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SPORT

An Exploratory Study of Youth Track and Field Athletes' Participation Motivation Factors

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Abstract

Using the Adapted Youth Track and Field Athletes' Participation Motivation Factors Questionnaire (AYTFAPMFQ), this study examined and analyzed the characteristics and relationships among high-school track and field (T&F) athletes' participation motivation Factors (PMFs), and four healthy-related elements. Participants were 133 youth athletes from fifteen high-school T&F teams of New York City public schools. Data analyses involved 2x2x2x2 factorial MANOVA, exploratory factor analysis (EFA), and multiple regression analyses (MRA). Results included: 1.) The top four motivation factors (MFs) were: MF3 (For a Healthier Body); MF11 (To Foster Self-Esteem); MF1(High Technical Content and Unique Value); MF2 (For Fun and Happy). These four MFs possess the highest impact on these participants' PMs. 2.) Genders (male/female) and Supporting (by parents or by school) had significant impacts on these athletes' PMs, but Goal-settings ('for professional' or 'for non-professional') and 'Years engage in T&F competition' (one to two years or three and four years) did not. 3.) Through the analyses of EFA and MRA, the characteristics and relationships among these high-school T&F athletes' participation motivations were correlations were identified. Further, the traits of the four healthy related elements associated with their basic psychological

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needs were also identified, and verified these traits were predictable. Last, meaningful recommendations on how to apply these findings to youth sports education were also provided.

Introduction

It was known that track and field sports are considered the oldest athletic events on the earth and serve as the foundation of all types of competitive sports. Scholarly literature regards the sports of track and field (T&F) as an individual sport category because usually, the participants compete with one another individually rather than in a team format, even if there are arguments in this regard, such as "any sport can create/form a team competition by combining the results of several individual competitors or by having team members take turns to compete" (e.g., Jordan, 2019; Naar, 2021). In fact, individual and team sports have been defined clearly; for example, individual sports were defined as activities in which competing as a part of a team isn't required. Naar (2021) stated that individual sports require very strong competitive capability; the athlete competes with others and oneself, and individual sports require a high level of self-motivation, etc.

Conversely, team sports involve a larger group of people working together and competing against another large group (or numerous team members). Often, the most popular sports to play and the most entertaining to watch are team sports such as football, basketball, and baseball, which have large fan bases (Naar, 2021). According to Official Report (2010), a new international sports event worth paying attention to is the Youth Olympic Games (YOG). Since 2010, the YOG has become a global sports event held every four years inspiring youth who dream of becoming sports stars. Theoretically, the youth athletes who competed in the YOG will most likely enter a higher competitive sports arena or obtain a scholarship to compete at the college/university level. In the USA, these youth athletes will have a high probability of being enrolled in those top colleges/universities and regularly compete in their division's competition conference of the National Collegiate Athletic Association (NCAA, 2018).

According to the report by the New York State Public High School Athletic Association (NYSPHSAA, 2018), thousands of high school athletes have been enrolled in colleges or universities because

of their athletic accomplishments and experienced their collegiate athlete journey. This statistic is one of the reasons why research studies in recent years aimed at middle and high school student-athletes have become increasingly broader and deeper (NYSPHSAA, 2018). According to the Public Schools Athletic League (PSAL, 2020), "The mission of the Public Schools Athletic League is to provide opportunities for educating students in physical fitness, character development, and socialization skills through an athletic program that fosters teamwork, discipline, and sportsmanship" (p. 1).

Regarding the domain of public school sports, the literature review showed that researchers have attributed the primarily driven factors that motivated youth athletes who participate in sports practices and competitions as Enjoyment, Physical health, Having fun, Fostering self-esteem, Friendship, Passion, or love of the game, Peer acceptance, To contest winners, To become a coach, To satisfy family's will, Entertainment, and Competitive and playful (e.g., Chen et al., 2014; Claver et al., 2017; Geidne et al., 2013; Miguel & Machar, 2007; Stellion & Sinclair, 2013; Zeng, 2018; Zeng, 2019). Specifically, Miguel and Machar (2007) found that the top three important motivational factors for the success of youth tennis players were 1) factors of enjoyment, 2) having fun, and 3) passion for the sport. At the same time, 'Improving performance, 'Keeping fit,' and 'Keeping socialized' were listed as the basic reasons for keeping them involved in the sport.

Moreover, Miguel and Machar (2007) indicated that the third group of important influence factors for the youth tennis players continuing in the sport were feeling important, remaining popular, and earning rewards. Additionally, school/team atmosphere and a good relationship with the coach were ranked as less important factors. Last, Miguel and Machar (2007) indicated that the 'Team atmosphere' has a positive relationship with players' participation motivations, implying that the closer/stronger the team atmosphere, the higher participation motivations.

