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Poza zdrową aktywnością fizyczną – społeczno-kulturowe postawy wobec ciała a poziom zaangażowania w aktywność fizyczną u młodzieży wychowanej w kulturach azjatyckich i europejskich: porównanie chińsko-polskie

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Beyond the healthy physical activity – sociocultural attitudes toward the body and the level of involvement in physical activity in young people brought up in Asian and European cultures: Chinese-Polish comparison

Supervisor:
prof. dr hab. Bernadetta Izydorczyk

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Wykaz publikacji naukowych składających się na rozprawę doktorską

Article 1

Guo, S., Izydorczyk, B., Lipowska, M., Kamionka, A., Lizińczyk, S., Sajewicz-Radtke, U., Radtke, B. M., Liu, T., & Lipowski, M. (2023). Socio-cultural attitudes toward the body as a predictor of motivation for physical activity in young people brought up in Asian and European culture—Chinese-Polish comparison. *BMC Sports Science, Medicine and Rehabilitation, 15*(1), 52. https://doi.org/10.1186/s13102-023-00662-y

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Article 2

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Impact Fact: 5.44; MNiE: 100

Article 3

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Abstract

Background: The World Health Organization emphasizes promoting health through physical activity and regularly publishes physical activity guidelines for different populations. The positive effects of regular physical activity on health have formed a consensus. However, moderate-certainty evidence suggests that the benefits of sports activities may decrease as activity levels increase beyond the globally recommended level and negatively affect health. Global public health research has confirmed that unhealthy physical activity is particularly prominent among young people aged 18-30 and is becoming a new threat to young people's health in Europe, Asia, and the Americas (including Poland and China). Studies based on social cognitive theory, sociocultural theory, planned behavior theory, and self-determination theory suggest that sociocultural attitudes towards the body are an important variable related to young people's physical activity and motivation for physical activity and eating attitudes have an impact on young people's physical activity. These variables may be related to the sociocultural environment in which young people grow up. Although globalization has brought about sociocultural cross-fertilization, differences between countries and regions persist. However, there is little cross-cultural research on potential risk factors for unhealthy physical activity. Based on these, the main purpose of this study is to find the cultural specificity of the relationship between undertaking unhealthy physical activity and sociocultural attitudes toward the body. This study involved young Polish and Chinese people engaged in physical activity, assessed the relationship between their sociocultural attitudes toward the body and motivation for physical activity and obligatory exercise, and examined the mediating role of motivation for physical activity and eating attitudes.

Methods: This study was conducted in three phases according to the study objectives and research questions. In all stages of the research, the study population was similar, and participants were recruited from four cities in Poland and China through purposive sampling. All participants had to meet the inclusion criteria developed for this study, such as being between 18 and 30, having Polish or Chinese nationality and growing up in that country. Participants completed self-report measures. At all stages of the research, we used the Sociocultural Attitudes Toward Appearance Questionnaire 3 (SATAQ 3) and the Inventory of Physical Activity Objectives (IPAO). Depending on the research question posed, we also used the Obligatory Exercise Questionnaire (OEQ) and the Eating Attitude Test (EAT-26). In the data analysis stage, specific statistical analysis methods were selected based on the research objectives and questions, including descriptive statistical analysis, correlation analysis, and multiple regression analysis.

Results: According to the research objectives, the questions raised in this research were answered through three studies. *Article 1* answers the *first research question*, with the results indicating that there are significant correlations between the sociocultural attitudes toward the body and motivations for physical activity among Polish and Chinese young people who grew up in European and Asian cultures, respectively, with cross-cultural differences being evident. Internalization of athletic and general appearance ideals, as well as perceived pressure from media and others, are universal predictors of motivation for physical activity among young people in Poland and China. However, information from media and other sources is a specific sociocultural predictor of motivation for physical activity only in Polish young people. The sociocultural attitudes toward the body may be important for Polish and Chinese young people undertaking physical activity and how they perceive the objectives of their physical activity.

Article 2 and *Article 3* address the *second research question*. The findings indicate that Internalization-Athlete in sociocultural attitudes toward the body is a common positive direct predictor of obligatory exercise among young Polish and Chinese women. Information and Internalization-Athlete in sociocultural attitudes toward the body were specific direct positive predictors of obligatory exercise in young Chinese men. Internalization-General and Internalization-Athlete in sociocultural attitudes toward the body were a direct positive predictor of obligatory exercise for young men in Poland, but this relationship is unstable.

Article 2 and *Article 3* also answer the *third research question*. The results demonstrate that: the social adaptation goal of motivation for physical activity mediated the relationship between sociocultural attitudes toward the body and obligatory exercise among young Polish and Chinese men. Information and Pressures in sociocultural attitudes toward the body indirectly and positively predicted obligatory exercise in young Polish and Chinese men through the social adaptation goals of motivation for physical activity. Internalization-General and Internalization-Athlete in sociocultural attitudes toward the body indirectly and positively predicted obligatory exercise in young Polish men through the social adaptation goal of motivation for physical activity.

Among Polish and Chinese young women, Internalization-General and Internalization-Athlete in sociocultural attitudes toward the body indirectly and positively predict obligatory exercise through Dieting and Oral control in eating attitudes, respectively; Bulimia and food preoccupation were only mediators of the relationship between sociocultural attitudes toward the body and obligatory exercise in young Polish men.

Conclusion: There was a significant association between young people's sociocultural attitudes toward the body and unhealthy physical activity (obligatory exercise), but this is specific to particular factors for sociocultural attitudes toward the body, and significant cross-cultural differences exist, with some factors of motivation for physical activity and eating attitudes playing a mediating role. Preventive interventions for unhealthy physical activity in young people should pay attention to the sociocultural standards regarding the body promoted by the mass media, with particular attention to the mediating role of motivation for physical activity and eating attitudes and the various effects of different sociocultural contexts and different genders.

Streszczenie

Wstęp: Światowa Organizacja Zdrowia kładzie nacisk na promowanie zdrowia poprzez aktywność fizyczną i regularnie publikuje wytyczne dotyczące zalecanej aktywności fizycznej dla osób z różnych populacji. Pozytywny wpływ regularnej aktywności fizycznej jest bezsporny, jednak badania dostarczają także danych wskazujących, że korzyści z uprawiania sportu mogą się zmniejszać wraz ze wzrostem intensywności ponad globalnie zalecany poziom i negatywnie wpływać na zdrowie. Badania z obszaru zdrowia publicznego potwierdziły, że antyzdrowotna aktywność fizyczna jest szczególnie widoczna wśród młodych ludzi w wieku 18-30 lat i staje się nowym zagrożeniem dla zdrowia młodych ludzi w Europie, Azji i obu Amerykach (w tym w Polsce i Chinach). Badania oparte na teorii społeczno-poznawczej, teorii socjokulturowej, teorii planowanego zachowania i teorii autodeterminacji sugerują, że socjokulturowe postawy wobec ciała są ważną zmienną związaną z aktywnością fizyczną młodych ludzi, a motywacja do aktywności fizycznej i postawy żywieniowe mają wpływ na ich aktywność. Zmienne te mogą być związane ze środowiskiem socjokulturowym, w którym młodzi dorastają. Mimo że globalizacja przyniosła znaczną kulturową unifikację, różnice między krajami i regionami utrzymują się. Niewiele jest jednak badań międzykulturowych dotyczących potencjalnych czynników ryzyka antyzdrowotnej aktywności fizycznej. Opierając się na tych doniesieniach, głównym celem niniejszej pracy doktorskiej jest znalezienie kulturowej specyfiki związku pomiędzy podejmowaniem pro- i anyzdrowotnej aktywności fizycznej a socjokulturowymi postawami wobec ciała. W badaniu wzięli udział młodzi Polacy i Chińczycy podejmujący aktywność fizyczną, oceniono związek między ich socjokulturowymi postawami wobec ciała a motywacją do aktywności fizycznej i obowiązkowych ćwiczeń oraz zbadano mediatorską rolę motywacji do aktywności fizycznej i postaw żywieniowych.

