Revista de Psicología del Deporte/Journal of Sport Psychology Vol. 30. n.°1 2021, pp. 60–74
Universidad de Almería / Universitat Autónoma de Barcelona. ISSN 1132–239X ISSNe 1988–5636

Regressing Dual Side of Motivation on Exercise Commitment in Adults: A Structured Equation Modelling Approach

Yan Zhou[1]

Abstract

Physical activity and exercise is the key to a healthy lifestyle and prevention of disease. Lack of persistency and regular commitment towards exercise are the basic challenges that lead individuals to develop inactive physical lifestyles. Motivation for exercise plays an important role in maintaining healthy lifestyle habits, a pre-requisite a healthy ageing process in the future. In this context, the self-determination theory is a widely used theory in the context of studying the influence of an individual's motivation for his/her behavior. In this context, the current study has been conducted with the objective to explore how autonomous, controlled and extrinsic motivation influences levels of exercise persistence and exercise commitment with the mediation of exercise enjoyment in China. To achieve this objective, the data was collected from 304 respondents through a survey questionnaire and the collected data was analyzed. The results obtained from the analysis have indicated that the impact of autonomous motivation is positively significant for exercise persistence but is insignificant in case of exercise commitment. Similarly, the impact of controlled motivation is significant and positive for both exercise commitment and persistence. Moreover, the impact of extrinsic motivation is negatively significant for both exercise commitment and persistence. Lastly, exercise enjoyment has significant mediating role between all the independent variables and dependent variables. The study has theoretical as well as practical implications, especially the gym trainers and physical health fitness coaches.

Keywords: autonomous motivation, controlled motivation, extrinsic motivation, enjoyment, exercise persistence, exercise commitment, China, self-determination theory

Introduction

One of the major challenging risk behaviors shown by individuals is physical inactiveness, considered to be the fourth largest cause of death according to the World Health Organization. According to these statistics, almost 3.2 million people face death in one year due to diseases attributable to physical inactivity (WHO, 2017). Lack of persistency and commitment towards exercise are the basic challenges in this regard. In other words, people who do not engage in physical exercise or do not stay consistent in their performance face the risks associated with of physical inactivity. The physical fitness indicator trends for China have been illustrated in Figure 1 (See below). According to Euro barometer's report, several reasons or excuses are put forward by people who lead physically inactive lifestyles. The most important and prominent causes reported by them include, lack of motivation for physical exercise, and lack of time for such activities. Of the total number of respondents, 23% cited the former reason while and 43% were inclined towards the latter (Euro barometer, 2018). Both these factors can be linked with to human psychology in case of individuals who do not feel motivated to exercise or do not possess the intention to do so (Caudwell & Keatley, 201 6). This indicates the need of motivation for people to engage them in different physical activities and exercises.

The health professional especially the physical fitness or exercise professionals use various approaches to motivate their clients but these approaches are usually imposed upon the clients. In this scenario, the human aspect of their clients is ignored by professionals (Santos, Ball, Crawford, & Teixeira, 2016). Moreover, the social environment of a person is also a good source of motivation as it motivates people to maintain their physical activities. In this regard, there are several dimensions of motivation such as extrinsic motivation, autonomous motivation and controlled motivation. Autonomous motivation refers to the idea that the person has a certain realization of the importance of physical exercise regardless of the fact that he/she enjoys it or not or perceives the exercise regime to be in accordance with his/her values. On the other hand, controlled motivation. Builds on the postulate that a person exercises in order to fulfill some external need or requirement which compels him or her to perform physical activity. Moreover,

[1] School of International Education, Shangqiu Normal University, Shangqiu 476000, China
Corresponding email: Zhou.xyan@Yandex.com

extrinsic motivation is related to some external reward that motivates the individual (Ryan & Deci, 2017). In addition, enjoyment of exercise is another important factor linked to levels of exercise commitment and exercise persistence shown by a person. Enjoyment is actually a process of feeling satisfaction, contentment and pleasure by performing a particular task or engaging is a specific behavior. If considered in the context of exercise, it can also be linked with the level of motivation, persistence and commitment of a person towards exercise with a person who feels motivated to do physical exercise and enjoys the process, being more likely to stay committed and persistent towards exercise (Vallerand & Young, 2014). Therefore, the aspect of enjoyment might provide important insights if studied in mediation with the influence casted by motivation on exercise commitment and persistence.

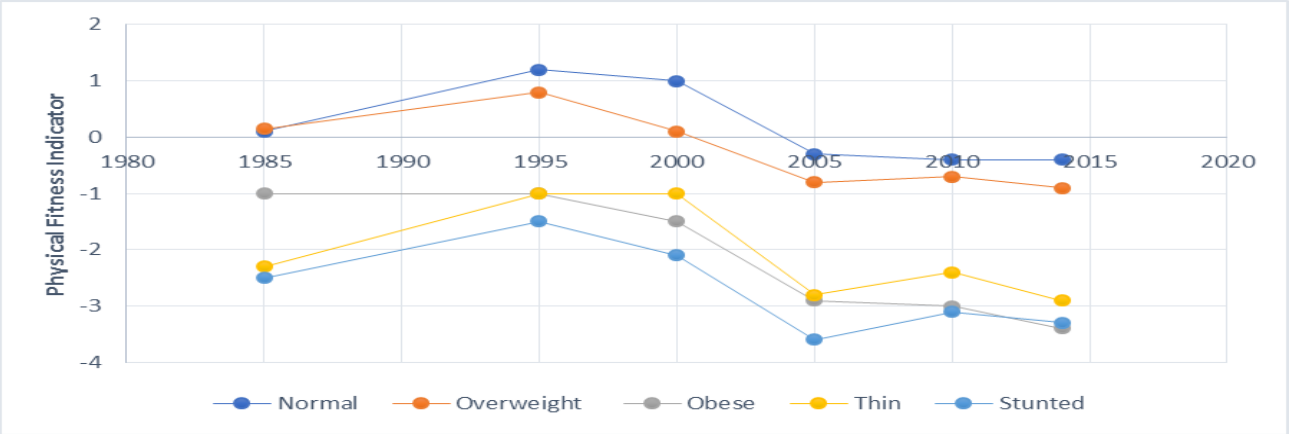


Figure 1: Physical fitness indicator Trends by growth and nutritional status, China (Dong et al., 2019)

It has been made quite clear in earlier researches that physical activity and exercise is the key towards developing a healthy lifestyle and preventing various diseases, especially cardiovascular diseases (Brunetti et al., 2016). People get engaged in exercise with various aims (See Table 1 below). In China, it has been estimated that cardiovascular diseases are very high in prevalence with approximately 290 million people contracting cardiovascular diseases in 2016 (Eisenberg, Vanderbom, & Vasudevan, 2017). The major cause of these cardiovascular diseases is considered to be individual behaviors especially, inactive physical lifestyle habits or lack of exercise in an individual's daily routine. With the passage of time, in China, the building environments have seen serious challenges that have negatively impacted the levels of physical activity of the Chinese (Zhou, Grady, & Chen, 2017). The issue of physical inactivity has been observed in different other countries and regions of the world especially, in the developing and underdeveloped countries with the major reason found to be lack of proper motivation in individuals. Therefore, it is crucial to investigate the impact of several dimensions of motivation on the commitment and persistence of people towards exercise, especially in the context of China. Otherwise, the unhealthy and inactive lifestyles of people will have severe outcomes and consequences for their health.

