Psychological effects of rapid weight loss and attitudes towards eating among professional jockeys

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Abstract

We examined the psychological effects of rapid weight loss among a sample of 41 professional jockeys (mean age 30.9 years, *s* = 7.0). Participants completed the Brunel Mood Scale (BRUMS) and the Eating Attitudes Test-26 (EAT-26) to establish the relationships between rapid weight loss, mood, and attitudes towards eating. These instruments were administered on three occasions: at the jockeys' minimal weight (achieved through rapid weight loss), their optimal riding weight (when they were not excessively restricting their weight and felt healthy), and their relaxed weight (when there were no forthcoming *light* rides or no rides at all). It was hypothesized that when riding at minimal weight, jockeys would record a more negative mood profile compared with scores recorded at optimal or relaxed weights. The same trend was expected for eating attitudes. These hypotheses were supported as jockeys reported significantly more negative mood profiles and eating attitudes at minimal weight. The EAT-26 scores indicated the presence of disordered attitudes towards eating at this weight. These results suggest that jockeys' endeavours to reach the minimum weight limit stipulated by governing bodies are likely to jeopardize their psychological well-being. Dialogue surrounding the appropriateness of current weight regulations is therefore encouraged.

Keywords: Diet, wasting, mood profiles, equestrian sport

Introduction

Weight restrictions have been in place in professional horseracing since the sport's inception in the mid- eighteenth century. Historically designed to safeguard the health of the horse, these regulations are now regarded by many commentators as archaic, arbitrary, and potentially dangerous (McGrath, 2006). Since 1979, the average weight of apprentice jockeys has increased by approximately 37%, but in that period the minimum weight for a flat jockey has risen by only 6% (Warrington, McGoldrick, & Griffin, 2005). As a consequence, jockeys are compelled to employ increasingly extreme methods to reach minimum riding weights. Researchers have reported that jockeys suffer constant dehydration, inadequate body fat and bone density, and an increased risk of osteoporosis as a result (Warrington *et al*., 2005). The Turf Club (the regulatory body of Irish Racing) consequently approved a 4-lb rise in the minimum flat racing weight, effective from the start of the 2006 racing season.

In a typical flat race in Britain, rider and saddle together must weigh as little as 110 lb, while the maximum permitted is 140 lb. One hundred and ten pounds is 80 lb below the average weight for an adult male and the upper limit is 50 lb below this average weight. One should note, however, that the average height of a male jockey is 1.58 m, while the average height on an adult male in the UK is 1.77 m. To reach riding weight, many jockeys endure a rigorous regime to reduce their body weight to an absolute minimum, known as wasting (Labadarios, Kotze, Momberg, & Kotze, 1993). This might involve a combination of starvation, deliberate dehydration, excessive sauna use, and even self-induced vomiting, known colloquially as *flipping*. The majority of jockeys battle with their weight at some point in their career. Labadarios et al. investigated South African jockeys' endeavours to ''make weight'' and reported that 80% used a variety of weight loss techniques, which included diuretics and appetite

suppressants.

Reaching the required weight is clearly a major challenge for many jockeys, yet there are very few structures in place to assist and support them in their quest. Trainee jockeys attend the British Racing School for a maximum of 5 days at the beginning of their career. This is one of the few structured education programmes available at present and just one lecture concentrates on diet and fitness (The British Racing School, 2000). Typical budgets for veterinary research to ensure the well-being of thoroughbred horses are extremely large, yet there is minimal funding to assist jockeys with the demands of weight control. It would appear that those jockeys who succeed do so *in spite* of the system.

The scientific research community has paid inadequate attention to the psychological and physical effects of weight control among jockeys. Leydon and Wall (2002) investigated the dietary habits of 20 professional jockeys in New Zealand and found that energy and carbohydrate intakes were below those recommended for athletes and that the jockeys were deficient in a number of micronutrients. A total of 44% were osteopenic (a condition involving decreased bone density that can lead to osteoporosis); possibly due to reduced calcium intake and habitual smoking. Mounting research from other weight category sports also indicates that rapid weight loss is associated with several deleterious physical effects (Fogelholm, 1994; Landers, Arent, & Lutz, 2001; Mafulli, 1992). Maffulli (1992) found that rapid weight loss in wrestlers was associated with reduced strength endurance and anaerobic capacity. These results are supported by Landers *et al*. (2001), who reported an association between rapid weight loss and muscle weakness, thermoregulatory problems, renal system dysfunction, and blood pressure abnormalities. Furthermore, Fogelholm's (1994) research with wrestlers indicated that rapid weight loss was associated with an increased risk of stress fractures and impaired physical