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Cohn and Cohn (2016) indicated that to motivate youth athletes, every coach must know what factors get their athletes motivated. Based on their research findings, they listed the following factors or reasons: 1) Love to practice and compete; 2) Like to work on weaknesses to assist their teammates to improve; 3) Get excited about competition; 4) Want to win and hate to lose; 5) Have high expectations for their performance; 6) Remain dedicated to their selected sport; 7) Stay committed, even when challenged, and 8) Go after goals with intensity.

Concerning how motivation factors impact youth martial arts athletes, Duricek and Cynarski (2017) described that the motivational incentives in martial arts were "based on the capability to stage situations that are attractive, interesting, entertaining, competitive and playful (p. 10)". The authors found that when participants were allowed to decide which activities they preferred, they experienced greater motivation to participate. Furthermore, Zeng et al. (2019) discovered that the top five factors that truly motivated youth soccer players were 1) technical content and unique value, 2) having fun, 3) making new friends, 4) looking good in my biography, and 5) establishing prestige. The other five factors possessed impact but less power on those youth soccer players' motivation: 1) to get recognition, 2) to improve health, 3) for one unique skill, 4) to reduce troubles, and 5) to be a professional.

As seen in the scholarly research listed above, most of those studies focused on team sports. Even though martial arts and tennis were included (Zeng, 2019; Zeng et al., 2019), track and field sports were not covered. Hence, conducting the current study appears to be highly necessary.

Theoretical framework of this study

A comprehensive theory named 'self-determination theory' (SDT) was employed as this study's theoretical framework; the SDT comprises two major branches: the theory of intrinsic motivation and the theory of extrinsic motivation (Ryan & Deci, 2000). Ryan and Deci (2000) indicated that humans are motivated by three basic psychological needs: competence, relatedness, and autonomy. The competence needs in the SDT model are called effectiveness motivation; the relatedness need refers to people's need to belong and to feel accepted by others; the autonomy need refers to people's need

to feel self-determined, which is the source of their action (Ryan & Deci, 2000). In terms of organismic needs, energize intrinsic and extrinsic motivations, according to Deci and Ryan (2002) and Pintrich and Schunk (2002), the concept of need itself is too general and too vague to illustrate the engagement in particular behaviors to guide empirical research is difficult as well (Deci & Ryan, 2002; Geidne et al., 2013; Pintrich & Schunk, 2002). A few models, therefore, describe how different motivations triggered by the need to manifest intrinsic and extrinsic motivation in specific aspects or activities were developed (Pintrich & Schunk, 2002; Ryan et al., 1997).

Smith et al. (2006) also indicated that the research literature is quite consistent regarding the benefits of intrinsic motivation to learning and development; that is, engagement based on intrinsic motivation does not need external incentives/rewards and can enhance the motivations necessary to engage in the same activity again and again in the future. Other researchers also indicated that engagements based on intrinsic motivations relate to improved comprehension, creativity, cognitive flexibility, accomplishment, and so on (Claver et al., 2017; Smith et al., 2006).

Further insights by multiple researchers suggested that intrinsic motivation could be defined as participating in a sport for fun or enjoyment, while extrinsic motivation included participating in a sport to gain rewards (Cohn & Cohn, 2016; Duricek & Cynarski, 2017; Smith et al., 2006). Additionally, researchers indicated that when athletes begin to engage in a particular sport, they are not only motivated by intrinsic motivations but also by extrinsic motivations (Claver et al., 2017; Kaplan, 2010). Some particular sports, however, may be more dependent on intrinsic rather than extrinsic motivations that demonstrate different types of sports need different types of motivations (Cohn & Cohn, 2016; Duricek & Cynarski, 2017; Smith et al., 2006).

Researchers illustrated that athletes' intrinsic motivations usually predict attendance and adherence to a particular sport (Chen et al., 2014; Claver et al., 2017; Ryan et al., 1997). Additionally, the research literature is quite consistent concerning the benefits of intrinsic motivations' linkage to learning and development; that is, engagement based on intrinsic motivations does not need external incentives or rewards and can enhance the motivations necessary to engage in the

same activity repetitively (Ryan et al., 1997; Zeng, 2018; Zeng et al., 2018; Zeng, 2019). In the present study, youth athletes who are intrinsically motivated would be those who go to practice their track or field techniques and fitness regularly for fun and self-satisfaction, whereas those youth athletes who are extrinsically motivated would be those who go to practice to become better track/field athletes for winning a medal in the competition (Jordan, 2019; Kaplan, 2010; Ryan & Deci, 2000; Smith et al., 2006). Multiple research studies have confirmed that intrinsic and extrinsic motivations affect youth athletes differently (e.g., Kaplan, 2010; Ryan & Deci, 2000; Ryan et al., 1997; Smith et al., 2006; Zeng et al., 2019).

