated to engage in physical activity than do those children with a weaker attraction to physical activity.

The CAPA scale have been employed and evidence generally supports the presence of a 5-factor structure of children's attraction to PA (Brustad, 1993, 1996) with a longer (25-item) and shorter (15-item) version. The CAPA scales have not been used with Portuguese children. However, the scale has been translated into other languages and used with other populations. Ries et al. (2009) translated the 15-item version of the CAPA into Spanish, French and German for use with Spanish and Luxembourgish adolescents and identified the same 5-factor structure present in the English language version. Lau et al. (2007) translated the 25-item version of the CAPA into Chinese for use with a sample of overweight youth, ages 8 to 12 years, in Hong Kong, and found good internal consistency for the measure with Cronbach alpha coefficients ranging from .62-.78 for each of the five subscales). Rose et al (2009) found the CAPA scale to be valid for use with Australia children aged 6 to 8 years old using the long version of CAPA.

The purpose of this study was to cross-validate the short version of "Children's Attraction to Physical Activity" Scale (CAPA) (Brustad, 1993) in order to assess attraction to PA in Portuguese children and to examined its factorial invariance in two random samples.

Methods

Participants

The sample included 683 children (331 girls, 352 boys) 8 to 10 years of age (8.8 ± 0.8) recruited from 22 primary public schools in different regions of northern Portugal. The sample comprised approximately 38% of the total population of children in the 3rd and 4th grades at these schools. The sample was randomly divided into calibration and cross-validation groups. The calibration sample comprised 342 children, 173 boys (8.8 ± 0.8) and 169 girls (8.8 ± 0.8) years. The cross-validation sample included 341 children, 179 boys (8.8 ± 0.8) and 162 girls (8.9 ± 0.7).

Children's Attraction to Physical Activity Scale (CAPA)

The CAPA scale was employed to measure children's attraction to PA (Brustad, 1993). Different aspects of attraction to PA exist, reflecting the importance of a multi-dimensional approach that incorporates both cognitive and affective dimensions (Brustad, 1993). The scale was previously validated with North American school children 9-12 years in fourth through grades. The instrument focuses on "children's feelings about their PA involvement along dimensions that children themselves have identified as being salient features of the PA experience" (Brustad, 1993, p.221).

The CAPA scale has long (25 items) and short (15 items) versions. The original longer version contains 25 items and five subscales, each with five questions. The five subscales were designed to understand specific aspects of attraction to PA that might differentiate children and include a) Liking of Vigorous Physical Activity; b) Liking of Games and Sports; c) Perceived Importance of PA to health and well-being; d) Peer Acceptance in Games and Sports; and e) Fun of Physical Exertion (Figure 1). These five subscales were generated through open-ended discussions with children in which children were asked about the characteristics of physical activity that they found to be desirable and undesirable and which, therefore, made them interested in participating or in avoiding physical activity. A higher score indicates stronger attraction to PA. The shorter version was reduced to 15 items and constituted the three items with the strongest factor loadings from each of the five subscales of the longer version.

The shorter version was used in this study because it can be completed more quickly by children (between 5 to 10 minutes) and is thus more practical for researchers using a variety of questionnaires with children. All items are scored on a four point format and use Harter's "structured-alternative" (1982) approach in which children are presented with two opposing choices and asked to decide which statement best

reflects their own feelings. This format is used as a means of reducing “social desirability” tendencies that commonly occur when children respond to questionnaires. Once children have made their choice, they then must select if that is “somewhat true” or “really true” for them. A sample question from the scale is "Some kids have more fun playing games and sports than anything else" but "Other kids like doing other things”. This instrument has proven suitable for use in studies with children in the United States (Brustad, 1993, 1996) and Australia (Rose, et al., 2009) but it should be noted that Ries et al. (2009) had greater success with a Likert-type four choice format that did not comply with the “structure alternative” framework.

Procedures

All procedures were approved by the research committee of the Faculty of Sport of the University of Porto, by the Regional Directorate of Education and by local school authorities where data were collected. Parents and children provided written informed consent. Data were collected in 22 primary schools in the municipality of Maia in the north of Portugal. Questionnaires were completed in the classroom in 10 to 15 minutes.

Data analysis

At the outset, the translation of the original version (North American) of the CAPA scale into Portuguese was validated. This included forward translation, synthesis of the translation, backward translation, and expert committee review, pre-test of the scale and reliability assessment of the Portuguese version short CAPA scale.

Data analysis was done in a stepwise manner using STATA 11 and EQS 6.1. (Bentler, 1995). Descriptive statistics were initially calculated and normality checks (univariate and multivariate) were run. The internal consistency for each of the five subscales of

the a priori five-factor structure were calculated using Cronbach's alpha (α). Subsequently, a series of CFAs were done to examine the structure of the CAPA scale independently in the calibration and cross-validation samples using the Maximum Likelihood robust estimation method (EQS 6.1). Model fit was assessed with several indices: Satorra-Bentler Scaled Chi-square index ($S-B\chi^2$), Robust Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA) and its associated 90% confidence interval. Recommended cut-off points for these indices (Hu & Bentler, 1999) were adopted to assess model quality.

Results

Descriptive statistics for all CAPA items, their distributional characteristics and Cronbach's α values are summarized in Table 1. Skewness, kurtosis and respective p-values showed violations of normality. The multivariate Mardia coefficient indicated violation to multivariate normality (normalized estimate=19.929). This was the main reason why the robust estimation procedure implemented in EQS 6.1 was used. The shorter scale had high consistency in Portuguese children with test-retest reliability with an interval of 15 days between the two assessments, ranging from 0.97 to 1.00 in all items across the 5 subscales. Internal consistency values (α) were low-to-moderate, .416 to .604, with peer acceptance in games and sports having the lowest values in both the calibration ($\alpha = .200$) and validation ($\alpha = .209$) samples.

Table 1. Descriptive statistics (mean±standard deviation) of all items of CAPA subscales in the calibration and validation samples.

Subscales	Item	Calibration sample (N=342)				Cross-validation sample (N=341)			
		Mean±SD	Skewness (p-value)	Kurtosis (p-value)	Cronbach's α	Mean±SD	Skewness (p-value)	Kurtosis (p-value)	Cronbach's α
Vigorous Physical Activity	2	3.42±.98	-1.50 (p<0.05)	.87 (p<0.05)	.528	3.52±.91	-1.50 (p<0.05)	.87 (p<0.05)	.548
	6	3.23±1.11	-1.18 (p<0.05)	-.04 (p=0.976)		3.23±1.11	-1.18 (p<0.05)	-.04 (p=0.976)	
	13	3.25±1.08	-.95 (p<0.05)	-.61 (p<0.05)		3.25±1.08	-.95 (p<0.05)	-.61 (p<0.05)	
Liking of Games and Sports	1	3.37±1.04	-1.43 (p<0.05)	.55 (p=0.059)	.503	3.37±1.04	-1.43 (p<0.05)	.55 (p=0.059)	.517
	10	3.59±.80	-2.01 (p<0.05)	3.20 (p<0.05)		3.60±.78	-2.01 (p<0.05)	3.20 (p<0.05)	
	12	3.57±.81	-1.87 (p<0.05)	2.51 (p<0.05)		3.64±.71	-1.87 (p<0.05)	2.51 (p<0.05)	
Importance of Physical Activity	5	3.61±.81	-2.16 (p<0.05)	3.73 (p<0.05)	.534	3.63±.67	-2.16 (p<0.05)	3.73 (p<0.05)	.604
	9	3.60±.79	-2.11 (p<0.05)	3.67 (p<0.05)		3.67±.69	-2.11 (p<0.05)	3.67 (p<0.05)	
	15	3.61±.76	-2.03 (p<0.05)	3.47 ((p<0.05)		3.65±.74	-2.03 (p<0.05)	3.47 ((p<0.05)	
Peer Acceptance in Games and Sports	3	2.96±1.17	-.64 (p<0.05)	-1.14 (p<0.05)	.200	3.02±1.15	-.64 (p<0.05)	-1.14 (p<0.05)	.209
	4	2.86±1.19	-.43 (p<0.05)	-1.37 (p<0.05)		2.89±1.19	-.43 (p<0.05)	-1.37 (p<0.05)	
	11	2.91±1.15	-.58 (p<0.05)	-1.13 (p<0.05)		2.91±1.15	-.58 (p<0.05)	-1.13 (p<0.05)	
Fun of Physical Exertion	7	2.99±1.20	-.66 (p<0.05)	-1.19 (p<0.05)	.470	3.05±1.14	-.66 (p<0.05)	-1.19 (p<0.05)	.416
	8	1.96±1.15	.75 (p<0.05)	-.97 (p<0.05)		1.99±1.17	.75 (p<0.05)	-.97 (p<0.05)	
	14	2.45±1.23	.11 (p=0.417)	-1.57 (p<0.05)		2.63±1.25	.11 (p=0.417)	-1.57 (p<0.05)	

Results of the single-group confirmatory factor analysis of the multidimensional five correlated factors in the calibration sample (designated as M_0 , Figure 1) indicated several problems (Table 2). The CFI was below threshold values, and most importantly, the factor loading of item 11 was very small and negative, and was not significant ($-.043 \pm .127$; $p > 0.05$). Item 11 reads “Some children are popular with other kids in games and sports but other kids are not popular with others in games and sports”. It was apparent that this question did not translate effectively into Portuguese as a consequence of differences in the connotation of the word “popular” in the two languages. A decision was made to drop this item from the factor “Peer acceptance in Games and Sports” and the model was re-fitted. Results with the modified model (M_1) indicated an acceptable fit (Table 2).

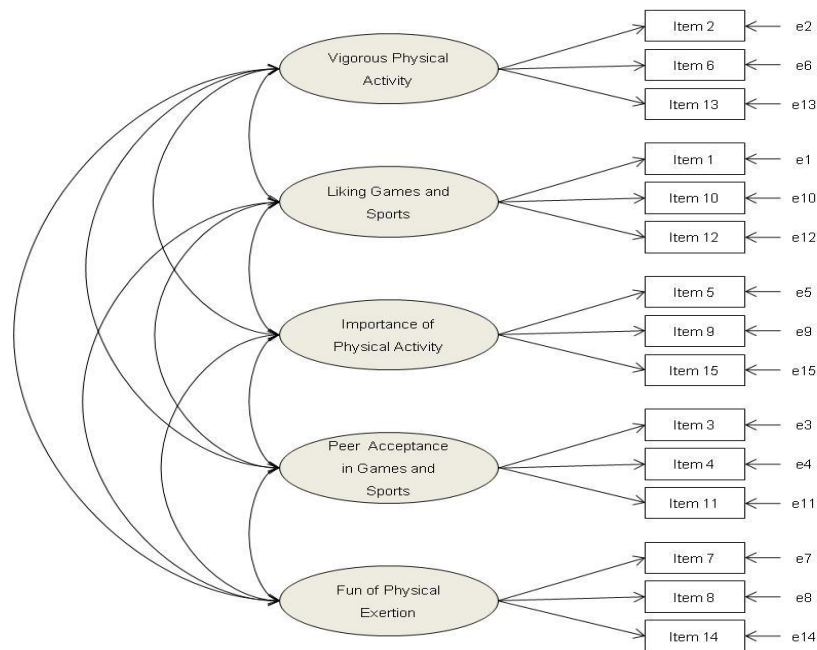


Figure 1. Graphic representation of the original CAPA scale (from Brustad, 1993)

Table 2. Model fit indices of the original model (M_0) and modified model (M_1) in the calibration sample.

Model	$S-B\chi^2$	df	Δdf	p	CFI	RMSEA (90% CI)
M_0 : Original Model	136.046	80	-	<.001	.873	.045 (.032 to .058)
M_1 : Modified Model (drop item 11)	94.270	67	42.344	.016	.950	.035 (.016 to .050)

Analysis of the validation sample also started with the original five-factor structure with three items per factor. Goodness of fit was inadequate (Table 3). The factor loading of item 11 was not significant ($.063 \pm .153$; $p > 0.05$). With this item deleted, the re-fitted model showed better results (Table 3).

Table 3. Fit indices of the original model (M_0) and modified model (M_1) in the validation sample.

Model	$S-B\chi^2$	df	Δdf	p	CFI	RMSEA (90% CI)
M_0 : Original Model	122.175	80		.002	.893	.039 (.024 to .053)
M_1 : Modified Model (drop item 11)	90.187	67	32.182	.031	.953	.032 (.010 to .048)

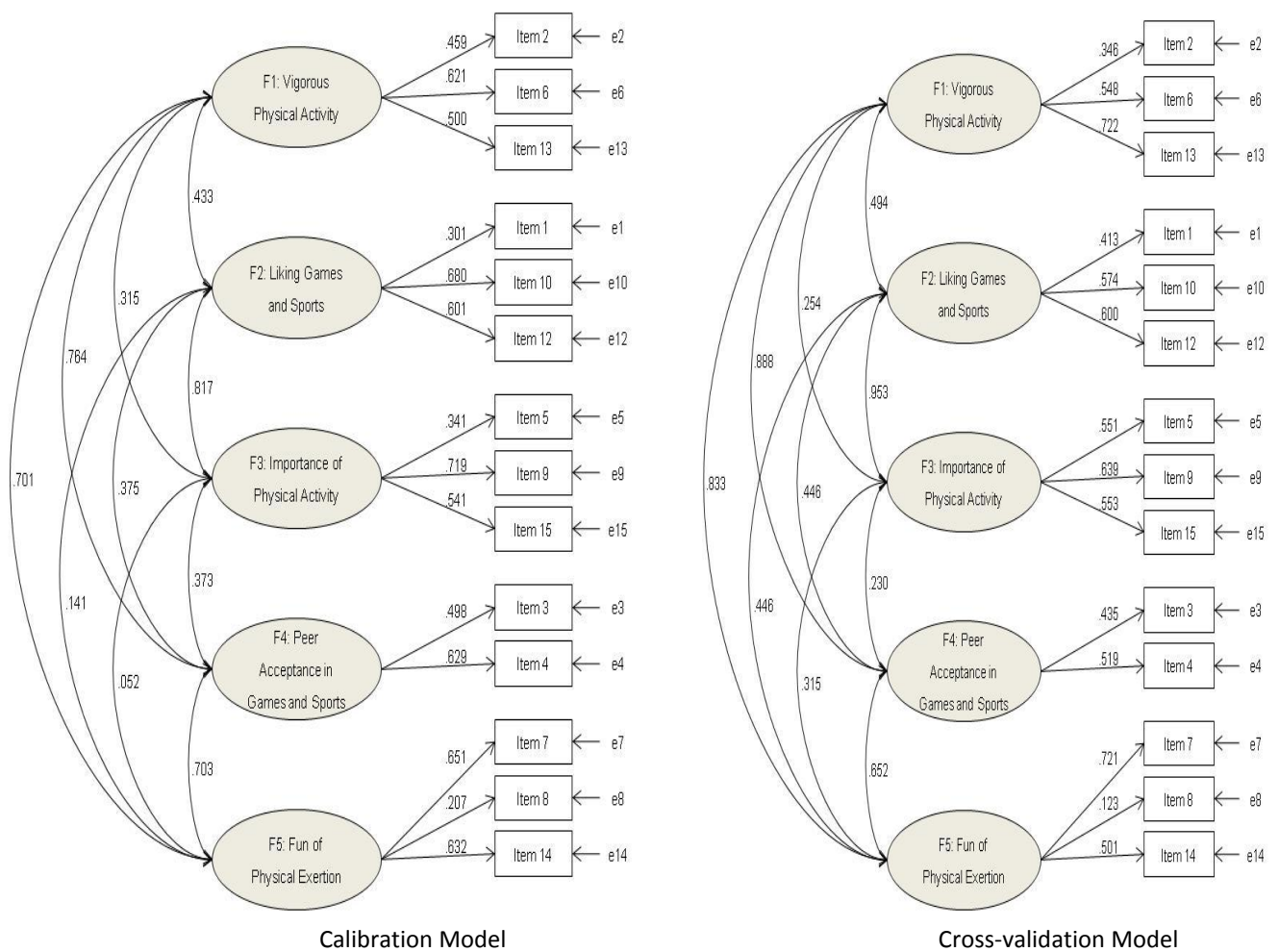


Figure 2. Factor correlations and factor loadings of the calibration and validation samples of the Portuguese version of CAPA

Given the preceding results (see Figure 2), the factor loadings and factor variances in the calibration and validation samples were compared to determine whether the structure of the CFAs was invariant across the samples. Invariance-testing procedures involved a series of analyses to assess the equivalence of specific model parameters across groups. Following the process recommended by Byrne (2006), successively more stringent equality constraints were applied. The configural invariance was initially tested, followed by measurement invariance. When a fully or partially invariant model was identified, multiple fit indices were used to assess the overall fit for both groups simultaneously. Results of the sequence of increasingly more restrictive tests of measurement invariance for the short version of CAPA scale are summarized in Table 4.

CAPA items associated with the five-factor structure showed a consistent pattern between groups, demonstrating configural invariance. Metric invariance was tested (all factor loadings were equal across groups). Conventionally, it is argued that invariance holds if goodness-of-fit related to the model is deemed adequate (Widaman & Reise, 1997) and if there is minimal difference in fit from that of the configural model (Table 4). This additional set of constraints did not reduce the fit because there was an increase in the $S-B\chi^2(\Delta S-B\chi^2_{(14)} = 14.5848, p > 0.05)$. CFI showed similar results as in the previous model.

Results of the tests of invariance of factor variances and covariance across the samples indicated that each of the five CAPA factors showed equal variance across samples and the interrelations among factors were similar. The CFI was .947 and acceptable. Correlations among factors ranged from low-to-high: Importance to PA/Fun of Physical Exertion=0.229; Vigorous PA/Importance PA=0.299; Importance PA/Peers Acceptance in Games and Sports=0.324; Liking Games and Sports; Fun Physical Exertion=0.344; Liking Games and Sports/ Peers Acceptance in Games and Sports=0.468; Vigorous PA/ Liking Games and Sports=0.499; Peers Acceptance in Games and Sports/ Fun of Physical Exertion=0.748; Vigorous PA/ Fun of Physical Exertion=0.827; Vigorous PA/ Peer Acceptance in Games and Sports =0.873; Liking Games and Sports/ Importance PA=.955.

Table 4. Multigroup invariance of the CAPA scale across calibration and validation samples (Goodness-of-Fit Statistics).

Model	$S-B\chi^2$	df	Δdf	p	CFI	RMSEA (90% CI)
Configural invariance	183.5553	133	-	.002	.951	.033 (.020 to .045)
Invariance of factor loadings	198.1401	143	14.456	.002	.947	-
Invariance of variances and covariance	213.0866	158	22.199	.002	.947	-

Discussion

The present study cross-validated the CAPA scale translated for Portuguese children and examined its factorial invariance in two random samples. The process of ‘forward and backward blind translation’ was used to correct errors in translation and to ensure that the meaning and intent of the items were maintained in the translation. The final version maintained the structure and number of items of the original scale which randomly mixed items of the subscales.