performance. Sauna abuse has also been associated with a range of negative health outcomes in a sample of 14 patients with an eating disorder (Mitchell, Pyle, & Eckert, 1991). These included fluid, electrolyte and acid– base imbalance, abnormally low blood pressure, hyperventilation, increased blood alkalinity, and hypertension. This has particular pertinence to horseracing given that many jockeys rely heavily on the sauna to make riding weight. Every racecourse in the UK provides a sauna facility. In summary, research indicates that rapid weight loss (via sauna use, starvation, or dehydration) is associated with myriad adverse physical outcomes.

Determining the psychological effects of rapid weight loss is perhaps more challenging, but equally pressing. Fogelholm (1994) reported that wrestlers undergoing severe weight loss experienced diminished mental alertness and a more negative mood profile. In particular, high anxiety, fatigue, and anger were noted. Further research with collegiate wrestlers also indicated that rapid weight loss through self-induced dehydration and starvation had a detrimental effect on mood and short-term memory (Choma, Sforzo, & Keller, 1998). Terry and colleagues reported elevated depression, tension, and confusion scores for elite rowers during periods of rapid weight loss (Terry, Lane, & Warren, 1999). Hall and Lane (2001) investigated the responses of amateur boxers to rapid weight loss before fighting. The boxers' dietary practices were associated with poor performance, increased anger, fatigue and tension, as well as reduced vigour. Among non- sports participants, Chaput *et al*. (2005) reported that the main negative psychological consequence associated with weight loss was increased depression; however, it should be noted that in such studies the weight loss is progressive in nature and does not reflect the rapid weight loss that jockeys endure.

Lane and Terry (2000) defined mood as ''a set of feelings, ephemeral in nature, varying in intensity and duration and usually involving more than one emotion'' (p. 17). They can arise

endogenously or in response to an event. Mood has important implications for both physical and psychological well-being and negative moods can have deleterious consequences for cognitive functioning, health, and successful interpersonal relationships (McConville *et al*., 2005). There is a need for further research into the psychological effects of rapid weight loss, a need which has been repeatedly articulated by psychologists in the field (e.g. Mafulli, 1992; Terry & Waite, 1996). This issue seems to be particularly pertinent in horseracing given jockeys' well-documented struggle with weight.

In addition to the mood-related penalties of severe weight control, researchers have suggested that athletes who participate in weight-category sports may be vulnerable to the development of eating disorders (Fogelholm, 1994; Hausenblas & Carron, 1999; Thompson & Sherman, 1993). These researchers indicated that prolonged periods of severe dieting, self-induced dehydration, and the resultant fluctuations in weight may trigger disordered attitudes towards eating and maladaptive eating behaviours. Thompson and Sherman (1993) highlighted that ''the sport environment may not only precipitate or worsen an eating disorder, it may also legitimise it'' (p. xi). This possibility is perhaps borne out by the extent to which extreme methods of weight loss have become pervasive, routine, and commonplace within professional horseracing and other weight- category sports. Jockeys who repeatedly battle with their weight through starvation and dehydration methods are, to a degree, glamorized by the racing industry, and congratulated by owners, trainers, and the media. Consequently, weight battles have become ubiquitous in many jockeys' lives. On a race day, a jockey will typically be weighed before and after every race and may even step on the scales up to 28 times in a day (Leydon & Wall, 2002). Although most athletes do not develop a clinical eating disorder to make weight, prolonged exposure to an environment that normalizes extreme weight loss techniques may render some

athletes vulnerable. In one paper, 37% of female athletes reported that the primary reason they developed an eating disorder was to meet weigh-in limits for their sport (Sundgot- Borgen, 1994). Of the current 110 flat race jockeys, only 9% can comfortably ride at the minimum weight of 110 lb; most jump jockeys can make the minimum weight of 140 lb, but only after heavy wasting and reliance on the sauna (The Jockey Club, 2001).

