Influencing Factors of Chinese Adolescence Athletes' Doping Intention and Strategy of Anti-Doping Education

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Abbreviations

AGT: the achievement goal theory

CADIS-A: Chinese Athletes Doping Intention Scale-Adolescence

CD: Perceived Cons of Doping

CN: Perceived Cons of not Doping

DI: Doping Intention

DSDM: Drugs Deterrence Model

EI: Ego-involving Climate

MC-MA: motivational climate-moral accomplishment model of doping intention

MD: Moral Disengagement

PD: Perceived Pros of Doping

PES: performance enhancing substance

SCT: the social cognitive theory

SDCM: the sport drugs control model

SDT: the self-determination theory

SP: Sportspersonship

TI: Task-involving Climate

TPB: the theory of planned behavior

Executive Summary

Background

Adolescent athletes seem to be even vulnerable to doping comparing with their adult peers. Since doping is essentially a goal-orientated decision-making behavior, it is essential to clarify the psychological mechanisms underlying adolescent athletes' doping and to design anti-doping educational strategy on this basis. However, existing psychological models for predicting doping motivation and behavior need to be improved to be more applicable to adolescent athletes and used as a theoretical framework of intervention. Considering psycho-culture background, the present study integrated critical constructs of the achievement goal theory (AGT; Ames, 1992; Nicholls, 1989), the social cognitive theory (SCT; Bandura, 1986), the sport drugs control model (SDCM; Donovan, Egger, Kapernick, & Mendoza, 2002), and the theory of planned behavior (TPB; Ajzen, 1991, 2019) to conduct motivational climate-moral accomplishment model of doping intention (MC-MA) for Chinese adolescent athletes were proposed and tested by two sample from Chines adolescent athletes. MC-MA hypothesized: 1) Moral accomplishment predicts doping intention as proximal factors. 2) Perception of motivational climate of sports team influences doping intention as distal predictors. 3) Moral accomplishment is the potential mechanisms underlying the effects of perception of motivational climate on doping intention. 4) Individual' s attitudes toward doping predict doping intention directly. The model was validated by two samples from China.

Methods

615 (age = 15.68 ± 1.67 years) and 2064 (age = 15.99 ± 1.84 years) competitive adolescent athletes finished the cross-sectional survey in the first and second study respectively. Considering that doping is a universal phenomenon in different sports, we recruited participants from various sport teams, covering both individual and team

sports (e.g., athletics, weightlifting, cycling, swimming, rugby, shooting, field and track).

Chinese Athletes Doping Intention Scale-Adolescents (CADIS-A) was established to measure adolescent athletes' doping intention and its psychological influencing factors. CADIS-A contains of forty 5-point Likert scale items, including 8 sub-scales: Doping Intention (DI), Task-Involving Climate, Ego-Involving Climate, Moral Disengagement, Sportspersonship, Pros of Doping, Cons of Doping, and Cons of not Doping. Each survey lasted for about 20 minutes. Statistical method of structural equation modelling (SEM) was used to test MC-MA and mediating effect of moral accomplishment in the two studies.

Results

1) Overall, MC-MA showed satisfactory fit in both study 1 and 2. 2) Moral disengagement positively related with doping intention with large effect size in study 1 and 2. 3) Sportspersonship was related with doping intention negatively with medium effect size in the two studies. 4) Task-involving climate had negative indirect effect on doping intention via sportspersonship in study 1 and 2. Task-involving climate was associated with doping intention negatively in study 1 but showed non-significant relationship with doping intention in study 2. 5) Ego-involving climate had positive indirect effect on doping intention via moral disengagement and non-significant direct effect in the two studies. 6) Pros of doping predicted doping intention positively in study 2 but showed non-significant predictive effect in study 1. 7) Cons of doping predicted doping intention negatively only in study 2. 8) Con of not doping predicted doping intention positively in study 1 only. 9) MA-MC explained 61.4% and 65.8% in variance of doping intention in study 1 and study 2 respectively.

Conclusion

MC-MA model provided a new approach to identify the roles of perceived motivational climate, moral accomplishment, and attitudes in the psychological mechanisms of doping intention of Chinese adolescent athletes.

The important findings showed that motivational climate conducted by coaches influence adolescent athletes' moral accomplishment, which in turn predicts doping intention. These findings provided new insights into the psychological mechanisms of social context influence on doping and also contributed to future intention-based doping prevention and anti-doping education programs.

Introduction

Doping has a long and varied history and seemed to have become more prevalent in adolescent sports in recent years (Lazuras et al., 2017). Previous evidence indicated that nearly half of surveyed adolescent athletes reported PESs use, including nutritional supplements and doping use, to achieve a greater physique and to optimize performance (Backhouse et al., 2013). Compared to adult athletes, adolescent athletes may be considered particularly vulnerable to doping. The hazards of doping include damage to physical and mental health, and perceptions relating to the unfairness of sports. Doping is essentially a goal-orientated decision-making behavior. It is essential to clarify the psychological mechanisms underlying adolescent athletes' doping and to design anti-doping education strategy on this basis.

Psychological mechanisms underlying doping

Researchers employed or integrated some social psychological models to predict doping including the self-determination theory (SDT) (Ryan & Deci, 2000), the social cognitive theory (SCT) (Bandura, 1986), and the theory of planned behavior (TPB) (Ajzen, 1991, 2019). For instance, Ntoumanis et al. (2013) integrated self-efficacy to refrain from doping and TPB to predict doping intention in physical activity settings. They found the model could explain 62% variance in doping intention. Similarly, Lucidi et al. (2008) integrated SCT and TPB to predict adolescents' use of doping substances. The model explained 55% variance in doping intention. Both moral disengagement and doping self-regulatory efficacy had predictive effects on doping intention. Hodge et al. (2013) integrated SDT and SCT, considering that autonomous and controlled motivations as predictors of moral disengagement in sports, which predicted drug taking susceptibility via attitude toward performance-enhancing drugs drugs in sports. The integrated model explained 47% variance in attitude and 22% variance in susceptibility only. Only controlled motivation related with moral disengagement positively with small effect size (β=.15). Barkoukis et al. (2013)

integrated goal orientation theory, SCT and SDT with TPB to predict elite athletes' doping intention from a meta-analysis perspective. They found both sportspersonship and goal orientations could predict doping intention. However, relative autonomy index (RAI) had neither direct nor indirect effects on doping intention.

The above results suggested motivation and morality were predictors of doping; indicated that integrated models could predict and explain doping intention more effectively than any uni-model alone; and proposed the reasonableness of distinguishing psychological influencing factors as distal and proximal predictors of doping. Doing so also was helpful to explore the mechanisms of doping.

Researchers also proposed models for doping specifically including the sports drug control model (SDCM; Donovan et al., 2002), the drugs deterrence model for elite athletes (DSDM; Strelan & Boeckmann, 2003), the life-cycle model of performance enhancement (Petróczi & Aidman, 2008), and systematic model of doping behavior (Johnson, 2011). These models were proposed from various perspectives. The latter two models are theoretical models and were not directly used as theoretical frameworks in psychological empirical research.

SDCM deems appraisals of benefits and threats, morality, legitimacy, reference group opinion, and personality as predictors of attitudes and intentions regarding PESs. DSDM proposed legal sanctions, social sanctions, self-imposed sanctions and health concerns are the deterrents of decision to use drugs, whereas material, social and internalized benefits correlate with decision to use drugs positively, and situation factors moderate the relationships between deterrents and benefits with decision.

These models emphasize the predicting effects of appraisals of benefits and threats on doping intention and behavior. In this respect, they are consistent TPB which deems attitudes toward doping are influencing factors of doping. Compared to social psychological models, these models ignore the roles of individual's motivation or team motivational climates on doping, and without the consideration of distinguishing

the influencing factors as distal and proximal factors, they are difficult to explore the mechanisms and guide designing anti-doping education strategy.

Motivational climate-moral accomplishment model of doping intention (MC-MA)

As we know, China is a country with collectivist culture. Compared to western countries, adolescent athletes spend more time with their coaches and teammates rather than their parents. Considering this psycho-cultural background and applicability of existing models, we integrated critical constructs of the achievement goal theory (AGT; Ames, 1992; Nicholls, 1989), SCT (Bandura, 1986), SDCM (Donovan, Egger, Kapernick, & Mendoza, 2002), and TPB (Ajzen, 1991, 2019). We proposed Motivational Climate-Moral Accomplishment Model of Doping Intention (MC-MA) for Chinese adolescent athletes.