Table 1

Aims of Exercising in China (China Daily)

Aim of Exercising	Percentage
Physical Activity	36.6
Recreation	23.7
Prevention or Curing diseases	14.5
Weight Loss	9.4
Improving Mood	8.6

Over the last decade, several studies have explored the aspects of exercise commitment and persistence along with several other factors that act as determinants of commitment and persistence towards exercise. Some studies have considered the motivation factor as an important determinant in this regard wherein the two aspects of motivation i.e. autonomous and controlled motivation have been considered. However, the aspect of

extrinsic motivation has not been related with commitment and persistence of exercise in this regard. Moreover, the factor of exercise enjoyment has also not been considered as a mediating variable between motivation, and commitment and persistence in the past. Therefore, in the current study, as recommended by Rodrigues, Teixeira, Neiva, Cid, and Monteiro (2020), the impact of autonomous, controlled and extrinsic motivation is on exercise persistence and commitment is studied taking enjoyment as the mediating variable in this regard. The study has been conducted in the context of China with the following key objectives;

- To analyze the impact of autonomous motivation on exercise persistence and exercise commitment in China
- To examine the impact of controlled motivation on exercise persistence and exercise commitment in China
- To investigate the impact of extrinsic motivation on exercise persistence and exercise commitment in China
- To explore the mediating impact of enjoyment on the relation between autonomous motivation; and exercise persistence and exercise commitment in China
- To determine the mediating impact of enjoyment on the relation between controlled motivation, and exercise persistence and exercise commitment in China
- To study the mediating impact of enjoyment on the relation between extrinsic motivation, and exercise persistence and exercise commitment in China

As clear from the objectives, the scope of the study is defined by the influence of three dimensions of motivation i.e. autonomous, controlled and extrinsic on the persistence and commitment level towards exercise while exploring the mediating role of enjoyment in the context of China. The study will be theoretically significant as it contributes to the literature and knowledge regarding dimensions of motivation and their impact on exercise persistence and commitment. Moreover, it will be practically significant for the general public as they will get insights to getting and staying motivated to engage in physical activities for an active and healthy lifestyle. It will also be significant for health and fitness professionals as they will gain guidance regarding the application of the most effective approach for motivation for their clients to make them feel more motivated about exercise in a way that they are able to enjoy doing exercise instead of performing this activity out of pressure. The next section will review relevant literature and the theoretical framework of the study followed by a section describing the particular research methodology used during the course of this study. In the next section, the results obtained will be analyzed and interpreted. The last section will summarise key findings and draw conclusions.

Literature Review

Self-Determination Theory

There are number of theories have been established regarding the study and analysis of motivation, including the Self Determination Theory (SDT). The importance of this theory is based on the fact that it focuses on both, the individual-level personality factors as well as the causes and impacts of self-determinated behavior of a person (Deci & Ryan, 2000). This theory has found applications in various fields namely, education, sports, exercise and physical education etc. (de Araujo Guerra Grangeia et al., 2016; Phillips & Johnson, 2018; Rocchi & Pelletier, 2018). Studies have shown that SDT is a widely used theory in the context of studying the influence of motivation of a person on his/her behavior and intention especially in the context of education (Diogo Santos Teixeira, Marques, & Palmeira, 2018). This theory is based on three fundamental psychological needs i.e. autonomy, competence and relatedness. These aspects are found in every person and the satisfaction of these factors has a bearing on the psychological as well as physical well-being of a person (Ryan & Deci, 2000). A higher level of self-determined motivation is the consequence of satisfaction of the aforementioned basic psychological needs and is the reason why it can be linked with various positive outcomes regarding behavior and intention of a person (Chen et al., 2015). Diametrically opposed to this, the frustration related to the basic psychological needs results in negative outcomes due to lack of self-determined motivation and is ultimately responsible the lack of development at the individual level. As far as the context of physical exercise is concerned, the satisfaction of basic psychological needs is an important indicator of motivation which ultimately leads to persistence and commitment towards exercise (P. J. Teixeira, Carraça, Markland, Silva, & Ryan, 2012). On the other hand, frustration related to these psychological needs is the indicator of amotivation leading towards low commitment and less persistence behavior towards exercise (Ryan & Deci, 2017). This indicates that in the context of the current study, i.e. to find out the impact of autonomous, controlled and extrinsic motivation on the persistence and commitment towards exercise, the self-determination theory can be considered as the theoretical foundation in the current study. The review of the relational literature regarding the variables of the study has been discussed next.

Impact of Autonomous Motivation on Exercise Persistence and Commitment

The impact of autonomous motivation on exercise persistence and commitment can be explored on the basis of SDT, which has been widely used to investigate the influence of motivation in the context of exercise. It has been proposed by the researchers that motivation lies on a continuum and three levels of behaviors can be identified in relation to different levels of self-determined motivation (Sylvester, Curran, Standage, Sabiston, & Beauchamp, 2018). These include autonomous motivation, controlled motivation and amotivation. Autonomous motivation lies on a higher level at the continuum and thus corresponds to a higher level of self-determined motivation. Autonomous motivation is based on three kinds of regulation. The first one is intrinsic regulation which refers to the involvement of a person in physical activities for the purpose of enjoyment and pleasure. The second one is integrated regulation which refers to the involvement of a person in physical activity as he/she considers it as a part of his/her self-evaluation, beliefs and values. The third one is identified regulation which is associated more with external motivation whereby a person gets involved in physical activity because he/she understands its value as well as the value of its outcomes (Rocchi & Pelletier, 2018; Diogo Santos Teixeira et al., 2018). In case of amotivation, the person gets involved in physical exercise without having any intention and will to do so. Different studies have explored the influence of autonomous motivation on the exercise-related behavior of individuals especially, sports players. Some studies have also focused on physical trainers or coaches in a similar context. It has been found that autonomous motivation results in positive exercise-related behaviors such as persistence and adherence. The factors responsible for these positive outcomes included a higher level of self-determination, and a higher level of self-esteem and relatedness of the person (Jowett et al., 2017). The role of physical trainers has been found to be more important in this regard as compared to friends or parents as autonomous motivation from the coaches results in the satisfaction of basic psychological needs, enjoyment and motivation for exercise. This results in an increased level of commitment and persistency towards exercise in the individual. On the basis of this review of existing literature, it can be hypothesized that;

H 1a: Autonomous motivation has a significant impact on exercise persistence.