Despite considerable anecdotal evidence, there is a notable paucity in the literature pertaining to the eating behaviours and attitudes of jockeys. In a meta- analysis of 92 studies investigating eating attitudes in sport, encompassing diving, gymnastics, dance, rowing, cycling, and wrestling, horseracing was notably absent (Hausenblas & Carron, 1999). The authors concluded that athletes who participate in weight classification sports, or sports in which weight and small body size are important, were particularly vulnerable to eating disorders. Although both conditions apply to horseracing, no jockeys were included in the research. In a rare study involving jockeys, King and Mezey (1987) reported that they employed a plethora of maladaptive weight-control techniques, including excessively restrictive dieting, sauna use and, to a lesser extent, laxatives, diuretics, appetite suppressants, and vomiting to make the required riding weight. The jockeys scored an average of 14.9 on the Eating Attitudes Test-26 (EAT-26; Garner & Garfinkel, 1979), which King and Mezey (1987) noted was approaching the ‘‘at risk’’ of an eating disorder category (delineated by scores greater than 20). Leydon and Wall (2002) investigated the dietary status of jockeys in New Zealand and found that 20% displayed signs of disordered eating. However, the reliability of the results of both studies is limited by relatively small sample sizes (n = 16 and n = 20 respectively).

In summary, research into the psychological effects of rapid weight loss among jockeys, and the extent to which the culture of weight loss impacts on jockeys’ relationship with food, is

long overdue. The current study addresses this need by examining the psychological effects of rapid weight loss, with particular reference to its effect on jockeys' mood, and their attitudes towards eating. It was hypothesized that when undergoing rapid weight loss to ride at a light weight, jockeys would record a more negative mood profile as determined by scores on the Brunel Mood Scale, compared with their mood profile taken at optimal (when they felt healthy and had not lost excessive weight) or relaxed weights (when no rides or no ''light'' rides were impending). It was also hypothesized that there would be a significant difference, with a small effect size, for eating attitudes across minimal, optimal, and relaxed weights, indicating that jockeys display a different attitude towards food when riding at different weights.

Method

Participants

Participants were recruited through purposive sampling, using personal contacts of the first author, and selected on the basis of the study objectives. They were fully licensed male flat and jump jockeys based in the UK (n = 41) and of White UK/Irish ethnicity. Participants ranged in age from 19 to 54 years (mean 30.9 years, s = 7.0). The study received ethical approval from the authors' institutional ethics committee and written informed consent was obtained from the participants before data collection.

Design

A repeated-measures design that comprised three points of data collection was employed. The dependent variables were the subscales of two psycho- metric instruments: the Brunel Mood Scale (BRUMS; Terry, Lane, Lane, & Keohane, 1999) and the EAT-26 (Garner & Garfinkel, 1979). The independent variable was the time in the jockeys' weight-loss schedule: minimal

weight (accomplished through wasting and other weight loss methods); optimal weight (when feeling healthy and not wasting); and relaxed weight (no forthcoming rides, or no light rides).

Instruments

Mood was assessed using the Brunel Mood Scale (Terry *et al*., 1999), an abridged version of the Profile of Mood States (McNair, Lorr, & Droppleman, 1971). The BRUMS is a self-report 24-item instrument that measures tension, depression, anger, vigour, fatigue, and confusion. Respondents are asked to rate ‘‘how they feel right now’’ and items are rated on a 5-point Likert scale from 0 (‘‘not at all’’) to 4 (‘‘very much so’’). The BRUMS has been validated with 1693 participants from two populations: schoolchildren and athletes (Terry *et al*., 1999). Confirmatory factor analysis substantiated the factorial validity of a 24-item six-factor model, using both independent and multi-sample analyses. The BRUMS also demonstrated concurrent validity with correlations between BRUMS scores and previously validated nomenclature showing relationships that are consistent with theoretical predictions (Terry *et al*., 1999). Subsequently, the BRUMS was subjected to a comprehensive analysis of its construct validity among adult participants by Terry and co-workers (Terry, Lane, & Fogarty, 2003). Their results strongly supported the psychometric integrity of the instrument with adults.

Attitudes to eating were examined using the EAT-26 (Garner & Garfinkel, 1979). This is a 26-item self-report questionnaire designed to identify abnormal eating habits, and concerns about weight, derived from a 40-item original. Participants record their agreement with statements about weight and food, such as ‘‘I feel that food controls my life’’ and ‘‘I find myself preoccupied by food’’, on a 6-point semantic differential scale anchored by ‘‘never’’ and ‘‘always’’. The EAT-26 has acceptable criterion-related validity and high internal consistency with reported alpha coefficients in excess of 0.94 (Garner, Olmsted, Bohr, & Garfinkel, 1982).