Based on all points introduced above, the present study would focus on the following research hypotheses and questions: 1) No significant differences would exist in the motivation elements between the 'gender' (male, female). 2) No significant differences would exist in the 'financing support' (by parents/myself or school/team). 3) No significant differences would exist in the motivation elements between the 'goal settings' (for professional or non-professional). 4) No significant differences would exist in 'Years engage in T&F competition' (1/2 year versus 3/4 years) among participants. 5) Whether or not the characteristics and the relationships among their participation motivation could be identified and predicted. 6) Could the traits and relationships among the participation motivations and the three basic psychological needs be identified and predicted?

Method

Participants

The study's participants included 133 high school T&F athletes (from 15 high school T&F teams), considered representatives of 18,000-35,000 high school students. The procedures for recruiting the participants were: 1) Obtaining approval for conducting this survey study from the Institutional Review Board (IRB) of the author's college; 2) following the guidelines for surveying within the 15 high schools selected (Note: the students' numbers of these high schools varied from 1,200 to 2,500, but all 15 had a school track and field team, and regular training and attend competition within the New York City High school track and field sports conferences); 3) submitting required documentation to these high schools' administrators;

4) recruiting 200 volunteer participants from 15 high schools T&F team; 5) contacting all volunteers and have the "Inform Consent" signed, and 6) delivering 200 "Questionnaire" to the athletes who voluntary participate in this survey study. As a result, among the Questionnaires returned, 133 were correctly completed/answered (return/effect rate of 66.5%).

Measurements/Instrumentation

The Adapted Youth Track and Field Athletes' Participation Motivations and Healthy Related Elements Questionnaire (AYTFAPMHREQ) was used to collect data (Zeng, 2019). The AYTFAPMHREQ consists of 27 items, of which eight items investigated participants' general information; the other 19 questions examined what reasons/factors (RFs) have motivated the athletes to participate in the track and field sports training and competitions.

The instrument included a Likert's 5-point scale, which allowed the participant to determine his/her answer to each of the questions using the following point system: 5 points = Strongly agree, 4 points = Agree, 3 points = some agree, 2 points = little agree, and 1-point = Disagree. Examples of additional questions included: "How long have you officially engaged in track & field training and competition?" "Financially, who supported your engagement in track & field training and competitions?" "What factors or reasons motivated you to continually take part in track & field training and competitions?" The Part II of the questionnaire contained 10 intrinsic motivation factors (i.e., items 1, 2, 4, 7, 8, 10, 13, 14, 15, and 17) and nine extrinsic motivation factors (i.e., items 3, 5, 6, 9, 11, 12,16, 18, and 19). In other words, just like Deci and Ryan (2002) described in the "Handbook of Self-determination Research," all three basic psychological needs (competence, relatedness, and autonomy) were included.

Data Analyses

To obtain the answers to the hypotheses and questions stated above, the research methods and data analyses have used: a) a 2x2x2x2 factorial multivariate analysis of variance (MANOVA), including Gender (male or female) x Financing supported (by-parents or by-school/team); 'Goal-settings' (for professional versus for none professional) and 'Years in T&F competition' (1/2 year vs. 3/4 years). b) The exploratory factor analysis (EFA), and c) the multiple regres-

sion analyses (MRA). The SPSS version 25.0 (SPSS, 2020) was utilized for statistical analyses.

Table 1

Descriptive Statistics of the Participants (N =133, 81 Male, 52 Female)

Motivation Factors (MFs)	Mean ± S.D	Sum	Rank
MF1 High technical content and unique value.	4.023 ± .609	535.000	3
MF2 For the fun and get rid of boredom.	3.879 ± .953	516.000	4
MF3 For getting healthier whole body.	4.436 ± .801	590.000	1
MF4 For the enjoyment and have happiness.	3.443 ±1.356	458.000	11
MF5 To meet my friends.	3.789 ±1.155	504.000	6
MF6 For make new friends.	3.639 ±1.182	484.000	8
MF7 For contest winners.	3.105 ±1.017	484.000	14
MF8 For shape the body.	3.857 ±1.291	513.000	5
MF9 For improve physical health.	2.797 ±1.496	372.000	15
MF10 For become a professional athlete.	2.714 ±1.131	361.000	16
MF11 For foster self-esteem.	4.045 ±0.983	538.000	2
MF12 For improve my own reputation.	3.443 ±1.251	458.000	10
MF13 For establish prestige among my friends.	3.444 ±1.215	459.000	9
MF14 For get the recognition from my coach.	3.707 ±1.198	493.000	7
MF15 For reduce the learning/working pressure.	3.353 ±1.175	446.000	13
MF16 For reduce the troubles from learning/work.	3.421 ±1.226	455.000	12
MF 17 For develop a unique sport skills.	2.263 ±1.180	301.000	18
MF 18 Hope to become a T&F coach in the future.	2.037 ±0.874	271.000	19
MF 19 For satisfy the will of family.	2.744 ±0.982	365.000	17

Results

The findings/results were presented in Table 1 to Table 3: Table 1 exhibits the descriptive statistics of participants, mean scores, standard deviations, and rank order of the 19 MFs; it reflects the participation motivations status of the participants.

