



Test-retest reliability and clinical correlates of the Eurofit test battery in people with alcohol use disorders

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ABSTRACT

People with alcohol use disorder (AUD) are at an increased risk for cardiovascular diseases (CVD). Physical fitness is a predictor of CVD and premature mortality. Currently, no existing measures of physical fitness used in the general population have been tested for validity and reliability in this vulnerable population. Therefore, we examined the reproducibility, feasibility and correlates of the Eurofit test battery in this population. From 32 men (age = 40.8 ± 13.8years; illness duration = 10.2 ± 10.3years; body mass index, BMI = 24.8 ± 3.8) and 13 women (age = 41.9 ± 12.1years; illness duration = 13.7 ± 13.1years; BMI = 26.3 ± 4.9) with AUD two trials of the Eurofit test, administered within one week, were analyzed. All patients also completed the International Physical Activity Questionnaire, the Positive Affect and Negative Affect Scale and Alcohol Use Disorders Identification Test. All Eurofit items showed good reproducibility with intraclass correlation coefficients ranging from 0.82 for the flamingo balance test to 0.97 for the standing broad jump and handgrip strength tests. Better performance on Eurofit test items was associated with younger age, a shorter illness duration, a lower BMI and higher physical activity levels. The current study demonstrates that the Eurofit test can be recommended as a reliable test for evaluating the physical fitness of inpatients with alcohol use disorder.

1. Introduction

People with alcohol use disorders (AUD) are at increased risk of cardio-metabolic diseases (Patra et al., 2010; Vancampfort et al., 2016a; Vancampfort et al., 2016b) and associated premature mortality (Roerecke and Rehm, 2014). Investigating and intervening against modifiable cardio-metabolic risk factors therefore is a research priority. In the general population, low levels of physical fitness are a strong and independent predictor of cardio-metabolic diseases and all-cause mortality of comparable importance with other risk factors such as smoking and physical inactivity (Bull and Bauman, 2011; Wei et al., 1999). Physical fitness is a multi-factorial concept comprising a set of more or less independent attributes that are related to the ability to perform physical activities such as balance and speed (Pate, 1988), while other aspects such as muscular strength and cardiorespiratory fitness have also a strong health-related component. More specifically, health-related physical fitness can be defined as the ability to perform daily

activities with vigor and to demonstrate capacities that are associated with a lower risk of premature development of hypokinetic diseases (i.e., those associated with physical inactivity) (Bouchard et al., 1994). To the best of our knowledge, data on the health- and performance related physical fitness in people with AUD compared with a matched control group are absent and this is surprising since the detrimental effects of alcohol on human physiology have been well documented. Heavy long-term consumption can negatively impact many aspects of metabolism, neural function, cardiovascular physiology, thermoregulation and skeletal muscle myopathy (Preedy et al., 2001; Suter et al., 2008). With regards to health- and performance related physical fitness in people with AUD in particular, in the only study to date in 30 inpatients with AUD (22♂, 40.4 ± 10.5years, illness duration = 9.7 ± 9.3 years), patients had a reduced whole body balance, speed of limb movement, explosive leg muscle strength, abdominal muscular endurance, and running speed compared with 30 age-, gender and body mass index (BMI) – matched healthy controls

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(Vancampfort et al., 2018c). The scarcity of research investigating health- and performance related physical fitness in people with AUD might, in part, be due to lack of appropriate physical fitness test batteries in most mental health care settings (Vancampfort et al., 2015b, 2016c). For example, although laboratory-based incremental exercise testing protocols that use breath-by-breath gas analysis and measure the maximum level of oxygen consumption ($VO_2\text{max}$) are considered the gold standard assessment (Vanhees et al., 2005), such test protocols (a) only assess cardiorespiratory fitness and no other health-related physical fitness components, (b) are time-consuming, (c) are costly, and (d) need highly sophisticated equipment (Vanhees et al., 2005). Therefore, field test batteries assessing all components of physical fitness have been developed for use in daily clinical practices where funding is limited, demands on the existing work staff are already high and professionals with expertise in sophisticated exercise and fitness prescription are not always readily available. In other sedentary and unfit populations with comorbid mental disorders such as schizophrenia (Vancampfort et al., 2012) and bipolar disorder (Vancampfort et al., 2015c), the Eurofit test battery for adults (Oja and Tuxworth, 1995) has been recommended as a reliable and valid method to measure and monitor physical fitness in clinical practice. This test battery is designed to assess all components of physical fitness of individuals, communities, sub-populations and populations (Oja and Tuxworth, 1995) including balance, speed, muscular strength and muscular endurance at a low cost and without the need of supervision by a physician. The reproducibility and feasibility of the Eurofit test battery has however never been assessed in persons with AUD. If shown to be reliable, valid and feasible, comparing physical fitness of people with AUD, as assessed with the Eurofit test battery, with available general population norms (Oja and Tuxworth, 1995) may identify aspects of the health-related physical fitness that could be targeted in rehabilitation programs.