Both distal and proximal predictors were considered when developing MC-MA (Fig. 1). As one kind perception of situation context, perceived motivational climate was deemed as distal predictors of doping intention. Individual's moral accomplishment was considered as proximal predictors of doping intention. Moral accomplishment is the potential mechanism underlying the effect of perception of motivational climate on doping intention. Perception of situation context plays role in doping intention via individual's moral accomplishment. Individual's attitudes toward doping also have effects on doping intention directly.

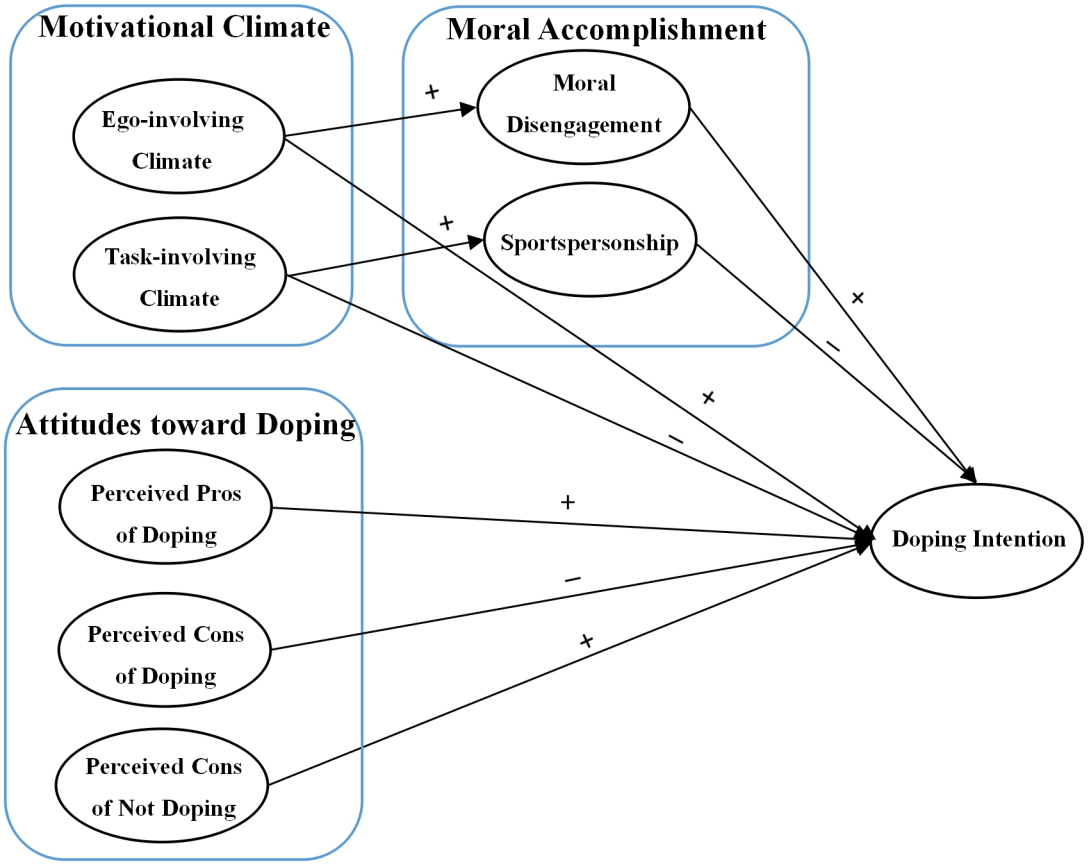

Figure 1. Motivational Climate-Moral Accomplishment Model of Doping Intention (MC-MA)

Doping intention

Doping has been viewed as a deliberate behavior and the role of doping intention has been particularly underlined in the process of doping use (Kavussanu et al., 2020; Lazuras et al., 2010; Lazuras et al., 2015). Previous studies indicated that doping intention accounted for more than 50% of the variance in adolescents' doping use (Elbe & Barkoukis, 2017; Ntoumanis et al., 2017; Zelli et al., 2010). And, by using intentions as an outcome variable, researchers were allowed to test for the psychological processes underlying doping use in athletes who did not commit to doping practices (Barkoukis et al., 2013). Sincen, adolescent athletes have fewer chance to dope than adult athletes. Doping intention is an important factor that should be targeted in doping prevention and anti-doping education. Therefore, doping

intention was considered as consequence variable in MC-MA.

Moral Accomplishment

Moral Disengagement

Doping is considered a voluntary and unethical activity, so the roles of moral variables in influencing doping intention and behavior have been outlined in relevant theories and studies (Corrion et al., 2017; Kavussanu et al., 2016; Ring & Kavussanu, 2018; Ntoumanis et al., 2014). Moral disengagement is a central construct of SCT (Bandura, 1986). It refers to a self-serving or self-regulatory process whereby people who transgress still believe they are acting morally (Bandura et al., 2001). For instance, athletes may regard illegal drugs as "nutrition products", so that doping behavior does not seem as bad (i.e., euphemistic labelling); they may distort, or minimize the consequences of drug use (i.e., distortion of consequences); and they may absolve themselves of responsibility by thinking that "*somebody also does this*" or "*my coaches do not prohibit this*" (i.e., diffusion and displacement of responsibility) (Bandura et al., 2001; Kavussanu et al., 2020). Both cross-sectional and qualitative studies have consistently reported the positive associations of moral disengagement with doping intention and behavior in athletes across different ages and various competitive levels (Boardley et al., 2014; Boardley et al., 2015; Mallia et al., 2016). For example, a strong relationship was found between moral disengagement and doping intention in 749 adolescent athletes (mean age = 16.43 ± 1.69 years) from three western countries (Italy, Greece, and Germany; r = .26 - .35, $p < .001$) (Mallia et al., 2016). Similarly, Hodge et al. (2013) also found that moral disengagement associated with attitudes toward drugs in sport with large effect size (β = .52).

Sportspersonship

The concept of sportspersonship is other approach toward understanding moral behavior in sports. Sportspersohip is a multidimensional construct incorporating respect for rules, rituals and traditions of sports and activities, fair play (i.e., *striving*

for victory but not using unfair means), acceptance of victory and defeat (Ommundsen et al., 2003). Sportspersonship is proposed to associate with a variety of prosocial and antisocial behaviors, such as cooperation and moral reasoning (Barkoukis et al., 2020; Perry & Clough, 2017; Serrano-Durá et al., 2020; Shrout et al., 2016). The inverse associations of sportspersonship with doping intention and behavior have been demonstrated in some previous studies (Barkoukis et al., 2013; Blank et al., 2016; Donahue et al., 2006). For example, a cross-sectional study with 750 adult elite-level athletes (mean age = 25 ± 5.89 years) supported the significant negative relationship between sportspersonship and doping intention (β = -.18, p < .001) (Barkoukis et al., 2013). A meta-analysis also indicated that sportspersonship was negatively associated with doping behaviour, with a significant small effect size (r = -.23) (Blank et al., 2016). However, previous studies have shown inconsistent results for the relationship between sportspersonship and doping intention. For instance, Mudrak et al. (2018) found that keeping winning in proportion (an aspect of sportspersonship) did not significantly correlate with doping intention in adolescent athletes. The explanation for the discrepancy might be the different operating definitions and classifications of sportspersonship. Thus, in MC-MA, sportspersonship was defined as multidimensional construct. Alternatively, the relationship between sportspersonship and doping could be moderated by other variables, such as age and competitive levels. Additionally, since adolescence is a time when values (e.g., sportspersonship) are still being formed, the role of sportspersonship on doping deserves to be further investigated.

Motivational Climates

As doping intention typically reflects the person's motivation and determination to engage in doping behavior within a specific social context (Ajzen, 1991, 2019; Kavussanu et al., 2020; Lazuras et al., 2010), researchers use AGT as a theoretical framework to understand pro- and anti-social behaviors in sport. The negative association between task-/ mastery-orientation and doping intention, and the positive

association between ego-/performance-orientation and doping intention were demonstrated in past studies (e.g. Barkoukis et al., 2013). Balaguer et al. (2002) found that perceived motivational coach climate had greater predictive ability than individual orientations with respect to various cognitive, affective and behavioral outcomes. To better understand doping intention and behavior, consideration of motivational climates is essential.