Besides the data in the tables, the participants possess the following unique characteristics: 1) Their duration of officially received track/field training was one year 8.3%, two years 23.3%, three years 42.8%, and four or more years 25.6% separately. 2) Responding to "Who supported you engaged in T&F practices and competitions?" 39.8% answered "By my parents," and 60.2% answered "By my school/team." 3) In response to "What is your goal of engaging in track/field practices and competitions? 31.8% reported "To become a professional T&F athlete," and 68.2% chose "To become a non-professional T&T athlete."

Table 2

Comparison of the Youth Athletes' Motivation Scores after the 2x2x2x2 MANOVA Significant Difference Effects Showed in 'Gender' and 'Supports' Elements)

Motivations Factors (MF)	Gender *Mean (SD)* Male (n=81)	Female (n=52)	Supports *Mean (SD)* By parents (n=53)	By school (n=80)
MF 1.	3.876 ± .509	3.250 ± .682*	3.868 ± .6.21	4.125 ±0.582*
MF 2.	3.889 ±1.118	3.865 ± .627	4.038 ± .854*	3.775 ±1.006
MF 3.	4.531 ± .881*	4.288 ± .636	4.604 ± .742*	4.325 ± .823
MF 4.	209 ±1.455	3.807 ±1.103*	3.604 ±1.276*	3.337 ±1.404
MF 5.	3.593 ±1.272	4.096 ± .869*	4.038 ± .869**	3.625 ±1.256
MF 6.	3.481 ±1.305	3.884 ± .921*	3.679 ±1.139	3.612 ±1.217
MF 7.	2.938 ±1.122	3.365 ± .767**	3.151 ± .928	3.075 ±1.076
MF 8.	3.938 ±1.354*	3.730 ±1.190	3.811 ±1.301	3.887 ±1.292
MF 9.	2.444 ±1.058	3.346 ±1.312**	3.000 ±1.480*	2.662 ±1.500
MF 10.	2.716 ±1.039*	2.711±1.427	2.698 ±1.170	2.725 ±1.136
MF 11.	4.099 ±1.056	3.961±0.862	4.189 ± .942*	3.950 ±1.005
MF 12.	3.197 ±1.336	3.827±1.004*	3.151 ±1.350	3.637 ±1.150*
MF 13.	3.148 ±1.246	3.903 ±1.014**	3.264 ±1.374	3.562 ±1.089*
MF 14.	3.370 ±1.279	4.231 ±0.831**	3.755 ±1.142	3.675 ±1.240
MF 15.	3.469 ±1.245*	3.173 ±1.042	3.453 ±1.066	3.287 ±1.234
MF 16.	3.951 ± 0.907**	2.595 ±1.208	3.660 ±1.125*	3.262 ±1.270
MF 17.	2.111 ±1.284	2.500 ± 0.959	2.302 ±1.171	2.273 ±1.105
MF 18.	2.173 ± 0.891*	1.827 ± 0 .809	2.075 ± 0.937	2.012 ± 0.834
MF 19	2.605 ± .931	2.961 ±1.028*	2.396 ± 0.967	2.975 ± 0.927*

The results from the 2x2x2x2 factorial MANOVA (Gender x Supports x Years in T&F Competition x Goal-settings) revealed that significant differences were found in Gender (p < 01, Λ = .594, F = 3.561) and Supports (p < 01, Λ = .637, F = 2.972), however, no significant differences exist in 'Goal-setting' (p < .05, Λ = .863, F = 824); and 'Years in T&F Competition' [Note.] (p > .05, Λ = .795, F = 1,367). After significant findings, a follow-up MANOVA test was executed. This follow-up test was able to determine not only which motivation factors motivated these high school T&F athletes engaged in their practices and competitions but also able to determine which related elements have a stronger or weaker impact on their participation motivations.

Below were some further interpretations for Table 2: 1) In the 'Gender' element, 17 out of 19 comparisons showed significant differences, with females scoring higher than males in seven comparisons reaching a significant p < .05 level; and four comparisons reached

Table 3

Unstandardized Regression Coefficients (Beta in parentheses) for Participants' Motivation Factors (MF) Standardized Score (N = 133, Male = 81, Female = 52)