In order to be able to identify variables that should be considered when using the Eurofit test battery in people with AUD, the association of different physical fitness components with socio-demographic variables, risky alcohol consumption patterns, smoking behavior, positive and negative affect levels, and somatic co-morbidity in people with AUD could be explored. Based on previous research in people with severe mental illness (Vancampfort et al., 2015a, 2016d, 2016e), we hypothesize that older age, a longer illness duration, female gender, smoking a higher number of cigarettes, lower positive and higher negative affect levels and the presence of somatic co-morbidity are associated with worse physical fitness performance in people with AUD.

Considering the lack of appropriate measures to assess physical fitness in this population, the primary aim of the present study was to investigate the test-retest reliability of the Eurofit test battery in people with AUD. Secondary aims were: (a) to describe the feasibility of the Eurofit in this population, and (b) to assess clinical and demographic characteristics associated with the performance on the Eurofit.

2. Methods

2.1. Participants

Over a 5-month period, all inpatients with a DSM 5 diagnosis of AUD (American Psychiatric Association, 2013) of the UPC KU Leuven campus Kortenberg in Belgium were invited to participate by their treating psychiatrist in the fourth week of admission. Participants were excluded if they had significant cardiovascular, neuromuscular and endocrine disorders which, according to the American College of Sports Medicine (2013), might prevent safe participation in the study. All participants received a physical examination before testing by a specialized physician. Participants were also requested to refrain from eating, drinking coffee or smoking during a two-hour period prior to the tests. All patients completed first the International Physical Activity Questionnaire (Craig et al., 2003), the Positive Affect and Negative Affect Scale (PANAS) (Watson et al., 1988) and Alcohol Use Disorders

Identification Test (AUDIT) (Babor et al., 2001), and performed afterwards the Eurofit test battery (Oja and Tuxworth, 1995). The test was repeated exactly three days later on the same hour of the day and if not possible for practical reasons within a one-week frame. Participants were requested to refrain from eating, drinking coffee or smoking during a two-hour period prior to the tests. The study procedure was approved by the Ethical Committee of the UZ Leuven and UPC KU Leuven, campus Kortenberg, Belgium and conducted in accordance with the principles of the Declaration of Helsinki. All participants gave their informed written consent. There was no compensation for participation in the study.

2.2. Sample size calculation

An a-priori sample size calculation was conducted following the procedures of Donner and Eliasziw (1987) and Walter et al. (1998). With a more than acceptable intraclass correlation coefficient (ICC) of 0.80, and alpha of 0.05 and power of 0.8 ($\beta = 0.2$) it was established that 45 participants were required in the final analysis. Based on similar research in people with severe mental illness (Vancampfort et al., 2012, 2015b), it was anticipated that approximately 15% of patients would be excluded, 10% would refuse and 10% would dropout from the testing for both motivational and practical reasons. Therefore, a pre-specified sample size of 65–70 participants was utilized to account for these factors in order to ensure the final analysis was adequately powered.

2.3. Test-retest of the eurofit test battery

A test-retest design was applied to test the reproducibility of several Eurofit test battery items (Oja and Tuxworth, 1995). The Adult Eurofit Physical Fitness Test Battery (Oja and Tuxworth, 1995) is a set of physical fitness tests covering a range of fitness components, designed for testing adults of Europe. It was devised in 1995 by the Council of Europe. Supervision and measurement of the Eurofit test battery was performed by a mental health physical therapist following a standardized procedure. The Eurofit test battery included 7 items and involved the assessment of the following measures: whole body balance, speed of limb movement, flexibility, explosive strength, static strength, abdominal muscular endurance and running speed. The test takes approximately 25 min to complete.