Metody: Badanie zostało przeprowadzone w trzech etapach zgodnie z celami badania i pytaniami badawczymi. We wszystkich etapach badania populacja badanych była podobna, a uczestnicy byli rekrutowani z czterech miast w Polsce i w Chinach poprzez dobór celowy. Wszyscy uczestnicy musieli spełnić kryteria włączenia opracowane dla tego badania, takie jak: wiek od 18 do 30 lat, narodowość polska lub chińska i dorastanie w kraju pochodzenia. Uczestnicy wypełniali kwestionariusze samoopisowe. Na wszystkich etapach badań wykorzystaliśmy Kwestionariusz Postaw Socjokulturowych wobec Wyglądu 3 (SATAQ 3) oraz Kwestionariusz Celów Aktywności Fizycznej (IPAO). W zależności od postawionego pytania badawczego korzystano także z Inwentarza Kompulsywnej Aktywności Fizycznej (OEQ) oraz Testu Postaw wobec Żywienia (EAT-26). Na

etapie analizy danych, w oparciu o cele i pytania badawcze, wybrano określone metody analizy statystycznej, w tym analizę statystyki opisowej, analizę korelacji oraz analizę regresji wielorakiej.

Wyniki: Weryfikacja pytań badawczych, postawionych w oparciu o cel badań, przedstawiona została w trzech opublikowanych artykułach naukowych. *Artykuł 1* odpowiada na *pierwsze pytanie badawcze*, a wyniki wskazują, że istnieją istotne korelacje między postawami socjokulturowymi wobec ciała a motywacją do aktywności fizycznej wśród młodzieży polskiej i chińskiej, która dorastała odpowiednio w kulturach europejskich i azjatyckich, z widocznymi różnicami międzykulturowymi. Internalizacja standardów ideału sylwetki sportowca oraz internalizacja socjokulturowych standardów promowanego wyglądu fizycznego, a także odczuwana presja ze strony mediów są predyktorami motywacji do podejmowania aktywności fizycznej wśród młodzieży w Polsce i Chinach. Natomiast uzyskiwane z mediów informacje na temat wizerunku ciała są socjokulturowymi predyktorami motywacji do aktywności fizycznej tylko wśród polskiej młodzieży. Postawy socjokulturowe wobec ciała stanowią ważny czynnik dla podejmowania przez polskich i chińskich młodych ludzi aktywności fizycznej oraz jak grupa młodych dorosłych w Polsce i Chinach postrzega cele swojej aktywności fizycznej.

Artykuł 2 i *Artykuł 3* odpowiadają na *drugie pytanie badawcze*. Wyniki wskazują, że internalizacja ideału sylwetki sportowca jest bezpośrednim predyktorem kompulsywnej aktywności fizycznej wśród młodych Polek i Chinek. Pozyskiwane informacje z mediów oraz internalizacja ideału sylwetki sportowca są specyficznymi bezpośrednimi predyktorami kompulsywnej aktywności fizycznej u młodych mężczyzn z Chin. Internalizacja socjokulturowych standardów wizerunku ciała oraz internalizacja ideału sylwetki sportowca są bezpośrednimi predyktorami obowiązkowej aktywności fizycznej dla młodych mężczyzn w Polsce, jednak siła związku jest tutaj niska.

Artykuł 2 i *Artykuł 3* odpowiadają również na *trzecie pytanie badawcze*. Wyniki wykazują, że: cel adaptacji społecznej motywacji do aktywności fizycznej, pośredniczył w związku między postawami socjokulturowymi wobec ciała, a kompulsywną aktywnością fizyczną wśród młodych mężczyzn w Polsce i Chinach. Uzyskiwane informacje i odczuwana presja socjokulturowych standardów wizerunku ciała pośrednio wyjaśniały kompulsywną aktywność fizyczną u młodych Polaków i Chińczyków, poprzez cele adaptacji społecznej motywacji do aktywności fizycznej. Internalizacja socjokulturowych standardów wizerunku ciała oraz internalizacja ideału sylwetki sportowca wyjaśniały kompulsywną aktywność fizyczną u młodych Polaków poprzez cel adaptacji społecznej motywacji do aktywności fizycznej.

Wśród młodych Polek i Chinek, internalizacja socjokulturowych standardów wizerunku ciała oraz internalizacja ideału sylwetki sportowca pośrednio wyjaśniają obowiązkową aktywność

fizyczną poprzez postawy wobec jedzenia, polegające na podejmowaniu diet oraz na kontroli jedzenia. Zachowania bulimiczne i koncentracja na jedzeniu były mediatorami związku między postawami socjokulturowymi wobec ciała a obligatoryjną aktywnością fizyczną u młodych Polaków.

Wnioski: Stwierdzono istotny związek między socjokulturowymi postawami wobec wizerunku ciała u młodzieży, a antyzdrowotną aktywnością fizyczną (kompulsywnymi ćwiczeniami). Istnieją istotne różnice międzykulturowe między badanymi młodymi Polakami i Chińczykami w zakresie relacji między socjokulturowymi postawami wobec wizerunku ciała u młodzieży, a antyzdrowotną (obligatoryjną) aktywnością fizyczną. Programy profilaktyczne podejmowane w promocji zdrowia oraz Interwencje profilaktyczne dotyczące antyzdrowotnej aktywności fizycznej zarówno u polskiej, jak i chińskiej młodzieży powinny uwzględniać promowane przez mass media socjokulturowe standardy wizerunku ciała. W programach profilaktyki zdrowia i aktywności fizycznej winno uwzględnić się także charakterystykę motywacji do aktywności fizycznej i charakterystykę postaw żywieniowych młodych osób z uwzględnieniem odmienności płci i kultury.

A brief description of the doctoral dissertation presented in a thematically coherent form

Krótki opis rozprawy doktorskiej przedstawiony w spójnej tematycznie formie

Introduction / *Wprowadzenie*

In 2021, the World Health Organization (WHO) released updated global physical activity guidelines for different age groups and specific populations, encouraging people to engage in physical activity to improve and maintain their health. According to the WHO, physical activity is any bodily movement produced by skeletal muscles that requires energy expenditure (Bull et al., 2020).

Physical activity and health / *Aktywność fizyczna a zdrowie*

The positive effects of regular physical activity on human health have been widely recognized, such as reducing the risk of chronic diseases such as obesity, cardiovascular disease, and diabetes, improving mental health and cognitive function, promoting social connections, and enhancing the quality of life (Maher et al., 2015; Nakagawa et al., 2020; Stubbs et al., 2018; Wilson et al., 2016). However, it is worth noting that there is moderate-certainty evidence suggesting a curvilinear dose-response relationship between physical activity levels and some health outcomes, such as cardiovascular disease mortality and incidence of cancer and diabetes (Bull et al., 2020). When physical activity exceeds the global recommended levels, the benefits may decrease with increasing activity levels and may have negative impacts on health, such as skeletal muscle injury, metabolic disruption, and emotional disturbances (Flockhart et al., 2021; O'Keefe et al., 2012; Rhim et al., 2022). From a global public health perspective, such unhealthy physical activity is particularly prominent among emerging adults aged 18-30 and is becoming a new threat to the health of young people in Europe, Asia, and the Americas, including Poland and China (Berczik et al., 2012; De Young & Anderson, 2010; Fan et al., 2021; Heather A. Hausenblas & Danielle Symons Downs, 2002; Marques et al., 2019; Meulemans et al., 2014; Salomon et al., 2015). Research on a global scale confirms that physical activity is a complex issue determined by individual, social, and environmental factors and that different national and cultural contexts may be associated with physical activity in young people (Guthold et al., 2008; Ricardo et al., 2022). In light of this, conducting cross-cultural comparative

studies to identify potential risk factors for unhealthy physical activity among young people would be beneficial.