Internal consistency of the short version was low-to-moderate ($0.416 \leq \alpha \leq 0.604$). The Peer Acceptance in Games and Sports subscale showed very low internal consistencies, $\alpha = .200$ and $\alpha = .209$, in the calibration and cross-validation samples, respectively. Research with the long version has indicated acceptable internal consistency for each of the CAPA subscales α 's between .62 to .78 and .70 to .74, respectively (Brustad, 1993, 1996). Similar results were observed with Australian children ($\alpha \geq .70$), but only in three dimensions: Importance of Exercise, Liking of Games and Sports, and Liking Physical Exertion and Exercise (Rose, et al., 2009). The remaining two subscales, Liking of Vigorous Activity and Peer Acceptance were low-to-moderate in their initial form

($\alpha=.64$ and $\alpha=.30$). When negatively worded items were removed, the resulting coefficients were higher for Liking of Vigorous Physical Activity but remained moderate for Peer Acceptance (0.74 to 0.55). A similar trend was noted earlier (Brustad, 1996) when two items were deleted from the Peer Acceptance subscale. In contrast to the validation study with an older sample (mean age = 10.6 ± 0.9) (Brustad, 1996), results of the present study and that with Australian children (Rose, et al., 2009) showed lower internal consistency on the subscale Peer Acceptance in Games and Sports of the original scale. This may relate, in part, to the inclusion of two negatively worded items in the Australian study, and item 11 in the version used with these Portuguese children. It should be noted that the American and Australian studies used the long version while the Portuguese study used the short version of the CAPA scale. The low internal consistency may also be related to the use of only three items per factor in the latter study, compared to five items per subscale in the former studies.

The 15 items comprising the five subscales of the short version of the CAPA scale loaded significantly and fit reasonably well in this sample of Portuguese children. Only item 11 (Popular with others in games and sports) was problematic. When item 11 was eliminated, global model fit measures improved substantially. Brustad's original exploratory factor analysis indicated a loading of 0.62 for "Popular with others in games and sports" (Brustad, 1993). This item did not load significantly on the subscale and/or has low reliability in the Portuguese sample. Although children in the pilot study understood the term, the word "popular" is not used on a regular basis in the Portuguese cultural context. We believe the word "popular" was somewhat problematic as it is not used on a regular basis among Portuguese children. Similar and more frequently used terms may be "most famous," "most cherished" and/or "most admired" in the class. This requires consideration in future studies.

Overall, the pattern of correlations in the calibration and cross-validation samples provided evidence for construct validity, specifically, convergent validity. Discriminant

validity, on the other hand, was somewhat limited. As such, the results were not fully consistent with the original exploratory factor analyses in which correlations among all subscales of the CAPA long version were ≥ 0.70 (Brustad, 1993, 1996). The differences may reflect differences in sampling, analytical techniques and/or cultural meanings of specific terms. Furthermore, use of a Likert-style format may produce better results in accordance with Ries et al's (2009) findings.

The study is limited to one region in the north of Portugal. The invariance of the scale needs to be evaluated in other regions of the country and in other Portuguese-speaking countries in an attempt to ensure that the scale is appropriate for use in other contexts. Analyses applying the Portuguese translation of the CAPA short scale in gender- and age-specific groups across different socio-economic strata are also required.

Conclusion

Allowing for its limitations, this study with Portuguese children demonstrated the cross-cultural validity of the CAPA short scale and the dimensional and configural invariance of the scale. Specifically, the CFA supported the factorial validity with 14 items instead the 15 items of the North American model. The results also provided evidence for the dimensional and configural invariance of the CAPA short scale for a sample of European children. No significant departure from measurement invariance in terms of factor form and factor loadings was noted. As such, the construct analyzed has the same basic meaning and structure and item differences across groups. The availability of a valid and reliable scale to evaluate attraction to PA among Portuguese children should provide improved opportunities for better assessment and understanding of children's involvement in PA. Results should also serve to inform the development of more effective PA programs within the school system and at the community level.

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Gender, weight status and socioeconomic differences in psychosocial correlates of physical activity in schoolchildren

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Abstract

To assess differences in the attraction to physical activity (PA), perceived physical competence and parental influences across gender, body mass index (BMI) and socioeconomic status (SES) in Portuguese primary school children. A cross-sectional sample of 683 children, 8-10 years of age, was surveyed. Attraction to PA, perceived physical competence and parental influences were assessed via standardized questionnaires. Family SES was estimated with a questionnaire. The prevalence of overweight and obesity was calculated using BMI, and the cut-off points suggested by Cole et al. Statistical procedures included three-way ANOVA. Boys and normal-weight and overweight children like more to participate in vigorous PA than girls and obese children. Boys enjoy more games and sports than girls. Obese children consider to be less accepted by peers' in games and sports than normal-weight and overweight children. High and medium SES children recognize more importance to PA than low SES children. Boys and normal-weight and high SES children like more exertion aspects of PA than girls, obese and low SES children. Boys and normal-weight children perceiving themselves as being more successful and physically competent than girls and obese children. High SES children consider, more significantly, their parents as role models and perceived them as having more fun and enjoyment doing PA than lower SES children. These results suggest that intervention should focus on girls, obese and lower SES children who were less attracted to PA, perceived as less physical competent and less influenced by their parents which put them at higher risk for inactivity.

Introduction

Childhood obesity is increasing at an alarming rate, reaching epidemic proportions, and becoming a serious and growing public health problem (Jansen, Mackenbach, Joosten-van Zwanenburg, & Brug, 2010). According to the Center for Disease Control and Prevention (CDC, 2002) reports that the percentage of obese children aged 6 to 11 almost quadrupled from 4% in 1974 to 15% in 2000. In Portugal, the prevalence of obesity more than doubled in the group of 9-year-olds (47.3% of obese children in 2000) and tripled in the group of 10- and 11-year-olds with greatest changes occurring between 1990 and 2000 (Cardoso & Padez, 2008). This increase in childhood obesity is particularly concerning because, besides being a strong predictor of obesity in adulthood, it is highly associated with disorders that increase the risk of cardiovascular disease (Jansen, et al., 2010).

Regular physical activity (PA) has beneficial effects on children's adiposity, musculoskeletal health, and several components of cardiovascular health (Strong et al., 2005). Despite the health benefits of regular PA, the prevalence of inactivity has increased worldwide with approximately two thirds of the children population to be insufficiently physically active (Sjostrom, Oja, Hagstromer, Smith, & Bauman, 2006). In Portugal, specifically, more than sixty percent of the children did not reach recommended levels of at least 60 minutes of moderate-to-vigorous PA on five or more days of the week (Currie et al., 2008).

The development of effective behavioral interventions to increase the time children spend in PA on a regular basis is a critical public health priority. However, a crucial step in the development of effective interventions is to better understand the correlates or factors that influence PA in children. A number of correlates have been found to explain the variation seen in PA levels and patterns (Sallis, Prochaska, & Taylor, 2000; Van Der Horst, Paw, Twisk, & Van Mechelen, 2007) but it has been difficult to determine how this information can be used for planning interventions. The Youth PA Promotion (YPAP) model has been offered as a social-ecological framework for better understanding the correlates of children's participation in PA (Welk, 1999). A unique feature is that it categorizes key correlates into psychological attributes (predisposing factors) and social influences (reinforcing factors).

Predisposing factors are personal knowledge and perceptions that influence children's participation in PA. They reflect the child's interest in performing PA and consist of two constructs - attraction to PA and perception of physical competence (Bandura, 1986). Attraction to PA is an individual's perceived value of PA or various forms of play, game, exercise, and sport. It is based on the concept that children's motivation to participate in PA is dependent on their affective reactions to the various dimensions of involvement (Brustad, 1993, 1996). Moreover perceived of physical competence represents the child's perceived ability to undertake PA. Reinforcing factors are rewards received or the feedback people get from others following a behavior that may encourage or discourage adoption and/or continuation of the behavior. Parents are generally considered a critical and decisive reinforcing factor in the well-being of children, shaping their healthy behaviours, including an active lifestyle (Duncan, Duncan, & Strycker, 2005). Children may perceive parental influences through a variety of parental behaviours, such as, encouraging activity, being active with them, and facilitating their PA participation at home and in the community (Davison, Downs, & Birch, 2006).

A large body of literature exists about the relationship between predisposing and reinforcing factors and children's participation in PA (Davison, et al., 2006; Duncan, et al., 2005; Lau, Lee, & Ransdell, 2007; Paxton, Estabrooks, & Dzewaltowski, 2004; Welk, Wood, & Morss, 2003; Welk & Schaben, 2004). Several studies highlighted that children's who are more attracted to participate in PA and perceive themselves as physical competent will persist longer in current and future PA. Further, parents, who believe in the importance of PA, who are role models by their own levels of participation, who encourage their children to be active, or provide instrumental support tend to have children who are more active than children whose parents are not physically active.

However, to date, there is a limited work done to examine possible demographic (gender and socioeconomic status (SES)) and biological (weight status) differences in these psychosocial correlates among children. Previous studies has reported the presence of gender differences in these psychosocial correlates favoring boys, although there is insufficient evidence to draw conclusions limiting thus the generalizability of these findings (Brustad, 1996; Lau, et al., 2007; Welk, et al., 2003). We are unaware of any studies to date that have examined the extent to which correlates differ in terms of socioeconomic status (SES) and weight status (body mass index, BMI). Understanding these differences would be important because some evidence suggest that girls, lower SES and obese children tend to be less active than boys, high SES children and non-obese counterparts and such characteristics influence children's motivation to participate in PA (Seabra, Mendonca, Thomis, Malina, & Maia, 2011). In addition, better understanding of these differences may lead to identifying more specific and appropriate intervention points to promote children's participation in PA.

Therefore, in the present study, we aimed to extend previous work by examining whether children' attraction to PA, perceived physical competence and parental influences differed by gender, SES and weight status in a sample of Portuguese elementary school children aged 8 to 10 years.

Methods

The data was derived from a community-based survey of children aged 8 to 10 years selected from 40 public elementary schools, throughout the municipality of Maia,

northern of Portugal, of which 20 agreed to participate in this study. These 20 schools with a total of 1249 students cover all the parishes of the municipality of Maia. Four weeks before data collection, all schoolchildren's parents were invited to participate in the study and were mailed a consent/refusal form and instructed to return the form to the school if they did not want their child to participate. The refusal rate was 45.3% (n=566). This provided a final sample of 683 children (331 girls and 352 boys; 54.7% response rate). The study was approved by the research committee of the Faculty of Sport of the University of Porto and by authorities at the individual schools which the children attended. Data were collected between February and March 2010.

Weight was measured to the nearest 0.1 kg using a Tanita *BC-418MA* (Tanita Corporation, Tokyo, Japan). Children wore light clothing and shoes were removed. Height was measured with shoes removed to the nearest 0.1 cm using an anthropometer (*Siber Hegner*). Body mass index (BMI, kg/m^2) was calculated as the weight (kg) divided height (m) squared. Weight status was classified as normal, overweight or obese using age- and sex-specific BMI cut-off points described by the International Obesity Task Force (Cole, Bellizzi, Flegal, & Dietz, 2000).

Participation in the subsidized school education material and meal program was used as a proxy for socioeconomic status (SES). In Portugal, children from families with incomes at or below one-half the minimum wage were eligible for free educational materials and meals. Those with incomes more than one-half but less than or equal to the minimum wage were eligible for reduced-price meals. Children from families with incomes above minimum wage are not eligible for the subsidies. The SES was classified into three categories: high (unsubsidized), medium (reduced-price) and low (free). Family income described as total income of the household was determined by school authorities and categories were extracted from official school records.

Attraction to PA was assessed with the Children's Attraction to PA (CAPA) scale (Brustad, 1993) which includes 14 items and 5 subscales: attraction to participating in vigorous PA (3 items), perceived importance of participation in PA (3 items), enjoyment of games and sports, whether physical exertion is perceived as fun or important (3 items), and perceived acceptance by peers in games and sports (2 items). Perceived physical competence was assessed using a five-item scale that reflects the appraisal of one's own competence to perform PA behaviors (Brustad, 1993, 1996). Parental influences on the socialization of children into PA were assessed with 9 items divided into three subscales: parental role modeling, encouragement, and enjoyment;

the items were described as social and psychological influences on adolescents PA behaviors (Brustad, 1993, 1996).

All items were rated on a 4-point scale using Harter's (1985) structured alternative approach that was designed to reduce tendencies for socially desirable responses. The five subscales on the CAPA, perceived competence scale, and parental influences on socialization into PA were **translated** from the English versions and modified accordingly into Portuguese versions, and subsequently back translated into English. A pilot study was conducted to assure that the contents of all scales were understood and comprehended by all children. Internal consistency was estimated with Cronbach's alphas; values ranged from 0.42 to 0.66. The psychometric properties of the scales have been validated and are regarded as reliable indicators (Brustad, 1993, 1996).

Data reliability was assessed in a pilot study of all variables estimated using a test-retest procedure with a random sub-sample of 41 children. The intra-class correlation coefficients (R) of all variables were high. Height and weight, $0.90 \leq R \leq 0.99$; CAPA subscales, $0.96 \leq R \leq 0.99$; perceived physical competence scale, $R=0.99$; and between $0.98 \leq R \leq 0.99$ for parental socialization influences subscales.

Results were expressed either as means (standard deviations) or proportions. Independent sample t-test and Pearson's chi-square tests were used to identify significant differences in means and proportions between genders. A three-way analysis of variance (ANOVA) was conducted to examine the main effects of gender (girls or boys), BMI (normal-weight, overweight, obesity) and SES (low, medium, high) on the attraction to PA, perceived physical competence and parental socialization subscales. We also examined interactions between those variables. The Bonferroni test for multiple comparisons was used to check for specific differences by gender, BMI and SES. Significance level in all analyses was set at 0.05. Statistical analyses were performed using SPSS version 18.0.

Results

Demographic and biological characteristics of the study sample are shown in Table 1. No significant differences between gender were observed for age, weight, height, BMI and SES ($p>0.05$). The prevalence's of overweight and obesity in girls was 26.9% and 13.3% and in boys 29.9% and 11.5%, respectively. The proportions of girls and boys with high SES were 60.8% and 62.5%, respectively, with medium SES 13.9% and 14.0%, and with low SES 25.3% and 23.5%.

Table 1. Characteristics of the study sample.

Characteristics	Girls (n=324)	Boys (n=358)	P-value
Age (years)	8.82 (0.73)	8.83 (0.78)	0.886*
Height (m)	1.36 (0.07)	1.36 (0.07)	0.578*
Weight (kg)	35.32 (8.79)	35.14 (7.93)	0.778*
BMI (kg/m ²)	18.96 (3.28)	18.84 (3.10)	0.605*
BMI			0.591 [†]
Normal-weight n (%)	194 (59.9)	210 (58.7)	
Overweight n (%)	87 (26.9)	107 (29.9)	
Obesity n (%)	43 (13.3)	41 (11.5)	
SES			0.850 [†]
Low n (%)	82 (25.3)	84 (23.5)	
Medium n (%)	45 (13.9)	50 (14.0)	
High n (%)	197 (60.8)	224 (62.5)	

Abbreviation: BMI, body mass index; SES, socioeconomic status

Notes: * t-test; [†] Chi-square test

Table 2 and 3 shows the mean values, standard deviations and the results of the three-way analysis of variance model for attraction to PA, perceived physical competence and parental socialization influences subscales according to gender, BMI and SES.

Table 2. Mean values and standard deviations of different attraction to PA, perceived competence and parental socialization subscales according to gender, BMI and SES.

	CAPA					PPCS	PSS		
	VPA	IPA	LGS	PAG	FPE	PC	PRM	PEJ	PEN
Gender									
Males	3.31 (0.77)	3.67	3.60	2.98	2.60	3.09 (0.58)	3.18 (0.63)	3.19 (0.71)	3.39
Females	2.91 (0.96)	3.62	3.46	2.95	2.42	2.84 (0.63)	3.16 (0.60)	3.12 (0.69)	3.28
BMI									
Normal-	3.21 (0.80)	3.65	3.53	2.98	2.54	3.01 (0.61)	3.16 (0.61)	3.18 (0.68)	3.33 (0.63)
Overweight	3.08 (0.95)	3.69	3.53	3.05	2.52	2.96 (0.65)	3.21 (0.63)	3.16 (0.69)	3.38 (0.62)
Obesity	2.75 (1.05)	3.50	3.53	2.70	2.35	2.81 (0.57)	3.09 (0.61)	3.01 (0.81)	3.27 (0.68)
SES									
High	3.15 (0.88)	3.68	3.53	3.00	2.58	2.97 (0.60)	3.21 (0.60)	3.20 (0.71)	3.40 (0.60)
Medium	3.14 (0.85)	3.68	3.55	2.97	2.50	3.00 (0.55)	3.15 (0.60)	3.16 (0.60)	3.35 (0.56)
Low	3.04 (0.94)	3.53	3.51	2.88	2.35	2.97 (0.69)	3.07 (0.66)	3.03 (0.74)	3.16 (0.71)

CAPA - children's attraction to PA; PPCS - perceived physical competence scale; PSS - parental socialization scale; VPA - vigorous to PA; IPA - importance to PA; LGS - liking games and sports; PAG - peers acceptance in games and sports; FPE - fun of physical exertion; PC - perceived competence; PRM - parent role modelling; PEJ - parent enjoyment; PEN - parent encouragement.

Table 3. F-test, and (*P* value) for three-way ANOVA models of different attraction to PA, perceived competence and parental socialization subscales according to gender, BMI and SES.

		CAPA					PPCS	PSS		
		VPA	IPA	LGS	PAG	FPE	PC	PRM	PEJ	PEN
Sources	of	F (<i>P</i>)	F (<i>P</i>)	F (<i>P</i>)	F (<i>P</i>)	F (<i>P</i>)	F (<i>P</i>)	F (<i>P</i>)	F (<i>P</i>)	F (<i>P</i>)
Gender		28.14	0.20	4.14	0.38	8.69	19.18	0.13 (0.718)	0.03 (0.871)	1.99
BMI		11.32	1.97	0.75	3.88	3.37	3.17 (0.043)	0.61 (0.544)	2.14 (0.119)	0.43
SES	1.62 (0.198)		4.97	0.37	0.49	5.20	0.16 (0.849)	4.55 (0.011)	5.61 (0.004)	8.42
Gender*BMI		3.73	0.39	1.02	0.09	0.51	0.09 (0.914)	1.05 (0.350)	4.28 (0.014)	4.41
Gender*SES	0.77 (0.465)		0.16	0.39	0.28	5.91	2.55 (0.079)	1.47 (0.231)	0.07 (0.936)	0.43
BMI*SES	0.97 (0.422)		1.31	2.41	0.24	1.10	1.04 (0.385)	2.29 (0.059)	2.32 (0.056)	0.86
Gender*BMI*SES	0.96 (0.427)		1.49	0.54	0.82	0.46	0.21 (0.933)	0.68 (0.605)	0.13 (0.972)	0.72

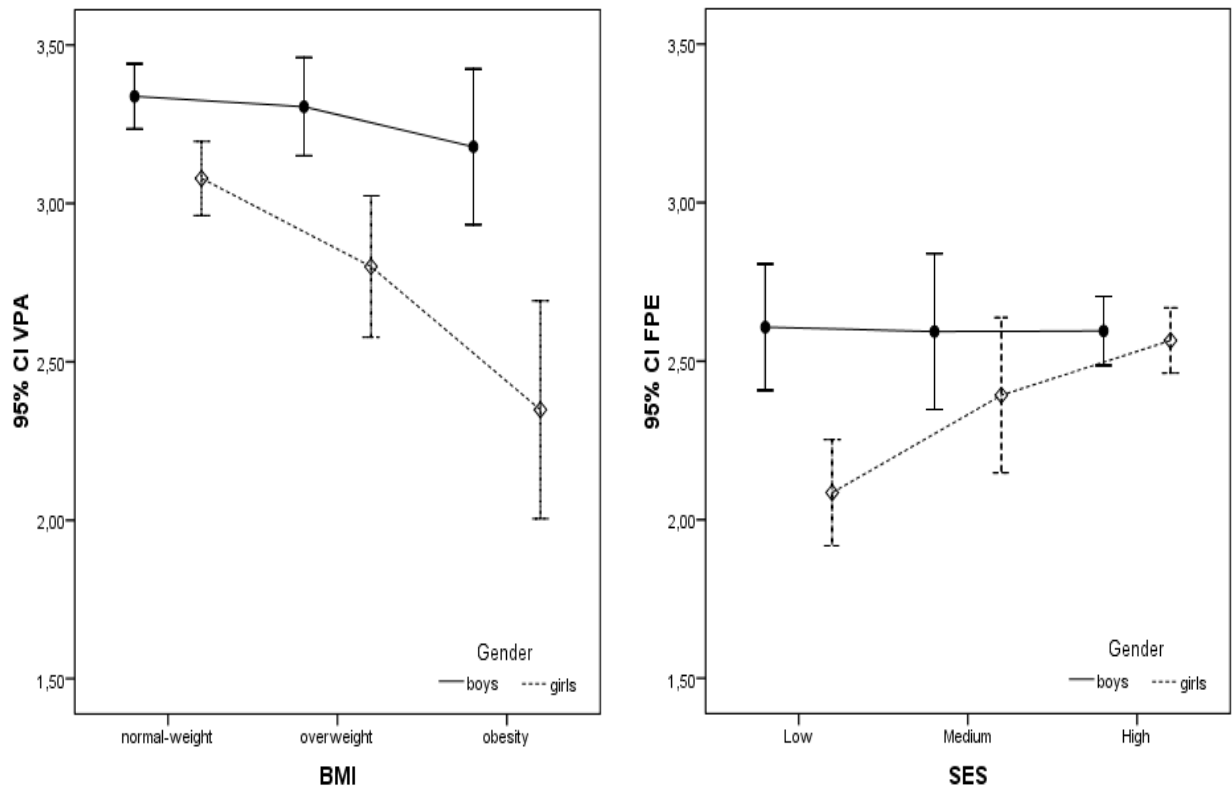
For the VPA subscale, a significant main effect for gender and BMI and a significant gender by BMI interaction effect were found. Boys and normal-weight and overweight children were found to have significantly more desire to participate in VPA than girls and obese children. The significant interaction showed that normal-weight girls have more feelings about engaging in VPA than overweight and obese children, while in boys, this perception tend to be more constant across weight status (Figure 1).