According to Ntoumanis et al. (2007): a task-involving (or mastery) motivational climate encourages effort and rewards task mastery and individual improvement, while an ego-involving (or performance) motivational climate emphasizes normative ability and promotes inter-individual comparison. Past research has demonstrated the associations between perceived motivational climates and doping behaviour within a sporting context (Blank et al., 2016; Kavussanu et al., 2020; Ntoumanis et al., 2014; Ntoumanis et al., 2017). For example, a recent study with 1495 adult football players (mean age 20.4 ± 4.4 years) from the UK, Denmark and Greece, indicated a significantly positive relationship between ego-involving motivational climate and doping likelihood ($\beta = .11$, $p < .001$). Similarly, a meta-analysis also indicated that doping use was inversely associated with task-involving motivational climate and was positively associated with ego-involving motivational climate (Ntoumanis et al., 2014). A systematic review also proposed the perceptions of a task or mastery climate were consistently associated with a range of adaptive motivational outcomes including perceived competence, intrinsic forms of motivational regulation, practice and competitive strategies and moral attitudes. Perception of an ego/performance climate was positively associated with extrinsic regulation and amotivation, maladaptive strategy use, antisocial moral attitudes (Harwood et al., 2015).

Another climate recommended in sport context is autonomy support climate which associated with intrinsic behavioral regulation via satisfaction of basic psychological needs. However, a study conducted by Hodge and colleagues (2013) demonstrated autonomy support and controlled climate created by coaches and teammates explained only 22% of variance in doping susceptibility. Similarly, another study found relative

autonomous index (RAI) had neither direct nor indirect effect on doping intention via sportspersonship (Barkoukis et al., 2013). We therefore combined AGT and motivational climate. Task- and ego-involving climates rather than autonomy support and controlled climate were integrated in MC-MA.

Distal and Proximal predictors

Compared to motivational climates, moral variables were considered more proximal antecedents towards doping intention and behaviour (Barkoukis et al., 2013; Corrion et al., 2017; Hodge et al., 2013; Ntoumanis et al., 2017). Previous evidence has demonstrated that moral disengagement significantly mediated the association between ego-involving motivational climate and antisocial variables in sport (e.g., drug taking susceptibility, antisocial behaviour, and doping intention) (Chan et al., 2015; Corrion et al., 2017; Hodge et al., 2013; Hodge & Gucciardi, 2015).

For sportspersonship, given its positive associations with task-involving motivational climate (Ommundsen et al., 2003) or mastery orientation, and its negative association with doping intention, and other anti-social behaviors (Barkoukis et al., 2020; Gano-Overway et al., 2005; Ntoumanis et al., 2014), it is reasonable to speculate that the task-involving motivational climate will be associated with doping intention via sportspersonship. Thereby, motivational climates and moral variables were considered as distal and proximal respectively.

Attitudes toward Doping

In addition to the above, other important antecedents of doping intention that need to be considered are doping attitudes (Blank et al., 2016) or perceived benefits and threats Both attitude and intention are the key constructs in the TPB (Ajzen, 1991, 2019; Lazuras et al., 2010; Lazuras et al., 2015). Doping attitude reflects individuals' positive and negative appraisals towards the benefits and threats of doping or not doping (i.e., pros/cons of doping and cons of not doping). Similar constructs were included in the SDCM (Donovan et al., 2002), DSDM (Strelan & Boeckmann, 2003)

and Integrative Model of Doping Use (Lazuras et al., 2015). In those models, attitude-related variables are proposed as direct antecedents towards behavioral intention. This assumption has been extensively proved in previous studies (Girelli et al., 2020; Lazuras et al., 2015; Lucidi et al., 2008; Jalleh et al., 2014; Zelli et al., 2010). Therefore, to better understand the mechanisms underlying doping, attitude-related variables (pros/cons of doping and cons of not doping) need consideration.

The Present Study

The present study firstly aimed to establish *Chinese Athletes Doping Intention Scale-Adolescents* (CADIS-A). The second aim was to test applicability of MC-MA for Chinese adolescent athletes. The following hypotheses would be tested by two studies. The goal of this study was to suggest anti-doping educational strategy based on results of study 1 and 2. It is hypothesized that:

a) Motivational climates have both direct and indirect associations with doping intention. Task-involving climate relates with doping intention negatively, and ego-involving climate associates with doping intention positively. (Hypothesis 1)

b) Moral disengagement has a significantly positive association with doping intention, whereas sportspersonship has significantly negative association with doping intention. (Hypothesis 2)

c) Association between task-involving motivational climate with doping intention is mediated by sportspersonship, whereas the association between ego-involving motivation climate with doping intention is mediated by moral disengagement. (Hypothesis 3)

d) Perceived pros/cons of doping and perceived cons of not doping are significantly associated with doping intention. (Hypothesis 4)

Study 1

The aim of study 1 was to establish the *Chinese Athletes Doping Intention Scale-Adolescents* (CADIS-A) and test the MC-MA initially.

Method

Sample

The sample size was estimated according to a rule of thumb (N: $q \geq 10$; q refers to the free parameters in model evaluation) (Hoogland & Boomsma, 1998). Considering an approximate response rate of 85% (Zhang et al., 2016), 518 participants were required to ensure the robustness of model evaluation. The eligibility criteria included: 1) 12-18 years of age; 2) competitive adolescent athletes (i.e., best sport performance was top three in the city-level competitions or top eight in the provincial/national-level competitions); 3) systematic and regular participation in training and competition (training duration ≥ 1 year); 4) have no cognitive disorders; and 5) have sufficient language skills in Chinese. We contacted 675 participants from seven youth sports training centers in the different districts of Beijing city using a convenience sampling approach. Finally, 615 adolescent athletes (375 males, 238 females, 2 missing) completed the self-designed preliminary CADIS-A (91.1% response rate), ranging in age from 12 to 18 years (age = 15.68 ± 1.67 years). Considering that doping is a universal phenomenon in different sports, we recruited participants from twelve sport teams, covering both individual and team sports (e.g., athletics, weightlifting, cycling, swimming, rugby). For educational level, 55.1% of participants were at primary and middle schools, while the rest were at high schools or universities. For competitive level, more than 67% of participants won the top eight in the provincial/national-level competitions. The average training duration for these participants was 3.67 ± 2.29 years.

Procedure

Ethical approval for this cross-sectional study was obtained from the Research Ethics Committee of Beijing Sport University. The purpose and nature of the study was explained to administers and team leaders of youth sports schools to request permission of accessing to the participants. All participants were invited to sign informed consent forms prior to participating in the study. The survey was conducted in each youth sports school in a classroom setting and participants completed the questionnaires voluntarily and independently. When responding to the questionnaire, participants did not include their name. We emphasized the anonymity of their responses as well as the importance of answering all questions honestly, in order to minimize socially desirable responding. Each survey lasted for about 20 minutes.

Measurements

Development of Chinese Athletes Doping Intention Scale-Adolescents (CADIS-A)

Based on previous theoretical frameworks, we defined the doping intention and psychological influencing factors operationally. Items pool were developed by translating items from previous scales and self-designing. Items were evaluated and adapted with sports psychology academics to fit with the definitions of constructs. Data from 615 adolescent athletes were used to filter items. The final items were selected based on a combination of the following criteria: 1) conciseness and simplicity, giving priority to shorter and simpler than longer and more complex items; 2) inter-item correlations, prioritizing items that were modestly correlated with each other and avoiding extremes; and 3) item means and standard deviations, prioritizing high values on these statistics (see Clark &Watson, 1995).

CADIS-A measures adolescent athletes' doping intention and its social psychological influencing factors. The scale contains 40 items within 8 sub-scales: *Doping Intention* (DI, 6 items), *Task-Involving Climate* (TI, 6 item), *Ego-Involving Climate* (EI, 6 items), *Moral Disengagement* (MD, 8 items), *Sportspersonship* (SP, 5 items), *Pros of*

Doping (PD, 4 items), *Cons of Doping* (CD, 3 items), and *Cons of not Doping* (CN, 3 items). These sub-scales have acceptable reliability. Confirmatory factor analyses (CFA) for all 8 sub-scales have showed each sub-scale were unidimensional and the factor loadings of items were acceptable.

For items of DI, EI, TI, MD and SP, response were given on a 5-point Likert scale, ranging from "1 = *strongly disagree*" to "5 = *strongly agree*". For items of PD, CD and CN, Responses were given on two 5-point Likert scales, one assessing the probability of the behavior outcome (from "1 = *totally impossible*" to "5 = *totally possible*") and the other assessing subjective importance for the behavior outcome (from "1 = *totally unimportant*" to "5 = *totally important*") (Strelan & Boeckmann, 2006). The score of each item was obtained by multiplying the probability and subjective importance scores (score range was 1-25).