Motivation for physical activity / *Motywacja do aktywności fizycznej*

Motivation is a proximal determinant of behavior and is considered a key factor in initiating and maintaining physical activity for individuals (Knittle et al., 2018). Motivation is defined as one or more drives responsible for the initiation, direction, intensity, and persistence of goal-directed behavior (Colman, 2015). Various theories of motivation, including social cognitive theory (Bandura, 1986, 1989), theory of planned behavior (Ajzen, 1991), and self-determination theory (Ryan & Deci, 2000), have been used to understand physical activity. These theories basically propose a hierarchical structure in which social cognitive, and environmental factors predict some seminal motivational structures that trigger (or are closely aligned with) a shift from motivation to behavior formulation (Knittle et al., 2018). Research has demonstrated that people may be motivated to engage in physical activity differently in young, middle and old age due to changes in values, life tasks, goals, social environment and health status (Brunet & Sabiston, 2011; Miller & Iris, 2002).

The most common reasons for physical activity in young adults in their 20s include weight control and shaping for appearance, physical attractiveness, and social acceptance (Anić et al., 2022; Ingledew & Sullivan, 2002; Jankauskiene et al., 2019; Sabiston et al., 2005). These reasons may result from increased pressure on young people to "look good", which may lead young people to take action to meet social ideals of appearance (Bassett-Gunter et al., 2017; Cash & Smolak, 2011; Linardon et al., 2022; Lucibello et al., 2023; Sabiston et al., 2019). Thompson and his team's three-factor model based on sociocultural theory, which has been extensively researched and validated, suggests that individuals are pressured by powerful social factors (i.e., media, information) to conform to culturally defined appearance ideals and that the internalization of these ideals will change an individual's behavior to meet social norms (Thompson et al., 1999; J Kevin Thompson et al., 2004). Therefore, the motivation of young people for physical activity is an important factor in understanding their physical activity, and this motivation is closely related to young people's sociocultural attitudes toward the body. Considering the potential differences and similarities in social-cultural, psychological, and other aspects of young men and women growing up in different environments and ethnic groups, it is necessary to conduct cross-cultural comparisons of young people's sociocultural attitudes toward the body in different cultures and measure their significance for motivation for physical activity.

Obligatory exercise / *Uzależnienie do aktywności fizycznej*

Although previous research has focused more on enhancing motivation to promote physical activity, the influence of motivation on physical activity beyond the realm of health is also worth examining. Some studies have shown that certain motivations can be potential risk factors for unhealthy physical activity in young people (Huw Goodwin et al., 2011; Homan, 2010; Lichtenstein et al., 2017). In existing research, various terms have been used to study unhealthy physical activity, such as exercise addiction (Landolfi, 2013), exercise dependence (Heather A Hausenblas & Danielle Symons Downs, 2002), compulsive exercise (Weinstein et al., 2015), obligatory exercise (LePage et al., 2012), and pathological exercise behavior (Cunningham et al., 2016). In the current study, obligatory exercise was considered the most appropriate term as it encompasses addiction, dependence, and compulsion. Obligatory exercise, defined by Polivy (Bouchard et al., 1994), is continued participation in physical activity despite the pain, lack of leisure time, interference with work or meaningful relationships, and the social consequences of indulgence.

The study showed that exercise motivation could predict obligatory exercise of young people, and the gender difference is noticeable, improved body tone, enjoyment, and perceived attractiveness predict the obligatory exercise of men, and improved body tone, fitness, and enhanced mood predict the obligatory exercise of women (Pritchard & Beaver, 2012). A cross-sectional analysis of young people with an average age of 24.15 showed that their motivation for physical activity directly affects when, how often, and how they engage in physical activity (Duncan et al., 2010). It is worth noting that research based on self-determination theory has demonstrated that extrinsic motivation for physical activity is associated with body dissatisfaction, internalization of sociocultural standards of body and appearance, and intrinsic motivation for physical activity is associated with higher body satisfaction and lower internalization of sociocultural standards of body and appearance (Anić et al., 2022; LePage & Crowther, 2010; Sebire et al., 2009). The study demonstrated that Thompson's three-factor model is applicable to explain body dissatisfaction and muscle development strategies in young men (Karazsia & Crowther, 2008). Therefore, research on potential risk factors for obligatory exercise in young people needs to focus on motivation for physical activity and consider its role in the relationship between sociocultural attitudes toward the body and obligatory exercise.

In addition, eating attitudes deserve attention in the relationship between sociocultural attitudes toward the body and obligatory exercise in young people. The study by Goodwin et al. (H. Goodwin et al., 2011) confirmed that obligatory exercise is a problematic drive to exercise that is closely associated with eating disorders and will always continue even when exercise is prohibited by injury or illness. A systematic review has shown that up to 85% of people with eating disorders have poor

exercise cognition and behaviors (Hallward et al., 2022). The three-factor model by Thompson et al. explains the strength and nature of the relationship between sociocultural factors (including mass media) and psychological and eating attitudes and is widely used and validated (Chen et al., 2020; Pallotto et al., 2022; J. K. Thompson et al., 2004; You & Shin, 2020). The study by Izydorczyk et al. (Izydorczyk et al., 2020) confirmed that the internalization of sociocultural standards of body, Information, Pressures, and Internalization-Athlete were differentially predictive of eating attitudes and behaviors across gender groups. A study on college students' eating attitudes demonstrated that women felt more pressure from the media about sociocultural standards of the body than men and predicted their restrictive and bulimic behavior (Quick & Byrd-Bredbenner, 2013). A comparative study on risk factors for eating disorders among Australian and French female university students revealed significant differences in the internalization of body ideals promoted by the mass media and restrictive and bulimic behavior among female university students in the two countries (Rodgers et al., 2011). Furthermore, research based on social comparison theory suggests that obligatory exercise in young people is associated with concerns about appearance and that the internalization of sociocultural standards will predict their obligatory exercise (Ganson et al., 2022; H. Goodwin et al., 2011). Thus, eating attitudes may mediate the relationship between sociocultural attitudes toward the body and obligatory exercise in young people, and there are gender and cultural differences.

An important innovation of the current study is to conduct a cross-cultural comparative study. Under the influence of globalization and industrialization, the aesthetic standards of Asian, European, and American countries are merging and unifying with each other, and the ideal body shape of Western cultures is being widely promoted (Jackson et al., 2016; Swami, 2015; Tiggemann & Barbato, 2018). However, cross-cultural differences in sociocultural attitudes toward the body persist (Gray & Frederick, 2012). In Europe, the Polish cultural identity is individualistic, seeking individuality and personal experience and emphasizing the autonomous individual's respect towards the body norms of his or her approval; in Asia, the Chinese cultural identity is collectivistic, concerned with the playing of social roles and focusing on the individual's physical submission to social norms (Becker et al., 2012; Lipowska et al., 2019; Schindler et al., 2016). The existence of obligatory exercise in young men and women in Poland and China has been confirmed (Fan et al., 2021; Marques et al., 2019; S. Novita et al., 2022). However, there is a significant lack of cross-cultural research on obligatory exercise for young people, and no scholars have conducted cross-cultural comparative studies on the sociocultural attitudes toward the body and obligatory exercise among young people in Poland and China. Following the principles of academic innovation, the topic of comparative research on sociocultural attitudes toward the body and the level of involvement in physical activity (beyond the healthy physical activity) among young people in Poland and China, who grew up in

European and Asian cultures, was identified. The author anticipates that this study will contribute to a global understanding of the potential risk factors for unhealthy physical activity among young people and provide evidence to address the adverse effects associated with physical activity, thus maximizing the potential health benefits of exercise.