Analyses for IPA, LGS and PAG revealed only a significant main effect for gender, BMI and SES, respectively. Boys enjoy more games and sports than girls. Obese children consider to be less accepted by peers' in games and sports than normal-weight and overweight children. High and medium SES children recognize more IPA than low SES children.

For FPE, there was a significant main effect for gender, BMI and SES and a significant gender by SES interaction effect. Boys and normal-weight and high SES children like more exertion aspects of PA than girls, obese and low SES children. This significant interaction suggests that the SES effects in FPE subscale are different in boys and girls. High SES girls like more exertion aspects of PA than low SES girls ($p < 0.05$), while in boys, this perception tend to be more constant across SES levels (Figure 1).

Figure 1. Mean vigorous physical activity (VPA) and fun of physical exertion (FPE) scores and 95% confidence intervals (95%) by gender and weight status (BMI) / socioeconomic status (SES).

CAPA



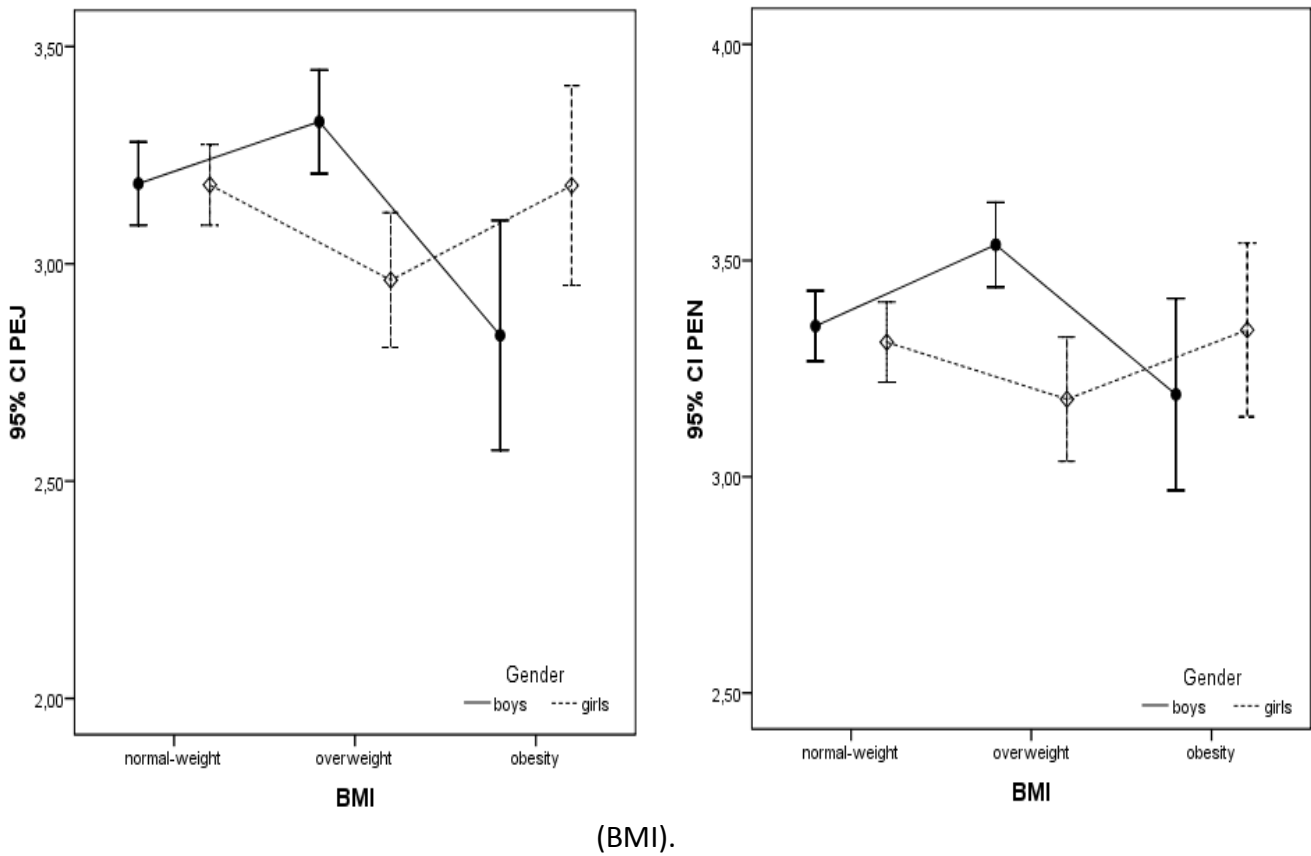
For perceived physical competence, a statistically significant main effect for gender and BMI were found. Boys and normal-weight children perceiving themselves as being more successful and physically competent than girls and obese children.

For parental role modeling, a significant main effect for SES was found. High SES children consider, more significantly, their parents as role models than lower SES children. For the parental enjoyment influence a significant main effect for SES and a significant gender by BMI interaction effect were found. High SES children perceived their parents as having more fun and enjoyment doing PA than lower SES children. This significant interaction showed that whereas overweight boys perceived their parents as having more fun and enjoyment doing PA than obese boys ($p < 0.05$), in girls, this

perception tends to be in the opposite direction (Figure 2). Identical results were revealed for the parental encouragement influence. High and medium SES children were more significantly encouraged by their parents to participate in PA than low SES children. Overweight boys consider to be more encouraged by their parents than normal-weight boys ($p<0.05$), whereas in girls, this perception tends to be in the opposite directions (Figure 2).

Figure 2. Mean parental enjoyment (PEJ) and parental encouragement (PEN) influences scores and 95% confidence intervals (95%) by gender and weight status

PSS



Discussion

The findings from this study are consistent with expectations that children's attraction to PA varies in accordance with gender and weight status. An important finding was that boys enjoy their participation in vigorous PA more than do girls, which is consistent with Brustad's (1996) study. These findings were also anticipated given Pellegrini et al's (2004) findings that boys engage in more vigorous PA on playgrounds than do girls. Anticipated differences were also found with regard to weight status as differences existed among normal weight and overweight children relative to obese children in liking of vigorous PA. In this regard, normal weight and overweight children reported greater liking of vigorous PA than did obese children. Children who are obese are less active and fit (Planinsec & Matejek, 2004), have poorer fundamental motor skill proficiency than those who are normal-weight (Okely, Booth, & Chey, 2004) and, consequently, are more likely to face exclusion from participation in vigorous games and competitive activities. An interesting finding in this study is the gender and weight status interaction found relative to the vigorous PA subscale. Normal-weight girls like to participate more in vigorous activities than do overweight and obese girls, whereas in boys, this perception tends to be more constant across weight status. The present findings suggest that effective PA intervention programmes among children need to consider both gender and weight status.

Regarding the perceived importance to participate in PA subscale, prior studies have reported that if children think that PA is beneficial for their health and well-being they will be more likely to participate in PA to achieve these benefits (Brockman, Jago, & Fox, 2011). This study extends previous research by demonstrating a socioeconomic trend with regard to the importance to participate in PA. High and medium SES children recognize more benefits of doing PA than do low SES children. This finding can be explained by positive attitudes towards the value of PA and healthy lifestyles in general of family members from higher social classes which are transferred to their children's attitudes and health-related behavior. In fact, there is some evidence that

socioeconomic inequalities have profound effects on the adoption and maintenance of healthy behaviors including PA participation among children (House, 2001).

The finding that boys liked games and sports more than girls is also consistent with other studies (Brustad, 1996; Crocker, Eklund, & Kowalski, 2000). The factors responsible for the larger interest in games and sports by boys are not well understood. A plausible explanation for the finding is one of a socio-cultural nature. Social and cultural roles more strongly emphasize strenuous and competitive activities for males than for females and males have had a longer and more extensive history of participatory opportunities in competitive games and sports. Other explanations for this lower involvement of girls in sports compared to boys are the differences in body image, physical abilities and attitudes necessary for the practice of sports activities (Malina, 1996). Girls' ideal body image seems to favour elegance and beauty that may not fit many acute and chronic requests from training and competition in games and sports. Gender differences and associated socio-cultural factors require special consideration in the design of intervention programs, sports activities and physical education curriculum issues. Girls, as a group, appear to be more at risk for insufficient levels of PA; as such, activities need to be more varied and directed to their interests and expectations.

In the present study, obese children reported feeling less accepted by peers in games and sports compared to their normal-weight and overweight counterparts. Previous research also suggests that obese children have problematic social functioning and when they are asked directly about their experiences within the peer environment they self-report numerous social difficulties including victimization, name-calling, and teasing about their appearance (Janssen, Craig, Boyce, & Pickett, 2004). Obese children also tend to be described as less physically attractive, less athletic, more tired, unhappy and absent from school than their normal-weight peers, which may explain

the lower peers' acceptance in games and sports (Zeller, Reiter-Purtill, & Ramey, 2008).

Interesting results were also observed with the fun of physical exertion subscale. There was a significant main effect for gender, BMI and SES, and a significant gender by SES interaction effect. Boys and normal-weight and high SES children reported liking the exertional aspects of PA more than girls, obese and low SES children. Examining the gender by SES interaction and subsequent stratified analyses showed that high SES girls like the exertional aspects of PA more than low SES girls. The same finding was not present for boys. These results are in accordance with previous studies in which boys expressed much more favorable attitudes toward the exertional characteristics of PA at varying socioeconomic levels (Brustad, 1993, 1996).

Perceived physical competence has been shown to be a predisposing factor affecting children's participation in PA, and those who perceive themselves as competent generally will persist longer in current and future physical activities (Harter, 1985). In the present study, boys and normal-weight children had higher perceptions of their PA competence than girls and obese children. Several studies have also indicated that boys have more favorable self-perceptions in PA and sports and this may result in a greater willingness to participate in PA and sports (Crocker, et al., 2000; Paxton, et al., 2004; Welk & Schaben, 2004). Conversely, girls with more negative perceptions of their physical competency will not be as motivated to perform, obtain competency, or enjoy participating in physical activities and sports and believed themselves more competent at reading and music (Eccles, Wigfield, Harold, & Blumenfeld, 1993). Differences relative to weight status and perceived physical competence have been also reported in previous studies (Jones, Okely, Caputi, & Cliff, 2010; Okely, et al., 2004) in that normal-weight children are generally perceived as more physical competent compared to obese children.

It is generally accepted that parents are a critical and decisive factor in the psychological and social well-being of children (Duncan, et al., 2005). Parents assume a great responsibility for the habits and behaviour showed by their children, because they work not only as role models but also as the main source of encouragement and positive reinforcement in acquiring a specific behaviour (Davison, et al., 2006). In this study, high SES children perceived their parents as important influences (providing more role modelling, encouragement and enjoyment for activity) in comparison with low SES children. There was a significant main effect for SES and a significant gender by weight status interaction effect. High SES children also perceived their parents as important influences (higher role modelling, encouragement and enjoyment for activity) in their PA participation in comparison with low SES children. Examining the gender by weight status interaction and subsequent stratified analyses showed that obese boys reported receiving less encouragement from their parents and perceived that their parents enjoyed PA less than did the parents of overweight boys.

Higher social economic status has been found to coincide with more favorable attitudes towards the value of an active and healthy lifestyle. In addition, low SES children may lack parental support and be unable to benefit from the higher value placed on PA and sports in comparison with more highly educated parents (Bois, Sarrazin, Brustad, Trouilloud, & Cury, 2005). Children from lower economic strata may also experience greater barriers (financial, location, proximity and access of facilities) to activity than children from higher economic status (Duncan, Woodfield, Al-Nakeeb, & Nevill, 2002). Also in accordance with prior research, obese and overweight children reported lower levels of adult support for PA than their non-obese counterparts (Zabinski, Saelens, Stein, Hayden-Wade, & Wilfley, 2003). Thus, the present findings suggest that designing interventions that incorporate parents may be an effective means of increasing PA among low SES and obese boys. They can effectively and practically influence them by communicating the worth of PA participation and telling that they are capable of participating.

There are several limitations in this study that should be addressed. A first limitation is the cross-sectional design of the study that did not allow us to determine causal effects. These results should therefore be interpreted with sufficient caution and require replication in others cross-sectional and longitudinal studies before any definite conclusions can be drawn. A second limitation, is the fact that all analyzes were conducted within a single sample, which reduces generalizability of our findings to other samples. A third limitation is the use of subsidized school education material and meal program as a marker of SES, which is a multi-faceted construct. Different results might have been observed if a different measure of SES, such as parental education or family income, had been used. Despite these limitations, this study makes an important contribution to the literature, providing important evidence about the gender, BMI and SES differences in the attraction to PA, perceived physical competence and parental socialization influences among elementary schoolchildren.

In summary, the findings from this study reveal that gender; weight status and SES differences are related to children's attraction to PA, perceived competence and parental influences and suggest that public health interventions need to consider these differences in order to tackle physical inactivity and obesity among this population. Interventions should be designed for girls, for children of lower SES status, and for overweight and obese children that are intended to favorably influence children's attraction to PA and their perceived physical competence. In addition, family-based interventions could be developed for the purpose of enhancing positive parental socialization practices toward PA. The findings from this study contribute to the body of knowledge relative to understanding differences among children in their attraction to PA and perceived physical competence. Structured interventions are needed that address the specific factors that attract children to, or repel them from, PA.

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Psychosocial correlates of physical activity in schoolchildren aged 8 to 10 years

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Abstract

Background: Understanding the correlates of physical activity (PA) during childhood in different populations may contribute to fostering active lifestyles, which are associated with several health benefits in childhood and adolescence and perhaps in adulthood. This study investigates the associations between weight status (body mass index, BMI) and socioeconomic status (SES) and psychosocial correlates of PA in Portuguese primary school children.

Methods: A random cross-sectional sample of 683 children (331 girls, 352 boys), 8-10 years of age, attending schools in the Porto district in northern Portugal, was surveyed. Height and weight were measured; BMI was calculated. Weight status (normal, overweight, obese) was classified relative to criteria of the International Obesity Task Force. Current level of PA was estimated by direct interview of the children using the Godin and Shephard questionnaire. Family SES was estimated from official school records. Psychosocial correlates included attraction to PA, perceived physical competence and parental socialization, which were assessed via standardized questionnaires. Sex-specific multiple regression analyses (SPSS 18.0) were used.

Results: Estimated level of PA was significantly higher in boys than in girls. Enjoyment of participation in vigorous PA was positively associated with level of PA (girls, $b=3.07$, CI 0.96-5.17; boys, $b= 6.90$, CI 3.74 - 10.17). Perceived acceptance by peers in games and sports ($b=2.98$, CI 0.80-5.17) and parental encouragement ($b=3.34$, CI 0.69-5.99) were positively and significantly related to PA in girls. Perceived physical competence ($b=4.26$, CI 0.06-8.46) was also positively and significantly related to PA in boys. Weight status and SES were not associated with PA.

Conclusions: Boys and girls differ in perceived attractiveness of PA and perceived physical competence, both of which influence level of PA. Differences in perceptions are probably important aspects of motivation of PA in schoolchildren.

Key words: attraction to physical activity, perceived competence, parental socialization, children

Background

A physically active lifestyle during childhood is associated with several positive health outcomes (Jansen, Mackenbach, Joosten-van Zwanenburg, & Brug, 2010; Strong et al., 2005) and may be important for the prevention of early onset of risk factors for several chronic diseases that are manifest in adulthood (Rowland, 2006). Habits of physical activity (PA) developed during childhood may also translate to a physically active lifestyle in adulthood (Malina, 2001; Telama, 2009). Nevertheless, nearly two-thirds of children in both developed and developing countries are insufficiently active (Bouchard, Blair, & Haskell, 2006). Boys tend to be, on average, more consistently engaged than girls in moderate-to-vigorous PA, while levels of PA tend to decline with increasing age in both sexes, especially during adolescence (Mota, Santos, Guerra, Ribeiro, & Duarte, 2003; Seabra et al., 2008).

There is much current discussion of the development of health intervention programs aimed at increasing levels of PA beginning in childhood. In order to do so, it is important to understand the correlates of PA at different ages during childhood and adolescence (Ferreira, Horst, Wendel-Vos, Kremers, van Lenthe, & Brug, 2007; Sallis, Prochaska, & Taylor, 2000; Van Der Horst et al., 2007). A broad range of demographic, psychosocial and environmental factors have been indicated as potential correlates of PA across broad ages

of childhood (3-12 years) and adolescence (13-18 years). Among the several results found, boys, normal-weight and high socioeconomic status (SES) children and adolescents have greater involvement in PA comparing to girls, obese and low SES children and adolescents. However, these reviews consistently affirm that further research is needed to identify gender differences in the correlates of PA in narrower age ranges during childhood due to incongruent results across studies, and also because few intervention programs have documented substantial and sustainable effects.

The Youth Physical Activity Promotion (YPAP) model suggests a social-ecological framework for understanding interrelationships among correlates of PA in children (Welk, 1999). Correlates of PA in the model include, among other, psychological attributes (predisposing factors) and social influences (reinforcing factors). Predisposing factors include personal knowledge and perceptions that influence participation in PA, and are viewed as reflecting interest in PA and consist of two constructs - outcome expectation and efficacy expectation (Bandura, 1986). The former refers to enjoyment of and attraction to PA, while the latter is refers to perception of competence to undertake PA (Welk, 1999). Reinforcing factors are rewards or feedback associated with PA that may encourage or discourage adoption and/or maintenance of PA behaviors. Parents are generally considered a critical and decisive reinforcing factor in the well-being of children, shaping their healthy behaviours, including an active lifestyle (Duncan, Duncan, & Strycker, 2005).

