



Original research

## Physiological and health characteristics of ex-jockeys



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### ABSTRACT

**Objectives:** The long-term health implications resulting from extreme and chronic weight cycling and the associated energy restricted lifestyle of a professional jockey remain unknown. The aim of the present study was to describe and evaluate the physiological and health characteristics of retired jockeys.

**Design:** Cross-sectional.

**Methods:** Retired male jockeys ( $n = 28$ ; age  $59 \pm 6$  yr; height  $1.65 \pm 0.03$  m; body mass  $73.7 \pm 10.9$  kg; BMI  $26.9 \pm 3.8$  kg m<sup>-2</sup>) participated. Body composition (by dual energy X-ray absorptiometry; DXA), resting metabolic rate (RMR), glucose metabolism (by oral glucose tolerance test; OGTT), lipids and thyroid function were assessed. All data were interpreted in relation to established age specific reference ranges for the particular assessment undertaken.

**Results:** Forty three percent of the retired jockeys were classified as overweight, while 21% were obese. RMR was calculated as  $1447 \pm 201$  kcal day<sup>-1</sup>. Mean total cholesterol was  $5.93 \pm 1.5$  mmol L<sup>-1</sup> for those not on cholesterol lowering medication and  $5.09 \pm 1.1$  mmol L<sup>-1</sup> for those currently taking medication. No abnormalities in glucose metabolism and thyroid function were found.

**Conclusions:** Chronic weight cycling during a career as a professional jockey did not induce any health consequences in the retired jockeys assessed in this study, however enhanced weight gain and dyslipidaemia were evident. Results suggest jockeys should be tracked longitudinally throughout their racing career and beyond to further establish long-term physical health implications associated with the current lifestyle of a professional jockey.

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## 1. Introduction

Professional jockeys are a unique group of weight category athletes who engage in extreme and chronic weight cycling throughout their horse racing career, primarily relying on severe energy restriction as well as dehydration to achieve the stipulated racing weights.<sup>1</sup> Unequivocal evidence exists suggesting the adverse physiological,<sup>2–7</sup> psychological<sup>8</sup> and performance<sup>9,10</sup> implications of making-weight for racing. Despite this, the long-term health impacts and risk factors associated with a jockey's lifestyle remain unknown.

Large fluctuations in body mass during growth or young adulthood have been suggested to represent a risk factor for the

development of obesity, diabetes and cardiovascular disease in later life.<sup>11</sup> In particular, chronic weight cycling at some point earlier in life has been implicated in the promotion of many cardiovascular risk factors inclusive of enhanced weight gain, total body and visceral fat accumulation, alterations in adipose tissue fatty acid composition, insulin resistance, hypertension and dyslipidaemia.<sup>11</sup> In retired weight category athletes, conflicting evidence exists relating to subsequent weight gain in response to a behaviour of weight cycling<sup>12,13</sup> however, weight cycling has been suggested to be harmful for permanent weight control.<sup>13</sup>

Only two previous studies have investigated these unique weight category athletes in retirement, one in terms of the welfare of retired jockeys in Australia<sup>17</sup> and the other establishing the incidence of musculoskeletal pain in a group of retired jockeys in the UK.<sup>18</sup> Self-reported surveys or questionnaires were utilised instead of a direct measurement and very little is known on the long-term health consequences of a career as a professional jockey.

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The purpose of this study was therefore to describe and evaluate the physical health characteristics of retired jockeys.

## 2. Methods

Twenty eight retired male jockeys were recruited via mass mailing of all retired jockeys on the pension directory received from the Turf Club in 2012. Such individuals in this directory were at least 50 years of age with a minimum of 8 years professional racing experience. Selection of participants was restricted to retired male jockeys between the ages of 50 and 70 years. As such, 83 retired jockeys in Ireland were contacted, with 28 (34%) volunteering to participate.

Participants attended an early morning testing session (0730) following an overnight fast. Upon arrival, various tests were performed including measurement of resting metabolic rate (RMR), measurement of lipids and thyroid function, 75 g oral glucose tolerance test (OGTT) and a dual energy X-ray absorptiometry (DXA) scan for the assessment of body composition. A detailed medical history was provided and any previous and current weight management practices, medication taken, smoking history and physical activity practices were recorded. All data were interpreted in relation to established age specific reference values for the particular assessment undertaken as well as comprehensive internationally comparable baseline data on older people<sup>19</sup> and free-living adults in Ireland.<sup>20</sup> Prior to participation in this study, written informed consent was provided. Ethical approval for this study was granted by the Dublin City University Research Ethics Committee.

Body mass was assessed in minimal clothing using a portable digital scales (Salter, Germany). Stretched stature was measured using a portable Stadiometer (Seca, Leicester Height Measure). The WHO classification system was used to categorise BMI.<sup>21</sup> A whole body DXA scan was performed on the Stratos dR (DMS Group, France)<sup>22</sup> according to the manufacturer's guidelines for the assessment of body composition. Trunk peripheral fat ratio (TPFR), calculated as the trunk fat mass (FM) divided by the sum of the FM of the arms and legs, was used to determine the distribution of body fat throughout the body.<sup>23</sup>