Research objectives and question / *Problem pracy, pytania i hipotezy badawcze*

The main aim of the research is to search for the cultural specificity of the relationship between undertaking unhealthy physical activity and sociocultural attitudes toward the body. The research concerned young Polish and Chinese individuals engaging in physical activity.

We formulated research questions and connected them to hypotheses, which we verified in individual scientific articles:

(1) Is there and what is the relationship between the sociocultural attitudes toward the body and the physical activity undertaken by young Poles and Chinese?
The answer to this question is in *Article 1*.

(2) Is there and what is the relationship between the sociocultural attitudes toward the body and the addiction to physical activity of young Poles and Chinese?
The answer to this question can be found in *Article 2* and *Article 3.*

(3) Are motivation for physical activity and eating attitudes mediating variables between sociocultural attitudes toward the body and obligatory exercise among young people in Poland and China?
The answer to this question can be found in *Article 2* and *Article 3*.

Based on the research objectives and research questions, a theoretical model (**Figure 1**) for the overall study was designed, with Sociocultural attitudes toward the body as the independent variable, Obligatory exercise as the dependent variable, and two mediating variables, namely Motivation for physical activity and Eating attitudes.

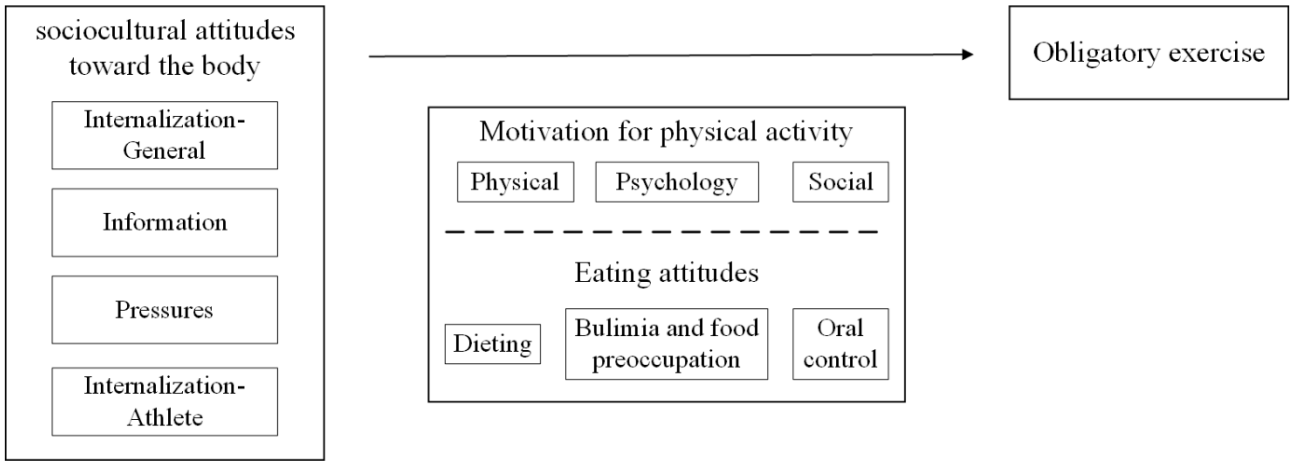

Figure 1 | Theoretical model of the research variables (own elaboration)

Research procedure / *Procedura badan*

The current study was conducted in three phases based on the research objectives and research questions. The data used for this study were part of a large international research project registered in the Protocol Registration and Results System (ClinicalTrials.gov; https://clinicaltrials.gov/ct2/show/NCT04432038). The procedure carried out in the project consisted of an online survey. The study was carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for research involving humans. The protocol of this study was approved by the Ethics Board for Research Projects at the Institute of Psychology, University of Gdansk, Poland (decision no. 33/2020). All participants were acquainted with the purpose of the conducted research and asked to complete an electronic informed consent form before registration on the project's website.

The project was conducted simultaneously in two academic cities in Poland (Krakow and Gdansk) and two academic cities in China (Beijing and Zhengzhou). Qualified researchers with psychological training (students and team members of the study authors) conducted the research. The researchers first disseminated information about the project among students majoring in humanities and social sciences at the aforementioned urban university and collected the email addresses of voluntary participants who met the selection criteria. Simultaneously, these students were asked to invite their peers to participate and collect their email addresses. Finally, the project details and a link to the online survey were emailed to participants. Participants must first complete an electronic informed consent form in order f access the questionnaire completion page.

Participants / *Osoby badane*

At all stages of the study, the study population was analogous, and participants were selected by purposeful sampling. The inclusion criteria were: age (18-30 years old), Polish or Chinese nationality and growing up in that country (lived with the family from childhood to now in Poland or China for the respective groups), lack of physical disability or somatic diseases that prevent physical activity, students or graduates in the humanities and social sciences. The criteria were validated through a questionnaire, allowing exclusion factors to be identified.

In the first stage of research (*Article 1*), from January to December 2021, we distributed research materials to 800 individuals, comprising 400 participants from Poland and 400 from China. Ultimately, 594 individuals (303 from Poland and 291 from China) participated in the study, resulting in 76% and 73% response rates for Poland and China, respectively. After preliminary screening to exclude samples which did not meet the inclusion criteria, provided conflicting information, or exhibited response biases, 44 young Polish and 83 young Chinese participants were excluded from the analysis. The final sample consisted of 186 Polish females (Mean age = 25.4, SD = 3.03), 73 Polish males (Mean age = 24.3, SD = 3.37), 98 Chinese females (Mean age = 22.2, SD = 3.11), and 110 Chinese males (Mean age = 22.3, SD = 2.82). Among the Chinese sample, 75.5% of females and 74.5% of males were university students, while 52.2% of females and 60.3% of males were university students in the Polish sample. The mean BMI for young Polish females and males was 21.32 and 24.16, respectively, while the mean BMI for young Chinese females and males was 21.67 and 23.27, respectively. All participants had humanities and social sciences backgrounds and had no prior experience as athletes or professional sports learners.

In the second stage of research (*Article 2*), the same recruiting procedure was used. We planned to survey 150 young Polish men and 150 young Chinese men. However, a total of 125 young Poles and 257 young Chinese participated in the study. 46 young Poles and 63 young Chinese were excluded from the study due to errors in completing the questionnaire and failure to meet all inclusion criteria. The mean age of young Polish men was 24.3 (SD = 3.30), and the mean age of young Chinese men was 22.0 (SD = 2.61). The mean BMI for both young Polish and Chinese men is between the normal values of 20 and 25. The two groups of respondents were undergraduate and postgraduate students currently living in the surveyed Polish and Chinese cities and university graduates entering the workforce. Of all respondents, 72% were students, 25% were employed for wages; 83% were single and never married, 11% were in a Married or domestic partnership, and no respondents were widowed or separated. The respondents' university majors were all in the humanities and social sciences; they had no experience as athletes and were not professional sports learners. All respondents

reported that they participated in physical activity, and their average monthly participation was 14 (SD=9.69).