The utility of the YPAP model has been recognized (Joens-Matre et al., 2008; Rowe, Raedeke, Wiersma, & Mahar, 2007), and a large body of literature exists about the relationship between predisposing and reinforcing and children's PA (Crimi, Hensley, & Finn, 2009; Davison, Downs, & Birch, 2006; Dollman, 2010; Duncan, et al., 2005; Lau, Lee,

& Ransdell, 2007; Paxton, Estabrooks, & Dzewaltowski, 2004; Welk, Wood, & Morss, 2003; Welk & Schaben, 2004). These studies highlighted that children's who are more attracted to participate in PA and perceive themselves as physical competent will persist longer in current and future PA. Further, parents, who believe in the importance of PA, who are role models by their own levels of participation, who encourage their children to be active, or provide instrumental support tend to have children who are more active than children whose parents are not physically active. However, to date, only few studies have reported the presence of gender differences in the relationships of components of the YPAP model with moderate-to-vigorous PA favoring boys, although there is insufficient evidence to draw conclusions limiting thus the generalizability of these findings (Brustad, 1996; Lau, et al., 2007; Welk, et al., 2003; Wenthe, Janz, & Levy, 2009).

The present cross-sectional study considers predisposing and reinforcing factors for PA in Portuguese children. It describes current level of PA and psychosocial correlates of PA in a sample of Portuguese primary school children, and evaluates relationships between the psychosocial correlates and body weight status (BMI) and familial socioeconomic status (SES) with level of PA.

Methods

Sampling and participants

The data was derived from a community-based cross-sectional survey of children aged 8 to 10 years selected from 40 public elementary schools, throughout the municipality of Maia, northern of Portugal, of which 20 agreed to participate in this study. These 20 schools with a total of 1249 students cover all the parishes of the municipality of Maia. Four weeks before data collection, all schoolchildren's parents were invited to participate

in the study and were mailed a consent/refusal form and instructed to return the form to the school if they did not want their child to participate. The refusal rate was 45.3% (n=566). This provided a final sample of 683 children (331 girls and 352 boys; 54.7% response rate). The study was approved by the research committee of the Faculty of Sport of the University of Porto and by authorities at the individual schools, which the children attended. Data were collected between February and March 2010.

Measures

Anthropometry and Weight Status

Weight was measured to the nearest 0.1 kg using a Tanita *BC-418MA* (Tanita Corporation, Tokyo, Japan). Children wore light clothing and shoes were removed. Height was measured with shoes removed to the nearest 0.1 cm using an anthropometer (*Siber Hegner*). Body mass index (BMI, kg/m^2) was calculated as the weight (kg) divided height (m) squared. Weight status was classified as normal, overweight or obese using age- and sex-specific BMI cut-off points described by the International Obesity Task Force (Cole, Bellizzi, Flegal, & Dietz, 2000).

Socioeconomic status

Participation in the subsidized school education material and meal program was used as a proxy for socioeconomic status (SES). In Portugal, children from families with incomes at or below one-half the minimum wage were eligible for free educational materials and meals. Those with incomes more than one-half but less than or equal to the minimum wage were eligible for reduced-price meals. Children from families with incomes above minimum wage are not eligible for the subsidies. SES was classified into three categories: high (unsubsidized), medium (reduced-price) and low (free). Family income described as

total income of the household was determined by school authorities and categories were extracted from official school records.

Psychosocial Variables

Attraction to physical activity

Attraction to PA was assessed with the Children's Attraction to Physical Activity (CAPA) scale (Brustad, 1993). This scale is designed to tap the most and least attractive children are to PA. This instrument focuses on children's feelings about PA involvement along dimensions that children themselves have identified as being important factors in PA involvement. The scale was developed to measure young peoples' interest in, and attraction to, PA, and specifically, to assess their emotional response to anticipated PA. Positive effect, in the form of liking of PA, is a fundamental contributor to youth's motivation to become involved in PA. The CAPA includes 14 items and 5 subscales: attraction to participating in vigorous PA (3 items), perceived importance of participation in PA (3 items), enjoyment of games and sports, whether physical exertion is perceived as fun or important (3 items) (Brustad, 1993).

Perceived physical competence

Brustad (1996) constructed a five-item perceived physical competence scale utilizing Harter's (1982) perceived physical competence scale for children. Children's perceived physical competence was assessed using part of the Athletic Subscale of the Self-Perception Profile for Children (Harter, 1985). Previous research from Brustad (1993) confirmed that three items of Harter's original 6-item subscale had moderate cross-loadings with CAPA dimensions and were deleted. Thus, three of Harter's original six items were retained ("Some kids do very well at all kinds of sports but others don't feel that they

are very good when it comes to sports" and "Some kids feel that they are better than others their age at sports but other kids don't feel they can play as well" and "Some kids don't do well at new outdoor games and sports but other kids are good at new games right away") and two items related to children's perceived physical capabilities were added. These two items added by Brustad (1993) were "Some kids are pretty sure that they are good athletes but other kids don't think they are good athletes" and "Some kids are better than others at most sports but other kids aren't so good at most sports. These two items and three of Harter's original items constitute the perceived physical competence scale (5 items). The term "perceived physical competence" used in this study reflects the appraisal of one's own competence to perform PA behavior.

Parental socialization influences

Parental influences on the socialization of children into PA were assessed using 9 items for assessing processes referred to the social and psychological influences on children's PA behavior, such as parental role-modeling (three items), parental encouragement of their children's PA participation (three items) and perceived parental enjoyment of PA (three items). According to Brustad (1993), the parental influence subscale items for the parental role-modeling dimension "were designed to reflect children's appraisals of the extent of their parent's PA involvement. The scale was designed to consider socialization influences that parents have on children's cognitive views towards PA and to test the theoretical perspectives of Eccles (Eccles & Harold, 1991) and Harter (1982). Eccles theory proposes that children's successful behavior in a particular achievement domain is shaped by parental values and expectancies. Likewise, Harter advocates that children who have parents who support their PA endeavors should experience positive affect, an enhanced perception of their competence, and be intrinsically motivated to engage in PA. Sample items for this scale include: "Some kids have parents who get a lot of exercise but other

kids have parents who don't get a lot of exercise". A higher score indicates that parents have a more positive influence on their child's PA.

All items assessing attraction to PA, perceived physical competence and parental influences were rated on a 4-point scale using Harter's (1985) structured alternative approach that was designed to reduce tendencies for socially desirable responses. For example: "some kids have more fun playing games and sports than anything else" but "other kids like doing other things". Upon making this choice, they must decide whether the statement is "sort of true" or "really true" for them. The range of the score for each question is from 1 (negative statement) to 4 (positive statement) with a higher score indicating that children. The five subscales on the CAPA, perceived physical competence scale, and parental influences on socialization into PA were translated from the English versions and modified accordingly into Portuguese versions, and subsequently back translated into English. A pilot study was conducted to assure that the contents of all scales were understood and comprehended by all children. Internal consistency was estimated with Cronbach's alphas; values ranged from 0.42 to 0.66. The psychometric properties of the scales have been validated and are regarded as reliable indicators (Brustad, 1993, 1996; Rose, Larkin, Hands, Howard, & Parker, 2009; Rowe, et al., 2007).

Leisure time physical activity

The evaluation of PA in leisure time was measured by using a personal interview in each respective schools using the Godin and Shephard (1985) questionnaire. The face-to-face interviews placed all questions in the context of the leisure daily routines of the children. Participants reported the number of times per week that they were engaged in different physical activities for a period of at least 15 minutes. Three PA categories were used: mild (3 METs: activities such as bowling, golf, sailing; moderate (5 METs: activities such as fast

walking, tennis, leisurely bicycling, volleyball, badminton, non-competitive swimming; or strenuous (9 METs: activities such as running, soccer, basketball, judo, roller skating, vigorous swimming. A total score was derived by multiplying the frequency of each category by the MET value, and the products were summed (Godin & Shephard, 1985).

Reliability

Reliability was assessed in a pilot study of all variables using a test-retest protocol in a random sub-sample of 41 children. Intra-class correlation coefficients (R) were high for height and weight, $0.90 \leq R \leq 0.99$; CAPA subscales, $0.96 \leq R \leq 0.99$; perceived physical competence scale, $R=0.99$; and parental socialization influences subscales, $0.98 \leq R \leq 0.99$; and moderate for weekly PA, $0.77 \leq R \leq 0.90$.

Analyses

Results were expressed as either means and standard deviations or proportions. Independent sample t-tests and Pearson chi-squares were used to identify significant differences in means and proportions between boys and girls. Multiple regression analyses with leisure time PA as the dependent variable and weight status (normal, overweight, obese), SES (low, medium, high) and psychosocial factors (attraction to PA, perceived physical competence; parental socialization influences) as independent variables were used. Weight status and SES variables were included as dummy variables using as references normal weight and low SES. A forward stepwise method was used. Interaction effects between sex and the psychosocial variables were initially tested. The results indicated significantly different effects for boys and girls. Subsequent analyses were thus sex-specific. The regression models used in the analysis took into consideration the potential clustering effects resulting from schools influences (robust standard errors).

In the final models, adjusted coefficients for the statistically significant variables are presented adjusted for the remaining significant variables. Significance level in all analyses was set at 0.05. SPSS version 18.0 was used in all analyses.

Results

Characteristics of the children are summarized in Table 1. The sample includes slightly more boys (52.5%) than girls (47.5%), and $\approx 60\%$ are classified by school records as higher SES. About 25% and 12% of girls are overweight and obese, respectively; corresponding values for boys are 26% and 12%. Boys have, on average, significantly higher scores than girls on liking games and sports ($t=2.92$, $p=0.004$), liking to participate in vigorous PA ($t=5.99$, $p<0.001$), enjoyment of physical exertion ($t=2.84$, $p=0.004$), and perceived physical competence ($t=5.53$, $p<0.001$); other psychosocial correlates do not differ between boys and girls. Levels of PA are significantly higher in boys than girls ($t=7.39$, $p<0.001$).

Crude and adjusted coefficients and 95% CI with PA level as the dependent variable in sex-specific linear multiple regression analyses are presented in Table 2. SES and weight status are not associated with PA level in either boys or girls. Liking to participate in vigorous PA is positively associated with PA in both sexes (girls, $b=3.07$, CI 0.96-5.17; boys, $b=6.90$, CI 3.74-10.17). Among girls, perceived acceptance by peers in games and sports ($b=2.98$, CI 0.80-5.17) and parent encouragement for PA ($b=3.34$, CI 0.69-5.99) are significantly and positively associated with PA. Among boys, perceived physical competence ($b=4.26$, CI 0.06-8.46) are also significantly and positively associated with PA. Overall, 7.8% and 8.6% of the variance in weekly PA in boys and girls respectively is explained by the psychosocial correlates.

Table 1. Means (standard deviations) for age, body size, psychosocial correlates of PA and level of PA of girls and boys; frequencies (percentages) by weight status and socioeconomic status; and tests of significance of sex differences.

Characteristics	Girls (n=331)	Boys (n=352)	p-value
Age, yrs	8.82 (0.76)	8.83 (0.78)	0.886*
Height, m	1.36 (0.07)	1.36 (0.07)	0.578*
Weight, kg	35.32 (8.79)	35.14 (7.93)	0.778*
BMI, kg/m ²	18.96 (3.28)	18.84 (3.10)	0.605*
Weight status			0.591 [†]
Normal weight, n (%)	209 (63.1)	217 (61.6)	
Overweight, n (%)	82 (24.8)	93 (26.4)	
Obesity, n (%)	40 (12.1)	42 (11.9)	
SES			0.850 [†]
Low, n (%)	87 (26.3)	80 (22.7)	
Medium, n (%)	46 (13.9)	49 (13.9)	
High, n (%)	198 (59.8)	223 (63.4)	
Psychosocial variables			
Attraction to PA			
Importance of PA	3.62 (0.54)	3.67 (0.55)	0.240*
Liking games and sports	3.46 (0.66)	3.60 (0.57)	0.004*
Peers acceptance in games and sports	2.95 (0.94)	2.98 (0.93)	0.604*
Enjoyment of vigorous PA	2.91 (0.96)	3.31 (2.90)	<0.001*
Enjoyment of physical exertion	2.42 (0.78)	2.60 (0.85)	0.005*
Perceived physical competence	2.84 (0.63)	3.09 (0.58)	<0.001*
Parental socialization influences			
Parental role modeling	3.14 (0.71)	3.19 (0.73)	0.344*
Parental enjoyment	3.13 (0.72)	3.16 (0.75)	0.598*
Parental encouragement	3.22 (0.75)	3.28 (0.71)	0.226*
Physical activity	38.48 (19.72)	51.57 (25.70)	<0.001*

* t-test; [†] Chi-square test

Table 2. Results of multiple regression analyses with level of PA as the dependent variable and weight status, SES and psychosocial factors as independent variables.

Explanatory variable	Girls			Boys		
	Crude β (95% CI)	Adjusted β (95% CI)	p-value	Crude β (95% CI)	Adjusted β (95% CI)	p-value
Weight status						
Overweight n (%)	4.25 (-0.35-8.85)			0.03 (-5.40-5.47)		
Obesity n (%)	-2.80 (-8.82-3.21)			-4.77 (-12.64-3.09)		
SES						
Medium n (%)	-2.70 (-8.60-3.21)			-5.17 (-12.51-2.18)		
High n (%)	2.19 (-2.06-6.43)			0.85 (-4.38-6.07)		
Psychosocial Variables						
Attraction PA						
Importance PA	4.02 (0.19-7.86)			7.24 (2.72-11.77)		
Liking games and sports	2.31 (-0.83-5.44)			8.31 (3.99-12.63)		
Peers acceptance games and sports	3.95 (1.78-6.12)	2.98 (0.80-5.17)	0.008	4.65 (2.03-7.27)		
Liking vigorous PA	3.95 (1.85-6.05)	3.07 (0.96-5.17)	0.004	7.27 (4.11-10.42)	6.90 (3.74-10.07)	<0.001
Fun of physical exertion	3.08 (0.43-5.73)			4.18 (1.26-7.09)		

Perceived physical competence	2.36 (-0.96-5.69)			5.32 (1.04-9.59)	4.26 (0.06-8.46)	0.047
Parental socialization influences						
Parental role modeling	1.17 (-1.77-4.12)			2.52 (-0.91-5.95)		
Parental enjoyment	0.57 (-2.31-3.45)			4.55 (1.22-7.87)		
Parental encouragement	4.20 (1.52-6.89)	3.34 (0.69-5.99)	0.014	0.90 (-2.71-4.51)		

Discussion

Levels of PA and psychosocial correlates of PA and associations between demographic (SES), biological (body weight status) and psychosocial correlates (attraction to PA, perceived physical competence, parental influences) with estimated level of weekly PA were considered in a cross-sectional sample of Portuguese boys and girls 8-10 years of age.

Consistent with previous research, Portuguese girls were less active than boys (Pereira et al., 2010; Seabra, et al., 2008), suggesting, perhaps, a need for special efforts to enhance activity levels in girls. Boys also scored better than girls, on average, for all subscales related to attraction to PA and had higher perceived physical competence. The observations were also consistent with previous studies conducted in different cultural settings that indicate that boys enjoyed more games and sports, liked vigorous aspects of PA and perceived themselves as doing well and excelling with PA (Brustad, 1996; Crocker, Eklund, & Kowalski, 2000; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002). On the other hand, girls had more negative perceptions of physical competence which may influence motivation to perform, to develop physical competence, and/or to enjoy participation in sport and other physical activities and believed themselves more competent in non-physical domains such as reading and music (Eccles, Wigfield, Harold, & Blumenfeld, 1993). In contrast, parental influence on socialization into PA did not differ significantly between boys and girls. These findings emphasize that gender differences exist in children's attraction to PA and perceived physical competence and suggest that interventions to promote girl's participation in PA should provide enjoyable and preferred physical activities and sports where girls feel confident and experience success; and enhance girl's competence feelings and beliefs in their ability to participate in vigorous PA.

According to Harter's Theory of Competence (Harter, 1987; Schmalz, Deane, Birch, & Davison, 2007), when girls perceived they were physically competent (i.e., possessed the requisite motor skills), they participated in club sport, while those who did not believe they were competent either did not participate or participated only in individual, non-movement skill-based physical activities. In addition, other powerful socio-cultural factors influence the types of activities that boys and girls choose (Cherney & London, 2006). In the recent past in Portugal and perhaps other countries, males were encouraged to and rewarded for taking part in PA and sports whereas females were encouraged to be involved in sedentary activities, especially of domestic or housekeeping nature. Alternatively, the demands of different sports and perceived associations with body image may not be consistent with the expectations and roles of girls in some cultural groups. Ideal body image in western societies tends to favour elegance, beauty and grace among girls. This view may not be consistent with the demands of training and competition in games and sports in girls, although it is changing in many parts of the world. This line of reasoning may enhance concerns about the potential role of sport and PA participation in affecting femininity (Weinberg & Gould, 1995). However, in Portugal sport preferences among boys and girls are relatively similar. The most preferred sport among boys is soccer, while both soccer and swimming are the more preferred sports among girls (Seabra, Mendonça, Thomis, Malina, & Maia, 2007).

Since significant gender differences were found for PA levels and for some psychosocial correlates, multiple regression analyses were conducted separately for girls and boys. Attraction to PA refers to the perceived value that an individual places on play, games, exercise, sport and other related activities, and includes feelings, either positive or negative, about involvement in PA (Brustad, 1993). The participation in PA among Portuguese primary school girls was positively associated with the attachment subscale related to peers acceptance in games and sport. Girls apparently placed a greater emphasis on friendship in the context of PA; participation increased

when girls perceived acceptance by their peers. Some evidence suggests that girls who have peers with whom they can share their activities were more active (Allender, Cowburn, & Foster, 2006). Moreover, being with friends and making new friends was often expressed by children and youth as a primary reason for participation in sport which is a major context of PA among youth and more often expressed by girls compared to boys (Coelho e Silva, Sobral, & Malina, 2009; Ewing & Seefeldt, 1988; Malina, 2008; Siegel, Peña Reyes, Cárdenas Barahona, & Malina, 2009). Participation among girls is motivated by enjoyment and the development and maintenance of social support networks, particularly opportunities to engage with their friends (Barr-Anderson et al., 2007). Given the value placed on peer relationships, PA intervention programs for girls should consider placing more emphasis on developing favourable peer relations through different forms of team activities that nurture the development of relationships among participants.

Desire and attraction of participation in vigorous PA was a significant correlate of level of PA in both boys and girls. The observation for girls is relevant because some data suggests that girls felt more threatened with extremely vigorous and competitive PA and sports (Raman et al., 2008). Participation in physical activities were also more enjoyable when young children (9-15 years) were not forced to compete and win, but were encouraged to experiment with different activities (Macphail, Gorley, & Kirk, 2003).