Predictor Variables [Note] **DV:**	Model I Gender	Model II Supports	Model III Years in T&F
Competence Needs variable	--	--	--
MF3. For healthier whole body	.021 (.035)	-.050 (-.082)	-.021(-.034)
MF7. In order to contest winners	-.005 (-.011)	-.007 (-.014)	.097(.204)
MF8. In order to shape the body	-.023 (-.060)	.055 (.144)	.031(.084)
MF13. In order to establish prestige	.086 (.215)	.018 (.045)	.021(.054)
MF14. For recognition from coach	.104 (.255)	-.023 (-.056)	.057(-.128)
Relatedness Needs variable	--	--	--
MF2. Having fun not boredom	-.055 (-.106)	-.043 (-.084)	.029 (.058)
MF4. For enjoyment & happiness	.015 (.041)	-.034 (-.095)	-.005 (-.015)
MF12. To improve my reputation	-.017 (-.044)	.100 (.256)	-.066 (-.171)
MF18. To become a T & F coach	-.066 (-.118)	-.004 (-.007)	-.006 (-.010)
MF19. To satisfy the will of family	.100 (.200)	.154 (.308)	-.118 (-.241)
Autonomy Need variable			
MF9. To improve physical health	.037 (.114)	-.063 (-.191)	-.025 (-.077)
MF11. To foster self-esteem	-.025 (-.051)	-.057 (-.115)	-.063 (-.128)
MF15. To reduce learning pressure	-.062 (-.148)	.035(.083)	-.075 (-.184)
MF17. For a unique sport skill.	-.030 (-.072)	.011(.027)	.016 (.039)
Constant	1.002*	1.338**	2.067**
ΔR^2	.412	.273	.213
F	6.233**	2.991**	2.071**

a significant $p < .01$ level; although overall the male scored lower than the females, there are also in six comparisons male scored significantly higher than the female at $p < .05$, wherein one comparison reached the $p < .01$ level; 2) In the 'Supports' element, overall, there are 11 out of 19 comparisons reached significant differences ($p < .05$) level with seven comparisons Support by parents score higher than Support by the school/team, but there are also four comparisons showed that Support by school/team score higher than the Support by parents.

Internal Consistencies and Correlation Analysis

For the internal consistencies and correlation analyses, according to the suggestions of Child (1990) and Zhu (2012), we used Exploratory Factor Analysis (EFA) and Multiple Regression Analyses (MRA). The criteria of correlation degree for low correlation is r = .20 -.39; for moderate correlation is r = .40 -.59; for moderately high

correlation is r = .61-.79; and for high correlation is $r \geq .80$ (31). According to their recommendation and criteria, the current study revealed that from the 171 correlation coefficients examined, 71 correlation coefficients reached significant levels (at p = .05 and p = .01 levels separately). Hence, this study's internal consistencies were between the 'acceptable' and 'good' levels.

Besides these, multiple research groups have indicated that these youth athletes' sports participation motivations could be effectively predicted through the EFA and the MRA (Chen et al., 2014; Child, 1990; Duricek & Cynarski, 2017; Pintrich & Schunk, 2002; Zeng, 2018; Zeng et al., 2018; Zeng, 2019). Following their methodology, the current study also implemented these two analysis methods. Following the self-determination theory and the principles of EFA and MRA, the findings were that 14 out of 19 original participation-motivation variables met these principles and were selected to enter the multiple regression analyses.

Therefore, based on the features of this research design and topic, three models of MRA were set and calculated separately: model one was for predicting the three psychological needs (i.e., Competence, Relatedness, and Autonomy) separately by 'Gender'; model two was for predicting the three psychological needs separately through 'Supports', model three was for predicting the three psychological needs to use the 'Years in T&F competition'. Results from each of the regression equations are exhibited in Table 3. Predictor variables were entered to determine the variance accounted for through inference in the motivations of high school T&F athletes' participation in each regression analysis.

In the first set of regression analyses, the motivation factors' standardized score was the dependent variable, and the satisfaction degrees of Competence, Relatedness, and Autonomy were based on those motivation factors' scores. Results showed a significant regression, F (6.233), at $p < .01$ level; the combined accounted variance for the three psychological needs satisfaction from the Gender element was 41%. In other words, this satisfaction level is higher than people expect.

A significant regression result appeared from the Supporting element F (2.991) at $p < .01$ level; this means the combination accounted variance for the three psychological needs satisfaction from

the Supporting element was about 27%, which is in the satisfaction level just as people anticipated, this result implied that: Support by parents even have more impact power than Supporting by their teams. Last, the regression analysis on the 'Years engage in T&F competition' element reached a significant F (2.071) at $p <$. 01 levels; this contribution to the satisfaction of the three psychological needs from this element was about 21%; this result seems to differ from what people expected, but it is reasonable. The fact is those athletes who have more years (three to four years) of training in the track or field need to maintain their participation motivation levels to perform as well as they should be in the competitions. In comparison, athletes with fewer years (one to two years) of training in the track and field have to work harder to improve their performance degree to reach or catch up with those junior/seniors (three to four years) athletes' skill performance levels, etc.

Therefore, all three psychological needs categories reached a significant level (one at $p < .05$ level, and two at $p < .01$ level), and the total satisfaction percentage was 89%, or the "Total Variance Explained" from the EFA revealed that these 14 variables accepted to enter the regression reach a level of 89%. This finding implicated that the educators (coaches and instructors) and administrators (managers or program directors) have done a good job cultivating and managing their athletes/students. Their ways of coaching their track/field athletes might be a successful example for encouraging and maintaining the youth athletes to continually participate in their track/field practices and competitions.

