The study of physical activity patterns (PAP) is still in its infancy due to methodological problems in measuring instruments of physical activity, and the lack of specific analytical tools to capture all its intrinsic issues. Moreover, it is not well known if differences among subjects are mainly due to specific environmental conditions, genetic attributes or both. This picture is more acute in children.

PURPOSE: to explore different ways of viewing and analyzing PAP in children.

METHODS: Thirty twin pairs (18 MZ and 13 DZ) aged 6 to 12 years of age were monitored for 5 days (3 week-day and a week-end) with a tri-axial accelerometer (TRITAC RJD). Count data was read in a specialized software (GEMWIZARD), was transformed into energy expenditure according to manufacturer indications, so that 4 phenotypes were derived: till 3 Mets (low PA), from 3 to 6 Mets (moderate PA), from 6 to 9 Mets (vigorous PA), and above 9 Mets (very vigorous PA). SPSS was used for all data analysis (descriptive stats, graphical displays and correlations).

RESULTS: It is evident that most part of the days is spent in low PA, and very few episodes of vigorous or very vigorous activities. Per hour, across days, about 56 minutes are of low PA. Per day, about 17 minutes are spent in moderate PA, and 3 to 4 minutes in vigorous or very vigorous PA. The amount of inter-individual differences in pairs of MZ and DZ twins is very high, although intra-pair range seems higher in DZ than MZ twins. Twin similarity (Pearson correlation) is as follows: low PA, rMZ=0.886, rDZ=0.772; moderate PA, rMZ=0.946, rDZ=0.880; vigorous PA, rMZ=0.636, rDZ=0.900; very vigorous PA, rMZ=0.759, rDZ=0.522.

CONCLUSIONS: In children, physical activity is mainly random. The highest frequency is for low activities (<3 Mets), interspersed with a very low frequency of moderate to vigorous PA. In twins the intra-pair differences are higher in DZ than MZ twins, suggesting that not only environmental factors are responsible for such results. Genetic factors may be also important. Adequate intervention programs should focus on inter-individual differences and diverse responses are to be understood in the light of genetic differences. Moreover, it is also important to provide children ample opportunities for doing more frequently moderate and vigorous PA through games and formal Physical Education programs in schools.

D-26 Free Communication/Poster – Reaction Time

THURSDAY, JUNE 1, 2006 2:00 PM - 5:00 PM
ROOM: Hall B

2148 Board #855
2:00 PM - 3:00 PM
The Influence of High Load Training on Reaction Time in Cyclists
Esther Nederhof1, Koen A.P.M. Lemmink1, Hans J. Zwerver2, Romain Meeussen, FACSM, 1Center for Human Movement Sciences, University Medical Center Groningen, University of Groningen, The Netherlands; 2Sports Medicine, University Medical Center Groningen, Groningen, The Netherlands; 3Department of Human Physiology and Sports Medicine, Free University, Brussels, Belgium.

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Overtraining syndrome (OTS) is seen as a serious threat by athletes and coaches because performance is deteriorated in OTS. Central fatigue has also been mentioned as an accompanying symptom of OTS which could possibly be measured through tasks of psychomotor speed. Since the only cure to OTS is (relative) rest, it is of utmost importance to prevent it.

RESULTS: of studies into markers have been contradictory, partly because researchers who study the effects of high load training claim to study OTS whereas these athletes were at most functional overreached (FO; Meeussen et al., In Press).

PURPOSE: The purpose of the present study is to investigate whether changes in psychomotor speed are already present in early stages of overtraining.

METHODS: Fourteen cyclists have completed an incremental exercise test, two questionnaires and the finger pre-cuing task (FPT) three times: before, right after and two weeks after a training camp. Maximal work load, heart rate, oxygen uptake and mood states were used to determine training status. The FPT is a complex four-choice reaction time task in which pre-cues reduce the task to a two-choice reaction time task in three out of four conditions (Miller, 1982). A control group of fourteen age and gender matched active individuals completed the FPT at the same time as the cyclists.