Perceived physical competence is an important predisposing factor in YPAP model. It denotes an individual's belief in his/her abilities to make changes with regard to a specific behavior (Bandura, 1986). An individual must not only intend to perform a behavior, but must also believe that he/she is capable to performing the behavior before action occurs. The model would predict that the greater the sense of physical competence, the greater the participation in PA (Harter, 1985; Ommundsen, Klasson Heggebo, & Anderssen, 2006; Welk, et al., 2003). Perceived physical competence was

positively related with involvement in PA among Portuguese boys. This was consistent with observations that boys with higher levels of perceived physical competence were more likely to approach achievement tasks with a high expectancy of success, leading to greater persistence and effort when engaged in PA than boys with low perceived physical competence (Paxton, et al., 2004; Welk, et al., 2003). By inference, some boys can benefit from the enhancement of perceived physical competence. Instruction and practice of movement skills may be important and strategy for improving perceived physical competence and in turn increased participation in PA (Vedul-Kjelsas, Sigmundsson, Stensdotter, & Haga, 2011).

Parents are generally considered as a critical and decisive factor in reinforcing the well-being of children and in shaping healthy behaviours, including a physically active lifestyle (Duncan, et al., 2005). Children perceive parental behaviours relative to PA in a variety of ways, such as, encouragement and facilitation of participation at home and/or in the community, and active participation with them (Davison, et al., 2006). Parents who believe in the importance of PA, are role models by their own participation, encourage children to be active and/or provide instrumental support tend to have children who are more physically active (Davison, et al., 2006; Dollman, 2010; Duncan, et al., 2005). In the present study, only parental encouragement was perceived as a significant influence on PA by girls. It is somewhat surprising that parental influences were not related to PA in boys because some evidence suggests that parents are often more encouraging of involvement of their sons in PA more so than of their daughters (Fredricks & Eccles, 2005; Savage, DiNallo, & Downs, 2009). Indeed, in traditional societies such as Portugal, boys were always more encouraged to participate in PA and sports than girls.

Parental role modeling and parental enjoyment influences were also not significant sources of parental influence on participation in PA in the sample of Portuguese children. This contrasts a generally held view that perceived parental encouragement and support is among the most important mechanisms influencing PA and sport

behavior in children (Brustad, 1996; Prochaska, Rodgers, & Sallis, 2002). It is suggested that child and parental activity may be mediated by differences in parental encouragement and support, with role modeling having little impact (Gustafson & Rhodes, 2006). The importance of parental role-modeling and enjoyment was consistently attenuated when other mechanisms of influence were observed (Brustad, 1996; Pugliese & Tinsley, 2007). Since children spend a great part of daily time at school and in organized sport, it is possible that opportunities for parental role modeling are relatively infrequent. It is also possible that the parents of the children were not physically active on a regular basis so that opportunities for direct observation of parental involvement and in turn role modeling were lacking. It is also important to recognize additional “significant others” in the daily life of children including teachers and coaches and of course peers. Some data suggested that friends and general peer support have a more positive influence on PA than parental support (Coppinger, Jeanes, Dabinett, Vogeley, & Reeves, 2010; Keresztes, Piko, Pluhar, & Page, 2008).

Strengths and limitations

The present study provides relevant information related to several psychosocial correlates associated with PA in primary schoolchildren. Several limitations of the study should be recognized. First, self-report measures were used and may be prone to certain forms of bias, especially present habits. The questionnaires used were reliable and valid in young children and have been widely used (Brustad, 1993; Pereira, et al., 2010), and researchers were present to assist children with completion of the questionnaires. Second, is the using of subsidized school education material and meal program as a marker of SES, which is a multi-faceted construct. Different results might have been observed if a different measure of SES, such as parental education or family income, had been used. Third, the study was cross-sectional which limits conclusions regarding relationships between PA and the psychosocial correlates. For example, is PA influenced by a correlate or vice versa? Finally, other known correlates of PA were not

considered (Ferreira, et al., 2007; Sallis, et al., 2000; Van Der Horst, et al., 2007). The results should thus be interpreted with caution and require replication in others cross-sectional and longitudinal studies. Nevertheless, the results provide some important evidence about the relative contribution of several psychosocial correlates of PA in children of primary school age. The regression analyses accounted for a significant but low percentage of the variance in PA so that additional variables in the YPAP model - peers, coaches and teachers influences, physical fitness, skills, environment, etc., need consideration in future research.

Conclusions

The findings presented in this study have shown that primary school boys and girls differed in level of PA and in perceptions of the attractiveness of PA and physical competence. Parental role modeling and parental enjoyment of PA were not viewed as significant influences on participation in PA, but parental encouragement was perceived as a significant influence on PA only by girls. Weight status as reflected in the BMI and SES did not influence level of PA. Although limited to a cross-sectional sample of Portuguese children of primary school age, the findings were generally consistent with the literature on correlates of PA. Nevertheless, prospective studies in children are needed to evaluate whether efforts to modify psychosocial correlates of PA will lead to improvements in level of PA.

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Evaluating the Youth Physical Activity Promotion model among Portuguese elementary schoolchildren

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Abstract

Background: The Youth Physical Activity Promotion (YPAP) model provides an integrated approach to understanding the predisposing, enabling, and reinforcing factors influencing physical activity (PA) behavior. The purpose of this study was to evaluate an adapted version of the YPAP model for explaining PA among Portuguese schoolchildren.

Methods: A random cross-sectional sample of 683 children (8-10 years of age) attending elementary public schools in the north of Portugal completed a detailed survey assessing attraction to PA, perceived physical competence, parental influences and leisure time PA. Structural equation modeling techniques were conducted (EQS 6.1).

Results: Attraction to PA was directly associated with children's PA participation ($\beta=0.271$, $p<0.05$). Perceived physical competence imposed an indirect effect on children's PA through children's attraction to PA ($\beta=0.253$, $p<0.05$). Parental influence had an indirect effect on children's PA through perceived physical competence and attraction to PA ($\beta=0.318$ and 0.662 , respectively, $p<0.05$). Perceived physical competence and parental influence were not directly associated with children's PA ($\beta=0.069$ and 0.180 , respectively, $p>0.05$).

Conclusions: The adapted version of YPAP model was useful in explaining PA participation in elementary Portuguese schoolchildren. Intervention programs intended to enhance attraction to PA, perceived physical competence and favorable parental influence should be developed to promote children's PA participation.

Whilst the benefits of regular participation in physical activity (PA) have been well-documented for children (World Health Organization, 2010), about 30% to 50% are not reaching the recommended minimum levels of PA that would be beneficial to their health (British Heart Foundation, 2010). In addition, active lifestyles appear to steadily

decline as children age (Nader, Bradley, Houts, McRitchie, & O'Brien, 2008). Physical inactivity and a sedentary lifestyle during childhood have been associated with negative health outcomes and contribute to the increased risk of overweight and obesity in youth (Salmon et al., 2005). Therefore, it is important to design, test and implement health intervention programs to enhance PA at the population level beginning in childhood. In order to maximize the effectiveness of such programs, contributors to children's PA need to be clearly identified. A broad range of social, psychological and environmental factors have been identified as potential correlates of children's PA (Sallis, Prochaska, & Taylor, 2000; Van Der Horst, Paw, Twisk, & Van Mechelen, 2007), and several theoretical models have been proposed to specify patterns of influence of such variables upon children's PA (Ajzen, 1991; Bandura, 1986; Sallis & Owen, 2002; Welk, 1999b; Wigfield & Eccles, 2000).

The Youth Physical Activity Promotion (YPAP) model has been proposed as a social-ecological framework designed to bridge the gap between theory and practice by identifying modifiable forms of influence upon children's and adolescents' desire to be physically active (Welk, 1999b). The YPAP model offers a broad basis for analyzing correlates of PA and then facilitating PA. Constructs within the YPAP model include psychological attributes (predisposing factors), social influences (reinforcing factors), and environmental influences (enabling factors). Predisposing factors are personal knowledge and perceptions that influence children's participation in PA. They reflect the child's interest in performing PA and consist of two constructs: outcome expectations and efficacy expectations (Bandura, 1986). Outcome expectations are defined as enjoyment from and attraction to PA, while, the efficacy expectation is defined as the child's perception of physical competence to undertake PA (Welk, 1999b). Reinforcing factors are rewards received or the feedback people get from others following a behavior that may encourage or discourage adoption and/or continuation of the behavior. This dimension of influence includes variables that reinforce a child's PA directly or indirectly through his/her predisposing factors (parental and peers influences). Direct effects may be through facilitating the child's

efforts to be active, while indirect effects may be mediated through other affective or attitudinal processes (labeled as predisposing factors). Enabling factors can include availability of resources, favorable conditions, accessibility of programs, or skills that allow children to be physically active. They include environmental factors that influence children's PA, including living near or having access to convenient play spaces, sports equipment, and transportation to sports or fitness programs, and having opportunities to participate in physical education curricula.

The measurement model and structural links within the YPAP model have been supported through previous research that employed structural equation modeling (Welk, Babke, Brustad, Vice, & Bauman, 1998). Cross-sectional studies have also provided support for the relationships between the YPAP model constructs and children's participation in PA (Schaben, Welk, Joens-Matre, & Hensley, 2006; Welk, Wood, & Morss, 2003). In these studies, attraction to PA, perceived physical competence and parental socialization influences accounted for roughly 30% of the variance in children's participation in PA.

Additionally, models such as the one proposed in the current study help shed light on some of the important factors and relationships among social and psychological influences on children's PA. However, a greater understanding of the direct and mediating mechanisms underlying PA among children requires that additional theoretical and empirical models be tested that include deeper examinations of the many potential individual, social, and environmental factors that explain regular PA. Such examinations may help in the design and implementation of effective interventions to promote children's PA. In addition, instruments available to measure contributors to children's PA are somewhat limited. The scales included in this study represent only a small number of potential influences on children's PA, but the integration of these constructs within the YPAP provides a way to examine the way they interact to influence PA.

Therefore, the purpose of this study was to evaluate an adapted version of YPAP model (presented in Figure 1) linking predisposing (attraction to PA and perceived physical competence) and reinforcing (parental influences) factors with Portuguese children's participation in PA. It was hypothesized that attraction to PA would have a positive direct effect on children's participation in PA; that perceived physical competence would have a positive direct effect on PA and an indirect effect on attraction to PA; and that parental influence would positively, directly and indirectly, influence children's PA participation via its effect on the other psychosocial correlates (i.e., children's attraction to PA and perceived physical competence).

METHODS

Sampling and participants

The data was collected from a community-based cross-sectional sample of children aged 8 to 10 years selected from 40 public elementary schools, throughout the municipality of Maia in the northern part of Portugal. The study had been previously approved by the research committee at the researchers' university and by authorities at the individual schools which the children attended. The administrators of 20 of the contacted schools agreed to participate in this study. Four weeks prior to data collection the families were mailed a passive consent form which instructed the parents to return the form to the school if they did not want their child to participate, which is a customary protocol for research conducted with children through Portuguese educational institutions and which was the approach approved for this research. The refusal rate was 45.3% (n=566). This provided a final sample of 683 children (331 girls and 352 boys; 54.7% response rate). Data were collected between February and March 2010.

Measures

Psychosocial variables

The psychosocial variables utilized in this study included attraction to PA, perceived physical competence, and parental influence on children's PA involvement. A reduced

version of the Children's Attraction to Physical Activity scale (CAPA) developed by Brustad (1993) was utilized as the Portuguese-language version includes 14 items designed to measure the extent of children's interest in engaging in PA. The CAPA includes five dimensions of attraction to participation in PA including attraction to participate in vigorous PA; perceived importance of participating in PA; liking of games and sports; assessments of whether physical exertion is perceived to be fun or important; and attraction due to perceived peer acceptance in games and sports (Brustad, 1993). The CAPA short version is recommended for use in computing an overall measure of children's attraction to PA. A perceived physical competence subscale was included that represented a translated version of Brustad's (1993) adaptation of Harter's (1982, 1985) previous work. Parental influences on children's PA socialization were assessed through a nine-item scale developed by Brustad¹⁶⁻¹⁷ that measures three different dimensions of parental support: parental role modeling behavior, parental encouragement, and parental enjoyment of PA. All items were scored on a 4-point response using Harter's (1985) "structured alternative" approach that is designed to reduce the tendencies for socially desirable responses from children.

The CAPA, children's perceived physical competence, and parental influences scales were translated and adapted from the English versions to their Portuguese versions and then back translated to English. In addition, a pilot study was conducted to assure that the contents of all scales were understood and comprehended by all children. The alpha reliability coefficients assessed through Cronbach's alpha statistics revealed acceptable internal consistency for all scales as each Cronbach alpha value exceeded 0.60 (CAPA scale: 0.71; perceived physical competence scale: 0.61; parental influence scale: 0.73) (Brustad, 1993).

Leisure time physical activity (PA)

The evaluation of PA in leisure time was measured by using a personal interview approach at the school site using the Godin and Shephard (1985) questionnaire. This

procedure has been previously used in several published studies of children's PA in Portugal (Pereira et al., 2010) and the USA (Scerpella, Tuladhar, & Kanaley, 2002). The face-to-face interviews placed all questions in the context of the daily leisure routines of the children. Participants reported the number of times per week that they participated in different physical activities that lasted for a period of at least 15 minutes. Three PA categories were used: mild (3 METs: activities such as casual walking, archery, stretching, and fishing from the river bank); moderate (5 METs: activities such as fast walking, tennis, leisurely bicycling, volleyball, badminton, non-competitive swimming); and strenuous (9 METs: activities such as running, soccer, basketball, judo, roller skating, vigorous swimming). A total score was derived by multiplying the frequency of each category by the associated MET value, and the products were summed (Godin & Shephard, 1985).

Reliability

Test-retest reliability for the individual responses was assessed through a pilot study in which data for a random sub-sample of 41 children was compared across a two week period. The 95% confidence interval of the intra-class correlation coefficients (R) were as follows: CAPA scale, $R \geq 0.96$; perceived physical competence scale, $R \geq 0.99$; parental influence scale, $R \geq 0.98$, and between $R \geq 0.77$ for leisure time PA.

Data analysis

Frequencies and means (standard deviations) were analyzed for all variables, and normality and multicollinearity checks were also conducted. Since children's PA data exhibited moderate levels of skewness and kurtosis a log transformation was performed. In order to reduce the number of parameters that would be estimated, the one-dimensional factor structure of these latent constructs (attraction to PA and parental influence) were used instead of the specific aspects of attraction or parental influence that might differentiate children. This approach has also been used in previous, similar studies (Dishman et al., 2002; Motl et al., 2000; Paxton, Estabrooks, & Dziewaltowski, 2004; Ries, Granados, & Galarraga, 2009).

Data were analyzed using structural equation modeling (SEM) through the software package EQS 6.1 with maximum likelihood estimation (ML), that allows for the simultaneous estimation and testing of relationships among multiple predictors including mediating, and outcome variables (Kline, 2005). The SEM was used to test the relationships among PA and the psychosocial correlates and provides information about the processes through which theoretical constructs influence PA as it permits calculation of a variable's direct, indirect, and total effects on outcomes (Kline, 2005). Model fit was evaluated using the chi-square goodness-of-fit test, which assesses the adequacy of the theorized model's covariance matrix in comparison with the observed matrix. Because the chi-square test has been criticized for its dependence on sample size, the addition of absolute and incremental fit indices has been recommended (Hu & Bentler, 1999). The root mean square of error approximation (RMSEA) and its 90% confidence interval was used as an absolute fit index, while the comparative fit index (CFI) was used as an estimate of incremental fit. An adequate model fit is obtained when the non-normed fit index (NNFI) and CFI are >0.90 and the RMSEA is <0.08 (Hu & Bentler, 1999), while a good model fit is obtained when the NNFI and CFI are >0.95 and the RMSEA is <0.05 (Hu & Bentler, 1999; Kline, 2005). These indices reflect current standards and recommendations for reporting in SEM analyses (Hu & Bentler, 1999). Factor loadings, factor correlations, residual variances, and path coefficients for the measurement and structural models were inspected for sign and/or magnitude according to what was proposed in the YPAP model. Analyses of alternative structural models were also conducted if model fit was not good enough. The purpose of the alternative structural models analysis was to further evaluate the direct and indirect relationships among variables. Indirect effects represent the mediatory role of an independent variable on a dependent variable. A significant chi-square difference would mean that the fit of the alternative model was significantly better than that of the original model.

Results

Descriptive statistics for age, gender, height, weight, BMI, psychosocial variables (attraction to PA, perceived physical competence and parental socialization influences) and PA in leisure time are summarized in Table 1.

Table 1. Characteristics of the study sample (mean $\pm$ SD).

Characteristics	Total (n=683)
Age (yrs)	8.83 $\pm$ 0.76
Gender	
Girls n (%)	331 (48.5)
Boys n (%)	352 (51.5)
Weight (kg)	35.22 $\pm$ 8.35
Height (m)	1.36 $\pm$ 0.07
BMI (kg/m ²)	18.90 $\pm$ 3.19
Psychosocial variables	
Attraction to PA	44.83 $\pm$ 6.50
Perceived physical competence	2.96 $\pm$ 0.62
Parental socialization influences	3.18 $\pm$ 0.58
Physical activity (MET/Week)	45.33 $\pm$ 23.94

The initial structural model, which served as the baseline model, was a parameterized model that included paths that emanated directly from parental influence, attraction to PA and perceived physical competence with direct effects upon children's PA. In addition, it was proposed that parental influence and perceived physical competence variables would have their effects on attraction to PA as mediated through these variables (i.e. indirect effects). Parental influence was also hypothesized to influence levels of physical competence (i.e. direct effect), which in turn would influence attraction to PA and children's actual PA. Figure 1 represents the proposed theoretical model for the study.

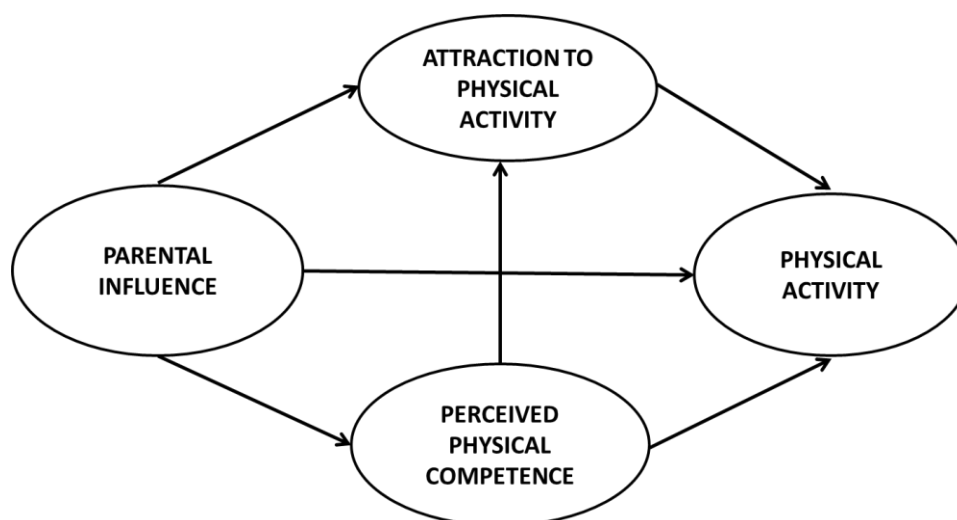


Figure 1. The YPAP model (adapted from Welk, 1999).

The overall model (Model A, Figure 1) provided acceptable fit to sample data; $\chi^2_{(28)}=101.796$; NNFI=.888; CFI=.933; and RMSEA=.062 (90% CI:.049 to .075). However, a review of the parameter estimates revealed that there were two factors with unsupported path coefficients: parental influence on PA ($-.081 \pm .101$; $p > 0.05$) and perceived physical competence on PA ($.025 \pm .548$; $p > 0.05$).