Discussion

This study aimed to explore the characteristics and relationships among high-school T&F athletes' PMs, the four related elements, and the kinds of PMs that motivated these youth athletes to participate continually in their T&F practices and competitions. First, the status and characteristics of these high school T&F athletes' motivations for participation were discovered. Second, the present study identified the correlation relationship characteristics among the 19 independent variables; among the 171 correlation coefficients, a total of 71 MFs' correlation coefficients reached a significant level. Third, our findings did show significant differences exist among the participants' motivation factors score; it was related to the 'Gender' and

'Supporting' two elements (reached $p < .05$ and $p < .01$ Levels), but no significant differences ($p > .05$ level) exist in the 'Goal-settings' and 'Years in T&F competition' elements. Fourth, the findings from the present study confirmed that positive correlations are the characteristics of the relationship between the three psychological needs and the motivation factors score, and those traits are predictable.

The MRA results exposed that the satisfaction degrees on three basic psychological needs (Competence, Relatedness, and Autonomy) reached an 89% contribution rate. These findings extended the research literature on this topic. Specifically, many of these characteristics have not been deeply explored among the age 15-18 years, high school track and field athletes' participation motivations.

Likewise, according to the SDT (Deci & Ryan, 2002; Ryan & Deci, 2000; Ryan et al., 1997), the results of the present study show those high school T&F athletes' participation motivations were more tended toward intrinsic motivation, and this type of motivation was their core motivation, and enable them to participate in T&F training and competitions continually (Deci & Ryan, 2002; Ryan & Deci, 2000; Ryan et al., 1997). Moreover, the findings from the present study were consistent with the recommendations from the self-determination theory (Ryan & Deci, 2000; Ryan et al., 1997) and found that the participants' decision on whether or not to participate in T&F training continually and competitions was based on their intrinsic motivations, not the extrinsic motivations, and these motivations can be predicted effectively (Stellion & Sinclair, 2013; Zeng, 2018).

In summary, 1) regarding these high school T&F athletes' participation motivations characteristics, the Intrinsic factors and the Extrinsic factors appear to possess similar impact power on these high school T&F athletes' participation motivations; 2) although the impact powers of both Intrinsic motivations and Extrinsic motivations do not have significant differences, the ten Intrinsic motivations in the AYTFAPMHREQ (Zeng, 2019) are still rated as the core motivation motivations factor (see Table 2); 3) some motivation factors or reasons possess higher impact power than other factors, but some motivation factors or reasons possess less impact power than the other factors as well. The findings from the present study

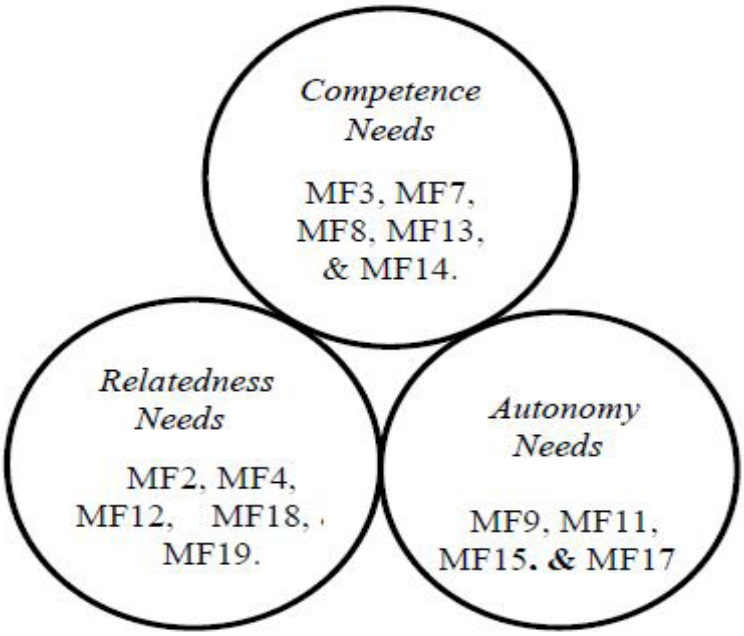
are consistent with the findings of the previous studies (Pintrich & Schunk, 2002; Ryan & Deci, 2000; Zeng, 2018; Zeng et al., 2019); and support what the previous studies described that all humans possess three psychological needs; the needs for autonomy, competence, and relatedness (Duricek & Cynarski, 2017; Ryan & Deci, 2000; Smith et al., 2006).