Doping Intention

The scale was used to measure adolescent athletes' doping intention, adjusted from the scales applied in the previous studies (Lazuras et al., 2010). An example item is "*If doping is difficult to detect, I will use it without hesitation*". The mean value of the items was calculated, where a higher score reflected a stronger intention to dope.

Task-Involving Climate and Ego-Involving Climate

Adjusted from the *Perceived Motivational Climate in Sport Questionnaire* (Walling et al., 1993), TI and EI were established to measure two types of perceived motivational climate (i.e., task-involving and ego-involving climates). The questions were asked with the stem "*On my team…*" followed by the items for the task-involving climate (e.g., "*everyone plays an important role*"*)*, and the items for the ego-involving climate (e.g., "*Only players with good performance receive coaches' attention*"). The correlation between EI and TI scales was -.30.

Moral Disengagement and Sportspersonship

The items of MD were self-designed mainly from definition of moral disengagement. An example item is "*It is okay for players to lie to officials if it helps their team*". The items of SP were extracted from the *Multidimensional Sportspersonship Orientation Scale* (MSOS; Vallerand et al., 1997), including different types of sportspersonship orientations (concern and respect for the opponent, rules and officials, social conventions, and commitment to one's sports participation) (Lazuras et al., 2015). An example item was "*Maintaining the fairness of the game is more important than winning*". The correlation between MD and SP scales was -.36.

Perceived Pros and Cons of Doping and Perceived Cons of not Doping

Based on the TPB (Ajzen, 1991, 2019; Armitage & Conner, 2001), we developed three scales to measure participants' attitudinal variables of doping: four items for perceived pros of doping (PD), three items for perceived cons of doping (CD), and three items for perceived cons of not doping (CN). Example items were "*If I dope, I will be more confident of winning*" for PD, "*If I don't' dope, it will be difficult for me to improve my sport competence*" for CN, and "*If I dope, my face/figure will become deformed*" for CD.

These sub-scales' reliability in study 1 were acceptable (see Table 1).

Data Analysis

Preliminary Analysis

Prior to the main analysis, we examined the data to ensure that all values were within a plausible range and to identify any pattern of missing scores. We also examined univariate skewness and kurtosis as well as Mardia's multivariate coefficients. Secondly, we tested the internal consistency of the scales and conducted confirmatory factor analysis (CFA) to examine the factorial validity of the scales. Finally, we tested

the fit of the full measurement model to the data, examining the correlations between all factors estimated (Jöreskog & Sörbom, 1999).

Main Analysis

We first tested the model fit of the MC-MA model for Chinese adolescent athletes, as outlined in the figure 1 (which includes the correlations between all exogenous variables not shown in the figure). We used Cohen's (1992) guidelines to interpret the strengths of the coefficients in the model (strong = .50, moderate = .30, and weak = .10). Then, we conducted path analyses to identify the mediation mechanisms, where we examined the total, direct, and indirect effects with a combined effects model.

For the evaluation of model fit, several goodness-of-fit indices were used, including Chi-square (χ^2), Bollen-Stine Chi-square/deviation freedom (χ^2/df), goodness of fit (*GFI*), comparative fit index (*CFI*), Tucker-Lewis fit index (*TLI*), incremental fit index (*IFI*), root mean square error of approximation (*RMSEA*), and standardized root mean square residual (*SRMR*). The general criteria for an acceptable model fit using these indices < 5 for $\chi^2/df > .90$ for *GFI*, *CFI*, *TLI* and *IFI*, and < .08 for *RMSEA* and *SRMR* (Bollen & Stine, 1992; Browne & Cudeck, 1993). For parameter estimation, we used the maximum likelihood (ML) estimation coupled with a bias-corrected bootstrapped approach (2000 replications) (Preacher & Hayes, 2008). This approach involves the calculation of the parameter estimates from an empirical sampling distribution rather than the theoretical distribution of tests such as χ^2 and normality tests, showing more robust evaluation when the data cannot meet the assumption of multivariate normality (Byrne, 2001; Mooney & Duval, 1993; Nevitt & Hancock, 2001). The IBM SPSS Amos 25.0 was used for the data analysis.

Results

Preliminary Analysis

We examined the data to ensure that all values were within the plausible range and to identify any pattern of missing scores. We discarded 12 participants' data (2.0%) who had missing values for at least one item of DI. After this step, there were minimal missing data (0 - 1.3% for each variable). Therefore, we replaced the missing data using series means. The univariate skewness and kurtosis were minimal (skewness < 2, kurtosis < 7) for all indicators excluding ten indicators. Among these ten indicators, the skewness of seven indicators ranged from 2.07 to 2.86, the skewness of one indicator was 3.07, and the kurtosis values for two indicators were 8.15 and 8.94. Cronbach's α coefficients of all subscales ranged from .68 to .87, indicating an acceptable internal consistency reliability of these scales (see Table 1). The fit indices from eight preliminary CFA indicated good fit to the data (*CFI* and *TLI* > .95, *RMSEA* < .08). All item-factor loadings were acceptable (> .44). Finally, none of the inter-factor correlations encompassed unity, suggesting that the factors represented distinct constructs (see Table 1). These results also supported the sub-scales have convergent validity and discriminant validity.

Table 1

Reliability and fit indices for all CFA models: Study 1 (N = 603).

Scales	*α*	χ^2	*p*	*df*	χ^2/df	*CFI*	*IFI*	*TLI*	*RMSEA*	90% CI of *RMSEA*	Factor loading
PD	.813	3.22	.20	2	1.61	.999	.996	.996	.032	[.00, .09]	.60 to .86
CN	.869	Saturated measurement model									.75 to .90
CD	.850	Saturated measurement model									.75 to .88
TI	.678	13.60	.01	5	2.72	.979	.979	.957	.053	[.02, .09]	.44 to .67
EI	.706	4.54	.00	2	2.27	.994	.994	.982	.046	[.00, .10]	.53 to .73
MD	.736	50.83	.00	14	3.63	.938	.939	.918	.066	[.05, .09]	.45 to .65
SP	.726	2.82	.24	2	1.41	.998	.998	.994	.026	[.00, .09]	.54 to .70
DI	.701	1.23	.54	2	0.66	1.00	1.00	1.00	.000	[.00, .07]	.55 to .72

Note: χ^2 = chi square; *df* = deviation freedom; C*FI* = comparative fit index; *IFI* = incremental fit index; *TLI* = Tucker Lewis index; *RMSEA* = root-mean-square error of approximation.

Descriptive Statistics and Correlations of the Study Variables

Overall, Chinese competitive adolescent athletes' doping intention was rather low. They had moderate perceived pros and cons of doping and perceived cons of not doping. High scores were reported on sportspersonship, perception of task-involving climate, and low scores on moral disengagement and perception of ego-involving climate (see Table 2).

Pearson product-moment coefficients were used to assess the correlations among the main measures of the study. As shown in Table 2, all variables except perceived cons of doping showed significant correlations with doping intention. Correlations between task-involving climate, moral disengagement, and sportspersonship with doping intention were strong. We also found a moderate positive correlation between perceived pros of doping and perceived cons of not doping; negative associations between perceived pros of doping, and perceived cons of not doping with perceived cons of doping; a moderate negative association between moral disengagement and sportspersonship, and a moderate negative relationship between task-involving climate with ego-involving climate. Additionally, the correlation between task-involving climate with sportspersonship and the relationship between ego-involving climate with moral disengagement were significantly positive, with a large effect size. These results supported the hypothesized relationships among the variables and indicated that there was no serious multi-collinearity in the hypothesized mediation model.

Table 2

Inter-correlations, square roots of *AVE*, means and standard deviations among the study variables.

	PD	CN	CD	TI	EI	MD	SP	DI	Range	*M*±*SD*
PD	*.74*								1~25	9.93±6.41
CN	.487**	***.83***							1~25	7.66±6.39
CD	-.334**	-.386**	***.81***						1~25	8.61±6.87
TI	-.056	-.008	-.084	***.59***					1~5	4.22±0.76
EI	.226**	.212**	.030	-.295**	***.62***				1~5	2.68±1.11
MD	.382**	.284**	-.101	-.135*	.527**	***.52***			1~5	2.46±0.84
SP	-.089	-.118*	-.002	.596**	-.191**	-.353**	***.64***		1~5	4.61±0.68
DI	.294**	.296**	-.002	-.513**	.386**	.659**	-.606**	***.61***	1~5	1.43±0.70

Note: * and ** indicate that the correlation significantly different from zero ($p < .05$ or $p < .01$); square roots of *AVE* are listed in italics on the diagonal.

