Evaluation of the state of the art of psychological variables among exercisers at different levels

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Background

There is growing interest in the field of sport psychology to measure psychological variables among exercisers at different levels and between exercisers and non-exercisers, in order to identify beneficial activities in non-clinical and clinical groups (such as patients with metabolic diseases or osteoarticular disorders) and to implement psychological drivers for the promotion of greater athletic achievement and healthier lifestyles. [Clemente et al. 2019; Bernstein et al 2019; Zur et al. 2019]. The populations involved in these studies are highly heterogeneous and vary from professional athletes to laypeople, including fragile populations, such as the elderly, and people with chronic diseases, such as diabetes or obesity, who can benefit from physical activity [Kosteli et al. 2018; Ku et al. 2017; Matson et al. 2019]. Variables such as self-efficacy and self-regulation, depression, emotion, stress, and affect have been analysed and compared among athletes of various levels. Furthermore, a correlation of these variables with physical activity has been demonstrated [Zur et al. 2019; Myers et al 2017; Looyestyn et al. 2018]. Among different sport populations (e.g. athletes, semi-professional sport performers, and amateurs), psychological variables are assessed through validated scales and questionnaires and can be correlated with sport performance using objectively measured physical parameters (e.g. resting muscle tension, skin conductance, and respiration rate) through biofeedback technology [Myers et al 2017]. Novel technologies, including the use of computerised tests or online surveys, the involvement of participants using social media, the use of micro-electromechanical systems (MEMS) including wearables devices and sensor systems (such as global positioning systems - GPS, accelerometers, and heart rate monitoring sensors) appear promising for collection of relevant physical parameters [Lutz et al. 2019] and can be used both in regular exercise performers and laypeople [Looyestyn et al. 2018; Lin et al. 2018; Myers et al 2017].

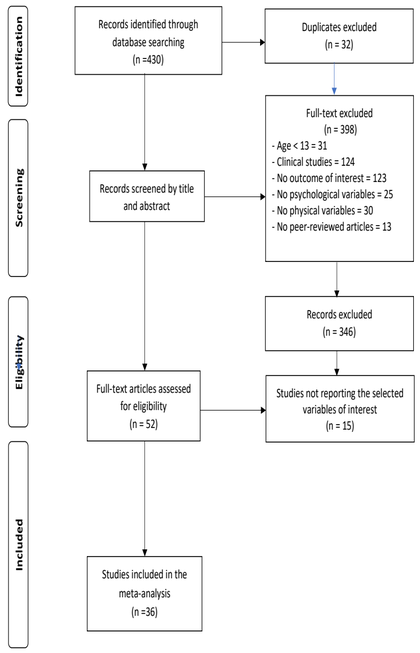
Aims

Primary aim of the study was to identify the most studied psychological variables among exercises at different levels and to report what variables have been shown to correlate with physical activity. We also aimed to identify and compare the main measures for assessing psychological variables and their correlations with physical activity in different sport and exercise populations. A comprehensive review that analyses various psychological variables in sport performers at different levels has not been performed so far. The results could be helpful to design potential interventions in the field of sport psychology and to allow reproducible analyses.

Methods

The protocol was written in accordance to the PRISMA-P 2015 checklist [Moher et al. 2009]. This review is registered with the PROSPERO international prospective register of systematic reviews (CRD42020175424, www.crd.york.ac.uk/PROSPERO/) with the title "Psychological variables among people who exercise at different levels: a systematic review". We searched Medline and PSYCHINFO databases for publications in English language between 01.01.2005 and 31.03.2021. All search strings were discussed with a qualified librarian. Bibliographies of reviews and original publications were hand searched for further studies. An additional search was performed in Google Scholar with the same search criteria as that applied to the electronic databases. Data search and extraction are reported in the PRISMA flow chart. Only peer-reviewed articles were included. All article types were considered for inclusion (e.g experimental studies, quasi experimental studies, surveys, etc.) Populations included were sport performers at different levels, including professional or elite athletes (e.g. remunerated athletes performing services in a professional athletic event); semi-professional or sub-elite athletes (e.g., engaging in sport activities but not as a full-time occupation or characterized by lower performance or roles compared to elite athletes); amateur or nonprofessional level sport (e.g. engaging in sporting activity largely or entirely without remuneration or at lower levels compared to elite and sub-elite athletes) or performing sport for recreational purposes. Laypeople level performers (people that rarely or do not perform in sport but undertake normal physical activity for daily living such as walking to work) were also included. Exclusion criteria were: non-human populations, children below 13 years of age and pregnant women, and certain patient populations (e.g. subjects with neurological and mental disorders). Clinical populations were excluded in this phase of the study. Quality assessment was performed separately for randomised controlled trials (RCTs) and observational studies using the Scottish Intercollegiate Guidelines Network (SIGN, https://www.sign.ac.uk/what-wedo/methodology/checklists/).