Additionally, the findings of the present study are consistent with the previous studies and provide support to what Deci and Ryan (2002) stated: the experience of Autonomy and Competence are both theoretically suggested to be necessary conditions for maintaining and enhancing the Intrinsic Motivation, and environmental such as conditions of practices and competitions that support feelings of Autonomy and Competence are expected to facilitate the intrinsic motivations. Based on the present findings, the high school T&F coaches, trainers, or administrators should fully diagnose and analyze their athletes' specific situations and carefully implement them accordingly. The participation motivations traits of these samples' youth T&F athletes are summarized and illustrated in Figure 1.

Regarding the hypotheses in the current study, some further interpretations were a) hypotheses 1 and 2 were not true because the findings revealed that female athletes possess significantly higher participation motivations than male athletes; the athletes who financing supported by parents possess significantly higher participation motivations than those athletes who financing supported by their school/team). b) The hypotheses 3 and 4 were true because in the 'Years in T&F competition' and the 'Goal-settings' elements, the findings did show no significant differences were found on the MFs score among the High-school T&F athletes. c) To the two research questions, by using the Exploration Factor Analysis and Multiple Regression Analysis techniques, the answers were: (1) the characteristics and relationships among the participants' participation motivations can be effectively identified (see Table 2 and 3), and (2) the participants' traits in their participation motivations, relationships among the three basic psychological needs could be identified and able to predict effectively.

These findings (Figure 1) were consistent with the point of view of youth athletes' motivations that need to be supported, and among the sources of support, the parents' support was rated as the highest

Figure 1
Characteristics of Three Basic Psychological Needs of the Participants (N = 133))



level (Chen et al., 2014; Geidne et al., 2013; Miguel & Machar, 2007; Stellion & Sinclair, 2013; Zeng, 2019; Zeng et al., 2019). Additionally, among the sources of satisfaction factors for motivating youth athletes to be involved in sports participation, family satisfaction was rated as one of the most important factors as well (Chen et al., 2014; Geidne et al., 2013; Miguel & Machar, 2007; Stellion & Sinclair, 2013; Zeng, 2019; Zeng et al., 2019).

The study also agrees with what those previous studies pointed out: building up healthy public policy in youth sports is very important for maintaining their participation motivations; various youth sports organizations should recognize and match up with the changes in health regulations (especially after our society experienced COVID-19), and then implement these regulations to different types of youth sports schools/teams because these public health policies possess positive impacts on fostering youth athletes' sport participation motivations.

Moreover, the follow-up test on the 2x2 (Gender x Supports) factorial MANOVA determined what motivation factors motivated

these high school T&F athletes to engage in their training and competitions. The findings discovered that 17 out of 19 comparisons showed significant differences within the 'Gender' element, and 11 out of 19 comparisons reached significant differences ($p < .05$) level in the 'Supports' element (see Table 3 for details), here no need to re-describe. These findings imply that even if 28 out of 38 comparisons reached significance levels, it did not mean those 28 motivation factors play a much more important role in the participants' participation motivations. The other motivation factors can be ignored. That is, to better develop or improve the participants' participation motivations, the professionals/educators still need to continually reinforce the needs of competence, relatedness, and autonomy. That is, have the three basic psychological needs as a complete development process (Deci & Ryan, 2002; Miguel & Machar, 2007; Smith et al., 2006; Stellion & Sinclair, 2013; Zeng et al., 2018; Zeng et al., 2019).

On the other hand, besides specific differences between the present study and those previous studies, there are some similarities, such as using previous studies on youth volleyball and football (Zeng, 2018; Zeng et al., 2019). It is not hard to find out that those differences and similarities exist simultaneously. First, in the youth volleyball players' motivation study, the researcher indicated that the six highest factors that motivated the youth volleyball athletes engaged in their practices and competition were: 'Technical content and unique value;' 'Become a volleyball coach;' 'To meet friends;' 'To make new friends;' 'To establish prestige;' and 'For building my biography' (Zeng, 2018). Second, in the youth soccer players' participation motivation study, the researchers summarized that the top six factors were: 'Technical content and unique value'; 'To developing extraordinary skills'; 'To getting healthier'; 'For enjoyment and happiness'; 'For improving my biography'; and to improve my physical fitness (Zeng et al., 2019).

Furthermore, researchers in their studies also summarized that a) Enjoyment, having fun, and Passion for the sport was rated as the top three important motivation factors for the success of youth tennis players (Zeng, 2018). b) Factors like 'Improving performance level,' 'Keeping Fit,' and 'Keeping Socialized' were rated as the basic reasons for them to keep involved in sports (Zeng et al., 2018; Zeng et al., 2019). c) Feeling important and popular and earning rewards

were ranked as lower influence motivations (Zeng et al., 2018; Zeng et al., 2019). d) School/team atmosphere and good relationship with the coach were also ranked as lower important factors in players' motivations (Stellion & Sinclair, 2013; Zeng, 2018; Zeng et al., 2018; Zeng et al., 2019). e) Team atmosphere has a positive relationship with players' participation motivations, which means that the closer the team atmosphere, the higher the participation motivations (Naar, 2021; Smith et al., 2006; Zeng et al., 2018; Zeng et al., 2019).