Main Analysis

Results showed that the MC-MA for Chinese adolescent athletes had a satisfactory fit, with both ML estimation and Bollen-Stine bootstrap (*N*=5000) (see Table 3). The model explained 61.4% of the variance in doping intention.

Table 3

Fit indices of MC-MA for Chinese Adolescent Athlete: Study 1 (*N* = 603).

Estimation Method	χ^2	*p*	*df*	χ^2/df	*GFI*	*CFI*	*TLI*	*RMSEA*	*SRMR*	*HOELTER's N p=.05*
ML	1064.91	<.01	508	1.99	.911	.917	.908	.042	.058	334
Bollen-Stine Bootstrap	594.41	<.01	508	1.17	.911	.986	.984	.017		515

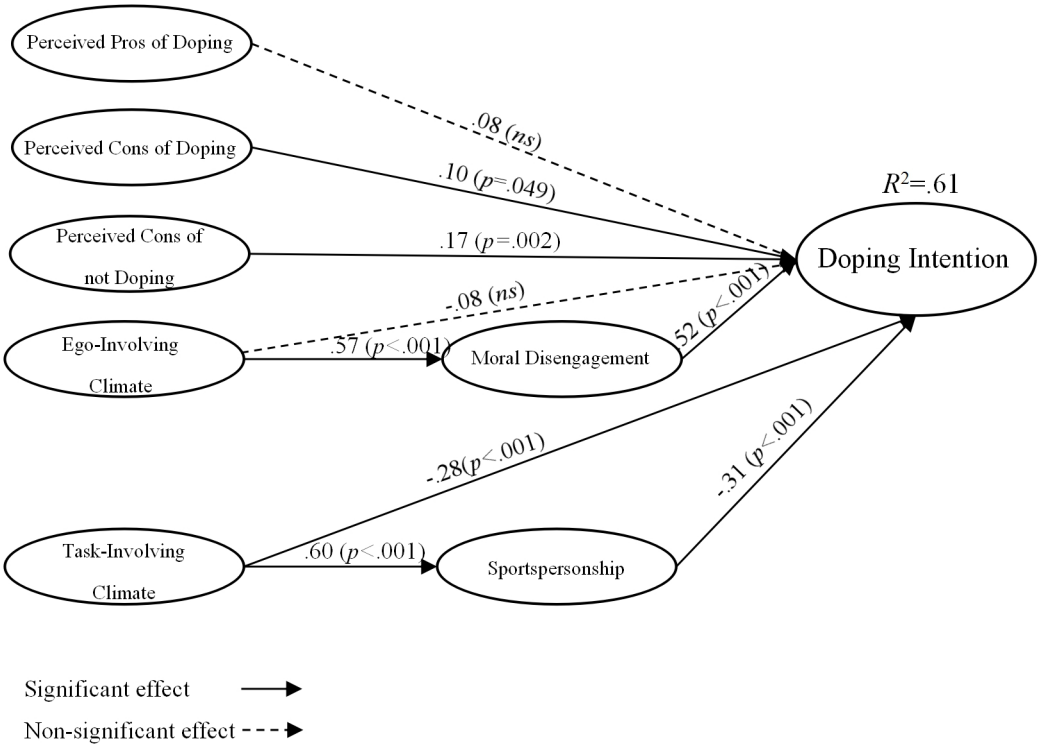

Figure 2. Results from structural equation modelling: Study 1.

As presented in Figure 2, for the two types of perceived motivational climate, only task-involving motivational climate had a significantly negative association with doping intention (a small to medium effect size of β = -.28), which partly supported Hypothesis 1. Both moral disengagement and sportspersonship were significantly associated with doping intention, with a large (β = .52) and medium (β = -.31) effect size. These results fully supported Hypothesis 2.

In terms of the mediation mechanisms (Hypothesis 3), results showed that moral disengagement fully mediated the association between ego-involving climate and doping intention, while sportspersonship partially mediated the association between task-involving climate and doping intention. In particular, bootstrap-generated bias-corrected *CI*s revealed a significant standardized indirect effect for ego-involving climate on doping intention (effect size = .41, 95% *CI* = .13 to .28, p = .001) and a non-significant direct effect of ego-involving climate on doping intention (effect size = -.08, 95% *CI* = -.16 to .04, p = .346). The examination of the path coefficients

demonstrated that ego-involving climate was positively related to moral disengagement, which in turn was positively related to doping intention. The bootstrap-generated bias-corrected 95% confidence intervals (*CI*s) also revealed a significant standardized indirect effect for task-involving climate on doping intention (effect size = -.10, 95% *CI* = -.25 to -.08, p = .001), and the direct effect of task-involving climate on doping intention was significant (effect size = -.28, 95% *CI* = -.36 to -.11, p = .002). The indirect effect accounted for a medium portion of the total effect (40%) of task-involving climate. The examination of the path coefficients demonstrated that task-involving climate was positively related to sportspersonship, which in turn negatively related with doping intention. These results fully supported Hypotheses 3.

For perceived pros/cons of doping, a significant association with doping intention was only found on perceived cons of doping, with a small effect size (β = .10). Perceived cons of not doping were positively related to doping intention, with a small to medium effect size (β = .17). These results partially supported Hypothesis 4.

Summary

Study 1 provided supportive evidence that MC-MA was applicable to predicting Chinese adolescent athletes doping intention. The associations between moral disengagement, sportspersonship, task-involving climate, and ego-involving climate with doping intention were in line with hypotheses. The mediating roles of moral disengagement and sportspersonship were supported too. Among three attitudinal variables, only the relationship between cons of not doping with doping intention support the hypothesis. However, this sample was approached conveniently from Beijing which is capital of China and is an economically developed district. The representative of the sample to population should be improved.

Study 2

The first study developed the *Chinese Athletes Doping Intention Scale-Adolescents* (CADIS-A) with satisfactory reliability and validity. The authors also tested the MC-MA model with a relatively small sample. Therefore, the second study was designed to test MC-MA model in a more representative sample of Chinese adolescent athletes.

Method

Sample

The eligibility criteria of study 2 was consistent with study 1. A quota sampling approach was used in study 2. In the first stage of sampling, five regions were selected randomly from seven regions of China. The selected regions included south of China, north of China, East of China, west-north of China and Middle of China. Ten provinces and cities were selected from the above regions conveniently. In order to improve the generation of sample, we also recruited participants from various sport teams as possible. 2111 participants were contacted by convenient approach and participated in study 2.

2064 adolescent athletes (1217 males, 847 females, 4 missing) completed the CADIS-A (97.8% response rate), ranging in age from 12 to 18 years (age = 15.99 ± 1.84 years). According to a rule of thumb (N: $q \geq 10$; q refers to the free parameters in model evaluation) (Hoogland & Boomsma, 1998), sample size in study 2 was adequate.

Participants in this study came from 28 sport teams, covering both individual and team sports (e.g., athletics, weightlifting, cycling, swimming, rugby, track and field, shooting, boxing). For educational level, 39.2% of participants were at junior middle schools, while 56.4 were at senior middle schools. For competitive level, more than

84% of participants won the top eight at least in the provincial competitions. The average training duration for these participants was 3.78 ± 1.83 years.

Procedure

Ethical approval for study 2 was obtained from the Research Ethics Committee of Beijing Sport University. The purpose and nature of the study was explained to administers of Local sports bureau and team leaders to request permission of accessing to the participants. All participants were invited to sign informed consent forms prior to participating in the survey, which was conducted in youth sports school in a classroom setting. Participants completed CADIS-A voluntarily and independently. In order to reduce the influence of social desirability, athletes were asked to respond anonymously. The survey lasted for about 20 minutes.

Measures

Chinese Athletes Doping Intention Scale-Adolescents (CADIS-A) was used in this study. The details of CADIS-A see Study 1. *Marlowe-Crowne Scale of Social Desirability-Short Form* which includes 13 items was used in study 2 to minimize the social desirable responding. The sum items was calculated (range = 0-13), where a higher score reflected a stronger social desirability.

Data Analysis

The data processing procedure and method were same with Study 1.

Results

Preliminary Analysis

We calculated the mean and standard deviation of social desirability sum of participants (social desirability = 8.45 ± 2.73), suggesting relatively low social desirability and honesty of responding.