RMR was assessed through the measurement of respiratory gas exchange using open circuit indirect calorimetry using a perspex canopy in the dilution testing mode (Vmax, SensorMedics, Italia, Milan, Italy). Participants lay in a supine position in a quiet, dimly lit, thermally neutral room for 30 min immediately upon arriving at the test centre, and were instructed to avoid hyperventilation, fidgeting or falling asleep during the test. After 30 min, the canopy was placed over the subject's head and the ventilated hood method was used to measure O<sub>2</sub> consumption and CO<sub>2</sub> production for a further 30 min period.<sup>24</sup> The mean values of V O<sub>2</sub> (L min<sup>-1</sup>) and non-protein Respiratory Quotient (RQ) for the final 15 min of steady state at the end of the 30 min measuring period were used for the calculation of RMR (kcal day<sup>-1</sup>) using the modified Weir equation.<sup>25</sup>

Fasting blood samples were acquired through cannulation of the antecubital vein and collected into specific plasma (fluoride oxalate) or serum (silica) separation vacutainers for the determination of fasting glucose, lipid profile and thyroid function. Following fasting blood samples, an OGTT was used for the assessment of glucose metabolism. Participants consumed 75 g of glucose (dextrose) in a 300 ml solution (121 ml of Polycal Liquid Orange and 179 ml of water) and a blood sample was then taken again after 120 min. The subject remained in a seated position for this period of time. Plasma and serum were separated and stored at -80 °C until analysed. Glucose was measured using the Randox Daytona Analyser (Randox Laboratories LTD, UK). Interpretation for risk of diabetes was based on the American Diabetes Association (ADA) guidelines.<sup>26</sup> Biochemical analyses for lipid profiles (total cholesterol, high density lipoprotein (HDL-C), triglycerides) were performed on the

**Table 1**  
Anthropometric and body composition information.

	n = 28 Mean ± SD
Age (yrs)	59 ± 6
Height (m)	1.65 ± 0.03
Body Mass (kg)	73.7 ± 10.9
BMI (kg m <sup>-2</sup> )	26.9 ± 3.8
FFM (kg)	47.2 ± 5.8
FM (kg)	18.6 ± 7.2
% Body fat	26.1 ± 6.6
TPFR	1.3 ± 0.4

Body mass index (BMI); fat free mass (FFM); fat mass (FM); trunk peripheral fat ratio (TPFR).

Beckman AU5400 analyser (Beckman Coulter, Ireland). These variables were used to calculate low density lipoprotein (LDL-C) using the Friedewald equation.<sup>27</sup> Thyroid function (free thyroxine (T4), thyroid stimulating hormone (TSH)) was analysed using a paramagnetic particle chemiluminescent immunoassay on the Beckman D × I immunoassay system (Beckman Coulter, Ireland). Blood samples for lipid profiles and thyroid function were interpreted in relation to established reference values for the particular assessment performed.

Data were analysed using SigmaPlot version 12.0. Normality of data distribution was tested using the Shapiro Wilks test. Descriptive statistics were found for each variable and expressed as mean ± SD. Pearson's product moment correlation analysis was used to identify any relationships between age, years as a professional jockey and the chosen variables of body composition, RMR, glucose metabolism, lipids or thyroid function. Statistical significance was set at  $p \leq 0.05$ .

## 3. Results

Anthropometric characteristics of the participants are presented in Table 1. Participants had a mean professional career in horse racing lasting 20 ± 6 years and were in retirement for a mean of 24 ± 8 years. Thirty six percent of the retired jockeys were normal weight (BMI: 18.5–24.99 kg m<sup>-2</sup>), 43% were overweight (BMI: 25.0–29.99 kg m<sup>-2</sup>), while 21% were obese (BMI: ≥30 kg m<sup>-2</sup>). Percentage body fat ranged from 15% to 43%, with 57% having a body fat greater than 25%. Percent body fat appeared to increase with age ( $r^2 = 0.387$ ;  $p < 0.05$ ), and fat free mass (FFM) decreased with age ( $r^2 = -0.376$ ;  $p < 0.05$ ).

All participants reported difficulties with weight management throughout their professional racing careers, engaging in chronic weight cycling and energy restriction. Currently only 32% attempt to control their daily living body mass. Compared to 75% smoking as a professional jockey, only 7% are current smokers. Ninety three percent reported partaking in regular exercise on a daily basis namely in the form of riding horses, walking or golf.

RMR was calculated as 1447 ± 201 kcal day<sup>-1</sup> or 30.7 ± 4.3 kcal kg FFM<sup>-1</sup> day<sup>-1</sup>. Values ranged from 1139 to 1831 kcal day<sup>-1</sup>. RMR was strongly correlated with BMI ( $r^2 = 0.693$ ;  $p < 0.001$ ), FFM ( $r^2 = 0.752$ ;  $p < 0.001$ ), FM ( $r^2 = 0.574$ ;  $p < 0.01$ ); TPFR ( $r^2 = 0.399$ ;  $p < 0.05$ ).

Mean fasting glucose among the retired jockeys was 5.5 ± 0.5 mmol L<sup>-1</sup> and mean glucose at 120 min was 5.8 ± 1.4 mmol L<sup>-1</sup>. No jockeys were found to have diabetes. However, impaired fasting glucose (reference range: 5.6 to 6.9 mmol L<sup>-1</sup>) was reported in 36% of the retired jockeys and two individuals were noted as having impaired glucose tolerance (reference range: 7.8 to 11.0 mmol L<sup>-1</sup>). Blood glucose levels at 120 min were moderately correlated with age ( $r^2 = 0.453$ ;  $p < 0.05$ ).

Seventy one percent of the participants displayed raised cholesterol levels. A further 14% reported being on medication to treat

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