H 1b: Autonomous motivation has a significant impact on exercise commitment.

Impact of Controlled Motivation on Exercise Persistence and Commitment

As in the case of autonomous motivation, the impact of controlled motivation on exercise-related behaviors can be explored on the basis of SDT, according to which, opposite to autonomous motivation, the controlled motivation is further based on two types of regulations i.e. introjected regulation which refers to the involvement of a person in physical exercise in order to avoid the negative feelings such as shame and guilt and also to have the positive feelings related to the personal ego such as pride (Ntoumanis et al., 2018), and external regulation in which the involvement of a person in exercise is controlled by several external factors such as punishment and rewards. In other words, it can be stated that the behaviors that are represented in case of controlled behavior are based on the feelings of pressurizing, forcing, compelling and coercing that come from external or internal sources. There have been a number of studies in the past, in which the research was based on the distinction between two types of motivation i.e. autonomous and controlled motivation, and the difference of these two types is understood through the SDT (Monteiro, Pelletier, Moutão, & Cid, 2018; Sheldon, Osin, Gordeeva, Suchkov, & Sychev, 2017). Research has indicated that the regulations of controlled behavior i.e. external regulation and introjected regulation do not yield consistent results as far as the behavior and intention of a person regarding exercise is concerned. In some cases, the impact of controlled motivation on exercise-related behaviors has been found to be negative and significant while in some cases this impact has been found to be insignificant. In a similar way, some studies have reported a positively significant association between controlled motivation and exercise behavior that is self-reported. In other studies, this positive association between the introjected and external regulations of controlled motivation and the self-reported behaviors related to exercise has been found to be insignificant (Jowett et al., 2017). An interesting point in this regard is that in some cases, there is no relationship found between the controlled motivation and exercise-related behaviors such as persistence and commitment. This clearly indicates that the aforementioned relationship has been quite inconsistent as mixed results have been obtained by the researchers. In

light of this discussion, the following hypotheses is proposed.

H 2a: Controlled motivation has a significant impact on exercise persistence.

H 2b: Controlled motivation has a significant impact on exercise commitment.

Impact of Extrinsic Motivation on Exercise Persistence and Commitment

Motivation is actually the consideration that forces or pushes one to perform a certain task and to identify the direction, intensity and adherence of behaviors related to that task. In other words, the starting of any behavior is due to psychological drives and in the recent studies, it has also been elaborated that moving towards a specific behavior is heavily based on the need for self-improvement and self-actualization (Divine, Watson, Baker, & Hall, 2019; Neace, Hicks, DeCaro, & Salmon, 2020). As far as intrinsic motivation is concerned, the behaviors developed out of this kind of motivation is for enjoyment and pleasure-seeking. On the other hand, in case of extrinsic motivation, the behaviors evolve in response to certain factors of outcomes that are not directly integrated with the activity such as rewards/feedback. In other words, it can be stated that in case of extrinsic motivation, the resulting behavior is actually to avoid the negative outcomes and to get the positive outcomes of that particular activity in which a person is involved. Although both, intrinsic and extrinsic motivation have a certain impact on an individual's behavior, according to literature, intrinsic motivation is usually preferred because of the reason that this motivation results in creative responses that are directly focused on the task itself instead of the outcomes of the task. Extrinsic motivation is more focused towards the external locus of control and it hinders the intrinsic motivation in a person (Sheldon et al., 2017). The self-determination theory can also be used as a base to explore the impact of extrinsic motivation on the levels of persistence and commitment towards exercise. A study was conducted in this regard based on a smoking termination program. It was observed that extrinsic motivation through rewards and prizes was more effective as compared to the intrinsic motivation through feedback and controlled motivation. However, after the research, when a follow-up was conducted with the participants, it was found that the participants of the group with intrinsic motivation showed twice more persistence and commitment to smoking termination as compared to the participants of extrinsic motivation, and thrice more as compared to the participants with controlled motivation. This indicates that although extrinsic motivation is beneficial to initiate a process of task, the persistence and commitment towards that task is attributed more towards intrinsic motivation. If this aspect is considered in the context of physical exercise, it can be stated that through extrinsic motivation, people might readily adopt the physical exercise or other physical activities but to sustain and maintain the exercise habit, intrinsic motivation is more significant (Ryan & Deci, 2017; Diogo Santos Teixeira et al., 2018). It has also been discussed that the use of extrinsic motivation without developing intrinsic motivation might not yield positive results but the role of motivation in the various stages involved in motivational readiness is not widely studied. In short, extrinsic motivation has been seen to have positive outcomes in the short-terms but if combined with intrinsic motivation, it might yield more long-term results. Thus, through this discussion of literature, the researcher hypothesizes that;

H 3a: Extrinsic motivation has a significant impact on exercise persistence.

H 3b: Extrinsic motivation has a significant impact on exercise commitment.

Mediating Role of Exercise Enjoyment

In the literature, a great emphasis has been placed on the factor of enjoyment while studying exercise-related behaviors and it has been discussed in different studies that the role of enjoyment during exercise is significant in the understanding of the aspects of persistence and committment towards exercise activity. As in recent years, the tendency towards exercise and physical activities of people has dramatically reduced and enjoyment is considered to be an important factor in this regard. This is the reason why researchers have incorporated the factor of enjoyment in relation to exercise (Li, 2018). Despite the fact that enjoyment has a significant role in determining levels of persistence and commitment towards exercise but still there is a dearth of studies that have explored the ways and methods to inculcate the factor of enjoyment during exercise. An important factor that has been related with the exercise enjoyment is intrinsic motivation and it has been discussed that due to intrinsic motivation, the feeling of enjoyment can be obtained while doing physical activities like exercise. However, studies focusing on understanding of other dimensions of motivation, such as controlled motivation and autonomous motivation in relation with the feeling of exercise enjoyment, are not found in considerable

amount (Phillips & Johnson, 2018). A study has been conducted with the theme of intrinsic and extrinsic motivation in relation with the exercise enjoyment that has the ultimate outcome of exercise adherence. In that study, it was found out that the intrinsic motivation was more related to exercise enjoyment leading towards exercise persistence as compared to other body-related motives of exercisers. In light of the above, the following hypotheses are developed and proposed herewith.

H 4a: Exercise enjoyment has significant mediating role in the relationship between autonomous motivation and exercise persistence

H 4b: Exercise enjoyment has a significant mediating role in the relationship between controlled motivation and exercise persistence

H 4c: Exercise enjoyment has a significant mediating role in the relationship between extrinsic motivation and exercise persistence

H 5a: Exercise enjoyment has a significant mediating role in the relationship between autonomous motivation and exercise commitment

H 5b: Exercise enjoyment has a significant mediating role in the relationship between controlled motivation and exercise commitment

H 5c: Exercise enjoyment has a significant mediating role in the relationship between extrinsic motivation and exercise commitment.