We examined the data to ensure that all values were within the plausible range and to identify any pattern of missing scores. We discarded 74 participants' data (3.59%) who had missing values for at least one item of the doping intention scale. After this step, there were minimal missing data (0 - 3.8% for each variable). Therefore, we replaced the missing data using series means. The univariate skewness and kurtosis were minimal (skewness < 2, kurtosis < 7) for all indicators excluding seven indicators. Among these seven indicators, the skewness of four indicators ranged from 2.39 to 2.88, and the kurtosis values for three indicators were 8.21, 8.25 and 11.84.

Composite reliability (CR) coefficients of all scales ranged from .64 to .84 except Cons of Doping, indicating an acceptable reliability of these sub-scales (see Table 4). Compared to the first study, the reliability of some sub-scales was less satisfactory in this study. In addition to CADIS-A generally needing further psychometric testing to improve sub-scale reliability, it is possible that this lack of reliability stemmed from the participants inability to clearly respond to items especially in Cons of Doping. Compared to study 1, some cities and provinces are economically developing. Adolescent athletes may have relatively poor knowledge of doping.

As multivariate normality were violated in 3 scales including Sportspersonship, Perceived pros of doping and Doping intention (Mardia' s statistic were 119.74, 69.39 and 95.43 respectively), maximum likelihood (ML) estimation was coupled with bootstrapping procedures in sub-scales CFA (N=5000). The fit indices indicated good fit to the data (*CFI* and *TLI* > .95, *RMSEA* < .08). All item-factor loadings were acceptable. Finally, none of the inter-factor correlations encompassed square root of average variance extraction, suggesting that the factors represented distinct constructs (see Table 5). These results also supported the sub-scales have convergent validity and discriminant validity.

Table 4

Reliability and fit indices for all CFA models: Study 2 (N = 1990).

Scale	estimation	*CR*	χ^2	*p*	*df*	χ^2/df	*CFI*	*IFI*	*TLI*	*RMSEA*	Factor loading
CD	Maximum	.54			Saturated measurement model						.39~.63
CN	likelihood	.84			Saturated measurement model						.72~.84
TI		.62	12.37	.03	5	2.48	.992	.992	.985	.027	.36~.68
EI		.69	21.56	.001	5	4.31	.988	.988	.976	.041	.43~.73
MD		.66	75.28	<.001	14	5.38	.953	.953	.929	.047	.40~.58
SP	Bollen-Stin	.64	2.60	>.05	2	1.30	.999	.999	.997	.015	.40~.71
PD	e Bootstrap	.84	3.669	>.05	2	1.84	.999	.999	.998	.020	.50~.79
DI		.64	13.82	<.01	9	1.54	.996	.996	.993	.016	.33~.61

Descriptive Statistics and Correlations of the Study Variables

In study 2, Chinese competitive adolescent athletes also showed rather low scores of doping intention. They had moderate perceived pros and cons of doping and perceived cons of not doping. They reported high scores on sportspersonship, perception of task-involving climate, and low scores on moral disengagement and perception of ego-involving climate (See Table 5). The results were consistent with results of study 1.

Pearson product-moment coefficients were used to assess the correlations among the main measures of study 2. As shown in Table 5, all variables except perceived cons of doping showed significant correlations with doping intention. The magnitudes of correlation coefficients were below .4, suggesting small to moderate effect sizes.

Additionally, the correlation between task-involving climate and sportspersonship and the relationship between ego-involving climate and moral disengagement were significantly positive, with moderate effect sizes. Both a low negative association between moral disengagement with sportspersonship, and a low negative relationship between task-involving climate with ego-involving climate were found. We also

found a moderate positive correlation between perceived pros of doping and perceived cons of not doping. These results were similar with relations among measures of study 1 and supported the hypothesized relationships. However, moderate positive correlations between perceived cons of doping with perceived pros of doping and perceived cons of not doping respectively. The two relations were contrary to hypothesized relations and were different from study 1. One possible explanation might be there may be potential moderators in the two relationships such as social-economic status, leadership styles of coaches and administrators. Maybe future study would focus on this topic. These correlations also indicated that there was no serious multi-collinearity in the hypothesized mediation model.

Table 5 Inter-correlations, square roots of *AVE*, means and standard deviations among the study variables (*N*=1990).

	PD	CD	CN	MD	SP	EI	TI	DI	Range	*M*±*SD*
PD	***.76***								1~25	7.30±5.67
CD	.479**	***.54***							1~25	10.18±5.80
CN	.401**	.436**	***.80***						1~25	7.63±6.34
MD	.261**	.101**	.144**	***.46***					1~5	2.43±0.80
SP	-.034	-.046*	-.049*	-.202**	***.57***				1~5	4.49±0.68
EI	.200**	.077**	.140**	.398**	-.180**	***.56***			1~5	2.59±0.96
TI	.051*	.015	-.01	-.157**	.444**	-.248**	***.51***		1~5	4.24±0.72
DI	.252**	.043	.137**	.395**	-.387**	.247**	-.278**	***.49***	1~5	1.63±0.65

Note: * and ** indicate that the correlation significantly different from zero ($p < .05$ or $p < .01$); square roots of *AVE* are listed in italics on the diagonal.

Main Analysis

We used factor-balance method to parcel items of Doping intention, task-involving climate and moral disengagement sub-scales in order to reduce measure error and improve reliability. As preliminary analysis revealed that multivariate normality was violated in total model (Mardia's statistic = 108.76). In line with recommendations made by Byrne (2001), maximum likelihood (ML) estimation was coupled with

bootstrapping procedures in model fit test (*N*=5000). On basis of bootstrapping procedure, the overall model fit was assessed using the Bollen-Stine χ^2/df value (Bollen & Stine, 1992), which is a correction of the χ^2 test and reported the corrected good-fit indices such as *GFI, CFI, TLI, IFI, RMSEA* and *SRMR*.

Overall, results showed that the MC-MA for Chinese adolescent athletes had a good fit, with both ML estimation and Bollen-Stine bootstrap (*N*=5000) (see Table 6). The model explained 65.8% of the variance in doping intention.

Table 6 Fit indices of MC-MA for Chinese Adolescent Athlete: Study 2 (*N*=1990).

Estimation	***χ²***	***p***	***df***	***χ²/df***	***GFI***	***CFI***	***TLI***	***RMSEA***	***SRMR***	***HOELTER's N p=.05***
Maximum Likelihood	1386.27	<.001	358	3.87	.954	.926	.916	.038	.039	579
Bollen-Stine Bootstrap	419.44	<.001	358	1.17	.971	.996	.995	.009		1699

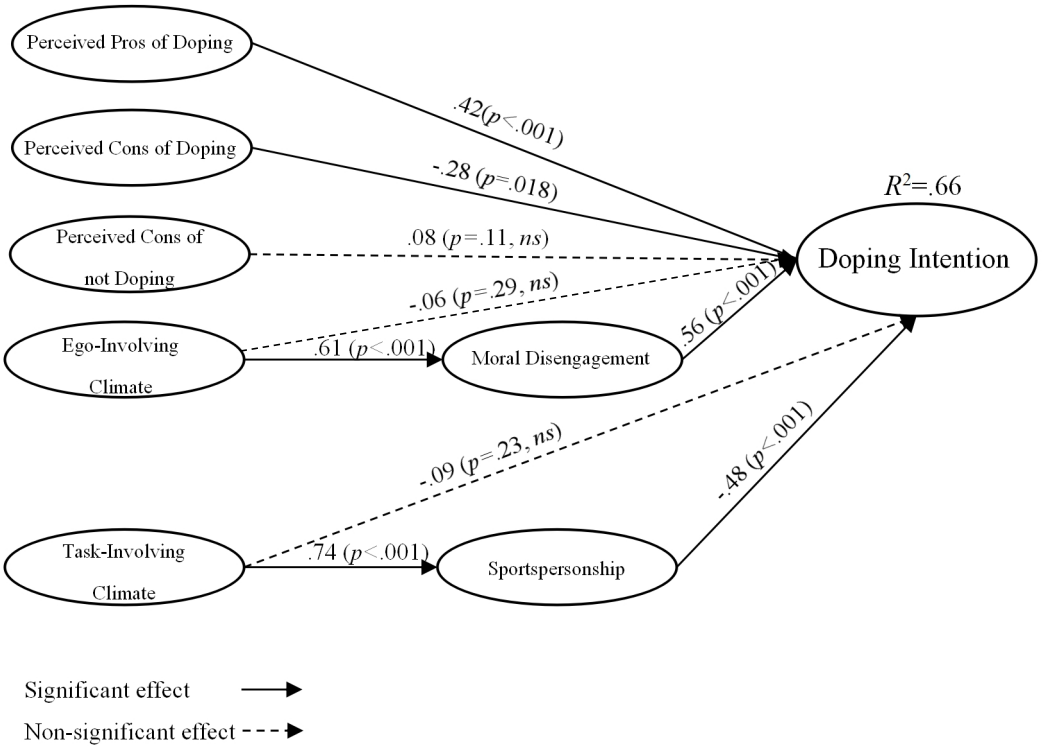

Figure 3. Results from structural equation modelling: Study 2.