Fig 1

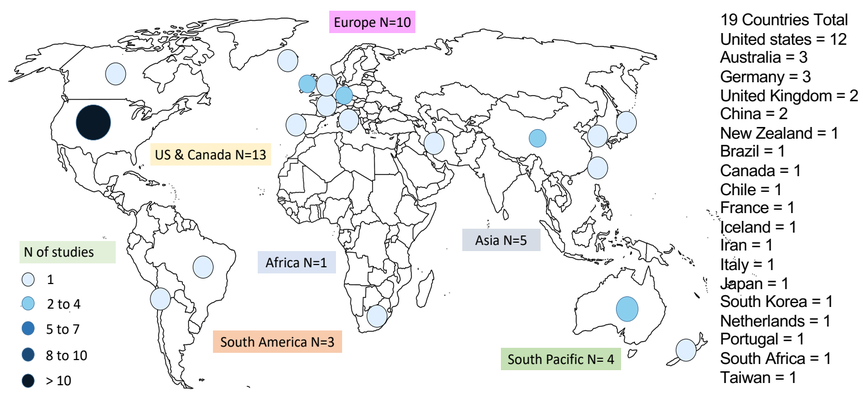


430 citations

52 articles for further scrutiny

36 studies included

Fig 2



19 Countries Total
United states = 12
Australia = 3
Germany = 3
United Kingdom = 2
China = 2
New Zealand = 1
Brazil = 1
Canada = 1
Chile = 1
France = 1
Iceland = 1
Iran = 1
Italy = 1
Japan = 1
South Korea = 1
Netherlands = 1
Portugal = 1
South Africa = 1
Taiwan = 1

Fig 3

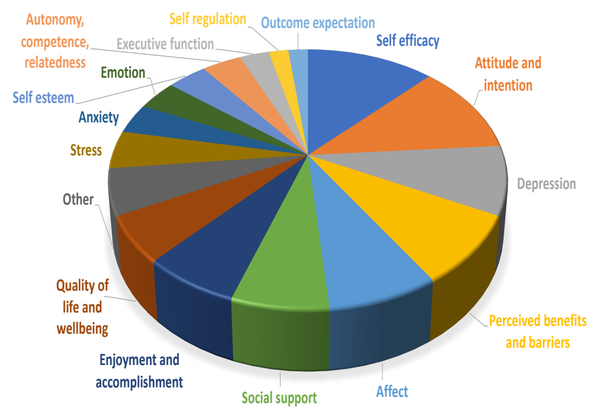


Fig 4

Characteristcs	N = 36
Pooled N, age	12064 (10 – 6346); 14 to 99 (22% > 60 years)
Gender	47.4% F (n= 1 males and n=6 females only)
Funding	44% publicly funded
Study duration	3 days to 2 years (median 65 days, IQR 9 – 169)
Population	4 (11%) professionals, 2 (5%) semi-professionals, 15 (42%) amateurs, 15 (42%) laypeople
Types of sport	Individual (cycling, running or fencing n=10, 28%), team sports (n=2, 5%) or mixed sports (n=4, 11%); 20 (56%) general fitness activities
Use of wearables	17 (47%); accelerometers (n=9), GPS (n=1), heart rate monitors (n=4) and pedometers (n=3)
Questionnaires	105 psychological variables assessed with 89 different types of questionnaires

Fig 5

Correlation with PA	Type	Athlete group
Self efficacy[1-5]	Positive	Laypeople (5) Amateurs (1)
Depression[6-9] Negative affect[9]	Negative	Laypeople (2) Amateurs (2)
Anxiety and Stress[5-7]	Negative	Laypeople (2)
Social support[4-6,10-12] Positive relationships	Positive	Laypeople (5) Amateurs (1)
Enjoyment Accomplishment[1,2,12]	Positive	Laypeople (3)

Fig 6

Type of Sport Performers	Elite or Sub-elite Athletes	Amateurs	Laypeople	P
Psychological variables n=105				
Type of variable (%)				
Cognitive (n=71)	7 (10)	19 (27)	45 (63)	0.02
Emotional (n=19)	3 (16)	9 (47)	7 (37)	0.08
Behavioural (n=15)	0	4 (27)	11 (79)	0.03
Physical variables (%)				
Wearables n=22				
Accelerometer/pedometer (n=14)	1 (7)	5 (36)	8 (57)	0.01
Heart rate monitor (n=6)	3 (50)	3 (50)	0	-
Power meter / GPS (n=2)	2 (100)	0	0	-
Type of activity n=57				
Physical activity intensity (n=42)	9 (21)	17 (40)	16 (38)	0.09
Fatigue/movement (n=8)	5 (63)	0	3 (39)	0.03
Aerobic (n=3)	0	2 (67)	1 (33)	-
Inactivity (n=3)	0	0	3 (100)	-
Anaerobic (n=1)	0	1 (100)	0	-

Fig 7

Study Quality	Elite or Sub-elite Athletes N=6	Amateurs N=15	Laypeople N=15
RCTs n=4			
Very good (4)	0	1	3
Observational n=32			
Very good (11)	6	2	3
Good (18)	0	11	7
Moderate (3)	0	1	2

Conclusion and Future Directions

Multiple psychological and physical variables were tested by each study and a high heterogeneity of questionnaires were used.
Results highlight a growing interest in the study of cognitive and emotional aspects of amateurs and laypeople performing physical activity.
Variables such as self-efficacy, accomplishment, and positive affect were frequently analysed and correlated with physical activity.
We are currently specifically exploring the correlations between the most common psychological variables and physical activity is currently ongoing, identifying the majority of the studies among laypeople and including self-efficacy as main reported variable.
High heterogeneity in the type of exercise performed and in the measurements of physical activity and exercise programs were reported, thus further limiting a consistent analysis.
One way to standardise the measurements of physical activity intensity could be the use of modern technology, including wearables. In our review, mainly pedometers and accelerometers were used, while more complex technology or the use of heart rate monitors were mainly limited to athletes.

References

[1]Kosteli et al. 2019; [2]Smith et al. 2016; [3]Levy et al. 2005; [4]Joseph et al. 2014; [5]Xiao et al. 2019; [6]Oliveira et al. 2019; [7]Elahi et al. 2012; [8]Farren et al. 2017; [9]Joseph et al. 2017; [10]Smith et al. 2019; [11]Hwang et al. 2017; [12] Lee et al. 2019; 5Xiao et al. 2019