In the final-third stage (*Article 3*), according to the same recruitment procedure, we planned to invite 300 young Poles and 300 young Chinese. The final study included 303 Poles and 400 Chinese. Due to errors in filling out the questionnaire (incomplete data obtained) and not meeting the inclusion criteria, 38 Poles and 45 Chinese were excluded. The mean age of young Polish men and women was 24.3 (SD = 3.30) and 25.3 (SD = 3.04), respectively; the mean age of young Chinese men and women was 22.0 (SD = 2.61) and 22.1 (SD = 3.11), respectively. The average BMI values for young Polish men and women were 24.3 and 21.5, respectively, and for young Chinese men and women, they were 22.7 and 20.9, respectively; both fell within the normal range of 20 to 25. All respondents were undergraduate and postgraduate students and university graduates currently living in Poland or the surveyed cities in China; 68% were students, and the remainder (32%) were college graduates who were employed at the time of the study; 69% were single and had never married, 21% were married or in a domestic partnership, and 9% were living apart together (LAT). All respondents had no experience as athletes and were not professional physical education learners.

Methods / *Narzędzia badawcze*

At all stages of the research, we used Sociocultural Attitudes Toward Appearance Questionnaire 3 (SATAQ 3) and the Inventory of Physical Activity Objectives (IPAO). Depending on the research question posed, we also used the Obligatory Exercise Questionnaire (OEQ) and the Eating Attitude Test (EAT-26).

This study used the Sociocultural Attitudes Toward Appearance Questionnaire 3 (SATAQ 3) (J. K. Thompson et al., 2004) with a Polish adaptation (Izydorczyk & Lizińczyk, 2020) and a Chinese adaptation (Jackson & Chen, 2010). The original version of the SATAQ 3 had 30 items and consisted of four subscales: Internalization-General (assesses the extent to which respondents internalization of sociocultural standards, consists of nine items, e.g., I compare my body to the bodies of TV and movie stars); Information (measures the frequency of seeking information about the sociocultural standards of body and appearance, consists of nine items, e.g., TV commercials are an important source of information about fashion and "being attractive."); Pressures (assesses the level of pressure of sociocultural standards felt by a person, consists of seven items, e.g., I have felt pressure from TV or magazines to lose weight); and Internalization-Athlete (measures the level of internalization of athletic body shape, consists of five items, e.g., I wish I looked as athletic as sports stars). Participants completed the SATAQ 3 questionnaire by marking their answers on a 5-point Likert scale. The total score for each subscale was calculated, with higher scores indicating higher internalization or

acceptance. In *Article 1*, Cronbach's alpha coefficients were: Internalization-General (0.897 in Polish studies and 0.868 in Chinese studies), Internalization-Athlete (0.859 in Polish studies and 0.654 in Chinese studies), Pressures (0.950 in Polish studies and 0.857 in Chinese studies), Information (0.862 in Polish studies and 0.793 in Chinese studies). In *Article 2*, the Cronbach's alpha coefficients for the four subscales were as follows: Internalization-General (0.803 in Polish studies and 0.931 in Chinese studies), Information (0.766 in Polish studies and 0.922 in Chinese studies), Pressures (0.882 in Polish studies and 0.897 in Chinese studies), and Internalization-Athlete (0.746 in Polish studies and 0.839 in Chinese studies). In *Article 3*, the Cronbach's alpha coefficients for the four subscales are as follows: Internalization—General (0.937 in Polish groups, 0.941 in Chinese groups), Information (0.899 in Polish groups, 0.922 in Chinese groups), Pressures (0.956 in Polish groups, 0.897 in Chinese groups), Internalization—Athlete (0.871 in Polish groups, 0.841 in Chinese groups).

This study used the Inventory of Physical Activity Objectives (IPAO) (Lipowski & Zaleski, 2015). The questionnaire consists of demographic variables, 12 physical activity objectives, and a motivational function of objectives scale. The first two parts of the questionnaire were investigated according to the needs of the study. Based on the research needs and drawing on previous studies (Lipowski & Zaleski, 2015; Sebire et al., 2009), this study divided the 12 physical activity goal items into three factors: physical development goals (containing four items; e.g., Physical fitness, being "in shape"), mental development goals (containing four items; e.g., Pleasure from physical activity), and social adjustment goals (containing four items; e.g., Company of other people). Respondents assessed the importance of the listed objectives by marking their answers on a five-point Likert scale, with 1 being not at all important and 5 being very important. The questionnaire obtained ideal Cronbach's alpha coefficients in existing studies on both Chinese and Polish populations (Lipowski & Zaleski, 2015; Wilczyńska et al., 2021). The Chinese version of the questionnaire was obtained using a standard forward-backwards translation procedure. In *Article 1*, Cronbach's alpha for the scale of the motivational function of objectives of IPAO was: Polish version = 0.831, Chinese version= 0.899. In *Article 2*, Cronbach's alpha for the scale of the motivational function of objectives of IPAO was as follows: Polish version = 0.831, Chinese version = 0.855. In *Article 3*, only the first part of the IPAO is used.

This study used the Obligatory Exercise Questionnaire (OEQ) (Ackard et al., 2002). The questionnaire contains 20 items that measure attitudes and activities related to exercise (e.g., "Then I do not exercise, I feel guilty"). Respondents rated how often they experienced each exercise-related situation on a four-point Likert scale, with higher scores indicating a more substantial obligation to exercise. The questionnaire obtained ideal Cronbach's alpha coefficients in existing studies on both Chinese and other national populations (Duncan et al., 2012; Shally Novita et al., 2022). The Polish

version and Chinese of the questionnaire were obtained using a standard forward-backwards translation procedure. In *Article 2*, Cronbach's alpha coefficients for the OEQ were as follows: Polish version = 0.854, Chinese version= 0.869. In *Article 3*, Cronbach's alpha coefficients for the OEQ were as follows: Polish groups = 0.873, Chinese groups = 0.873.

This study used Eating Attitude Test (EAT-26) with a Polish adaptation (Włodarczyk-Bisaga & Dolan, 1996) and a Chinese adaptation (Lee & Lee, 1996). The EAT-26 consists of 26 items and contains three subscales: Dieting (assesses attitudes and behaviors that are focused on being thin and avoiding fattening foods; 13 items, e.g., "I am terrified about being overweight"), Bulimia and Food Preoccupation (assesses overeating, loss of control overeating, and subordination of thoughts and behaviors to food; 6 items, e.g., "I vomit after I have eaten"), Oral Control (assesses self-control over diet and perceived pressure to gain weight; 7 items, e.g., "I avoid eating when I am hungry"). Participants completed the EAT-26 questionnaire by marking their answers on a 6-point Likert scale. Higher scores on the total EAT-26 and the three subscales indicated a greater likelihood of eating attitudes and behavioral disorders. In *Article 3*, the Cronbach's alpha coefficients for the three subscales were as follows: Dieting (0.821 for the Polish group, 0.866 for the Chinese group), Bulimia and Food Preoccupation (0.906 for the Polish group, 0.929 for the Chinese group), and Oral Control (0.895 for the Polish group, 0.878 for the Chinese group).

Statistical methods / *Metody statystyczne*

At each stage of the study, we used different statistical analysis methods depending on the research objectives and questions.

In *Article 1*, according to the research objectives and research question, statistical analyses were performed in Excel (Microsoft Office 365) and IBM SPSS Statistics 28.0.

Stage 1 - descriptive statistics for all variables, include mean, median, standard deviation, variance, skewness, kurtosis, and percentile.

Stage 2 - as the subject variables were not normally distributed, the Mann-Whitney U test was used to measure the significance of the difference between the two groups.

Stage 3 - the significance of the difference in the strength of the relationship and the strength of the correlation between the two groups of variables was measured using Spearman's rank correlation coefficient.

Stage 4 - measure the strength of the relationship between the dependent and independent variables using stepwise multiple regression analysis. This stage aimed to search for predictors of the dependent variables in the groups of Polish and Chinese for young men and young women.