As presented in Figure 3, neither perceived task-involving climate nor perceived ego-involving climate had significant relation with doping intention. These results did not support hypothesis 1. Both moral disengagement and sportspersonship were significantly associated with doping intention, with a large (β = .56) and medium (β = -.48) effect sizes respectively. These results fully supported Hypothesis 2.

Compared to study 1, a positive relation between perceived pros of doping with doping intention and a negative association between perceived cons of doping with doping intention were found. Cons of not doping had non-significant relation with doping intention. These results partially supported Hypothesis 4 and were not consistent with the first study.

In terms of the mediation mechanisms (Hypothesis 3), results showed that moral disengagement fully mediated the association between ego-involving climate and doping intention; and sportspersonship fully mediated the association between task-involving climate and doping intention. In particular, bootstrap-generated bias-corrected *CI*s revealed a significant standardized indirect effect for ego-involving climate on doping intention (effect size = .21, 95% *CI* = .17 to .26, $p < .001$) and a non-significant direct effect of ego-involving climate on doping intention (effect size = -.04, 95% *CI* = -.10 to .03, $p = .349$). The examination of the path coefficients demonstrated that ego-involving climate was positively related to moral disengagement, which in turn was positively related to doping intention. The bootstrap-generated bias-corrected 95% confidence intervals (*CI*s) revealed a significant standardized indirect effect for task-involving climate on doping intention (effect size = -.37, 95% *CI* = -.52 to -.26, $p < .001$), and the direct effect of task-involving climate on doping intention was significant (effect size = .10, 95% *CI* = -.06 to .26, $p = .309$). The examination of the path coefficients demonstrated that task-involving climate was positively related to sportspersonship, which in turn negatively related with doping intention. These results fully supported Hypotheses 3.

Summary

In study 2, MC-MA model also showed satisfactory application to predicting doping intention of Chinese adolescent athletes. The relationships among moral disengagement, sportspersonship, task-involving climate and ego-involving climate with doping intention were in consistent with these relations of study 1 and supported hypotheses. Especially, the indirect effects of two types of motivational climates on doping intention were repeated in study 2 with similar effect sizes as study 1. In this study, influences of pros and cons of doping on doping intention supported hypotheses, but effect of cons of not doping on doping intention was not supported.

Combining results of study 1 and study 2, we found that the effects of both moral disengagement and sportspersonship on doping intention were stable. The indirect effects of perceived motivational climates on doping intention were also stable. These results suggested the moral accomplishment and motivational climates play important roles in formation of doping intention for Chinese adolescent athletes.

Discussion

Most of previous models focusing on the psychological mechanism underlying doping targeted elite adult athletes rather than adolescent athletes. Adolescent athletes have their own characteristics including stage of moral development, value formation and influence by significant others. In the present study, we proposed the motivational climate-moral accomplishment model of doping intention (MC-MA) by integrating critical social psychological constructs. The MC-MA model was tested in two samples of Chinese adolescent athletes. We tested the associations of perceived motivational climate, moral accomplishment, and attitudes toward doping with doping intention. The potential mechanisms of moral accomplishment in the relationships between perceived motivational climate with doping intention were also examined. Overall, the MC-MA model showed satisfactory fit in Chinese adolescent athletes. The observed relationships largely supported our hypotheses. Predicting factors in MC-MA explained a large portion of the variance in doping intention of Chinese adolescent athletes. These results suggested that MC-MA model could be used as theoretical framework to design effective intention-based doping prevention and anti-doping education strategy.

Moral accomplishment and doping intention

In two studies, we found that moral disengagement and sportspersonship were significantly related to doping intention and explained a large portion of the variance in doping intention, suggesting that these relationships are stable. Moral disengagement was positively associated with doping intention with a large effect size, adolescent athletes with high levels of moral disengagement had relatively stronger doping intention than those with low levels of moral disengagement. Consistent results have also been found in previous studies (Hodge et al., 2013; Jalleh et al., 2014; Lucidi et al., 2008). Moral disengagement represented cognitive self-defence strategies used by individuals in the face of their unethical activities. The selective use

of psychosocial maneuvers, collectively known as mechanisms of moral disengagement, allows individuals to transgress moral standards (such as in doping; Strelan & Boeckmann, 2006) without experiencing negative affect (e.g., guilt), thereby decreasing constraint on future immoral behavior. High moral disengagers experience low guilt over immoral behavior (Bandura, 2002). Reducing athletes' use of these strategies would be one of approaches to prevent doping.

Interestingly, the present study found a stable preventive effect of sportspersonship on doping intention, although the effect was smaller than moral disengagement. Athletes with high sportspersonship had relatively low doping intention. This result was in line with some previous research (e.g., Barkoukis et al, 2013; Manouchehri & Tojari, 2013; Petróczi, 2007) but contrary to other studies (e.g., Barkoukis et al., 2011). A possible explanation might be that sportspersonship belief is a comprehensive construct comprising several sports-related aspects, including respect for a total commitment to sports, respect for the rules and referees, respect for social conventions, and respect and concern for opponents (Serrano-Durá et al., 2020). If we only investigated one aspect of sportspersonship or deem it as categorical variable, we may have observed no effects (e.g., Barkoukis et al., 2013). Moreover, compared to adult athletes, adolescent athletes have more professional choices besides sports, and are easier to build sportspersonship. Thus, in anti-doping education program for adolescent athletes, sportspersonship should be paid more attention.

Perceived motivational climate and doping intention

We found that task-involving climate had both direct and indirect effects on doping intention in study 1 but only indirect effect in study 2. The indirect effect was mediated by sportspersonship. Only the indirect effect of ego-involving climate was significant in both study 1 and study 2. Moral disengagement played a mediating role between ego-involving climate and doping intention. The indirect effects of both task-involving climate and ego-involving climate were consistent between two studies with similar effect sizes, suggesting that moral disengagement and sportspersonship

played important roles and are the potential mechanisms underlying the effect of perceived motivational climate on doping intention.

The indirect effect of task-involving climate was in line with past researches (e.g., Davies et al., 2016; Hodge et al., 2013; Ntoumanis et al., 2014). As the results indicated, a task-involving climate created by coaches would contribute to the formation of appropriate professional values for young athletes. Athletes in task-involving climates show higher sportspersonship and are even willing to defend the fairness and justice of sports. The explanation for this might be that a task-involving climate is characterized by a focus on personal improvement and the equal distribution of coach support across athletes (Newton et al., 2000). In this situation, athletes receive positive feedback from coaches when they work hard, improve their skills and cooperate with others. Athletes perceive coaches to evaluate performance based on personal skill improvement and to regard errors as inevitable in the process of learning and training.

Consistent results of mediating role of moral disengagement were found. This result gave us some indications. In an ego-involving environment, athlete evaluation and recognition are based on normative or comparative criteria for competence. They receive messages from coaches that poor performance and mistakes are bad and punishable, and that only athletes with the most ability can receive positive attention (e.g., from a coach), and that winning (or performing better than others) is more important than personal improvement (Seifriz et al., 1992). Such emphases have been linked to anxiety, maladaptive sources of sport confidence, dysfunctional attributions, and other negative outcomes in past research (e.g., Magyar & Feltz, 2003; Roberts et al., 1998; for a review see Ntoumanis et al., 1999). Therefore, athletes may be tempted to cheat (e.g., using drug) in their quest of establishing superiority over others (Allen et al., 2015; Kavussanu et al., 2020) and tend to use maladaptive self-defence strategies to protect their morality and avoid self-guilt (Harwood et al., 2015; Waldron, & Krane, 2005).

In study 1, we also found the direct effect of task-involving climate on doping intention. Athletes perceived more task-involving climate would have lower doping intention. This result indicated other potential mechanisms in the relationship. Autonomous behavioral regulation or intrinsic motivation may be one of mechanisms (for a review see Harwood et al., 2015). Thus, creating task-involving climate and avoiding ego-involving climate would play important roles in doping prevention.