Table 2

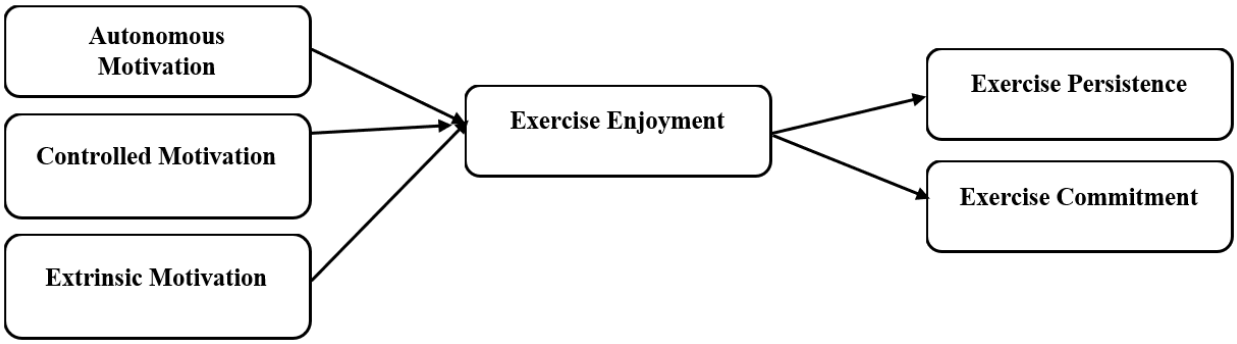
Literature Review Summary

Sr. No.	Author(s)	Contribution	Gap
1	(Rodrigues et al., 2018)	Found the relationship between variables related to motivation and their behavior-based outcomes in context of exercise	Lack of valid instrument that could analyze all the six dimensions of interpersonal behavior in context of exercise
2	(Monteiro et al., 2018)	Found the relationship between self-determination theory and achievement goal theory to analyze enjoyment and intention to continue swimming	Only limited to the exercise in context of swimmers
3	(Diogo S Teixeira, Silva, & Palmeira, 2018)	Measurement of motivation regulation, basic psychological needs of SDT and emotional response. Analysis of mediators of basic psychological needs and emotions	Lack of emphasis on the classes or categories of exercisers
4	(Gardner, Magee, & Vella, 2017)	Found the impact of enjoyment and intention to continue on drop out behavior	Limited generalizability of the results due to demographics
5	(Jowett et al., 2017)	Analyzed the impact of perception of motivation and quality of relationship with coach on well-being of athletes	Only well-being of the athletes was considered. No discussion of persistence and commitment levels
6	(Teques, Calmeiro, Silva, & Borrego, 2017)	Developed physical activity enjoyment scale to measure the level of enjoyment during physical exercise	Not related with the motivation and exercise commitment aspects
7	(Sheldon et al., 2017)	Evaluated the Relative Autonomy Continuum of self-determination theory	The exercise persistence and exercise commitment aspects are not evaluated
8	(Diogo Santos Teixeira et al., 2018)	Meta-analysis of the links between affect, exercise motivation and basic psychological needs in the context of exercise	Lack of adequate statistical data for some researches included in the meta-analysis

Methodology

This section outlines the overall research design of the current study including the research method, sample selection techniques, measurement tools, data collection procedure, and data analysis methods, used for the purposes of this study.

Research Framework



Research Method

The current study is aimed at exploring the influence of autonomous motivation, controlled motivation and extrinsic motivation on levels of exercise persistence and commitment along with the mediating role of exercise enjoyment in the context of China. Based on this objective, the current research has been designed as a quantitative study. The positivism research philosophy has been applied as the interference of the researcher is minimum in the research process and the results are interpreted and explained without the involvement of any opinion or point of view of the researcher. In the same way, the deductive research approach has been utilized in the current study as the researcher has taken self-determination theory as the foundation following which thee hypotheses have been developed for testing. Moreover, the study is a cross-sectional one as data is collected only once from the respondents as there is no additional need to collected data before and after a particular point. In short, the study is quantitative in nature, and the analysis is based on the collection of these quantitative data-sets.

Sampling and Data Collection

As far as the population of the study is concerned, all the exercisers of China are included in the population as the study is conducted in the context of exercise. Through the use of convenient sampling techniques, a representative sample has been selected from the population of exercisers that go to gym regularly and have an exercising experience of at least six months. The respondents were informed about the purpose of the study and other ethical aspects were also considered in this regard. They were informed that their personal information will be kept confidential, and will not be made public in any case and only be used for the purpose of research. After making all these ethical aspects clear, the survey questionnaires developed for the purpose of data collection were distributed online through E-mail. The survey questionnaires contained three sections. The first section contained all the ethical assurances for the respondents. The second section was based on the demographic information of the respondents such as age, gender, exercise experience etc. The third and final section contained the questions regarding the measurement item used for different variables of the study. The questionnaire was designed carefully and it was also pre-tested by field experts to ensure that any error or issue can be resolved to guarantee accurate and reliable collection of data. A total of 350 questionnaires were administered, and after completion, l305 responses were finalized to be used in the study. The remaining responses have been discarded based on their incompleteness and/or non-reliability.

Measurement Items

For the measurement items of the variables, there are three independent variables i.e. autonomous motivation, controlled motivation and extrinsic motivation. There are two dependent variables i.e. exercise persistence and exercise commitment. Lastly, there is one mediating variable i.e. exercise enjoyment. The first independent variable, -autonomous motivation, has been measured through three measurement items, a sample of these items is “My exercise instructor supports my choices”. In the same way, the second independent variable i.e. controlled motivation has also been measured using three measurement items, a sample of these items is “My exercise instructor imposes his opinions”. Items for both these aspects have been adapted from the literature (Rodrigues et al., 2019). The last independent variable of extrinsic motivation has been measured in the context of four measurement items which have also been adopted from a study in the past (Zahariadis, Tsorbatzoudis, & Grouios,

2005). The dependent variable, exercise persistence has been measured through only two items as per existing literature (Sarrazin, Vallerand, Guillet, Pelletier, & Cury, 2002). A sample is "I will continue to exercise in the next 6 months as I currently do or in a very similar way (same type, frequency, duration and intensity)" On the other hand, the other dependent variable, exercise commitment contains six measurement items adapted from past studies (Wilson et al., 2004). The only mediating variable of the study i.e. exercise enjoyment has been measured through the use of eight items for measurement taken from literature (Teques et al., 2017). A sample of these items is "Exercise is very stimulating". In this way, using all these measurement items, a questionnaire has been developed for data collection purposes. All these measurement items have been measured using a five point Liker Scale that ranges from 1 to 5. The 1 on this scale indicates strong disagreement with 5 indicating strong agreement of the respondent.