2.3.1. Whole body balance

Whole body balance (flamingo balance) was measured as the number of attempts needed by individuals to achieve a total duration of 30 sec in balance on their preferred foot on a flat firm surface. While balancing on the preferred foot (shoes removed), the free leg is flexed at the knee and the foot of this leg held close to the buttocks. Lower flamingo balance scores indicate a better whole body balance.

2.3.2. Speed of limb movement

Speed of limb movement (plate tapping) was assessed using a table on which two discs at 80 cm distance had to be touched alternately with the preferred hand as fast as possible, completing 25 cycles. The best of 2 attempts was recorded. Higher scores indicate lower speed of limb movement.

2.3.3. Flexibility

Flexibility was measured using the sit-and-reach test. Participants sat on the floor with straight legs and reached forward as far as possible (shoes removed). The knees were held in extended position by the investigator throughout the test. The feet were placed against a test box with a ruler placed on the top of the box. The ruler had to be pushed with the fingertips and this in a smooth and slow movement. The best of 2 attempts was recorded. A longer distance reached, indicates better flexibility.

2.3.4. Explosive strength

Explosive strength was measured by a standing broad jump, using a tape measure on a foam mat. Participants were asked to stand behind a line drawn perpendicular to the tape measure and jump forward as far as possible using arm swing and knee bending before jumping. The distance jumped was recorded from the take-off line to the farthest point backward of the participant. The best of 2 attempts was recorded. Higher scores indicate a better explosive strength.

2.3.5. Handgrip strength

Handgrip strength was assessed using a handgrip dynamometer (Lafayette Instruments Hand Dynamometer) to be squeezed as forcefully as possible with the preferred arm fully extended slightly away from the body, and palm facing inward. The best of 2 attempts was recorded. Higher scores indicate better handgrip strength.

2.3.6. Abdominal muscle endurance

Abdominal muscle endurance was measured as the number of correctly completed sit-ups in 30 seconds. Sit-ups were performed with the hands placed at the side of the head, knees bent at 90°, and the feet secured by the investigator. A full sit-up is defined as touching the knees with the elbows and returning the shoulders to the ground. A higher number of completed sit-ups indicates greater abdominal muscle endurance.

2.3.7. Running speed

Running speed was assessed using a 10 by 5 m shuttle run. Each participant was required to sprint 10 times between two lines placed 5 m apart over a 1.3 m wide track. The sprint was followed by immediately turning and running back. Lower scores indicate better running speed. Except for the flamingo balance test, the sit-ups test and the shuttle run, each test was done twice and the better score was recorded.

2.4. International physical activity questionnaire (IPAQ) - long version

A structured format that asked participants to recall activities during 'usual days' before admission and this for morning, afternoon, and evening time periods was used (Craig et al., 2003). On the basis of what activities participants self-reported, the interviewer clarified the perceived intensity of that specific activity. Following the IPAQ protocol a continuous indicator was calculated as a sum of weekly metabolic equivalent (MET)-minutes per week of physical activity.

2.5. Positive affect and negative affect Schedule (PANAS) (Watson et al., 1988)

The PANAS is a self-rating scale used to measure positive and negative affect. The instrument consists of 20 adjectives divided into two 10-item scales measuring positive and negative affect, respectively. Positive affect refers to the extent to which a person experiences positive emotions or sensations (e.g. enthusiastic and active), and negative affect the extent to which a person experiences negative emotions or sensations (e.g. anger or guilt). On a five-point scale (from not at all to very much) the participants are asked to rate the extent to which they have experienced each specific affect "during the past week." Higher scores represent greater endorsement of the construct.

2.6. Alcohol use disorders identification test (AUDIT)

To assess risky alcohol consumption patterns, we used the AUDIT (Babor et al., 2001), which was developed by the World Health Organization (WHO) as a simple method of screening for excessive drinking. The AUDIT comprises three domains: hazardous alcohol use (frequency of drinking, typical quantity, and frequency of heavy drinking), dependence symptoms (impaired control over drinking, increased salience

of drinking, and morning drinking), and harmful alcohol use (guilt after drinking, blackouts, alcohol-related injuries, and other concerns about drinking). Higher scores indicate greater likelihood of hazardous and harmful drinking. We used the AUDIT as a continuous score.

2.7. Smoking behavior

Participants were asked whether they smoked or not, and if so, how many cigarettes they smoke per day on average.

2.8. Anthropometric measurements

Body weight was measured in light clothing to the nearest 0.1 kg using a SECA beam balance scale, and height to the nearest 0.1 cm using a wall-mounted stadiometer.