Next, by comparing the findings on the top six motivation factors from the four different research projects (Note. using the grand mean scores only), the researchers found that Soccer MGrand = 4.40; Volleyball MGrand 4.25; Tennis MGrand = 4.23; and Martial arts MGrand = 3.82. Soccer ranked No. 1, Volleyball No. 2, Tennis No. 3, and Martial arts No. 4. This result may relate to the atmosphere of these sports/teams. Soccer and volleyball are team sports with a stronger team atmosphere; tennis and martial arts are not team sports. Even though sports categorized scholars said the sports of martial arts and track or field can create a team to compete by combining several individual athletes' competition results or by arranging their team members to take turns to compete against the other teams; however, teamwork atmospheres still are not as strong and natural as in those real team sports (e.g., soccer, volleyball, and basketball). Hence, people have to say that it is the reality and real situations in the sports domain that people must consider.

Moreover, researchers in their studies also summarized that a) Enjoyment, having fun, and Passion for the sport were rated as the top three important motivation factors for the success of youth tennis players (Zeng, 2018; Zeng et al., 2018; Zeng, 2019). b) 'Improving performance level,' 'Keeping fit,' and 'Keeping socializing' were rated as the basic reasons for them to keep involved in the sport (Stellion & Sinclair, 2013; Zeng, 2018; Zeng et al., 2018; Zeng, 2019). c) Feeling important and popular and earning rewards were ranked as lower influence motivations (Stellion & Sinclair, 2013; Zeng, 2018; Zeng et al., 2018; Zeng, 2019; Zeng, 2020). d) School/team atmosphere and having a good relationship with the coach were also ranked as the least important factors in players' motivations (Zeng, 2018; Zeng et al., 2018; Zeng, 2019). e) Team atmosphere has a positive relationship with players' participation motivations, which means that the

closer the team atmosphere, the higher the participation motivations (Stellion & Sinclair, 2013; Zeng, 2018; Zeng et al., 2018; Zeng, 2019; Zeng.

Conclusions

Based on the discussions described above, the present study has come up with the following conclusions:

1) Based on the impact power from high to low, the following 14 motivation factors (MFs) were crucial and play more important roles in the participation motivation functions, these MFs are MF3 For a healthier body; MF7 To contest winners; MF8 To shape body; MF13 To establish prestige; MF14 To get recognition from the coach; MF2 Having fun not boredom; MF4 For enjoyment and happiness; MF12 To improve my reputation; MF18 To become a T&F coach; MF19 To satisfy the will of the family; MF11 To foster self-esteem; MF15 To reduce learning pressure; MF17 For developing a unique sport skill.

2) Significant positive correlation coefficients among the 19 MF variables can be identified.

3) The questionnaire's Intrinsic and Extrinsic motivation factors are important for establishing and maintaining high school T&F athletes' participation motivations; how to weigh and implement these 19 MFs will depend on the specific season and the athletes' motor skills developmental stage.

4) The findings of this study revealed the elements of 'Goal-setting' and 'Years in T&F competition' are not the determining factors, but 'Gender' and 'Supports' elements are, which means to maintain and improve the high school T&F athletes' participation motivations level, professionals/educators who were working in high school T&F teams need to make sure there are enough Support powers from parents and the school/team; especially the support from their parents.

5)The findings discovered that the Intrinsic factors possess a slightly higher impact/influence power than the Extrinsic factors. Such as MF2 for having fun not boredom, and MF8 to shape the body are crucial to forming these high school T&F athletes' participation motivations. High school T&F professionals/educators must analyze their athletes' situations and apply these research findings.

6) Exploratory Factor analysis and Multiple regressions techniques are effective ways to predict the T&F athletes' participation

motivations, and this way not only can use for helping the professionals and educators establish an effective way to reinforce and manage their T&F teams/programs but also can use for assisting their athletes maintaining and enhancing their participation motivations.

Application in Youth Sports and Recommendations

First, by providing new evidence/findings on the psychological mechanism associated with high school T&F athletes' participation motivation factors, this study extends the literature on youth athletes' study. Using the Exploratory Factor analysis and Multiple regressions techniques can effectively predict the relationships between the three basic psychological needs (i.e., Competence, Relatedness, and Autonomy needs) and participants' key-related elements (e.g., 'Gender', 'Supports', 'Goal-settings', and 'Years in competition'), the results of this study supported that the three basic psychological needs are the essential factors contributing to youth T&F athletes' participation motivations, and can be predicted effectively. Second, these findings are lively and meaningful and can serve as examples for sports pedagogy, sports management, or physical education teacher education classes. Third, by applying these findings or research methodologies from this study, coaches and managers in youth T& F teams will be able to develop more suitable coaching strategies, enhance their athletes' participation motivations, and improve their management capability in this area.

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