Statistical Analysis

After the collection of required and essential data, the same has been statistically analyzed through different tests and techniques. The SPSS and AMOS software have been employed in order to run the analysis tests and the results have been obtained. The most important tests that have been conducted include the descriptive statistics, KMO and Bartlett's test, convergent and discriminant validity test, rotated component matrix, confirmatory factor analysis and structure equation modelling. Results obtained through these tests have been interpreted and explained in the next section of the research.

Data Analysis

Demographics

Three aspects of demographic profile have been taken into consideration in the questionnaire i.e. age, gender and education of the respondents. A total of 304 respondents have taken part in the study. In case of gender, there are a total of 52.3% males and 47.7% females in the selected sample. In addition, if the age of the participants is concerned, it can be seen that most of the respondents i.e. 31.9% belong to the age group of 41 to 50 years old. Moreover, 23% of the respondents belong to the age group between 21 to 30 years old. In the same way, 28.8% of the respondents were 31 to 40 years old. Lastly, there are 16.1% respondents included in the sample that belong to the age group of 50 years or above. As far as the educational qualification of respondents is concerned, the respondents holding a graduation degree are only 12.2%. Respondents holding a post-graduation degree are the highest in number in the sample i.e. 43.4%. Moreover, 33.9% of respondents hold a Master's Degree with 10.5% of the respondents holding other educational qualifications. These demographics realities of the respondents provide the basic information regarding them that may be helpful in interpreting the results of the analysis.

Descriptive Statistics

The basic information of the data can be obtained through descriptive statistics of the variables of the study such as minimum and maximum values, mean of the data, level of standard deviation and skewness of the data. The basic information regarding the normality and validity of the collected data can be obtained through descriptive statistics. The results of descriptive statistics have been provided in the table 3 of the study. The table indicates that the minimum and maximum values of all the variables except controlled motivation is ranging from 1 to 5 respectively. Only in case of controlled motivation, the maximum value is 6.33 which indicates the outlier. This range of 1 to 5 is in accordance with the five point Likert scale. Moreover, the mean values of the variables indicate the normality of the collected data. In the same way, the skewness values are ranging between -1 and 1 - a clear indication that the data collected is distributed normally and can be utilized for the purposes of the study.

Table 3: Descriptive and Normality

Variable	N	Minimum	Maximum	Mean	Std. Deviation	Skewness
ExceEnjoy	304	1.00	5.00	3.5658	1.07385	-.836
AutonMotiv	304	1.00	5.00	3.5274	1.13806	-.695
ControMotiv	304	1.00	6.33	3.1447	1.13624	.003
ExtrinMotiv	304	1.00	5.00	2.4893	1.31775	.841
ExcerPeri	304	1.00	5.00	3.6086	1.12710	-.718
ExcerComit	304	1.00	5.00	3.2900	1.09515	-.412

KMO and Bartlett's Test

The KMO test is applied so that the adequacy related to the collected sample can be determined. The closer the value of KMO is to 1, the higher its usefulness for the factor analysis of the sample. As seen in the results reported in Table 4 below, it is evident that the value of KMO test is 0.943 which is very close to 1. This shows that the factor analysis will be useful for the study. The other test i.e. Bartlett's test is generally applied to probe into the overlapping factor between the variables with the significance value indicating the outcome in this regard. As illustrated in Table 4, it has been reported that the significance value of this test is 0.000; thus, it can be stated that variables do not possess any redundancy.

Table 4

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.943
Bartlett's Test of Sphericity	Approx. Chi-Square	7442.693
	Df	325
	Sig.	.000

Rotated Component Matrix

In order to apply the factor analysis and to probe the cross-loading issue, the rotated component matrix is used, the results of which have been reported in Table 5 below. If the values of the factor loadings obtained are higher than 0.7, this indicates the validity of the collected data and the absence of the cross-loading issue. As shown in Table 4, nearly all the values of the factor loadings of the measurement items are higher than 0.7; thus, it can be stated that there is no cross-loading issue and the data is valid.

Table 5: Rotated Component Matrix

Component	**1**	**2**	**3**	**4**	**5**	**6**
EE1	.658					
EE2	.752					
EE3	.821					
EE4	.822					
EE5	.830					
EE6	.840					
EE7	.827					
EE8	.821					
AM1				.784		
AM2				.822		
AM3				.821		
CM1					.713	
CM2					.731	
CM3					.638	
EM1			.890			
EM2			.908			
EM3			.912			
EM4			.900			
EP1						.814
EP2						.810
EC1		.687				
EC2		.744				
EC3		.775				
EC4		.718				
EC5		.772				
EC6		.855				

Common Method Bias

In order to investigate the issue of common method bias, the diagnostic test has been applied, the results of which have been reported in Table 6 below. It can be seen that the percentage variance of all the components is less than 50%, which indicates that there is no common method bias issue found in the collected data-set and the same can be used for analysis.

Table 6

Common Method Bias

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	12.118	46.608	46.608	12.118	46.608	46.608
2	2.508	9.646	56.253			
3	2.313	8.897	65.150			
4	1.459	5.612	70.761			
5	1.047	4.027	74.788			
6	.940	3.617	78.405			

Convergent and Discriminant Validity

The convergent validity can be tested through the values of CR, AVE and MSV. Any value of CR greater than 0.7 and any value of AVE greater than 0.5 indicates that the collected data has convergent validity. Similarly, if the MSV values are lower than AVE values, it also points towards convergent validity. On the other hand, self-correlation values of variables higher than the other correlation values point towards the discriminant validity. All these aspects have been quantified in Table 7 below, illustrating that the data has both convergent and discriminant validity to be used in the analysis.

Table 7

Convergent and Discriminant Validity

	CR	**AVE**	**MSV**	**EP**	**AM**	**CM**	**EM**	**EE**	**EC**
EP	0.862	0.758	0.328	0.871					
AM	0.906	0.762	0.366	0.573	0.873				
CM	0.738	0.684	0.511	0.529	0.551	0.796			
EM	0.860	0.742	0.268	0.483	0.509	0.518	0.862		
EE	0.956	0.730	0.392	0.559	0.605	0.626	0.503	0.854	
EC	0.904	0.711	0.511	0.532	0.424	0.415	0.452	0.534	0.781