2.9. Medication use

Psychotropic medication use was retrieved from the medical files.

2.10. Presence of somatic co-morbidity

Presence of a somatic co-morbidity was retrieved from the medical files.

2.11. Statistical analyses

Continuous data were assessed for normality using the Shapiro-Wilk test and found to be normally distributed. Descriptive statistics are therefore presented as mean \pm standard deviation (SD). The intraclass correlation coefficient (ICC) between the two Eurofit tests using a one-way random single measures intraclass correlation analysis and its associated 95% CI (confidence interval) was calculated to objectively assess reliability between the two tests. An acceptable level of reliability was defined, acknowledging that such limits are essentially arbitrary. ICC values greater than 0.70 indicated acceptable reliability (Portney and Watkins, 2000) and were used to determine which Eurofit items might be retained or discarded. Pearson correlations were used to compute associations between the Eurofit scores and demographical data and other variables. Gender differences were assessed using an unpaired *t*-test. The significance level was set at 0.05. Statistical analyses were performed using the statistical package SPSS version 25.0 (SPSS Inc., Chicago, IL).

3. Results

3.1. Participants

A total of 60 inpatients with AUD were initially screened. Five persons were excluded as a consequence of a cardiovascular or neuromuscular disorder that may have precluded safe participation. Of the 55 eligible persons with AUD, 6 declined to participate (i.e., were not interested), two were not motivated anymore to perform the second test and two were transferred to another hospital following the test trial. In total, 45 participants were with complete data for two separate time points included in the final analysis. Within the final sample 32 men (age = 40.8 \pm 13.8 years; illness duration = 10.2 \pm 10.3 years; body mass index, BMI = 24.8 \pm 3.8) and 13 women (age = 41.9 \pm 12.1 years; illness duration = 13.7 \pm 13.1 years; BMI = 26.3 \pm 4.9) were represented. There were no significant differences in age, illness duration and BMI between men and women. The mean PANAS positive affect scores were respectively 30.1 \pm 7.0 for men and 24.8 \pm 6.1 for women, the PANAS negative affect scores 25.7 \pm 7.3 for men and 29.9 \pm 8.2 for women, and the mean AUDIT score 27.8 \pm 6.8 for men and 25.4 \pm 4.7 for women. Men had significantly higher PANAS positive affect scores ($P = 0.03$). All participants were Belgian natives and

Table 1
Medication use among people with alcohol use disorders ($n = 45$) screened prior to participation.

Type of medication	n prescriptions
<i>Antidepressants</i>	
Escitalopram	7
Trazodone	6
Duoxetine	4
Bupropion	2
Fluoxetine	1
Mirtazapine	1
Paroxetine	1
<i>Mood stabilizers</i>	
Valproic acid	1
<i>Antipsychotic medication</i>	
Quetiapine	5
<i>Other medication</i>	
Somatic medication	15
Benzodiazepines	8
Disulfiram	3
Atomoxetine	1

27 (60%) of the participants smoked an average of 15 ± 8 cigarettes per day. An overview of the medication use of the entire sample is presented in Table 1. There were 22 prescriptions for antidepressants in 17 persons. Eight persons received benzodiazepines, five anti-psychotics, three disulfiram, one a mood stabilizer and one an atomoxetine prescription. Fifteen persons were treated with somatic medication.

3.2. Eurofit test battery scores

A summary of the Eurofit test scores is presented in Table 2 according to gender. Male participants had significantly higher explosive muscle strength as measured with the standing broad jump and a significantly greater handgrip strength. No other gender differences were found.

3.3. Test-retest reliability of the eurofit items

The means and standard deviation scores for the first and second Eurofit tests and the associated ICC's with 95% CI's are presented in Table 3. All Eurofit items demonstrated a minimal acceptable ICC above 0.70. The ICC ranged from 0.82 for the flamingo balance test to 0.97 for the standing broad jump and handgrip strength tests.

3.4. Feasibility of the eurofit test

Except for the sit-and-reach and the sit-ups test, all Eurofit test items could be completed by all participants without any adverse events. One participant was not able to perform the sit-and-reach test (see Table 3). Four participants didn't perform the sit-ups due to lower back problems and/or pain (see Table 3). No adverse events during and in two days

Table 2
Descriptive statistics of the Eurofit retest scores in men and women with alcohol use disorders.