Total scores on the EAT-26 are derived as a sum of the composite items, ranging from 0 to 78. Higher scores indicate disturbed eating attitudes and behaviour, while a score of 20 or more may indicate the presence of an eating disorder. It should be noted that in scoring the EAT-26, the first three points on the Likert scale are scored at zero when using the < 20 diagnostic criterion (Garner & Garfinkel, 1979).

Procedure

All together, 73 jockeys were contacted by letter, informed of the general nature of the study, and asked if they would be interested in participating. Fifty-four jockeys initially signed the informed consent form assuring confidentiality and anonymity, while 41 actually completed the study (56.2% of those initially contacted). The 13 jockeys who did not complete the study dropped out owing to injury, illness or an insufficient number of rides.

Participants completed the BRUMS and EAT-26 on three separate occasions: at minimum weight (which necessitated wasting and rapid weight loss), optimal weight (when the jockey felt healthy and was not wasting), and relaxed weight (when the jockey was not required to maintain or lose weight). To assess the validity of each of these weight specifications, the jockeys were weighed and the corresponding mean weights at minimum, optimal, and relaxed weights were as follows: 56.89 kg (s = 6.1), 57.97 kg (s = 6.4), and 59.06 kg (s = 6.8). The means indicate that the specifications adopted were indeed valid given the increase in jockeys' weight from their minimum through to their optimal weights. They were given written and verbal instructions to complete the questionnaires prior to riding, and within a 10-week period.

Data Analysis

Data were screened for univariate outliers using the $z > \pm 3.29$ criterion and for multivariate outliers using the Mahalanobis distance method ($P < 0.001$; Tabachnick & Fidell,

2007). Following checks for the appropriate parametric assumptions, the data were analysed using a single-factor repeated- measures multivariate analysis of variance (MANOVA) to determine differences in mood and eating attitudes between the jockeys' minimal, optimal, and relaxed weights.

Results

No univariate or multivariate outliers were found and all assumptions underlying repeated measures MANOVA were satisfactorily met other than a violation of sphericity (Bartlett's approximate $\chi^2_{54} = 995.992$, $P < .001$). As a consequence, the Pillai's Trace omnibus statistic was used (see Table 1). The MANOVA revealed a statistically significant difference between minimal, optimal and relaxed weight measurements for the composite variable (Pillai's Trace = 1.21, $F_{20, 144} = 11.126$, $P < 0.001$, $\eta_p^2 = 0.61$). Follow-up univariate analyses indicated large and significant differences for depression ($F_{2,80} = 19.29$, $P < 0.001$, $\eta_p^2 = 0.32$); anger ($F_{2,80} = 26.33$, $P < 0.001$, $\eta_p^2 = 0.39$), vigour ($F_{2,80} = 17.65$, $P < 0.001$, $\eta_p^2 = 0.30$) and fatigue ($F_{2,80} = 14.46$, $P < 0.001$, $\eta_p^2 = 0.26$). A smaller effect was noted for confusion ($F_{2,80} = 5.88$, $P < 0.05$, $\eta_p^2 = 0.12$) and tension ($F_{2,80} = 4.09$, $P < 0.05$, $\eta_p^2 = 0.09$). Collectively, the BRUMS results indicated that jockeys' mood profiles at minimum weight were far more negative than at optimal and relaxed weights. Pair-wise comparisons on the BRUMS subscales indicated no significant differences between the optimal and relaxed weights ($P > 0.05$).

There was a statistically significant difference across the three weights for attitudes to eating as measured by the EAT-26 ($F_{2,80} = 10.99$, $P < 0.001$, $\eta_p^2 = 0.21$). Pair-wise comparisons indicated that jockeys scored higher on the EAT-26 at minimal weight than at optimal weight (95% confidence interval = .42 to 3.14, $P < 0.05$) and relaxed weight (95% confidence interval = 0.90 to 3.88, $P < 0.01$). This indicated the presence of more disordered attitudes towards eating

at minimal weight. Six jockeys scored more than 20, which falls within the "at risk" category as determined by the EAT-26 scoring system described earlier. The *post-hoc* analyses for the BRUMS and EAT-26 are presented in Table 1.