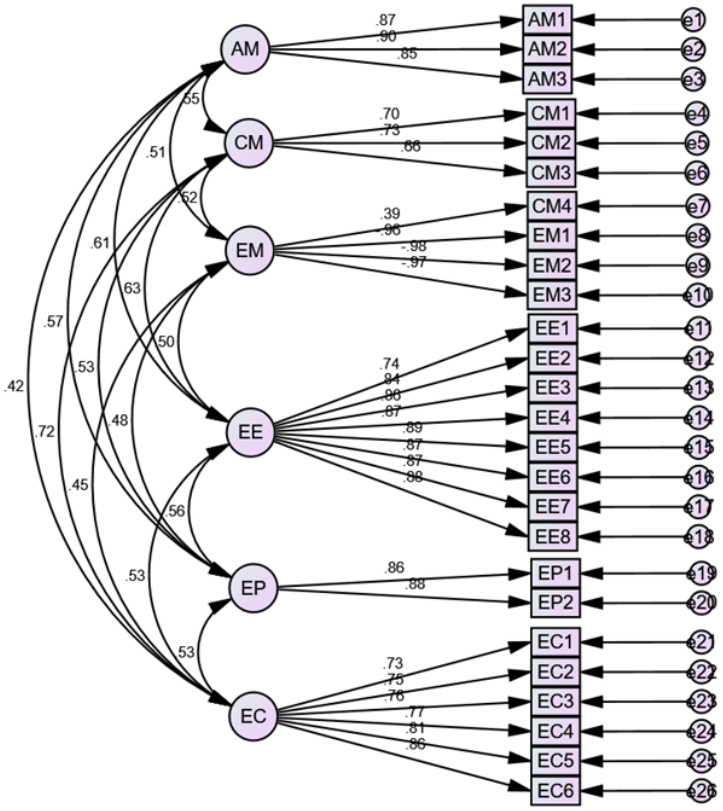
Confirmatory Factor Analysis

The results of CFA have been reported in Table 8 below and both, the recommended values and the observed values of various indicators of CFA have been presented along with their interpretation. As illustrated in Table 7, the observed values of all the indicators of CFA such as CMIN/DF, GFI, IFI, TLI and CFI are found to be present within the threshold or recommended values, indicating that the model used is suitable for the purposes0 of the current study.

Table 8: Model Fit Indices

Fit Index	**Recommended Score**	**Observed Score**	**Interpretation**
CMIN/DF	≤ 3.0; 5.0	1.822	Excellent
GFI	≥ 0.80	0.887	Excellent
IFI	≥0.90	0.965	Excellent
TLI	≥ 0.90	0.960	Excellent
CFI	≥ 0.90	0.965	Excellent
RMSEA	≤ 0.08	0.052	Excellent

Figure 2. CFA



Structural Equation Modeling

According to the results of SEM, as summarised in Table 9 below, it can be seen that the impact of all three dimensions of motivation i.e. autonomous, controlled and extrinsic on exercise enjoyment is significant with autonomous and controlled motivation having a positive impact but extrinsic motivation having a negative impact. In addition, the impact of autonomous motivation is positively significant for exercise persistence but is insignificant in case of exercise commitment. However, the impact of controlled motivation is significant and positive in case of both exercise commitment and persistence. The impact casted by extrinsic motivation is negatively significant in case of both exercise commitment and persistence. As far as the mediating role of exercise enjoyment is concerned, the results presented in Table 10 indicate that exercise enjoyment has a significant mediating role between all the independent variables and dependent variables.

Table 9: Structural Equation Modeling

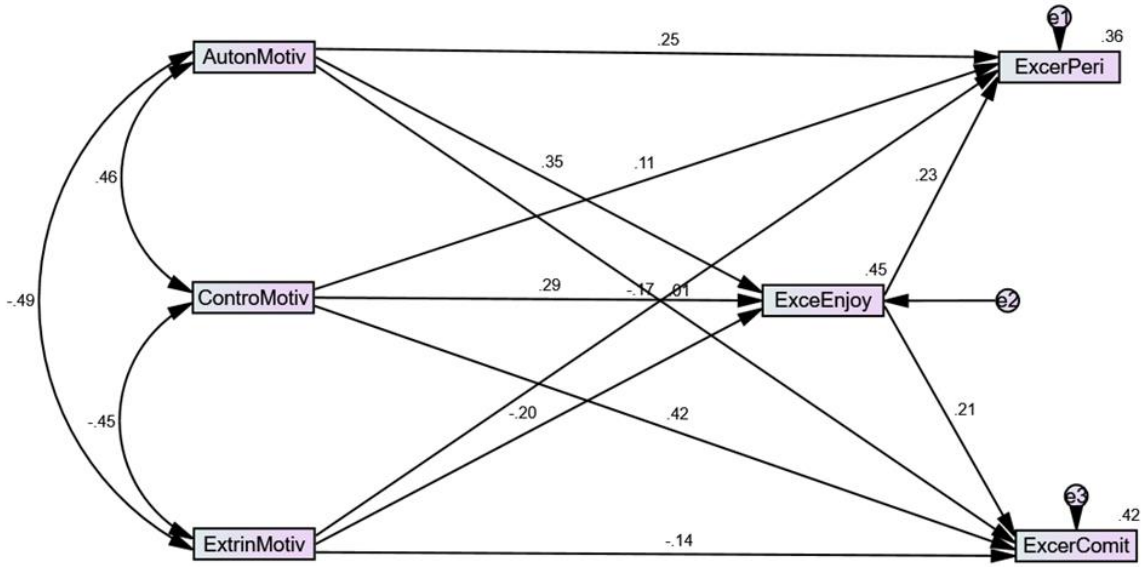
	Path		Estimate	S.E.	C.R.	P
ExceEnjoy	<---	AutonMotiv	.346	.048	6.768	***
ExceEnjoy	<---	ControMotiv	.286	.047	5.731	***
ExceEnjoy	<---	ExtrinMotiv	-.200	.041	-3.935	***
ExcerPeri	<---	AutonMotiv	.246	.059	4.151	***
ExcerComit	<---	AutonMotiv	.010	.054	.169	.866
ExcerPeri	<---	ControMotiv	.114	.056	2.010	.044
ExcerComit	<---	ControMotiv	.416	.052	7.697	***
ExcerPeri	<---	ExtrinMotiv	-.168	.048	-2.982	.003
ExcerComit	<---	ExtrinMotiv	-.143	.045	-2.665	.008
ExcerPeri	<---	ExceEnjoy	.225	.065	3.639	***
ExcerComit	<---	ExceEnjoy	.211	.060	3.582	***