Considering these results, the model was re-specified and these two paths were eliminated one at a time (Model B₁: perceived physical competence was removed, Model B₂: parental influence was removed) with subsequent reanalysis and evaluation of the effects on model fit with the subsequent elimination of these two paths (in Model B₃ perceived physical competence and parental influence were removed). The results showed acceptable fit indices in the re-specified models (see Table 2). Differences in model fit between the baseline model and the final model were based on a chi-square difference test and comparisons of the additional fit indices.

The final model (Model B₃) is presented in Figure 2 and was based on both theoretical and measurement considerations. For theoretical support, the results indicated that all the significant paths were in the expected direction. However, parental influence and

perceived physical competence did not have a direct effect on PA as proposed in the theoretical model. In the final model, a) attraction to PA had a direct effect on actual PA; b) parental influence had an indirect effect on actual PA through perceived physical competence and attraction to PA; and c) perceived physical competence had an indirect effect on actual PA through attraction to PA. In terms of statistical support, the results indicated a good fit of the model to the sample data and all fit indices were acceptable. Compared with the original model (Model A) the B₃ model showed better RMSEA fit indices and was more parsimonious. Fit indices of indicators in models A and B₁, B₂ and B₃ are displayed in Table 2.

Table 2. Fit Indices of Model A and model re-specified (Model B₁, B₂, B₃).

Model	χ^2	df	p	NNFI	CFI	RMSEA (90% CI)
Model A (Overall model)	101.796	28	p<0.01	.888	.933	.062 (.049 to .075)
Model B ₁ (Perceived physical competence removed)	102.093	29	p<0.01	.893	.934	.061 (.048 to .074)
Model B ₂ (Parental influence removed)	102.418	29	p<0.01	.893	.934	.061 (.048 to .074)
Model B ₃ (Perceived physical competence and Parental influence removed)	102.849	30	p<0.01	.897	.934	.060 (.047 to .073)

Abbreviations: χ^2 =Chi-square; df=Degrees of freedom; p=p-value; NNFI=Non-normed fit index; CFI=Comparative fit index; RMSEA=Root mean square error of approximation.

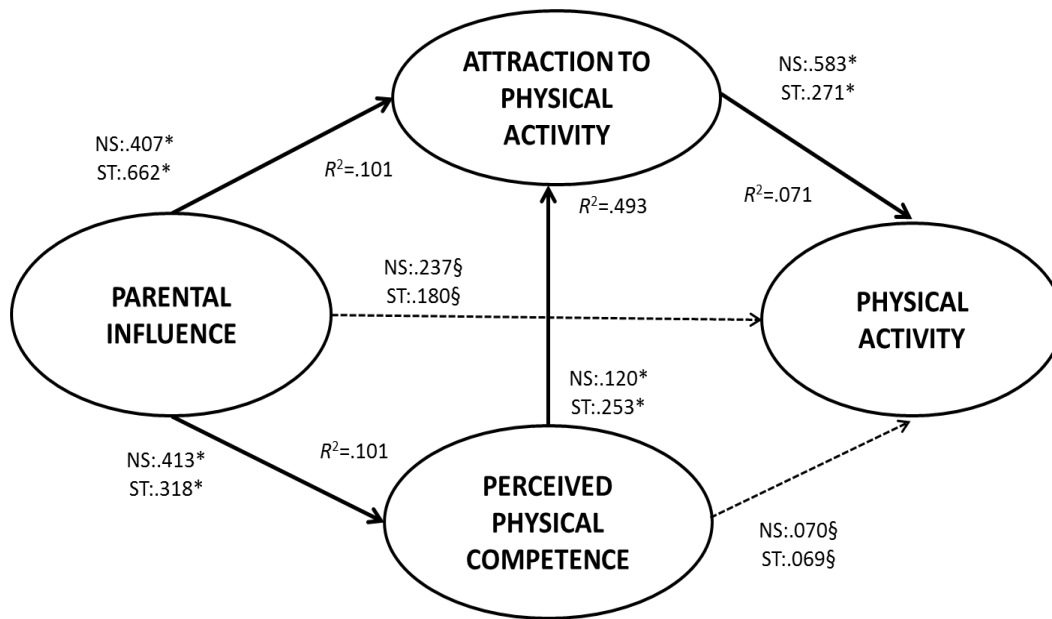


Figure 2. Final model (Model B₃).

Abbreviations: R^2 - Squared multiple correlations; Solid lines represent statistically significant standardized path; dashed lines represent non-significant standardized path; ST - Standardized coefficients, NS - No standardized coefficients; § $p > 0.05$, * $p < 0.05$

The non-standardized and standardized coefficients of attraction to PA, perceived physical competence and parental influence on PA are shown in Figure 2. The parameter estimates from Model B₃ indicated that attraction to PA had a direct effect on PA ($\beta = 0.271$, $p < 0.05$) meaning that children who had a stronger desire to participate in PA reported higher levels of actual PA. Thus, this finding supports the first hypotheses. Perceived physical competence had an indirect effect on actual PA through attraction to PA ($\beta = 0.253$, $p < 0.05$) and parental influence had an indirect effect on children's PA through perceived physical competence and attraction to PA ($\beta = 0.318$ and 0.662 , respectively) and these path coefficients were significant ($p < 0.05$). However, the paths between perceived physical competence and parental influence on children's PA participation were not significant ($\beta = 0.069$ and 0.180 , respectively, $p > 0.05$). In this regard, perceived physical competence and parental influence did not

have a direct effect on the actual PA of Portuguese children. Thus, the results from final model (B₃) were not supportive of the second and third hypotheses.

Discussion

The present study evaluated an adapted version of the YPAP model linking predisposing (attraction to PA and perceived physical competence) and reinforcing (parental influences) factors to children's PA behavior. It was hypothesized that attraction to PA would have a positive direct effect on children's participation in PA; that perceived physical competence would have a positive direct effect on PA and an indirect effect on attraction to PA; and that parental influence would positively and directly influence children's PA and also have an indirect effect through its influence on the psychosocial variables of children's attraction to PA and perceived physical competence.

In agreement with findings obtained in research with primary school children (Brustad, 1993, 1996; Paxton, et al., 2004; Schaben, et al., 2006; Welk, et al., 2003), the variable of attraction to PA exerted a direct and positive influence on children's PA participation ($\beta=0.271$, $p<0.05$). In this regard, children who were more attracted to PA had higher levels of actual PA. Attraction to PA refers to children's inherent desire to participate in PA due to the anticipated affective consequences of the involvement (Brustad, 1993). Given the importance of attraction to PA to children's actual PA behavior, future intervention programs might be designed to include enjoyable and preferred physical activities and sports where children feel confident and which provide children with favorable peer experiences.

Perceived physical competence is also an important predisposing factor in the YPAP model, and denotes an individual's belief in his/her ability to make changes with regard to a specific behavior (Bandura, 1986). An individual must not only intend to perform a behavior, he/she must also believe that he/she is capable to performing it before action will be taken. Some studies have observed a direct relationship between

perceived physical competence and children's PA participation (Bois, Sarrazin, Brustad, Trouilloud, & Cury, 2005; Paxton, et al., 2004; Schaben, et al., 2006; Welk, et al., 2003), and have suggested that the more children perceived they are competent in regard to PA, the more likely they are to engage in this activity (Eccles et al., 1983; Harter, 1985). Other studies have found an indirect link between perceived physical competence and children's PA participation mediated through its positive association with children's attraction to PA (Brustad, 1993, 1996; Kimiecik & Horn, 1998; Paxton, et al., 2004). In the present study, perceived physical competence only influenced children's PA indirectly through its positive effects on the children's attraction to PA ($\beta=0.253$, $p<0.05$). Higher levels of perceived physical competence were linked to children's interest in, and desire to, engage in PA. This finding suggests that children can benefit from the enhancement of perceived physical competence. Consistent with competence motivation theory (and the original tenets of the YPAP model), these results suggest that youth become more attracted to PA when they feel competent when performing PA. While causality can't be confirmed, research suggests that attraction to PA (Brustad, 1993; Welk, 1999b) that will promote both current and future PA participation (Davison, Downs, & Birch, 2006; Harter, 1985; Schaben, et al., 2006; Welk, et al., 2003; Welk & Schaben, 2004).

Parental influence is generally considered to be an important reinforcing factor for children's PA (Duncan, Duncan, & Strycker, 2005). Parents may influence children's PA participation, directly and indirectly, through a variety of distinct behaviours. Direct influence can come from parents actively facilitating their child's participation or from parents' direct encouragement to be active, whereas the indirect influences stem from forces that shape a child's predisposition or attraction to PA participation (Brustad, 1993; Schaben, et al., 2006; Welk, 1999a). Surprisingly, in the current study, parental influence only served as a mediator to facilitate children's PA through the enhancement of children's perception of their own physical competence and attraction to PA. While direct paths were expected, the indirect path is consistent with the original tenets of the YPAP model (Welk, 1999a). A number of other studies have

also demonstrated positive relationship between parental influences and children's perceived physical competence and attraction to PA participation (Brustad, 1993; Trost et al., 2003). The findings suggest that parents indirectly influence their children's behavior by influencing the attitudes and cognitions that children develop (Eccles, et al., 1983). The lack of direct effects was surprising because many studies have reported that children are more likely to be active when their parents believe in the importance of PA, are role models through their own participation, and encourage their children to be active, or provide supportive equipment (Duncan, et al., 2005; Schaben, et al., 2006; Trost, et al., 2003).

Any interpretation of the present findings should bear in mind certain methodological limitations. First, the study was cross-sectional in nature which limits conclusions regarding relationships between the hypothesized predisposing and reinforcing factors and children's PA participation. Even though pathways are drawn in a particular direction, a cause-and-effect relationship among variables should not be concluded. Second, it is important to note that our sample is somehow homogeneous and was limited to a unique region of the North of Portugal. Consequently, the generalizability of the results may be limited. Third, this study focused specifically on some predisposing and reinforcing factors related to children's PA. It is likely that other important correlates of PA such as the siblings, peers, teachers, and coaches may also contribute significantly to the prediction of children's PA participation.

Notwithstanding these study limitations, the present findings demonstrate that the adapted version of YPAP model has utility for explaining associations between predisposing (attraction to PA and perceived physical competence) and reinforcing (parental influences) factors and children's PA. Although, the percentage of total variance explained by the model was modest (7%), one of the most important finding in this study was the direct relationship noted between attraction to PA and children's PA participation among primary Portuguese schoolchildren. In addition, it is important to note that children who possessed a strong belief in their physical competence and

who were more exposed to a positive parental influences were more attracted to PA participation, and consequently may increase their likelihood to be engaged in PA. National and regional educational and public health authorities should be encouraged to use these findings to design intervention programs that effectively promote children's PA. Clearly, enhancing children's attraction to participate in PA and their perceived physical competence should be a goal for practitioners and researchers interested in the promotion and maintenance of PA. An important contribution should be also the recognition that parents can influence their children's PA participation in an indirect manner through an increase in their perceived physical competence and attraction to participate in PA. Nevertheless, future prospective studies are needed to extend these findings and to further explore the direct and indirect effects of additional predisposing and reinforcing influences on children's PA participation.

Acknowledgment

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Effects of a 6-month soccer intervention program on psychological health and body composition in overweight children

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Abstract

The effects of a 6-month intervention program of soccer instruction and practice on the psychological well-being and body composition of overweight children were examined. Twenty-eight overweight children (8-12 years old) participated in the prospective observational cohort study: 14 were assigned to a soccer program group (SG) and 14 were assigned to control group (CG). The soccer program involved 60–90 min sessions, 4 times/week with an average intensity $>80\%HR_{max}$. CG participated only in the compulsory physical education classes at school (45–90 min, 2 times/week). Psychological outcome variables included attraction to participation in PA, perceived physical competence, self-esteem and body image measured with standardized questionnaires. Body composition was evaluated dual-energy X-ray absorptiometry. Statistical procedures included paired and unpaired *t* tests and ANCOVA models. From baseline to post-intervention, SG demonstrated greater increases in attraction to PA, perceived physical competence, self-esteem and body image than CG. Changes in percentage body fat and lean body mass did not differ between SG and CG. The findings suggest that a 6-month soccer intervention program in overweight children was effective in improving psychological well-being of children, but did not result in significant changes in body composition.

Introduction

Childhood overweight and obesity have reached epidemic proportions and are a major public health concern (Wang & Lobstein, 2006). Approximately 25% of children in developed countries are currently overweight or obese (Lobstein, Baur, & Uauy, 2004). Prevalence has doubled in Portugal in the last two decades (Cardoso & Padez, 2008).

Childhood obesity is associated with a range of adverse metabolic health effects including an increased incidence of type 2 diabetes and heightened risk of cardiovascular disease (Dietz, 2004). Childhood weight status, especially obesity, is also a predictor of obesity in adulthood (Dietz, 2004). Although the physiological health consequences of childhood overweight and obesity are well established, psychological consequences associated with obesity are considered less often (Cornette, 2008). Previous studies have suggested that children who are overweight and/or obese are at increased risk for depression, stigmatization and social isolation, lower quality of life, lack of confidence in physical competence, poor body image, lower self-esteem and less attraction to participation in physical activity (Griffiths, Parsons, & Hill, 2010; Wardle & Cooke, 2005).

A variety of intervention programs aimed at preventing and/or alleviating overweight and obesity in young children have been suggested. Physical activity (PA) is accepted as an effective treatment for childhood overweight and obesity and potential psychological comorbidities (Parfitt & Eston, 2005). In general, regular PA is associated with improvements in body composition (Brown & Summerbell, 2009), the desire for and attraction to participation in PA (Welk, Wood, & Morss, 2003), self-perception of physical competence (Jones, Okely, Caputi, & Cliff, 2010), body image (Gehrman, Hovell, Sallis, & Keating, 2006), and self-esteem (Ekeland, Heian, & Hagen, 2005). All studies affirmed the need for further research. Some observations were not consistent which may reflect the variety of study designs, sampling and ages of subjects. PA programs also varied in intensity, duration, frequency, and type of activities. Intervention programs for overweight and obese youth have generally incorporated a variety of aerobic and resistance activities which accommodate individual differences (e.g., rowing machines, cycle ergometers, circuit activities), and to a lesser extent team game and sport activities (see, for example, Barbeau et al., 2007; Gutin et al., 2002; Meyer, Kundt, Lenschow, Schuff-Werner, & Kienast, 2006; Nassis et al., 2005).

Current recommendations from select panels (Strong et al., 2005) and national health organizations (USDHHS, 2008) suggest that children should accumulate at least 60 minutes or more of aerobic moderate- to-vigorous PA per day, and to perform muscle and bone-strengthening activities at least 3 days per week. Activities that are appropriate for age and enjoyable and that offer variety are recommended (Strong, et al., 2005). In Portugal, more than 60% of the children do not reach the recommendations (Baptista et al., 2011). Factors responsible for the low compliance are not well understood. Plausible explanations may be linked to limited possibilities of undertaking the recommended PA in many school and community settings, and child perceptions of prescribed PA as not enjoyable because it is superimposed by others and/or not self-selected.

Youth sports have been more recently invoked as a potentially important means to combat the worldwide epidemic of childhood overweight and obesity (R.M. Malina, 2009). Youth in several cultures have indicated fun (enjoyment), improvement in skills, and being with friends or members of a team as major motivations for participation in sport (Coelho e Silva & Malina, 2009; Siegel, Peña Reyes, Cárdenas Barahona, & Malina, 2009). Soccer is one of the most popular and widely practiced team-sports worldwide and has been suggested as an effective PA intervention in adults (Krustrup et al., 2010). Traditionally played as 11vs11, but also as small-sided games (e.g. 3vs3, 5vs5, 7vs7), soccer is associated with high relatively energy expenditure and has a high aerobic component, with mean heart rates (HR) of 75–85% of maximum HR (Randers et al., 2010). Recreational soccer also involves multiple aerobic and anaerobic actions (sprints, jumps, duels and tackles) and high impact activities which stimulate the muscular-skeletal system (Krustrup, et al., 2010).

Of relevance to the present study, the efficacy of a recreational soccer program on health and fitness of overweight children has been investigated (Faude et al., 2010; Weintraub et al., 2008). Results suggested that soccer has significant health and fitness benefits, and may thus serve as an effective alternative for exercise interventions in overweight children. The aim of this prospective observational cohort study was to examine the effect of a 6-month soccer intervention program on the psychological well-being (attraction to participate in PA, perceived physical competence, self-esteem and body image), weight status (body mass index, BMI) and body composition (percentage body fat and lean body mass) of overweight children. The study illustrates a relatively novel attempt in applying a soccer intervention program (60–90 min, 4 times per week) in an attempt to improve weight status and body composition and to promote psychological well-being of overweight children.

Methods

Participants

Subjects (n=28) were from two convenience sources. The soccer group (SG; n=14) included volunteers from a single school in the Porto district, northern Portugal. The control group (CG; n=14) included children from an outpatient clinic for obesity in a hospital in Porto. Eligibility for recruitment and participation in this study required children to be 8 to 12 years of age and to have a BMI $\geq$ 85th percentile for age and gender (CDC/NDHS, 2000). Children using a medication or with diagnosed medical conditions that would limit their ability to perform activities (e.g., cardiovascular disease, type I diabetes, renal insufficiency, liver disease) were excluded. Children who participated in a structured exercise, nutrition and/or weight loss program for at least 1 year prior to the study were also excluded. The study was approved by the research committee of the Faculty of Sport of the University of Porto and by school and hospital authorities. After explaining the

study procedures and protocol to the children and their parents, informed consent was obtained. Study participation was voluntary; children were free to withdraw at any time.

SG completed a 6-month soccer intervention program between January and June 2011. The program was administered at school, after school time (16.00-17.30), 4 days per week, for 60–90 min per session. Each session consisted of warm-up (10–20 min), technical exercises and small-sided games (40–60 min), and cool-down (10 min). Training intensity was defined to induce heart rate higher than 80 of each child's HR_{max} for the duration of the technical exercises and small-sided games. A randomly selected of 10 children wore a portable heart rate monitor during all sessions (Polar Team² Pro, Polar, Finland). Exercises and games were progressively intensified as individually tolerated. Members of the research team conducted all training sessions. Physical activities of CG were limited to the compulsory physical education curriculum (2 sessions per week, 45–90 min each).

Psychological Measures

Attraction to physical activity was assessed with the Children's Attraction to Physical Activity (CAPA) scale (1993). CAPA includes 14 items designed to measure the extent of children's interest in engaging in PA. Perceived physical competence was assessed with a five-item scale that required the subject to appraise his/her competence to perform PA behaviours (Brustad, 1993). All items were rated on a 4-point scale using a structured alternative approach that was designed to reduce tendencies for socially desirable responses (1985). The psychometric properties of the CAPA and perceived physical competence scales have been validated and are regarded as reliable (Brustad, 1993).

Body image was examined with the Collins Child Figure Drawings scale (Collins, 1991). The scale includes seven silhouette figures of boys and girls ranging from very thin to obese. Children were required to indicate the figure which best represented how they currently looked (perceived) and how they wanted to look (ideal). Body dissatisfaction was the difference between the self-perceived and ideal scores. Negative and positive scores indicated a desire to be fatter or thinner, respectively. Moderate to high test–retest reliability and validity have been previously shown for the scale in children (Vander Wal & Thelen, 2000).

Self-esteem was measured with the Rosenberg Self-Esteem scale (Rosenberg, 1979). Responses to the 10 items were rated on a four-point scale (strongly disagree to strongly agree) yielding scores between 10 and 40; higher scores indicated higher self-esteem. This scale is the most widely used measure of global self-esteem and is valid and reliable among students in grades third to eighth (DeBate, Pettee Gabriel, Zwald, Huberty, & Zhang, 2009).