First, we conducted separate tests to assess the multicollinearity among the four independent variables in Poland and China's male and female samples. Table 1 shows that all tolerance (TOL) values are greater than 0.10, and all variance inflation factor (VIF) values are less than 10, indicating no multicollinearity among the independent variables. Second, we performed stepwise multiple regression analysis to determine the most predictive independent variables for the dependent variable in Poland and China's male and female samples. Taking the "Health" variable in the female sample of Poland as an example, we selected the independent and dependent variables and then used the stepwise regression analysis method. The criterion for selecting variables was based on the F-probability value, with a critical value of 0.05 for inclusion in the model and 0.10 for exclusion. Both forward selection and backward elimination methods were employed, and the best multiple regression analysis models were selected using statistical software features. We followed the same steps to test the most predictive independent variables for each dependent variable (Health; Physical Fitness; Company of Others; Fit, Shapely Body; Well-Being; Fashion; Boosting Confidence; Pleasure from Physical Activity; Escape from Everyday Life; Managing Stress; Fulfilling the Need for Activity; Promoting Physical Activity; Motivational Value; Time-Management; Persistence in Action; Motivational Conflict) in Poland and China's male and female samples.

Table 1 | Results of multicollinearity test for all independent variables

Independent variable	Polish				Chinese			
	Female		Male		Female		Male	
	TOL	VIF	TOL	VIF	TOL	VIF	TOL	VIF
Internalization-General	0.368	2.720	0.286	3.496	0.346	2.888	0.554	1.805
Information	0.307	3.260	0.324	3.088	0.638	1.567	0.649	1.542
Pressures	0.287	3.479	0.487	2.054	0.359	2.786	0.497	2.014
Internalization-Athlete	0.741	1.350	0.618	1.619	0.799	1.252	0.789	1.267

Note: TOL, tolerance value; VIF, variance inflation factor value.

In *Article 2*, the survey data were analyzed in Excel (Microsoft Office 365) and IBM SPSS Statistics 26. The steps in the statistical analysis were as follows.

Stage 1 - Measure the mean, quartile, and standard deviation of all variables in the model, depending on the research objective and question.

Stage 2 - Given that the tested variables were not all normally distributed, the Mann-Whitney U test was used to measure the significance of the difference between variables in the groups of Polish and Chinese.

Stage 3 - The significance of differences in the strength of relationships and strength of correlations between variables in the study model was measured using Spearman's rank correlation coefficient.

Stage 4 - Measures the strength of the relationship between the independent and dependent variables using multiple regression analysis while testing the role of mediating variables. Six basic hypotheses of the multiple regression analysis were tested. The Shapiro-Wilk test significance values for the dependent variable (obligatory exercise) were 0.258 (China) and 0.385 (Poland), satisfying the condition of normal distribution, and other characteristics of the analyzed data allowed the use of multiple regression analysis. This stage aimed to find predictors of the dependent variable in the Polish and Chinese young male populations. Calculations were performed using the PROCESS macro for SPSS (Hayes, 2017).

The study proposes an integrated model of hypothesized relationships between variables to explain the direct predictive role of sociocultural attitudinal factors about the body, the mediating role of motivation factors for physical activity in explaining the emergence of obligatory exercise. Model 4 in the PROCESS macro for SPSS was used to test for direct and indirect effects (Hayes, 2017). The significance of the indirect effects was tested using bootstrapping, and a bootstrap sample of 5000 was used to model the data distribution better. The confidence interval (CI) was 95%. The effect is insignificant if the confidence interval contains a zero value. Only unstandardized estimates could be calculated. The hypothesized relationships used for testing include only those variables for which there is a significant relationship.

In *Article 3*, the data were analyzed in Excel (Microsoft Office 365) and IBM SPSS (Statistical Package for the Social Sciences) Statistics 26 according to the research objectives and research questions. The statistical analysis stages were as follows:

Stage 1—Descriptive statistics. Cross-cultural similarities and differences between Polish and Chinese young men and women in terms of sociocultural attitudes toward the body, eating attitudes, and obligatory exercise were elucidated by measuring the mean, quartile, etc. of each variable in the study model.

Stage 2—Assessing between-group differences of all variables. For the purposes of further statistical analysis, the variables were tested for normality of distribution using the Shapiro–Wilk test. The obtained results indicate that the variables do not meet the conditions of the normal distribution; therefore, non-parametric tests (Mann–Whitney U test) were used for further analysis. The Mann–Whitney U test was used to measure the significance of the differences between the Polish and Chinese groups.

Stage 3—Measuring the strength of relationships between variables in the Polish and Chinese groups. The significance of the difference in the strength of the relationship and the strength of the correlation between the variables in the Polish and Chinese groups was measured using Spearman's rank correlation coefficient.

Stage 4—Measuring the strength of the relationship between independent and dependent variables using multiple regression analysis and testing the mediating role of eating attitudes. This phase aimed to find predictors of obligatory exercise among young men and women in Poland and China. Calculations were performed using the PROCESS macro for SPSS (Hayes, 2017).

The study presents an integrated model of the hypothesized relationship between variables to explain the direct predictive role of sociocultural factors and the mediating role of eating attitudes factors in explaining the emergence of obligatory exercise. The direct and indirect effects were tested using Model 4 in the PROCESS macro of SPSS. The significance of the indirect effects was tested using bootstrapping, and a bootstrap sample of 5000 was used to model the data distribution better. The confidence interval (CI) was 95%. The effect is not considered significant if the confidence interval contains a zero value. Only unstandardized estimates can be calculated. The hypothesized relationships for validation include only those variables for which there is a significant relationship.

Main results and conclusions / *Główne wyniki i wypływające z nich wnioski*

Results */ Wyniki*

The sociocultural attitudes toward the body and the physical activity undertaken by young Poles and Chinese

Published in *Article 1*:

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To address the *first research question* in this study, we have proposed the following hypotheses based on our theoretical review:

H1: Significant differences exist in the sociocultural attitudes toward the body and motivations for physical activity among Polish and Chinese young people who grew up in European and Asian cultures, respectively.

H2: The sociocultural attitudes toward the body among Polish and Chinese young people predict their objectives for physical activity and the motivational function of these objectives, with cross-cultural differences evident.

Similarities and differences between Polish and Chinese young people's sociocultural attitudes toward the body and motivations for physical activity

The results of this study (*Article 1*) show that there are significant differences between Polish and Chinese young people in terms of the importance of physical activity objectives and the motivation function of the objectives, but this difference is only presented in some of the variables. This confirms the hypothesis **H1** proposed in this study. Well-Being objective and Physical Fitness objective show high importance in both Polish and Chinese young men and women. Polish and Chinese young women differed significantly in the importance of only two of the 12 physical activity objectives, Company of Others and Managing Stress, while Polish and Chinese young men differed significantly in six objectives, Health, Fit, Shapely Body, Fashion, Boosting Confidence, Escape from Everyday Life, and Promoting Physical Activity.

Compared to young Chinese men and women, the physical activity objectives of young Polish men and women show greater efficiency and persistence of action, and the ability to cope with adversity, and their physical activity objectives are less vulnerable to conflict with other objectives. The physical activity objectives of young Polish women have a greater influence on the actions taken by the individual. Young Chinese men are more focused to planning, arranging, and organizing their physical activity time.

On the other hand, the results of this study (*Article 1*) also show that there are significant differences between young people in Poland and China in terms of the average level of some variables of sociocultural attitudes toward the body. Young Polish women seek information about body image and appearance from the mass media less frequently than young Chinese women, but they have higher endorsement and acceptance of an athletic body ideal than young Chinese women. Young Chinese men prefer to have the same appearance as people in mass media such as TV or magazines more often than young Polish men, seek information about body image and physical appearance from mass media more frequently, and feel more pressure from mass media regarding physical appearance standards.