Table 10: Mediating Effect of Exercise Enjoyment

	ExtrinMotiv	**ControMotiv**	**AutonMotiv**

ExcerComit	-.042**	.060**	.073**
ExcerPeri	-.045**	.064**	.078**

Figure 3: SEM



Discussion and Conclusion

Discussion

The current study was aimed at finding out how autonomous, controlled and extrinsic motivation influences levels of exercise persistence and commitment with the mediation of exercise enjoyment in China. Based on the review of existing literature and using the theoretical framework of SDT, various hypotheses were developed to te be tested through the analysis. The first two hypotheses stated that autonomous motivation has a significant impact on exercise persistence and exercise commitment respectively. The first hypothesis has been accepted as results indicated the significant impact of autonomous motivation on exercise persistence with a one percent increase in autonomous motivation enhancing exercise persistence level by 24.6% significantly. This can be justified by the fact that when a person gets the motivation to exercise through genuine interest or personal endorsement, there are high chances that he/she will show consistency in exercise behavior. This result is in line with findings from past researches (Monteiro et al., 2018; Rodrigues et al., 2018; Diogo Santos Teixeira et al., 2018). The second hypothesis was however rejected as the impact of autonomous motivation on exercise commitment could not be found to be significant. The next two hypotheses stated that controlled motivation has a significant impact on exercise persistence and exercise commitment, respectively. Both these hypothesis have been accepted as the results have shown that as the controlled motivation increases by one percent, the exercise persistent will significantly enhance by 11.4% and exercise commitment will significantly increase by 41.6% . This shows that controlled motivation increases commitment more than an increase in persistence. The logic behind this inference is that as the controlled motivation involved gaining of some reward or avoiding punishment, this might make a person commit to exercise but this might only be effective in the short-term. In the long-term, the level of persistency may not remain as high; indicating a positive contribution of controlled motivation towards exercise commitment as compared to persistence. These results have been found in consistency with similar studies conducted in the past (Monteiro et al., 2018; Rodrigues et al., 2018; Diogo Santos Teixeira et al., 2018). The next two hypotheses indicated that extrinsic motivation has a significant impact on exercise persistence and commitment. As the results have indicated, the influence casted by extrinsic motivation on persistence and commitment is negative and significant, rendering these two hypotheses acceptable. In other words, as the extrinsic motivation increases by one percent, it may reduce the levels of exercise persistence by 16.8% and exercise commitment by 14.3%. The logical reasoning behind these results may be that even though extrinsic motivation might

innculcate exercise behavior in people but it may not be that effective as individuals might not remain consistent in the performance of exercise based on extrinsic motivation because the external rewards in extrinsic motivation do not possess the power to induce persistence and commitment among the exercisers. These results are also in concordance with past studies (Neace et al., 2020; Wilson et al., 2004). The last several hypotheses are related to the mediating role of exercise enjoyment between different dimensions of motivation and commitment and persistence towards exercise. The results have indicated that the mediating impact of exercise enjoyment is significant in all cases, and thus all these hypotheses can be considered as accepted. This may be explained by the fact that autonomous and controlled motivated exercises enjoy exercising, leading towards a more committed and persistent behavior in this regard. On the other hand, extrinsic motivation does not induce the feeling of enjoyment while doing exercise, and thus the commitment and persistence levels are lower in this case. Past studies conducted in a similar context have also indicated similar outcomes (Monteiro et al., 2018).

Conclusion

The results have indicated that the impact of autonomous motivation is positively significant for exercise persistence but is insignificant in case of exercise commitment. However, the impact of controlled motivation is significant and positive for both exercise commitment and persistence. Moreover, the impact of extrinsic motivation is negatively significant for both exercise commitment and persistence. Lastly, exercise enjoyment has a significant mediating role between all the independent variables and dependent variables. On the basis of these results, it can be concluded that autonomous and controlled motivation must be used by the Chinese gym coaches or physical fitness experts so that not only the enjoyment factor can be added for the exercisers performing different physical activities but their commitment and persistence for exercise can also be effectively increased.

Implications

Theoretically, the current study has the benefit that it possesses the detailed information regarding different types of motivation under the light of self-determination theory and how they impact the exercise related behavior of individuals. In practical terms, the study has implications for gym trainers and physical fitness coaches especially in the context of China as they can benefit from insights pertaining to the use of motivation factor to induce enjoyment factor for their clients to enhance their persistence and commitment for exercise. They can get the guidelines for the application of autonomous and controlled motivation in this regard and avoid reliance on extrinsic motivation. This indicates that the study also has indirect implications for exercisers as well because increased levels of commitment and persistence are beneficial for their own health and fitness.

Limitations and Future Research Indications

Despite scope and implications of the current study, there are certain limitations that must be highlighted. Firstly, the sample size for the present study could stand to be increased was. In future, it is necessary to take a larger sample size so that the findings of the study can be generalized to the population in a better way. Moreover, other exercise-related behaviors and intentions might also be considered in the future in addition to commitment and persistence towards exercise. More robust techniques and tools should be employed in future researches in order to generate more reliable results.

References

Brunetti, N. D., Santoro, F., Correale, M., De Gennaro, L., Conte, G., & Di Biase, M. (2016). Incidence of atrial fibrillation is associated with age and gender in subjects practicing physical exercise: A meta-analysis and meta-regression analysis. International journal of cardiology, 221, 1056-1060. doi: https://doi.org/10.1016/j.ijcard.2016.07.133

Caudwell, K. M., & Keatley, D. A. (2016). The effect of men's body attitudes and motivation for gym attendance. Journal of strength and conditioning research, 30(9), 2550-2556. doi: 10.1519/JSC.0000000000001344

Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J., . . . Mouratidis, A. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. Motivation and Emotion, 39(2), 216-236. doi: 10.1007/s11031-014-9450-1

de Araujo Guerra Grangeia, T., de Jorge, B., Franci, D., Martins Santos, T., Vellutini Setubal, M. S., Schweller, M., & de Carvalho-Filho, M. A. (2016). Cognitive load and self-determination theories applied to e-learning: impact on

students' participation and academic performance. PLoS ONE, 11(3), e0152462. doi: 10.1371/journal.pone.0152462

Deci, E. L., & Ryan, R. M. (2000). The" what" and" why" of goal pursuits: Human needs and the self-determination of behavior. Psychological inquiry, 11(4), 227-268. doi: 10.1207/S15327965PLI1104_01

Divine, A., Watson, P. M., Baker, S., & Hall, C. R. (2019). Facebook, relatedness and exercise motivation in university students: a mixed methods investigation. Computers in Human Behavior, 91, 138-150. doi: https://doi.org/10.1080/07448481.2020.1748041

Dong, Y., Lau, P. W., Dong, B., Zou, Z., Yang, Y., Wen, B., . . . Ma, J. (2019). Trends in physical fitness, growth, and nutritional status of Chinese children and adolescents: a retrospective analysis of 1· 5 million students from six successive national surveys between 1985 and 2014. The Lancet Child & Adolescent Health, 3(12), 871-880. doi: https://doi.org/10.1016/S2352-4642(19)30302-5

Eisenberg, Y., Vanderbom, K. A., & Vasudevan, V. (2017). Does the built environment moderate the relationship between having a disability and lower levels of physical activity? A systematic review. Preventive Medicine, 95, S75-S84. doi: https://doi.org/10.1016/j.ypmed.2016.07.019

Eurobarometer. (2018). Sports and Physical Activity (Vol. 2020). Brussels: European Comission: Eurobarometer.