Physical Measures

Body mass, height and sitting height were measured according to standardized procedures. Body mass was measured by a physician digital scale (Tanita®, BC-418MA, USA), height with a fixed stadiometer (Holtain Ltd., UK) and sitting height using a portable stadiometer (Holtain Ltd., UK). BMI (kg/m^2) was calculated. Children were classified as overweight and/or obese relative to gender- and age-specific BMI cut-offs of the U.S. Centers for Disease Control and Prevention (CDC/NDHS, 2000).

Body fat and lean body mass were estimated by dual-energy X-ray absorptiometry (DXA; Hologic QDR 4500A, Hologic Inc., Waltham, MA, USA). The equipment was calibrated

according to the manufacturer's instruction and a trained technician made the assessments. Subjects were scanned in a supine position using standard protocols. Scans were performed in high resolution. The same investigator analysed all scans. The principles underlying body composition analyses with DXA are described elsewhere (Kelly, Berger, & Richardson, 1998). Body fat was converted to a percentage of body mass.

Biological maturity status (maturity offset) was estimated as the predicted time before or after peak height velocity using the gender-specific equations of Mirwald et al. (2002) where $R=0.94$, $R^2=0.89$ and $SEE=0.57$. The protocol requires height, sitting height, estimated leg length (height minus sitting height), body mass and chronological age.

Daily physical activity was assessed at baseline using GT1M accelerometers (Actigraph, USA). All participants provided 5 consecutive days of accelerometer data with ≥ 500 min of valid data per day. The accelerometer was set to use an epoch of 1 minute, similar to other studies (Welk, Schaben, & Morrow, 2004). Mean minutes of moderate-to-vigorous intensity physical activity per day (MVPA) were derived using age-specific count ranges (Ministério da Educação, 2004) to provide an estimate of volume and intensity of PA for each participant.

Testing

Children came to the Faculty of Sports, University of Porto, for testing at the beginning of the study and after 6 months. Tests were administered under the same conditions and using the same protocols and instruments.

Reliability

In-field reliabilities (technical error of measurement and intra-class correlation coefficient) of all variables were estimated using a test-retest procedure in a pilot study of a random sub-sample of 10 overweight children. Technical errors of measurement were 0.20 cm and 0.30 cm for height and sitting height, respectively, and 0.35 kg for weight. Intra-class correlation coefficients (R) were $0.96 \leq R \leq 0.99$ for CAPA, $R \leq 0.99$ for perceived physical competence, $R \leq 0.92$ for self-esteem and $R \leq 0.90$ for body image.

Statistical analyses

Descriptive statistics (means and standard deviations) were calculated for the two groups at the start and conclusion of the study. None of the physical and psychological characteristics showed significant deviations from a normal distribution (Shapiro-Wilk test). Baseline differences in mean physical and psychological characteristics between SG and CG were tested with unpaired sample t-tests. Intervention effects (6 month means minus baseline means) were examined by paired sample t-tests. For each of the physical and psychological characteristics, change scores were calculated as the difference between baseline and 6-month values; the difference was then divided by the initial value to estimate percentage or relative change. The overall effects of the intervention were tested using analysis of covariance of the relative change scores, after controlling for baseline scores, gender and percentage of body fat. Significance level in all analyses was set at 0.05. Statistical analyses were conducted using SPSS version 18.0.

Results

With the exception of BMI and percentage body fat, psychological and physical baseline characteristics were similar ($p > 0.05$) in SG and CG (table 1). CG had a significantly higher

BMI than SG (mean difference: +4.6kg/m², p=0.001) and percentage body fat (+5.9%, p=0.001). No significant differences between groups were noted for estimated biological maturity status and daily PA (p>0.05).

Table 1. Means (standard deviations) for baseline psychological and physical characteristics of all variables in the soccer and control groups, and p values for differences between groups.

Characteristics	Soccer group	Control group	p-value
Psychological			
Attraction to physical activity	45.4 (6.2)	43.5 (5.9)	0.427
Perceived competence	3.0 (0.5)	2.7 (0.4)	0.153
Self-esteem	24.1 (4.7)	21.4 (5.4)	0.168
Body image	1.6 (0.5)	1.9 (1.3)	0.338
Physical			
Age (years)	10.1 (2.0)	10.5 (2.2)	0.569
Height (cm)	146.1 (10.4)	146.5 (13.6)	0.928
Weight (kg)	48.9 (11.6)	59.7 (15.9)	0.051
BMI (kg/m ²)	22.6 (2.7)	27.2 (3.4)	0.001
Body fat (%)	37.2 (4.2)	43.6 (4.6)	0.001
Lean body mass (kg)	29.3 (6.1)	31.4 (8.7)	0.480
Maturity offset (years)	-0.6 (1.3)	-0.1 (1.8)	0.437
MVPA (min/day)	108.5 (53.0)	97.4 (45.4)	0.582
Energy intake (kcal/d)	1773.3 (336.6)	1594.5 (134.2)	0.127

Abbreviations: BMI, body mass index; MVPA, moderate-to-vigorous intensity physical activity.

Changes in psychological and physical characteristics in each group are shown in table 2. Psychological characteristics increased significantly in SG (attraction to PA: +11.8%, perceived competence: +13.5%; body image: -25.0%; self-esteem: +10.1%) and decrease

in percentage body fat (-2.9%), but not in CG. As expected with normal growth, both groups increased height (SG: +1.9%; CG: +1.4%) and lean body mass (SG: +4.1%; CG: +3.9%) from baseline to 6 months; BMI did not change ($p>0.05$).

From baseline to after 6 months, with percentage body fat and baseline values as covariates in ANCOVA, SG showed significantly greater changes in attraction to PA (+11.9%), perceived physical competence (+23.4%), self-esteem (+13.6%) and body image (-78.7%) compared to CG. In contrast, changes in physical characteristics from baseline to 6-months did not differ significantly ($p>0.05$) between the SG and CG. Changes in percentage body fat (-4.5%) and lean body mass (+0.7%) after the intervention period were negligible and did not differ in both groups.

Table 2. Changes in psychological and physical characteristics between baseline and after 6 months in the soccer and control groups.

	Soccer group				Control group				Intervention effects		
	Baseline	Post	p-value	% Change ^a	Baseline	Post	p-value	% Change ^a	Difference ^b	Adj. difference ^c	p-value
Psychological											
Attraction to physical activity	45.4 (6.2)	51.4 (4.8)	<0.001	11.8 (8.3)	43.5 (5.9)	41.3 (7.2)	0.115	-6.7 (12.1)	18.5	11.9	0.021
Perceived competence	3.0 (0.5)	3.5 (0.3)	0.004	13.5 (14.7)	2.7 (0.4)	2.6 (0.7)	0.449	-9.3 (25.9)	22.9	23.4	0.035
Body-image	1.6 (0.5)	1.1 (0.5)	0.013	-25.0 (32.5)	1.9 (1.3)	2.0 (0.9)	0.818	31.5 (84.5)	-56.5	-78.7	0.008
Self-esteem	24.1 (4.7)	26.7 (3.4)	0.002	10.1 (9.6)	21.4 (5.4)	21.1 (4.7)	0.635	-1.1 (9.9)	11.2	13.6	0.003
Physical											
Height (cm)	146.1 (10.4)	148.9 (10.5)	<0.001	1.9 (0.7)	146.5 (13.6)	148.5 (13.3)	<0.001	1.4 (0.8)	0.5	0.6	0.126
Weight (kg)	48.9 (11.6)	51.3 (12.2)	0.001	4.7 (4.2)	59.7 (15.9)	60.9 (17.1)	0.217	1.4 (7.0)	3.3	2.4	0.472
BMI (kg/m ²)	22.6 (2.7)	22.8 (2.7)	0.431	0.8 (4.0)	27.2 (3.4)	27.0 (4.1)	0.620	-1.5 (7.6)	2.3	1.5	0.676
Body fat (%)	37.2 (4.2)	36.1 (4.2)	0.035	-2.9 (4.8)	43.6 (4.6)	42.4 (5.4)	0.316	-1.8 (5.9)	-1.1	-4.5	0.100
Lean body mass (kg)	29.3 (6.1)	30.7 (7.4)	0.023	4.1 (4.8)	31.4 (8.7)	32.6 (9.3)	0.002	3.9 (3.5)	0.2	0.7	0.745

Abbreviations: BMI, body mass index; Adj., adjusted

^a Differences between baseline and after 6 months unadjusted values, then dividing each result by its initial value.

^b Intervention effect defined as the % change in SG minus the % of change in CG.

^c Intervention effect defined as the % change in SG minus the % change in CG adjusted for baseline values, percent body fat and gender.

[†] p<0.05 obtained from the ANCOVA comparing change values between SG and CG adjusted for baseline values, percent body fat and gender.

Discussion

Childhood obesity is associated with several adverse psychological and physical health consequences (Cornette, 2008; Dietz, 2004). Hence, the potential of PA interventions to improve psychological well-being and body composition of overweight/obese youth merits serious concern and may be important in designing effective approaches to overweight/obesity prevention in childhood. The present study was set in this context and specifically examined the effects of a 6-month soccer intervention program on psychological well-being and body composition of overweight children.

The 6-month soccer intervention (60–90 min, 4 times/week, intensity >80%HRmax) resulted in beneficial changes in indicators of psychological well-being in overweight children. Participants in the soccer intervention (SG) experienced significantly greater improvements in attraction to participate in PA (11.8%), perceived physical competence (13.5%), body image (-25.0%) and self-esteem (10.5%) compared with the control group (CG). The results were consistent with other studies highlighting the importance of PA in enhancing psychological health among overweight and obese children (Mutrie, 1998; Parfitt & Eston, 2005). The findings thus suggested that soccer participation was an effective short-term strategy to reverse psychological morbidities associated with overweight/obesity in late childhood/early adolescence (8-12 years). By inference, the results also suggested an increase in the likelihood of the adoption and maintenance of PA among the children (Neumark-Sztainer, Goeden, Story, & Wall, 2004).

Soccer is the most popular and preferred sport at all ages and across social and economic strata of the Portuguese population. From 1996 to 2009, the number of children participating in soccer more than doubled from 44,125 to 89,138 (Portuguese Institute of Sport, 2011). Since soccer is a relatively inexpensive, accessible, and easy sport to learn, it may offer overweight children opportunities for enjoyable physical

activities that have potential health benefits. This of course assumes appropriate opportunities for overweight children, satisfactory adult instruction and supervision, and game modification as necessary. As a team-based activity, soccer (and other group activities/team sports) probably has more chances to enhance psychological health of participants than many individual physical activities. It is suggested that participation in most forms of individual activities/sports provides limited interactions with other youth in contrast to interactions with a caring adult role model. Individual activities also encourage the development of a strong sense of individual accomplishment or mastery whereas team sports provide a fertile ground for self-esteem enhancement because the group nature of the activities provides opportunities for children to engage with peers and adults in an effort to achieve collective goals (Larson, 2000; Pedersen & Seidman, 2004). Other research has also noted that children involved in team sports reported greater body satisfaction than children participating in individual activities (Dosil, 2008). Since team activities/sports focus on the group in contrast to the individual, they may provide a buffer to individual social evaluation as the focus is on the group. Individual activities/sports, in contrast, offer more opportunities for one-on-one comparisons, which may heighten levels of body dissatisfaction (Dosil, 2008). Thus, soccer and other team activities appear to have the potential to promote teamwork and sharing, and provide opportunities to enhance attraction to participate in PA, self-esteem, and self- and body-satisfaction.

The soccer intervention program, on the other hand, had limited effects on body composition and weight status. Over the 6-month intervention, SG experienced small gains in weight (4.7%) and height (1.9%), resulting in negligible change in BMI (0.2 kg/m^2 , 0.8%), whereas CG maintained weight (1.4%) and increased in height (1.4%), resulting in a negligible reduction in BMI (-0.2 kg/m^2 , -1.5%). Changes in body size in both groups are well within ranges expected with normal growth (R. M. Malina, Bouchard, & Bar-Or, 2004). Findings from previous soccer intervention studies have also reported no significant changes in BMI ($+0.2$ to $+0.6 \text{ kg/m}^2$, 0.8% to 1.9%) in

overweight children, suggesting that the increases in weight and height were due to normal growth over the intervention period (Faude, et al., 2010; Weintraub, et al., 2008). The findings were consistent with previous research reporting small mean changes in BMI (-0.2 to -1.1 kg/m²) of overweight children after individual-based PA interventions (Brown & Summerbell, 2009; Harris, Kuramoto, Schulzer, & Retallack, 2009).

DXA was used to assess changes in body composition after the soccer intervention. Although changes were not significant, SG experienced small, non-significant differences in percentage body fat and lean body mass (approximately 1% less body fat and 0.2% more lean body mass) compared to CG. The findings were consistent with recent interventions which noted negligible changes percentage body fat and lean body mass after an activity intervention in obese children (Graf et al., 2005; Thivel et al., 2011). However, it is important to note, that several studies have noted a beneficial impact of some PA programs on body composition of overweight and obese children (Gutin, et al., 2002; LeMura & Maziekas, 2002). Several factors may underlie the seemingly inconsistent observations for overweight/obese children. It is possible that a greater volume of activity than provided by the intervention is required to influence body weight and composition in growing children. The intervention may not have been of sufficient frequency, duration and/or intensity to influence body composition, but was sufficient to maintain of body weight over the short term, consistent with a recent meta-analysis (Gonzalez-Suarez, Worley, Grimmer-Somers, & Dones, 2009). Systematic reviews of PA interventions have suggested that longer and more intensive interventions are needed to achieve more positive changes on body composition of children and adolescents and should include a broader range of weight-related outcome measures (Brown & Summerbell, 2009; Harris, et al., 2009).

The soccer intervention was limited to a single sport activity. It has been suggested that more marked effects of activity interventions on body composition would be

achieved with multicomponent interventions including diet and perhaps behavior modification with overweight/obese children (Nemet et al., 2002). Combining a soccer intervention with a dietary intervention to reduce the energy intake may be more effective in modifying weight status and body composition. Several studies have recommended balanced diets and regular PA in school settings to achieve optimal weight control during childhood (Brown & Summerbell, 2009). A difficulty in this context is the definition of weight control and “optimal weight gain” in normally growing and maturing children (R.M. Malina, 2010). Although the soccer intervention program did not result in improved body composition after 6 months, the findings should not be dismissed in light of the preceding discussion. On the contrary, the findings can be viewed as encouraging in that they stimulated interest in soccer and perhaps other activities which may lead the adoption and maintenance of a more physically active lifestyle among the youth over the long term.

Observations of the study should be tempered with several limitations. First, subjects were not randomly assigned to SG and CG. This was in part by design since it was of interest to assess the feasibility of the soccer intervention before attempting randomized trials in the future. The absence of randomization introduced a greater potential for confounding than a randomized controlled trial, but in the current study both groups were similar on most physical and psychological characteristics. Moreover, several statistical adjustments were utilized in the analyses which alleviated some of the potential problems. Second, participants consisted of small numbers which might have reduced the statistical power for group comparisons and in turn the generalizability of results. Nevertheless, the *post hoc* statistical power tests for detecting physical and psychological differences between the two groups ranged from 61% to 92%. Third, self-report psychological measures may be prone to certain forms of bias. However, all questionnaires used were reliable and valid in child populations and have been widely used (Brustad, 1993; DeBate, et al., 2009; Vander Wal & Thelen, 2000). Moreover, members of the research team were present to assist children with

completion of the questionnaires. Finally, neither PA outside of the intervention nor dietary intake were formally controlled. This may have influenced the ability to detect changes, specifically in body weight and composition. All children, however, were instructed to maintain their normal PA and dietary intake during the intervention.

In summary, a 6-month soccer intervention program (60–90 min, 4 times/week) can be effectively implemented in the elementary school setting and was effective in enhancing the psychological well-being of overweight children. In contrast, the soccer intervention had limited effects on body weight and composition. The results highlight a need for further research in the context of replication and potential translation into more pronounced benefits in longer-term and larger-scale studies.

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Capítulo 3.

Conclusões, limitações e perspectivas futuras

A dissertação apoiada em saberes da Psicologia do Desporto, da Epidemiologia da AF e da Estatística Multivariada pretende entender, de forma mais elaborada e extensa, a teia de agentes que condiciona a variabilidade interindividual na atração das crianças para a AF, bem como esta influencia a magnitude de um dos seus comportamentos mais universais - a AF. Pretende, também, verificar a viabilidade de um programa de intervenção em alterar, positivamente e numa magnitude de efeito moderada a elevada, a atração para a AF. Para que essas tarefas fossem possíveis foram formulados alguns objetivos específicos, concretizados em seis estudos de natureza observacional-transversal.

O primeiro objetivo específico desta investigação pretendia validar transculturalmente para a população Portuguesa a versão curta da escala “*Children’s Attraction to Physical Activity*” (CAPA) e examinar a invariância fatorial em duas amostras aleatórias (calibração e validação).

Quadro 1. Resumo dos principais resultados encontrados nos dois estudos de validação.

Confirmatory Factorial Analysis of Children’s Attraction to Physical Activity Scale (CAPA)

- A fiabilidade da escala apresentou coeficientes de correlação intraclasse que se situaram entre .974 e 1.00 em todos os itens, com intervalo de duas semanas entre as aplicações.
- Os valores de consistência interna (α) foram baixos a moderados (.416 a .604), sendo o fator aceitação dos pares em jogos e desportos a obter os valores mais baixos na amostra de calibração ($\alpha=.200$) e de validação ($\alpha=.209$).
- Os resultados obtidos na análise fatorial confirmatória nos três modelos testados (modelo unidimensional; modelo hierárquico com 2ª ordem; e modelo de cinco fatores, multidimensional) permitiram perceber que os primeiros dois modelos não apresentaram bons índices de ajustamento, enquanto o modelo de cinco fatores mostrou bons índices de ajustamento relativamente aos primeiros.
- O modelo multidimensional (re-especificado) obteve melhores índices de ajustamento.
- A escala portuguesa ficou composta por 14 itens, em vez dos 15 itens do modelo original (americano) e pode ser usada para avaliar a atração pela AF em crianças.

Validation and invariance of the short version of Children's Attraction to Physical Activity (CAPA) scale in Portugal

- Os itens do CAPA associados com a estrutura de cinco fatores mostraram um padrão consistente entre os grupos, demonstrando a invariância configuracional e métrica.
- Os resultados dos testes de invariância das variâncias fator e das covariâncias indicaram que cada um dos cinco fatores CAPA mostrou igual variância entre as amostras e as inter-relações entre os fatores foram semelhantes. O CFI foi aceitável.
- As correlações entre os fatores variaram de baixo a alto: Importância da AF, Divertimento no Esforço Físico=.229; AF Vigorosa, Importância da AF=.299; Importância da AF, Aceitação dos Pares em Jogos e Desportos=.324; Gostar de Jogos e Desportos, Divertimento no Esforço Físico=.344; Gostar de Jogos e Desportos, Aceitação dos Pares em Jogos e Desportos=.468; AF Vigorosa, Gostar de Jogos e Desportos=.499; Aceitação dos Pares em Jogos e Desportos, Divertimento no Esforço Físico=.748; AF Vigorosa, Divertimento no Esforço Físico=.827; AF Vigorosa, Aceitação dos Pares em Jogos e Desportos=.873; Gostar de Jogos e Desportos, Importância da AF=.955.
- Os resultados forneceram evidências para a invariância dimensional e configuracional da escala reduzida CAPA em crianças portuguesas.