The relationship between sociocultural attitudes toward the body and motivation for physical activity of young people in Poland and China (Table 2)

The results of this study (*Article 1*) confirm that the sociocultural attitudes towards the body in the Polish and Chinese young people predicted their physical activity objectives and the motivational function of these objectives, and there are cross-cultural differences, but this predictive function is limited to some of the variables. This confirms the hypothesis **H2** proposed in this study. Importantly for this work, in the Polish and Chinese young people internalization of sociocultural standard for the body appearance, internalization of athletic body idea, and seeking information about body image was positively associated with the sense of the importance of physical activity objectives, such as Health, Company of Others, Fit, Shapely Body, Boosting Confidence, etc.; Pressures was negatively associated with the sense of the importance of physical activity objectives, such as Physical Fitness, and Pleasure from Physical Activity. This is a result that indicates that the sociocultural attitudes toward the body may be of importance for Polish and Chinese young people who undertaking physical activity and how they perceive the objectives of their physical activity.

Internalization-Athlete was a positive predictor factor for the importance of physical activity objectives of Health, Fit, Shapely Body, Well-Being, Boosting Confidence, and Pleasure from Physical Activity in the Polish and Chinese young women. Pressures were a negative predictor factor for the importance of physical activity objectives of Physical Fitness, and Pleasure from Physical Activity in the Polish and Chinese young men. Internalization-General was a positive predictor factor for the importance of physical activity objectives of Physical Fitness and Company of Others for Polish young men, and a positive predictor factor for the importance of physical activity objectives of Escape from Everyday Life and Managing Stress for Chinese young men. Information was a significant predictor factor for the importance of physical activity objectives of Health, Fit, Shapely Body, Well-Being, Fashion, and Boosting Confidence in Polish young people, and a positive predictor factor for Time-Management. However, Information has no predictive effect on the importance of physical activity objectives and the motivational function of objectives in Chinese young men and women.

The predictors of the motivational function of objectives showed significant differences in Polish and Chinese women and men. Such as Pressures is a positive predictor of Persistence in Action in Chinese young women, but no predictor effect in Chinese young men; conversely, Pressures is a positive predictor of Persistence in Action in Polish young men, but no predictor effect in Polish young women. Internalization-General is a negative predictor of Motivational Conflict in Polish young women, but no predictor effect in Polish young men.

Table 2 | Comparison of predictor factors for the development of motivation for physical activity in the Polish and Chinese young men and women

Dependent variable	Polish		Chinese	
	Female	**Male**	**Female**	**Male**
Health	R^2=0.092 F=9.259*** **M1**, Adj R^2=0.066 **M2**, Adj R^2=0.082 Predictors: **IA**, β=0.202** **P**, β=0.157*	R^2=0.063 F=4.781* Adj R^2=0.050 Predictors: **I**, β=0.251*	R^2=0.063 F=6.453* Adj R^2=0.053 Predictors: **IA**, β=0.251*	
Physical Fitness		R^2=0.139 F=5.632** **M1**, Adj R^2=0.062 **M2**, Adj R^2=0.114 Predictors: **P**, β=-0.462*** **IG**, β=0.315*		R^2=0.046 F=5.216* AdjR^2=0.037 Predictors: **P**, β=-0.215*
Company of Others	R^2=0.045 F=8.645** Adj R^2=0.040 Predictors: **IA**, β=0.212**	R^2=0.115 F=9.217** Adj R^2=0.102 Predictors: **IG**, β=0.339**		
Fit, Shapely Body	R^2=0.188 F=21.208*** **M1**, Adj R^2=0.157 **M2**, Adj R^2=0.179 Predictors: **IA**, β=0.338*** **IG**, β=0.176*	R^2=0.152 F=6.277** **M1**, Adj R^2=0.081 **M2**, Adj R^2=0.128 Predictors: **I**, β=0.535*** **P**, β=-0.333*	R^2=0.084 F=8.812** Adj R^2=0.075 Predictors: **IA**, β=0.290**	
Well-Being	R^2=0.030 F=5.628* Adj R^2=0.024 Predictors: **IA**, β=0.172*	R^2=0.233 F=10.642*** **M1**, Adj R^2=0.092 **M2**, Adj R^2=0.211 Predictors: **P**, β=-0.664*** **I**, β=0.494***	R^2=0.102 F=5.422** **M1**, Adj R^2=0.039; **M2**, Adj R^2=0.084 Predictors: **IA**, β=0.329** **IG**, β=-0.255*	
Fashion	R^2=0.336 F=46.290*** **M1**, Adj R^2=0.258 **M2**, Adj R^2=0.329 Predictors: **I**, β=0.351*** **IA**, β=0.316***	R^2=0.245 F=22.989*** Adj R^2=0.234 Predictors: **I**, β=0.495***		
Boosting Confidence	R^2=0.397 F=60.120*** **M1**, Adj R^2=0.334 **M2**, Adj R^2=0.390 Predictors: **I**, β=0.437*** **IA**, β=0.283***	R^2=0.093 F=7.244** Adj R^2=0.080 Predictors: **IA**, β=0.304**	R^2=0.071 F=7.374** Adj R^2=0.062 Predictors: **IA**, β=0.267**	
Pleasure from Physical Activity	R^2=0.066 F=6.477** **M1**, Adj R^2=0.017 **M2**, Adj R^2=0.056 Predictors: **I**, β=-0.272*** **IA**, β=0.244**	R^2=0.059 F=4.473* Adj R^2=0.046 Predictors: **P**, β=-0.243*	R^2=0.076 F=7.920** Adj R^2=0.067 Predictors: **IA**, β=0.276**	R^2=0.040 F=4.497* AdjR^2=0.031 Predictors: **P**, β=-0.200*
Escape from Everyday Life	R^2=0.065 F=6.369** **M1**, Adj R^2=0.028 **M2**, Adj R^2=0.055 Predictors: **I**, β=-0.370*** **IG**, β=0.260*	R^2=0.065 F=4.946* Adj R^2=0.052 Predictors: **IA**, β=0.255*	R^2=0.131 F=7.140** **M1**, Adj R^2=0.074; **M2**, Adj R^2=0.12 Predictors: **P**, β=0.232* **IA**, β=0.225*	R^2=0.038 F=4.218* AdjR^2=0.029 Predictors: **IG**, β=-0.194*
Managing Stress	R^2=0.136 F=14.392*** **M1**, Adj R^2=0.087 **M2**, Adj R^2=0.126 Predictors: **I**, β=-0.524*** **IG**, β=0.305**			R^2=0.080 F=9.377** AdjR^2=0.071 Predictors: **IG**, β=-0.283**
Fulfilling the Need for Activity			R^2=0.103 F=11.027** Adj R^2=0.94 Predictors: **IA**, β=0.321**	

Promoting Physical Activity	R^2=0.074 F=14.634*** Adj R^2=0.069 Predictors: **IA**, β=0.271***	R^2=0.105 F=8.354** Adj R^2=0.069 Predictors: **IA**, β=0.324**	
Motivational Value	R^2=0.153 F=16.469*** **M1**, Adj R^2=0.112 **M2**, Adj R^2=0.143 Predictors: **IA**, β=0.415*** **IG**, β=-0.201**	R^2=0.182 F=7.808*** **M1**, Adj R^2=0.080 **M2**, Adj R^2=0.159 Predictors: **P**, β=-0.355** **IA**, β=0.303**	
Time-Management	R^2=0.403 F=40.989*** **M1**, Adj R^2=0.295 **M2**, Adj R^2=0.310 **M3**, Adj R^2=0.393 Predictors: **IA**, β=0.468***; **IG**, β=-0.433***; **I**, β=0.460***	R^2=0.056 F=4.222* Adj R^2=0.043 Predictors: **IA**, β=0.237*	
Persistence in Action	R^2=0.266 F=22.014*** **M1**, Adj R^2=0.295 **M2**, Adj R^2=0.310 **M3**, Adj R^2=0.393 Predictors: **IA**, β=-0.398***; **IG**, β=0.553***; **P**, β=-0.430***	R^2=0.091 F=7.101** Adj R^2=0.043 Predictors: **P**, β=0.302**	R^2=0.182 F=21.399*** Adj R^2=0.174 Predictors: **P**, β=0.427***
Motivational Conflict	R^2=0.096 F=19.430*** Adj R^2=0.091 Predictors: **IG**, β=-0.309***		