Discussion

One purpose of the present study was to investigate the effects of rapid weight loss on mood among professional jockeys in the United Kingdom. It was hypothesized that at minimal weight, jockeys would report a more negative mood profile than at their optimal or relaxed weight. Support was found for this hypothesis given that scores on the BRUMS indicated a strong relationship between jockeys' mood profile and body weight. Overall, jockeys recorded more negative mood profiles at minimal weight than at optimal and relaxed weights. Specifically, scores for depression, anger, and fatigue were significantly elevated and scores for vigour significantly reduced at minimal weight. Scores for tension and confusion were also higher when jockeys were at their minimum weight, but with a smaller effect size (see Table I).

These results support prior research documenting a detrimental effect of rapid weight loss on mood (Fogelholm, 1994; Hall & Lane, 2001; Landers *et al*., 2001; Mafulli, 1992). In particular, the results are similar to those of Fogelholm (1994), who reported elevated fatigue and anger among a sample of wrestlers who endured rapid weight loss to make competition weight. The present results also corroborate the findings of Choma *et al*. (1998) and Terry *et al*. (1999), and further substantiate the link between rapid weight loss and detrimental mood alteration. An original contribution of the present study is that it augments the extant literature through its focus on professional jockeys, a group previously neglected by researchers.

Of particular note is the high level of the mood variable depression following wasting that is accompanied by relatively high scores for anger, fatigue, and confusion. Researchers have

shown that in the presence of depression, the other negative mood factors, and in particular anger, can have debilitative effects on performance (Lane & Terry, 2000). A further risk for jockeys in terms of their psychological well-being is that if continued wasting results in increased depressive symptoms, over a prolonged period this may lead to clinical depression and compromise their mental health (Parker, Wilhelm, & Asghari, 1997). Also, the high anger scores during wasting may lead to friction with significant others in the days immediately before a race meeting. Moreover, the high fatigue experienced by jockeys during wasting places them in physical danger while they drive hundreds of miles across the country to attend competitions. Collectively, the disturbed mood associated with ‘‘making the weight’’ has serious ramifications for the mental and physical well-being of jockeys.

A second purpose of the present study was to explore jockeys’ attitudes to, and relationship with, food when wasting to a minimum weight compared with periods of relaxed or optimal weight. It was hypothesized that jockeys would display a more negative attitude towards food when wasting to their minimum riding weight. This hypothesis was accepted as jockeys recorded higher scores on the EAT-26 when riding at their minimum weight. This finding suggests that their attitudes and behaviours towards food became more disordered when wasting. However, the mean score at minimum weight was 8.56, which is much lower than the means reported in earlier studies: 14.9 (King & Mezey, 1987) and 13.5 (Leydon & Wall, 2002). Such differences may, in part, be accounted for by the relatively small sample sizes employed in these studies (n = 16 and n = 20 respectively) or representative of particularly deleterious eating patterns among jockeys in King and Mezey’s and Leydon and Wall’s samples of professional jockeys.

The EAT-26 was not designed to diagnose clinical eating disorders; rather, it is a standardized measure of symptoms and concerns characteristic of eating disorders. Respondents who score 20 or more are considered ‘‘at risk’’ of an eating disorder and are advised to seek psychological support (Garner & Garfinkel, 1979). Six jockeys (15%) in the current study scored 20 or more at minimum weight. This suggests that as these jockeys engage in wasting behaviours to reach minimum weight, they display significantly more symptoms of eating disorders and, consequently, some may be classified as ‘‘at risk’’ of an eating disorder. Using the same criteria, Leydon and Wall (2002) reported that 20% of jockeys showed signs of disordered eating, a figure analogous with that in the present study. This highlights the latent dangers of the culture of severe and repeated weight loss so endemic in professional horseracing, and the potentially detrimental effect it may have on jockeys' psychological well-being. The findings also lend support to Hausenblas and Carron's (1999) contention that athletes who participate in weight-category sports are particularly vulnerable to eating disorders.

The strengths of the current research include the elite nature of the sample and generalizations that can be made regarding the psychological effects of rapid weight loss given that measures were taken in a real-life context, thus increasing the external validity of the study. The use of sport psychology in horseracing remains limited and it is hoped that the present study will act as a catalyst for a comprehensive analysis of jockeys' weight-management regimes and the possible repercussions for their physical and psychological health. This research also addresses the dearth of research into eating attitudes among male athletes (Hausenblas & Carron, 1999).