RESULTS: Five out of fourteen cyclists showed performance decrements and worsened mood states and were classified as overreached. Because performance and mood states had improved two weeks after the training camp, their status was specified as high. Seven others did not show differences on performance or mood states after the training camp and were classified as well-trained (WT). Two athletes showed disturbed mood states before and after the training camp and were excluded from the study. A repeated measures ANOVA showed no significant difference between MZ and WT and the control group. However, the interaction between time and group was significant with a trend (F = 2.30, p < 0.079). The FO group showed longer reaction times than the control group right after the training camp.

CONCLUSIONS: The results show that psychomotor slowness as an indicator of central fatigue is not present in FO. This could be because FO is part of acute signs and symptoms of OTS are still mild. Future research should perhaps whether psychomotor slowness is present in non-functional overtraining and if Meeussen R, Duclos M, Gleeson M, et al. Prevention, diagnosis and treatment of overtraining syndrome. Eur J Sport Sci; In Press;Miller J. Discrete venue stage models of human information processing: In search of partial rep. Psychol '82; 3:73-96.

2149 Board #866
3:00 PM - 4:00 PM
The Inverted-U Relationship between Arousal and Failure in Fractionated Reaction Time Tasks
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Several different hypotheses have been proposed to explain the relationship between arousal and cognitive performance. Drive theory and the inverted-U hypothesis have been the most popular for explaining the relationship. However, the results designed to test these hypotheses with respect to reaction time have hit many such as ambiguous definitions of arousal (i.e., confounding arousal with stress), using few arousal levels, assessing arousal by self-report, using subjective subjects designs, and failing to separate the motor (peripheral) and cognitive components of reaction time task.

PURPOSE: The purpose of this study was to use a within-subject design to examine the relationship between arousal and cognitive performance using reaction time to identify the effects on the central and peripheral components.

METHODS: Sixteen male participants aged from 20 to 30 years, with no health or disabilities were recruited. Heart rate reserve (HRR) was determined by recording baseline HR and maximal HR during a ramped exercise protocol on an exercise ergometer. On Day 2, participants were asked to perform the tests at 8 different levels of arousal (20%, 30%, 40%, 50%, 60%, 70%, 80%, 90% HRR). The order of presentation of the arousal levels was randomized. Squares design with the limitation that the higher intensities were always performed back-to-back and were not performed during the first 5 minutes of each condition. At each intensity level, the resistance level on the bicycle ergometer was set using information from the ramped exercise protocol to get the participants to the target level. Participants were asked to perform 10 simple reaction tasks where they reached target HR for each level of arousal. Data were analyzed using a 4-measures analysis of variance with polymorphic contrasts. RESULTS: The linear trend was significant for movement time (on average), with increasing arousal levels. There was no significant difference for a function of arousal.

CONCLUSIONS: The data suggest that arousal induced by the different intensities had different effects on reaction time, with increasing arousal levels affecting the central components. In addition, the relationship tends to support the inverted-U hypothesis. It is concluded that arousal in simple reaction time is related to it's effect on motor function rather than on cognition per se, and that this relationship is linear in nature.

2150 Board #876
4:00 PM - 5:00 PM
Choice Reaction Time Difference Between Gender Using the Fractionated Reaction Time Technique
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A gender difference in choice reaction time (RT) has been reported in both adults and children (e.g., Adam et al., 1999; Noble et al., 1964). Noble, Baker and Jones found females had slower choice RT than males, whereas Weiss (1965) introduced the measurement of RT components with error: EMG (pre-choice period), FPT (motor time) and motor time (MT) have been used to test the central (cognitive) and peripheral (neuromuscular) processing of the intentional voluntary movement in human performance research.

PURPOSE: To examine whether choice reaction time and its fractions differ between genders and dominant and non-dominant hands.

METHODS: Twenty right-handed dominant college students (10 male, 10 female, 25.4 ± 2.7 yrs) were tested for their visual-mental choice RT for four consecutive days using both left and right hands. Based on EMG, we tested the pronator teres and biceps brachii, fractionated RTs of pronation and supination measured for each hand. The learning effect was identified and a stable