Attitudes and doping intention

Unexpectedly, the relationships among three attitudinal variables with doping intention differed between the first and second study. It is worth noting, in the second study with a more representative sample, perceived pros of doping were a determinant of doping intention with medium effect size; and perceived cons of doping was a deterrent with medium effect size. These results supported hypothesis and were in line with previous research (Blank et al., 2016; Donovan et al., 2002; Lazuras et al., 2015; Strelan & Boeckmann, 2003). In the first study, the relationship between pros of doping and doping intention was not significant, and cons of doping associated with doping intention positively with a very small effect size. Some research also had similar results. They found that perceptions of pros and cons of doping did not associate with doping intention (e.g., Jalleh et al., 2014; Laure et al., 2004). One reason for these result might be that athletes had good knowledge of benefits and threats of doping. Compared to the second study, the sample of study 1 was from economically developed district, where adolescent athletes understand better about the function and health damage of doping.

In the first study, the perceived cons of not doping was positively related to adolescent athletes' doping intention. This positive relationship was not repeated in study 2. However, the result still implied one reason that athletes intend to dope might be that they are afraid of the outcomes of not doping, such as difficulty in gaining the physical fitness needed to support training and competition, a cessation of competitive competence and so on. There are at least two possible explanations this result. First,

perception of the cons of not doping stimulates a fear of failure, which is associated with anxiety. In turn, anxiety relates to doping intention. Sattler and Wiegel (2013) also revealed that increased cognitive anxiety increased the prevalence of medication use over various time windows. In addition, fear of failure also motivates one to avoid failure. Previous research has found that the brain structures associated with individual differences in motivation to achieve success (MAS) and motivation to avoid failure (MAF) are distinct. Compared to that of MAF, and the generation process of MAS may be more complex and rational. In the real world, MAS may be more beneficial to personal growth and guarantee the quality of task performance. MAF prompts irrational behavior (Ming et al., 2015).

The inconsistent relationships between pros and cons with doping intention deserve future study (e.g., moderating factors, expanding the facets of pros and cons rather than competence and health). When designing anti-doping education strategy, the effects of pros and cons of doping and not doping on doping intention should be used with caution.

Suggestions to anti-doping education program

"***Pure sport, say no to doping***" is the goal of Chinese government and China Anti-Doping Agency (CHINADA). On the one hand, Chinese government increased the punishment of doping by legislating to punish doping. According to 11th Criminal Law Amendment, persons who induce, abet, deceive, organize, or force athletes to use doping will be sentenced. On the other hand, doping-preventing education was be strengthened by CHINADA. Anti-doping education lectures have been launched, aiming to popularize doping knowledge and improve anti-doping awareness and abilities for sports participants and managers.

As we know from MC-MA which was established and tested in the present study, improving moral accomplishment of adolescent athletes would reduce the doping intention.

The education program for adolescent athletes should be focus on strategies to improve their moral accomplishment. For example, setting moral dilemmas in competitive sport context to allow adolescent athletes to argue. It can also include various approaches to strengthen sportspersonship such as setting models, giving lectures.

The other key point education strategy of anti-doping is that coaches, trainers and parents to create and developing task-involving motivational climate either in everyday training and leisure life such as encouraging and rewarding of progresses through personal effort, exertion, and self-comparing; avoiding ego-involving climate such as, arranging the same task and focusing on the same assignment, publicly recognizing of athlete's accomplishment, and rewarding superior performances.

Coaches, trainers, or parents should also be educated to master strategies/skills of building task-involving climate and influence athletes' sportspersonship should also be educated to coaches. Past study has found, six coaching behaviors may influence athletes' sportspersonship: 1) sets expectations for good sportspersonship; 2) reinforces good sportspersonship; 3) teaches good sportspersonship; 4) models good sportspersonship; 5) punishes poor sportsmanship; and 6) prioritises winning over good sportsmanship (Bolter & Weiss, 2012, 2013). For example, reacting responsibly when a referee makes a poor call, or sitting a player out for tripping an opponent, are potential ways for coaches to show he or she values good sportspersonship and cares about his or her players. Skills to construct task-involving climate by coach include reinforcing the importance of individual's contribution, emphasizing work ethic, rewarding effort and persistence, avoiding identifiable performance-related feedback. Finally, anti-doping education strategy should provide effective advice including nutrition, improving sport competence by fitness and skill training, stress coping skills.

Limitations

The present study revealed some interesting findings, but also has several limitations. First, because the motivational climate may vary over time (Roberts, 2012), researchers should employ longitudinal or experimental designs in future. The present study employed a cross-sectional design, which limits the ability to provide causal explanations of proposed relationships, especially in a mediation model. Second, although the study examined the psychological mechanisms of doping using a relatively concise model, only direct paths of attitudinal variables and doping intention were hypothesized in the present study, whereas indirect paths and relevant mediation mechanism have not yet been examined. Third, a more comprehensive examination that includes other covariates (e.g., subjective norms and past doping behaviour) and confounders (e.g., demographics) and their interrelationships deserve consideration would be considered in future research.

Conclusion

The current study is the first tempt to develop MC-MA model to identify the roles of perceived motivational climate, moral accomplishment, and attitudes in the psychological mechanisms underlying doping intention of Chinese adolescent athletes.

The important findings showed that motivational climate conducted by coaches influence adolescent athlete's moral accomplishment, which in turn predict doping intention. These findings provide new insights into the psychological mechanisms of doping and contributes to future intention-based doping prevention and anti-doping education programs.

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Note: "*" for correspondence author.

Appendix

Chinese Athletes Doping Intention Scale-Adolescence

In Doping Intention, Task-involving climate, ego-involving climate, moral disengagement, and sportspersonship sub-scales, items are responded on 5-Likert scale: 1 = strongly disagree, 2 = slightly disagree, 3 = neither disagree nor agree, 4 = slightly agree, 5 = strongly agree

Doping Intention

1. If doping is difficult to detect, I will use it without hesitation.
2. Even if the coach/parents agree, I refuse to use doping*.
3. If everyone dopes, I wouldn't be too stupid.
4. If I have to dope, I would rather not train*.
5. If the doping test is not strict, I want to try.
6. I would rather lose the game than doping*.

*: reverse scoring item.

Task-involving Climate

On my team:

1. The coach can spot everyone's progress.
2. Most athletes have the opportunity to play in competitions.
3. Everyone feels that he is very important to the team.
4. Star players are also punished when they make mistakes.
5. Although the skill level is different, each member is very important to the team.
6. Everyone plays an important role.

Ego-involving Climate

On my team:

1. The coach only praises player who surpass others.
2. Everything depends on performance.

3. Only players with good performance receive coaches' attention.
4. Only a few players with higher skill level than other teammates feel like 'star'.
5. Only a few players with very good performance are praised.

Moral Disengagement

1. Referees often make big fuss and excessive penalties.
2. If the opponent is fierce, it is reasonable to fight back.
3. If the opponent insults or attacks me first, it's not wrong for me to fight him/her back.
4. If I am not fined, even the opponent is injured because of me, I would not be responsible.
5. It is okay for players to lie to officials if it helps their team.
6. In competitive sports, it is inevitable to do something against morality.
7. As long as the behavior is not rude, it is allowed to yell at your opponent.
8. As long as it is not discovered by the referee, it's okay to do some 'small moves'.

Sportspersonship

1. It is against sportspersonship to use deception to win the game.
2. Maintaining the fairness of the game is more important than winning.
3. Players who maintain fair competition are respectable even if they lose the game.
4. Player' s success is not measured by performance only.
5. As long as you give full play to your level, it is satisfactory even if you lose the game.

In Pros of doping, Cons of Doping and Cons of not Doping sub-scales, respondents were asked evaluate possibility and importance to him/her of some consequence.
Possibility: 1 = totally impossible, 2 = slightly impossible, 3 = neutral, 4 = slightly possible, 5 = totally possible
Importance: 1 = totally unimportant, 2 = slightly unimportant, 3 = neutral, 4 = slightly important, 5 = totally important

Pros of Doping

If I dope,

1. I will attain more material benefits.

2. I will be more confident of winning.

3. I will feel impossible to be surpassed.

4. I will help my team to win.

Cons of Doping

If I dope,

1. I will Make me be difficult to control sexual desire.

2. I will be crazy outside the game.

3. My face/figure will become deformed.

Cons or not Doping

If I don't dope,

1. It will be difficult to obtain good rank needed to enter higher competitive level.

2. It will be difficult to support rigorous training and competitions.

It will be difficult for me to improve my sport competence.