Estes dois estudos demonstram a validade transcultural da escala reduzida CAPA e a sua invariância dimensional e configuracional. O construto atração para a AF tem o mesmo significado e a mesma estrutura básica entre o grupo de calibração e o de validação. Assim sendo, a versão reduzida em Português da escala CAPA pode ser considerada uma ferramenta adequada para a análise da atração para a AF em crianças. Especificamente, a análise fatorial confirmatória mostra que a escala CAPA tem uma estrutura conceptual adequada para avaliar a atração para a AF em crianças portuguesas e fornece suporte para a validade fatorial da versão portuguesa com 14 itens, em vez 15 itens do modelo norte-americano. Esta escala, traduzida e validada, proporciona avaliações mais consistentes e adequadas da atração para a AF de crianças. Pode pois ser usada em estudos observacionais de carácter transversal e longitudinal ou em intervenções destinadas a aumentar os níveis de AF durante a infância.

O segundo objetivo específico desta dissertação pretendia descrever a atração para a AF, a percepção de competência física e a influência parental em crianças em função do sexo, do IMC e do ESE.

Quadro 2. Resumo dos principais resultados encontrados no estudo descritivo.

Gender, weight status and socioeconomic differences in psychosocial correlates of physical activity in schoolchildren

- Rapazes e crianças de peso normal e excesso de peso têm desejo mais elevado em participar em AF vigorosas do que as raparigas e as crianças obesas. A interação significativa entre o sexo e o IMC, mostrou que as raparigas de peso normal envolvem-se mais em AF vigorosas do que as raparigas com excesso de peso e obesidade, enquanto nos rapazes, essa participação tende a manter-se constante.
- Os rapazes desfrutam mais de jogos e desportos do que as raparigas. Crianças obesas consideram ser menos aceites pelos seus pares nos jogos e desportos do que as crianças com peso normal e excesso de peso. Crianças de ESE elevado reconhecem mais importância da AF do que as crianças de ESE inferior.
- Rapazes, e crianças com peso normal e de ESE elevado referem gostar mais de aspetos relacionados com a libertação de energia do que as raparigas, e as crianças obesas e de ESE inferior.
- Rapazes e crianças de peso normal percebem-se como sendo mais bem-sucedidos e fisicamente mais competentes do que as raparigas e as crianças obesas.
- Crianças de ESE elevado consideram, de forma mais significativa, os seus pais como modelos, do que as crianças de ESE inferior.
- Crianças de ESE elevado percebem os seus pais como tendo mais diversão e prazer quando participam em AF do que as crianças com ESE mais baixo. Os rapazes com excesso de peso percebem os seus pais como tendo mais diversão e prazer fazendo AF do que os rapazes obesos; nas raparigas, essa percepção tende a ser no sentido oposto.
- As crianças de ESE mais elevado foram significativamente mais incentivados pelos pais a participar em AF do que crianças de ESE inferior. Rapazes com excesso de peso consideram ser mais incentivados pelos seus pais do que rapazes com peso normal, enquanto nas raparigas, essa percepção tende a ser na direção oposta.

Este estudo enfatiza que a atração para a AF, a percepção de competência física e a influência parental de crianças diferem em função do sexo, do IMC e do ESE, sugerindo

que intervenções futuras devem considerar tais diferenças, a fim de combater o sedentarismo e a obesidade nesta população.

Os programas de intervenção com vista à promoção de níveis moderados a elevados de AF em crianças devem assim:

- (1) Focar especialmente nas raparigas, e nas crianças obesas e de ESE mais baixo, pois mostraram-se menos atraídas para a prática de AF, têm uma menor perceção de competência física e são menos influenciadas pelos seus pais, colocando-as por isso num risco superior de se tornarem crianças sedentárias;
- (2) Mostrar os benefícios positivos que a participação em AF poderá ter na melhoria ou na manutenção da saúde e do bem-estar;
- (3) Promover atividades variadas, de elevado teor lúdico, gratificantes e preferenciais para que as raparigas e as crianças obesas se sintam confiantes e obtenham sucesso na sua prática;
- (4) Procurar o estabelecimento de relações positivas com os seus pares através da prática de diferentes tipos de AFs e desportivas, pois foi evidente que as crianças com excesso de peso e obesidade eram menos aceites pelos seus pares;
- (5) Incluir os pais nas AFs e desportivas, pois estes podem proporcionar oportunidades e ser elementos encorajadores na aquisição de estilos de vida ativos.

A escola é uma das instituições educativas onde programas de intervenção com as referidas características podem ser eficazmente desenvolvidos e implementados. As crianças que frequentam o 1º Ciclo do Ensino Básico passam uma elevada percentagem do seu tempo diário na escola em atividades de natureza letiva e não letiva, competindo por isso a esta instituição educativa uma importante responsabilidade na aquisição e manutenção de estilos de vida ativos e saudáveis. É urgente que todos os intervenientes no processo educativo e na comunidade escolar

(responsáveis políticos, docentes, encarregados de educação e discentes) reconheçam a escola como sendo um local privilegiado capaz de ensinar, incentivar e desenvolver os referidos estilos de vida.

Urge reforçar e incluir nos currículos escolares nacionais novos programas de educação para a saúde que sejam mais variados e suficientemente motivadores para promover junto das crianças estilos de vida ativos e saudáveis. Tais programas deverão em cada comunidade escolar ter estratégias e características bem definidas e articuladas entre os diferentes anos de escolaridade e ciclos de ensino, de modo a permitirem que todas as crianças se tornem conhecedoras dos benefícios e da importância da prática de AFs e desportivas e consequentemente se tornem participantes ativas e autónomas.

A expressão físico-motora, parte integrante dos currículos escolares do 1º Ciclo do Ensino Básico, possui igualmente um importante papel na aquisição desses estilos de vida, visto constituir-se, para muitas das crianças, provavelmente a única experiência onde a prática de AFs e desportivas é orientada, organizada e realizada regularmente. Educar as crianças para que se tornem ativas e saudáveis, deve ser um dos motivos centrais da expressão físico-motora (da pré-escola até ao 4º ano) que se prolonga posteriormente para a disciplina de EF (do 5º ano até ao 12ºano).

O quadro de resultados encontrado neste estudo possibilita identificar alguns fatores capazes de contribuir para o desenvolvimento de programas de intervenção eficazes na promoção de estilos de vida mais ativos e saudáveis nas comunidades escolares.

A compreensão do que atrai e motiva as crianças a participar em AFs e desportivas é um passo importante para a conceção e desenvolvimento de programas de intervenção no âmbito da educação para a saúde. Como foi constatado, são muitos e variados os atributos com potencial para atrair ou diminuir a participação das crianças em AF. É fundamental que tais programas contribuam para que as crianças

reconheçam os benefícios para a sua saúde e bem-estar da participação em AFs; que encorajem as crianças pelo sucesso e pelas experiências positivas; que as atividades propostas sejam diversificadas e motivadoras correspondendo às suas expectativas e necessidades; que permitam a sociabilidade com os seus pares, o divertimento, o prazer e a percepção de competência. Para além destes aspetos, devem ainda considerar a família, particularmente os pais, elementos capazes nestes intervalos de idade de influenciar a aquisição e a manutenção de estilos de vida ativos e saudáveis. Os programas de intervenção devem por isso procurar atividades capazes de promover a participação conjunta das crianças e dos seus pais num ambiente e clima alegre e divertido.

O terceiro objetivo específico desta dissertação consistia em identificar a associação entre fatores psicossociais e os níveis de AF de crianças.

Quadro 3. Resumo dos principais resultados encontrados nos estudos dos determinantes psicossociais.

Psychosocial correlates of physical activity in schoolchildren aged 8 to 10 years
- Os rapazes gostam mais de jogos e desportos, de AF vigorosas, divertem-se mais a libertar energia em esforço físico e percecionam-se mais competentes do que as raparigas. - Os níveis de AF são significativamente mais elevados nos rapazes do que nas raparigas. - O ESE e IMC não estão associados aos níveis de AF de rapazes e raparigas. - Gostar de participar em AF vigorosas está positivamente associado aos níveis de AF de ambos os sexos. - Nas raparigas, a aceitação dos pares em jogos e desportos e o encorajamento dos pais para a AF estão positivamente associados aos níveis de AF. - Nos rapazes, a importância da AF e a percepção de competência física estão positivamente associadas aos níveis de AF. - Os determinantes psicossociais explicam, aproximadamente, 8% e 9% respetivamente da variação total dos níveis de AF, em rapazes e raparigas.

Os rapazes e as raparigas diferem nos seus níveis de AF, na atração que revelam pela sua prática e na perceção de competência física. Em ambos os sexos, o papel de modelação parental e o prazer dos pais pela prática de AF não se mostraram fatores capazes de influenciar significativamente a participação em AF. No entanto, o encorajamento dos progenitores mostrou-se positivamente associado aos níveis de AF das raparigas. O IMC e o estatuto socioeconómico não influenciaram os níveis de AF. Embora este estudo esteja limitado a uma amostra transversal de crianças portuguesas em idade escolar, os resultados foram consistentes com a literatura internacional.

O quarto objetivo específico desta dissertação era avaliar o modelo “*Youth Physical Activity Promotion*” (YPAP) de Welk (1999), procurando identificar a associação entre fatores que predispõem (atração para a AF e perceção de competência física) e que reforçam (influência parental) e os níveis de AF de crianças.

Quadro 4. Resumo dos principais resultados encontrados no estudo de avaliação do modelo YPAP.

Evaluating the Youth Physical Activity Promotion model among Portuguese children aged 8 to 10 years

- O modelo de YPAP adaptado obteve índices de ajustamento aceitáveis para a amostra, com dois fatores com coeficientes inadequados: a influência dos pais para a AF e perceção de competência física para a AF.
- O modelo foi re-especificado e estes dois fatores eliminados. O modelo re-especificado obteve melhores índices de ajustamento.
- O modelo re-especificado (modelo final) indica que a atração para a AF tem um efeito direto sobre a AF, significando que as crianças com maior desejo para participar em AF mostraram níveis mais elevados de AF.
- A perceção de competência física teve um efeito indireto sobre a AF através da atração para a AF, e a influência dos pais teve um efeito indireto sobre a AF das crianças através da perceção de competência física e atração para AF das crianças.
- A perceção de competência física e influência dos pais não evidenciaram nenhum efeito direto sobre a AF das crianças.

O modelo YPAP (Welk, 1999) foi desenvolvido especificamente para prever ou explicar a AF em crianças e jovens, integrando vários determinantes anteriormente identificados como importantes na explicação da AF em crianças. Além disso, as relações construídas entre o modelo YPAP e a AF em crianças e jovens foram testadas e apoiadas por vários estudos (Schaben et al., 2004; Schaben et al., 2006; Welk & Schaben, 2004).

Neste estudo foram colocadas as seguintes hipóteses: a atração para a AF teria um efeito direto e positivo na participação das crianças em AFs; a percepção de competência física teria um efeito direto e positivo na AF e um efeito indireto na atração para a AF; a influência parental afetaria de modo direto e indireto, positivamente, a participação das crianças em AF as variáveis psicológicas (i.e., atração para a AF e percepção de competência física). Com base nos resultados obtidos é possível referir que a relação entre os fatores psicossociais e os níveis de AF das crianças foram ligeiramente distintas das hipóteses inicialmente formuladas e previstas igualmente no estudo de Welk ([1999](#)). De fato, o modelo obtido no presente estudo, indica-nos que a percepção de competência física e a influência parental não mostraram um efeito direto sobre a AF das crianças. No entanto, os restantes efeitos mantiveram-se, ou seja, a atração para a AF mostrou um efeito direto sobre a AF; a percepção de competência física apresentou um efeito indireto sobre a AF através da atração para a AF; e a influência parental revelou um efeito indireto sobre a AF das crianças através da percepção de competência física e atração para AF das crianças. Este modelo adaptado ao contexto português permite-nos assim a identificar alguns aspetos a implementar em programas de intervenção futuros.

Os fatores que predispõem incluem variáveis que aumentam a probabilidade das crianças serem fisicamente ativas. As crianças que se sentem menos atraídas e interessadas pela participação em AF devem ser consideradas o principal grupo de risco devendo por isso ser alvo de uma atenção mais particular e cuidada. É necessário por isso que nas disciplinas de expressão físico-motora e de EF exista a preocupação de

desenvolver um clima motivacional orientado para aumentar a motivação intrínseca, o sentimento de competência e as atitudes positivas das crianças face às atividades que são propostas. Para além disso, foi igualmente verificado que as crianças que têm autoperceções positivas e que sentem que a sua participação em AF tem algum benefício estão mais propensas a participar regularmente em AF. Neste sentido, todas as atividades, conteúdos e estratégias a implementar nas disciplinas de expressão físico-motora e de EF devem propiciar a inclusão de todas as crianças, tendo em conta a variedade de exercícios utilizados, bem como o grau de complexidade dos mesmos. Em todas as fases do processo de ensino-aprendizagem deve levar-se em conta as características, capacidades e interesses das crianças, nos domínios motor, afetivo, social e cognitivo procurando assim a aquisição de autoperceções positivas relativamente à participação em AFs e desportivas.

No que se refere aos fatores de reforço os resultados deste estudo salientam a necessidade de implicar a família (particularmente os pais) nos programas de intervenção. De fato, os pais surgem como fatores que reforçam ou encorajam indiretamente as crianças a participar em AF através da perceção de competência física e da atração para AF das crianças. Neste sentido, o desenvolvimento e a implementação de programas de intervenção devem introduzir a formação de pais, em articulação com a escola, de modo a que possam integrar conteúdos sobre práticas educativas e estilos de vida ativos e saudáveis.

O quinto objetivo específico desta dissertação pretendia examinar o efeito de um programa de intervenção, baseado na prática desportiva de futebol, no bem-estar psicológico e na composição corporal de crianças com excesso de peso.

Quadro 5. Resumo dos principais resultados encontrados no estudo de intervenção.

Effects of a 6-month soccer intervention program on psychological health and body composition in overweight children

- Do início do programa e até ao final dos 6 meses, o grupo de intervenção mostrou um significativo aumento na atração para a AF, percepção de competência física, autoestima e imagem corporal.
- No grupo de controlo não se registaram alterações significativas na atração para a AF, percepção de competência física, autoestima e imagem corporal durante os 6 meses da intervenção.
- Nenhuma alteração significativa ocorreu desde o início até ao final da intervenção de 6 meses nas características físicas entre os grupos. Houve um pequeno aumento, mas não significativo na percentagem de gordura corporal e massa corporal magra em ambos os grupos durante a intervenção.

O programa de intervenção baseado na prática desportiva de futebol, com a duração de 6 meses (60-90 min, 4 vezes/semana, intensidade > FC max 80%), produziu mudanças significativas e benéficas no bem-estar psicológico de crianças com excesso de peso. Mais especificamente, as crianças submetidas a este programa de intervenção mostraram uma melhoria significativa na sua atração para participar em AF, na percepção de competência física, na imagem corporal e na autoestima comparativamente a crianças não praticantes de qualquer AF e ou desportiva.

Estes resultados sugerem assim que o futebol se apresenta como uma modalidade estratégica capaz de reverter alguns aspetos psicológicos negativos normalmente evidenciados pelas crianças com excesso de peso e/ou obesidade, e que poderá consequentemente contribuir para que essas crianças adotem e mantenham um estilo de vida mais ativo. Por outro lado, e reforçando os resultados encontrados, é importante ainda salientar que em Portugal, o Futebol é o desporto mais popular e preferido por todas as idades, classes sociais e económicas; é acessível (joga-se em qualquer espaço desportivo), é económico (apenas exige uma bola), fácil de jogar

(regras fáceis); e é capaz de oferecer a todas as crianças, independentemente do seu peso corporal, oportunidades de diversão, recreação e sucesso.

Assim sendo, os resultados obtidos sugerem a importância da implementação de um programa de intervenção com estas características em escolas do Ensino Básico. A melhoria significativa obtida nas variáveis psicológicas nas crianças com excesso de peso e praticantes de futebol é nova e merece ser explorada para avaliar se este achado poderá traduzir-se em benefícios mais pronunciados a longo prazo. De referir, no entanto, que o programa de intervenção de futebol mostrou um efeito reduzido nas diferentes componentes da composição corporal que foram avaliadas. Estudos de intervenção adicionais, utilizando esta prática desportiva em períodos de tempo mais prolongados, são necessários para determinar, novos caminhos com vista a alcançar melhorias nas diferentes componentes da composição corporal.

Não obstante a relevância dos resultados obtidos, do seu significado e alcance, é importante salientar, em primeiro lugar, limitações da pesquisa, e de seguida os desafios futuros.

- A primeira limitação pode associar-se à circunstância dos estudos de validação e invariância da escala CAPA terem sido realizados com uma amostra de crianças dos 8 aos 10 anos de um concelho (Maia) do distrito do Porto. Deste modo, os resultados obtidos podem ser úteis e apropriados para essa região e escalão etário, mas reduzem a generalização dos achados para outras regiões do País e idades. Investigações adicionais poderão complementar este estudo ao serem realizadas noutras regiões do País e idades (7 aos 13 anos) numa tentativa de verificar a sua generalização para o intervalo de idade dos 1º e 2º Ciclos de ensino. Sugere-se, também, a realização de estudos de invariância da escala CAPA a outros grupos específicos (como por exemplo, diferentes estatutos socioeconómicos e idades).

- Uma segunda limitação pode associar-se ao facto do delineamento usado ser de natureza transversal. Não obstante a apresentação de modelos para interpretar a variabilidade na atração para a AF, há um limite claro nas conclusões sobre as relações entre os fatores psicossociais e os níveis de AF de crianças, dado não ser possível a construção de uma argumentação de natureza causal. Daqui, a necessidade de replicação da presente metodologia em novos estudos utilizando, essencialmente, uma perspetiva longitudinal.
- Uma terceira limitação advém do fato de todos os dados se basearem em instrumentos de autopreenchimento, sendo os resultados exclusivamente oriundos da percepção das crianças sobre o seu próprio envolvimento. Contudo, não é do conhecimento a existência de uma outra qualquer forma de natureza objetiva, que providencie dados precisos sobre a atração para a AF.
- Uma quarta limitação diz respeito aos fatores determinantes da AF considerados. Os fatores psicossociais selecionados correspondem a um subconjunto com potencial para explicar a variabilidade interindividual na atração para a AF. Os estudos realizados centraram-se especificamente em alguns dos fatores que predispõem e que reforçam a AF, sendo por isso de equacionar o recurso a outros subconjuntos de determinantes (p.e. influência dos irmãos, pares, professores e treinadores) capazes de contribuir para a explicação dos níveis de AF das crianças. Decorre daqui a utilização de modelos mais complexos e abrangentes recorrendo a procedimentos estatísticos de análise de trajetória (do inglês *path analysis*).
- O estudo de intervenção, não obstante o valor da sua estrutura operativa e eficácia “relativa”, mostra aspetos que importa resolver de modo mais eficiente. O primeiro prende-se com a utilização de um delineamento não-randomizado. De fato, a intervenção procurou testar a viabilidade do uso do

futebol, e a sua eventual generalização exige nova pesquisa baseada num delineamento randomizado. Uma segunda limitação diz respeito, necessariamente, à dimensão amostral. Neste estudo, foi amostrado somente, por motivos alheios à equipa de investigação, um grupo relativamente pequeno de crianças com excesso de peso. Tal facto limita a potência estatística das análises realizadas e, consequentemente limita a generalização dos resultados.

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