Physical fitness component	Test items	Men ($n = 32$)	Women ($n = 13$)	<i>P</i>
Whole body balance	FBA ($n/30$ sec)	9.3 ± 4.5	12.0 ± 4.8	0.16
Speed of limb movement	PLT (sec)	12.7 ± 3.3	14.2 ± 2.8	0.20
Flexibility	SAR (cm)	23.2 ± 10.1	22.4 ± 9.3	0.80
Explosive muscle strength	SBJ (cm)	161.9 ± 42.7	113.7 ± 29.7	0.002*
Handgrip strength	HGR (kg)	46.7 ± 10.7	30.9 ± 4.2	<0.001*
Abdominal muscle endurance	SUP ($n/30$ sec)	17.1 ± 6.9	13.4 ± 4.6	0.16
Running speed	SHR (sec)	25.4 ± 7.4	27.0 ± 3.7	0.54

Retest data are expressed as mean \pm SD. *Significant when $P < 0.05$. FBA = flamingo balance, PLT = plate tapping, SAR = sit-and-reach, SBJ = standing broad jump, HGR = handgrip strength, SUP = sit-ups, SHR = shuttle run.

following the tests were reported.

3.5. Correlates for Eurofit parameters

The *r*- and *p*-values for all associations between Eurofit items and demographical and clinical variables are presented in Table 4. Except for the scores obtained on the flamingo balance and handgrip strength test, all Eurofit items were significantly associated with age. Younger patients performed better than older patients. A longer illness duration was consistently significantly associated with a poorer performance on all but one Eurofit test, i.e. flamingo balance test. A higher body mass index was significantly correlated with a worse performance on the standing broad jump and sit-ups test. We did not find significant associations of any Eurofit test with the PANAS and AUDIT scores. In contrast, except for the scores obtained on the flamingo balance, all Eurofit items were significantly associated with the IPAQ scores. Better performances were significantly associated with higher physical activity levels.

4. Discussion

4.1. Reliability and feasibility of the eurofit test battery

To our knowledge, this is the first study investigating the feasibility and reliability of the Eurofit test in inpatients with AUD. Our findings demonstrate that the Eurofit test may prove useful to assess physical fitness in the studied sample. All items demonstrated an acceptable ICC indicating it is reproducible and reliable. Except for the abdominal muscle endurance test and flexibility test, no Eurofit item had to be terminated prematurely and no patient required a rest, which is comparable with previous findings in clinical (Vancampfort et al., 2015c) and non-clinical (Oja and Tuxworth, 1995) populations. Given the present observations and its safety profile based on previous studies in people with severe mental illness (Vancampfort et al., 2012, 2015c) physician attendance is not required if the Eurofit test can be supervised by an experienced physical therapist.

4.2. Correlates of the eurofit test battery

In accordance with previous research in people with severe mental illness (Vancampfort et al., 2012, 2015c) a higher BMI was significantly associated with a poorer performance on physical fitness tests requiring propulsion or lifting of the body mass (i.e., sit-ups and standing broad jump tests). A second reason for the poorer performance in people with a higher BMI might be the high prevalence of physical complaints and pain during physical activities in this sub-population (Vancampfort et al., 2018a, 2018b). The observation that male patients perform better than women on some Eurofit test items has been reported previously (Vancampfort et al., 2012). Interestingly, illness duration was a stronger correlate for the Eurofit test performance than biological age. It might be hypothesized that a cumulative long-term effect of poor health behaviors, and longer lifetime exposure to

Table 3

Descriptive statistics and intraclass correlation coefficients (ICC) and 95% confidence intervals (CI) for the Eurofit test in patients with alcohol use disorders.

Test items	Completers (n)	First test	Re-test	P	ICC	95%CI
FBA (n/30 sec)	45	11.3 ± 4.3	9.9 ± 4.7	0.21	0.82	0.68 – 0.91
PLT (sec)	45	14.0 ± 3.6	13.2 ± 3.2	0.29	0.89	0.81 – 0.94
SAR (cm)	44	21.4 ± 10.1	23.0 ± 9.8	0.50	0.96	0.92 – 0.98
SBJ (cm)	45	144.8 ± 43.3	149.0 ± 45.2	0.67	0.97	0.93 – 0.98
HGR (kg)	45	41.6 ± 11.8	42.4 ± 11.7	0.76	0.97	0.95 – 0.99
SUP (n/30 sec)	41	15.4 ± 7.0	16.3 ± 6.6	0.58	0.95	0.91 – 0.98
SHR (sec)	45	27.0 ± 7.4	25.9 ± 6.9	0.53	0.93	0.86 – 0.96

Test-retest data are expressed as mean ± SD. *Significant when $P < 0.05$. FBA = flamingo balance, PLT = plate tapping, SAR = sit-and-reach, SBJ = standing broad jump, HGR = handgrip strength, SUP = sit-ups, SHR = shuttle run.