Gardner, L. A., Magee, C. A., & Vella, S. A. (2017). Enjoyment and behavioral intention predict organized youth sport participation and dropout. Journal of physical activity and health, 14(11), 861-865. doi: https://doi.org/10.1123/jpah.2016-0572

Jowett, S., Adie, J. W., Bartholomew, K. J., Yang, S. X., Gustafsson, H., & Lopez-Jiménez, A. (2017). Motivational processes in the coach-athlete relationship: A multi-cultural self-determination approach. Psychology of Sport and Exercise, 32, 143-152. doi: https://doi.org/10.1016/j.psychsport.2017.06.004

Li, M. (2018). The Influence of Psychological Needs and Exercise Motivation on Exercise Dependence among Chinese College Students. Psychiatric Quarterly, 89(4), 983-990. doi: https://doi.org/10.1007/s11126-018-9595-2

Monteiro, D., Pelletier, L. G., Moutão, J., & Cid, L. (2018). Examining the motivational determinants of enjoyment and the intention to continue of persistent competitive swimmers. Int. J. Sport Psychol, 49(6), 484-504.

Neace, S. M., Hicks, A. M., DeCaro, M. S., & Salmon, P. G. (2020). Trait mindfulness and intrinsic exercise motivation uniquely contribute to exercise self-efficacy. Journal of American College Health, 1-5. doi: https://doi.org/10.1016/j.psychsport.2017.06.007

Ntoumanis, N., Stenling, A., Thøgersen-Ntoumani, C., Vlachopoulos, S., Lindwall, M., Gucciardi, D. F., & Tsakonitis, C. (2018). Longitudinal associations between exercise identity and exercise motivation: A multilevel growth curve model approach. Scandinavian Journal of Medicine & Science in Sports, 28(2), 746-753. doi: https://doi.org/10.1111/sms.12951

Phillips, L. A., & Johnson, M. A. (2018). Interdependent effects of autonomous and controlled regulation on exercise behavior. Personality and Social Psychology Bulletin, 44(1), 49-62. doi: 10.1177/0145167217733068

Rocchi, M., & Pelletier, L. (2018). How does coaches' reported interpersonal behavior align with athletes' perceptions? Consequences for female athletes' psychological needs in sport. Sport, Exercise, and Performance Psychology, 7(2), 141.

Rodrigues, F., Bento, T., Cid, L., Pereira Neiva, H., Teixeira, D., Moutão, J., . . . Monteiro, D. (2018). Can interpersonal behavior influence the persistence and adherence to physical exercise practice in adults? A systematic review. Frontiers in Psychology, 9, 2141. doi: https://doi.org/10.3389/fpsyg.2018.02141

Rodrigues, F., Pelletier, L., Neiva, H. P., Teixeira, D. S., Cid, L., & Monteiro, D. (2019). Initial validation of the Portuguese version of the Interpersonal Behavior Questionnaire (IBQ & IBQ-Self) in the context of exercise: Measurement invariance and latent mean differences. Current Psychology, 1-12. doi: https://doi.org/10.1007/s12144-019-00374-y

Rodrigues, F., Teixeira, D. S., Neiva, H. P., Cid, L., & Monteiro, D. (2020). The bright and dark sides of motivation as predictors of enjoyment, intention, and exercise persistence. Scandinavian Journal of Medicine & Science in Sports, 30(4), 787-800. doi: https://doi.org/10.1111/sms.13617

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. American psychologist, 55(1), 68. doi: 10.1037/0003-066X.55.1.68

Ryan, R. M., & Deci, E. L. (2017). Self-determination theory: Basic psychological needs in motivation, development, and wellness: Guilford Publications.

Santos, I., Ball, K., Crawford, D., & Teixeira, P. J. (2016). Motivation and barriers for leisure-time physical activity in socioeconomically disadvantaged women. PLoS ONE, 11(1), e0147735. doi: 10.1371/journal.pone.e0147735

Sarrazin, P., Vallerand, R., Guillet, E., Pelletier, L., & Cury, F. (2002). Motivation and dropout in female handballers: A 21-month prospective study. European journal of social psychology, 32(3), 395-418. doi: https://doi.org/10.1002/ejsp.98

Sheldon, K. M., Osin, E. N., Gordeeva, T. O., Suchkov, D. D., & Sychev, O. A. (2017). Evaluating the dimensionality of self-determination theory's relative autonomy continuum. Personality and Social Psychology Bulletin, 43(9), 1215-1238. doi: https://doi.org/10.1177%2F0146167217711915

Sylvester, B. D., Curran, T., Standage, M., Sabiston, C. M., & Beauchamp, M. R. (2018). Predicting exercise motivation and exercise behavior: A moderated mediation model testing the interaction between perceived exercise variety and basic psychological needs satisfaction. Psychology of Sport and Exercise, 36, 50-56. doi: https://doi.org/10.1016/j.psychsport.2018.01.004

Teixeira, D. S., Marques, M., & Palmeira, A. L. (2018). Associations between affect, basic psychological needs and motivation in physical activity contexts: Systematic review and meta-analysis. Revista iberoamericana de psicología del ejercicio y el deporte, 13(2), 225-233.

Teixeira, D. S., Silva, M. N., & Palmeira, A. L. (2018). How does frustration make you feel? A motivational analysis in exercise context. Motivation and Emotion, 42(3), 419-428. doi: https://doi.org/10.1007/s11031-018-9690-6

Teixeira, P. J., Carraça, E. V., Markland, D., Silva, M. N., & Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: a systematic review. International journal of behavioral nutrition and physical activity, 9(1), 78. doi: 10.1186/1479-5868-9-78

Teques, P., Calmeiro, L., Silva, C., & Borrego, C. (2017). Validation and adaptation of the Physical Activity Enjoyment Scale (PACES) in fitness group exercisers. Journal of Sport and Health Science. doi: https://doi.org/10.1016/j.jshs.2017.09.010

Vallerand, J. R., & Young, B. W. (2014). Are adult sportspersons and exercisers that different? Exploring how motives predict commitment and lapses. International journal of sport and exercise psychology, 12(4), 339-356. doi: 10.1080and1612197X.2014.932823

WHO. (2017). Physical Activity for Health. Geneva: World Health Organization.

Wilson, P. M., Rodgers, W. M., Carpenter, P. J., Hall, C., Hardy, J., & Fraser, S. N. (2004). The relationship between commitment and exercise behavior. Psychology of Sport and Exercise, 5(4), 405-421. doi: https://doi.org/10.1016/S1469-0292(03)00035-9

Zahariadis, P. N., Tsorbatzoudis, H., & Grouios, G. (2005). The Sport Motivation Scale for children: Preliminary analysis in physical education classes. Perceptual and motor skills, 101(1), 43-54. doi: https://doi.org/10.2466%2Fpms.101.1.43-54

Zhou, P., Grady, S. C., & Chen, G. (2017). How the built environment affects change in older people's physical activity: A mixed-methods approach using longitudinal health survey data in urban China. Social Science & Medicine, 192, 74-84. doi: https://doi.org/10.1016/j.socscimed.2017.09.032