However, the present study is not without some limitations. First, the internal validity of the study may have been compromised by the personal and professional relationship between the

first author and the jockeys; he was employed by the Jockeys' Association for the 12-year period immediately before the study. Nonetheless, it is argued that this relationship permitted a level of rapport and access that facilitated the research aims and provided a safe forum for the jockeys to discuss potentially sensitive matters. Second, there are weaknesses in the measurement of mood with a self-report instrument such as the BRUMS. Although the jockeys were mindful of the general purpose of the research, their mood at the point of questionnaire completion may have been influenced by a host of factors, including current form, interpersonal issues with trainers, injury, and the ability of the horse due to be ridden on a given day. Finally, honest disclosure may have been inhibited by concerns about the implications of acknowledging the use of pathogenic weight-control measures. Although all participants were explicitly aware that the first author's professional role within the Jockey's Association did not in any way constitute a threat in this regard, it is conceivable that some jockeys may have felt that such sensitive information could have serious, even career-threatening, repercussions if it entered the public domain.

A number of future research directions emerge from the current study. Psychologists must respond to the challenge of investigating the effects of weight control and develop reliable and valid nomenclature specifically tailored to athlete populations. A longitudinal approach would also allow a more meaningful appraisal of the long-term consequences of repeated rapid weight loss; this would include the proneness to mental illnesses such as clinical depression. Further research is also needed to ascertain whether the discrepancy between average scores on the EAT-26 in this sample and the professional jockeys studied by King and Mezey (1987) and Leydon and Wall (2002) was a product of the small sample size employed in the latter two studies or an additional confounding variable.

The results of the present study also have several practical ramifications. First, our results suggest that the methods used by jockeys to reach minimum riding weight, including restricted food and fluid intake and extensive use of the sauna, are detrimental to their overall mood. Therefore, governing bodies should continue to explore a possible increase in the minimum riding weight. Although the entry rights of naturally lean jockeys must be considered, this study joins a mounting body of research which suggests that many jockeys may be endangering their physical and psychological health to make and win rides (King & Mezey, 1987; Labadarios *et al*., 1993; Leydon & Wall, 2002). Second, the need to support jockeys in their efforts to safely and effectively manage their weight must be acknowledged. This support should be multi-faceted and include elements such as: educational programmes addressing adaptive weight loss strategies; how to set and achieve realistic weight goals; and the psychological effects and dangers of severe weight control. A counselling network for jockeys who require support with the demands and effects of continued wasting, and a nutritional service to discuss weight-related issues, would also be valuable. This service could include a forum for jockeys, coaches, doctors, and psychologists to discuss weight-control techniques. It should eventually be extended to all weight-category sports such as weightlifting, boxing, and rowing as well as sports where leanness is deemed necessary, such as gymnastics and figure skating. Data should be more systematically recorded on the physical and psychological effects of weight loss and advice shared on best practice by professionals within the given sports.

In conclusion, the results of the current study indicate that jockeys who continually undergo periods of rapid weight loss to ride at a light weight may experience significant mood disturbance and develop maladaptive behaviours and attitudes towards eating. Some jockeys may also be vulnerable to the development of eating disorders and should seek professional support in

their endeavours to ride at a low weight. Governing bodies must continue to explore the possibility of increasing the minimum riding weight. Finally, jockeys should have access to forms of clinical support that provide practical assistance to help them manage the considerable demands of their sport.

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Table 1. MANOVA and post-hoc analyses for POMS-A and EAT-26 across three weights: minimal (A), optimal (B), and relaxed (C).

POMS-A Subscales/EAT26	***M***	***SD***	***F***	**Source of diff.**	η_P^2
Tension A	42.48	5.05	4.09*	—	0.09
Tension B	41.60	3.51			
Tension C	40.82	3.01			
Depression A	48.68	5.13	19.29**	A > B, C	0.32
Depression B	45.57	3.22			
Depression C	45.00	2.60			
Anger A	47.36	5.47	26.33**	A > B, C	0.39
Anger B	43.61	3.18			
Anger C	42.88	2.54			
Vigour A	32.58	4.67	17.65**	C > B, A	0.30
Vigour B	36.35	4.31			
Vigour C	36.25	4.03			
Fatigue A	51.58	6.78	14.46**	A > B, C	0.26
Fatigue B	46.62	6.12			
Fatigue C	46.09	5.34			
Confusion A	43.75	6.79	5.88*	A > C	0.12
Confusion B	41.76	3.50			
Confusion C	40.99	3.23			

EAT A	8.56	9.08	10.99**	A > B, C	0.21
EAT B	6.78	8.29			
EAT C	6.17	7.83			

* $P < 0.05$, ** $P < 0.001$.