Table 4Associations of the Eurofit retest scores with physical activity levels and demographical and clinical characteristics in patients with alcohol use disorders ($n = 45$).

	Flamingo balance	Plate tapping	Sit and reach	Standing broad jump	Handgrip strength	Sit-ups	Shuttle run
Age (yrs)	0.22	0.57***	−0.34*	−0.71***	−0.26	−0.61***	0.53**
Illness duration (yrs)	0.24	0.82***	−0.39*	−0.78***	−0.44**	−0.69***	0.71***
BMI (kg/m ²)	0.33	0.22	−0.24	−0.34*	−0.09	−0.39*	0.11
Cigarettes / day (n) [†]	0.01	−0.12	−0.06	0.07	0.01	−0.06	0.10
PANAS positive affect score	0.13	−0.25	0.14	0.23	0.32	0.16	−0.14
PANAS negative affect score	−0.07	0.21	−0.19	−0.12	0.05	−0.27	0.21
AUDIT score	0.05	0.04	−0.02	−0.01	0.04	−0.11	0.08
IPAQ total MET	−0.12	−0.50**	0.38*	0.52**	0.50**	0.44**	−0.42**

*Significant when $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$, [†]27 patients smoked. BMI = body mass index, PANAS = Positive Affect and Negative Affect Scale, AUDIT = Alcohol Use Disorders Identification Test, IPAQ = International Physical Activity Questionnaire.

hazardous drinking translate into a poorer physical fitness.

Another important finding with possible clinical implications is that except for the flamingo balance, higher levels of physical activity were associated with a better physical fitness. Our data provide further evidence to the still limited exercise in AUD literature (Giesen et al., 2015; Hallgren et al., 2017a, 2018, Hallgren et al. 2017b) that better physical fitness might be achieved via increasing physical activity levels. Due to the limited physical activity and physical fitness research in patients with AUD, there are however currently no detailed physical activity guidelines available for this clinical population. Until such recommendations based on longitudinal and intervention studies are made available, we suggest that patients with AUD should comply with the general population physical activity recommendations for health, i.e. patients should do at least 150 min of moderate-intensity aerobic physical activity throughout the week or do at least 75 min of vigorous-intensity aerobic physical activity throughout the week or an equivalent combination of moderate- and vigorous-intensity activity. Aerobic activity should be performed in bouts of at least 10 min duration. Besides this, muscle-strengthening activities should be done involving major muscle groups on 2 or more days a week (WHO, 2010).

One explanation for the fact that hazardous drinking patterns itself were not a significant correlate for any of the Eurofit subtests might be that we only included inpatients with high risk drinking behaviors and who were rather heavily dependent, as suggested by the relatively high AUDIT scores and a relatively small variance (27.8 ± 6.8 for men and 25.4 ± 4.7 for women). Therefore, future research should explore any differences in Eurofit test item performances between (a) patients with different risk drinking and dependence levels, and (b) those with lower risk drinking and levels of alcohol dependence (e.g. outpatients not in need for an inpatient treatment). Previous research shows that the majority (about 74%) of those meeting the criteria for AUD are not severely dependent, with only 2–3 criteria fulfilled (Andréasson et al., 2013a). Moreover, these individuals are generally employed, living in stable accommodation with few social problems. Despite meeting the criteria for AUD, these people rarely seek help from specialist treatment clinics, despite drinking at risky levels (Andréasson et al., 2013b).

4.3. Study limitations and future research

Whilst this is the first study of its kind, a number of limitations should be considered. First, we only included inpatients from one center which questions the generalizability. However, the sample size was adequately powered and calculated a-priori. Future studies should replicate our study to determine whether present results are also applicable to outpatients with less alcohol dependence.

In conclusion, the present study demonstrates that the Eurofit test is a reliable and feasible test battery to assess several physical fitness components in inpatients with AUD. Because it is easy to perform and safe, the Eurofit test could be used by experienced clinicians (e.g. physical therapists) to assess the important construct of physical fitness in this vulnerable population.

Conflict of interest

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