*Note: R^2, coefficient of determination; F, Fisher test; * p<0.05, ** p<0.01, *** p<0.001; M1, model 1; M2, model 2; Adj R^2, model-adjusted coefficients of determination; β, standardized regression coefficient; IG, Internalization-General; I, Information; P, Pressures; IA, Internalization-Athlete.*

In summary, the research presented in *Article 1* addresses the *first question* of this study. The results indicate that there are significant correlations between the sociocultural attitudes toward the body and motivations for physical activity among Polish and Chinese young people who grew up in European and Asian cultures, respectively, with cross-cultural differences being evident. Internalization of athletic and general appearance ideals, as well as perceived pressure from media and others, are universal predictors of motivation for physical activity among young people in Poland and China. However, information from media and other sources is a specific sociocultural predictor of motivation for physical activity only in Polish young people. The sociocultural attitudes toward the body may be important for Polish and Chinese young people undertaking physical activity and how they perceive the objectives of their physical activity.

The sociocultural attitudes toward the body and the addiction to physical activity of young Poles and Chinese

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To address the *second research question* in this study, we have proposed the following hypotheses based on our theoretical review:

H3: Significant differences exist in the sociocultural attitudes toward the body and obligatory exercise among Polish and Chinese young people who grew up in European and Asian cultures, respectively.

H4: The sociocultural attitudes toward the body among Polish and Chinese young people predict their obligatory exercise, with both common predictors and culture-specific predictors being present.

Similarities and differences among young Polish and Chinese's sociocultural attitudes toward the body and obligatory exercise

The results of the study (*Article 3*) indicate that there is no significant difference between young Polish and Chinese women in terms of perceived pressure to sociocultural standards regarding the body promoted by mass media, and no significant difference between young Polish and Chinese men in terms of recognition and acceptance of the athletic body ideal promoted by mass media. Other sociocultural attitudes toward the body differed significantly between young Polish and Chinese people in a same-gender comparison. Compared to young Chinese women, young Polish women showed a higher acceptance of the athletic body ideal promoted by mass media, while they were less receptive to the general sociocultural standards regarding the body promoted by mass media and less frequently sought information about sociocultural standards regarding the body and appearance promoted by mass media. Compared to young Chinese men, young Polish men were less receptive to general sociocultural standards regarding the body promoted by the mass media, less frequently sought information about sociocultural standards regarding the body and appearance promoted by the mass media, and felt less pressure about sociocultural standards regarding the body and appearance promoted by the mass media.

Furthermore, the findings of this study (*Article 3*) suggest that compared to young Chinese people of the same gender, young Polish women are more likely to undertake obligatory exercise,

while young Polish men are less likely to do so. Obligatory exercise was less likely among young Polish men than young Chinese men.

The results mentioned above confirm hypothesis **H3** proposed in this study.

The relationship between sociocultural attitudes toward the body and obligatory exercise of young people in Poland and China

It is worth noting that *Articles 2* and *3* reveal different findings regarding the relationship between sociocultural attitudes toward the body and obligatory exercise among young men in Poland and China. Although the results of Article 2 suggest that Internalization-General and Internalization-Athlete is a direct positive predictor of obligatory exercise for young men in Poland; Pressures are a direct positive predictor of obligatory exercise for young men in China (**Figure 2**). However, a closer analysis reveals that the significance of this relationship is only at the 0.05 level, which may suggest that this significant relationship is not stable. The results of *Article 3* prove this point (**Figure 3, 4**).

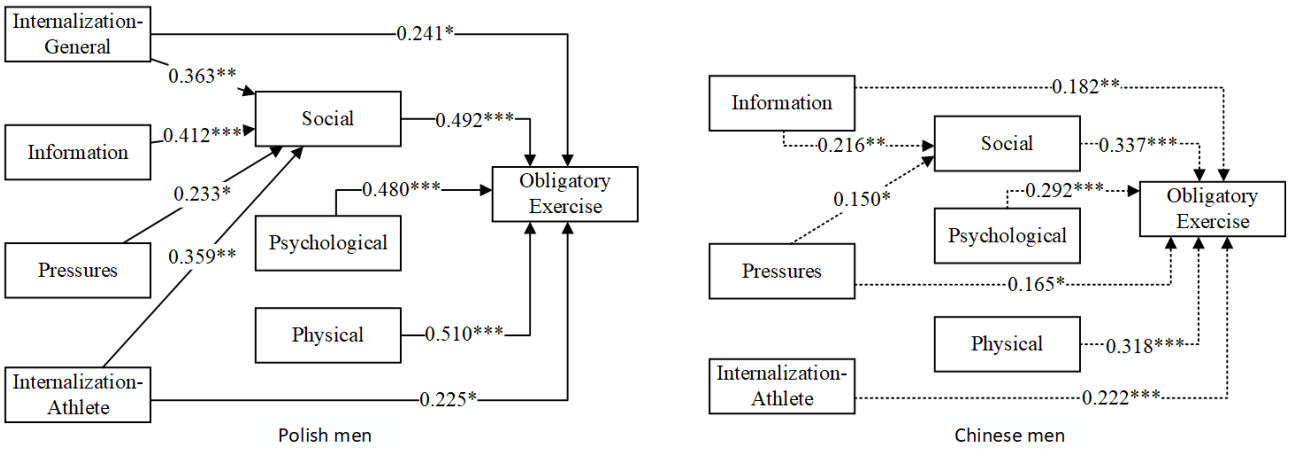

FIGURE 2 | Sociocultural attitudes about the body (Internalization-General, Information, Pressures, and Internalization-Athlete) and motivation for physical activity (Physical, Psychological, and Social) as predictors of obligatory exercise among young Polish and Chinese men . Note: Non-standardized estimates are presented; *p<0.05, **p<0.01, ***p<0.001; to improve the readability of the presentation, only paths with significance levels <0.05 were retained.

This study's results (*Article 2, 3*) confirmed the existence of specific sociocultural predictors of obligatory exercise in young Chinese men. Information and Internalization-Athlete in sociocultural attitudes toward the body were direct positive predictors of obligatory exercise in young Chinese men. Furthermore, Internalization-General and Internalization-Athlete in sociocultural attitudes toward the body were a direct positive predictor of obligatory exercise for young men in Poland; Pressures in sociocultural attitudes toward the body are a direct positive predictor of obligatory exercise for young men in China. However, this significant relationship is not stable. Importantly, this study suggests that young men's acceptance of the athletic body ideal promoted by the mass media may positively influence their obligatory exercise. The study also suggests that young Polish men's recognition of

universal sociocultural norms about the body as promoted by mass media may be a direct positive predictor of their obligatory exercise. The frequency with which young Chinese men seek information about sociocultural standards of the body promoted by mass media and the level of perceived pressure from body and appearance sociocultural standards promoted by mass media would directly and positively predict their obligatory exercise.

The results of this study (*Article 3*) show that Internalization-Athlete in sociocultural attitudes toward the body is a common direct positive predictor of obligatory exercise among young women in Poland and China. Importantly, this study suggests that the acceptance of the athletic body ideal promoted by the mass media among young women will directly and positively predict their obligatory exercise.

The results mentioned above confirm hypothesis **H4** proposed in this study.

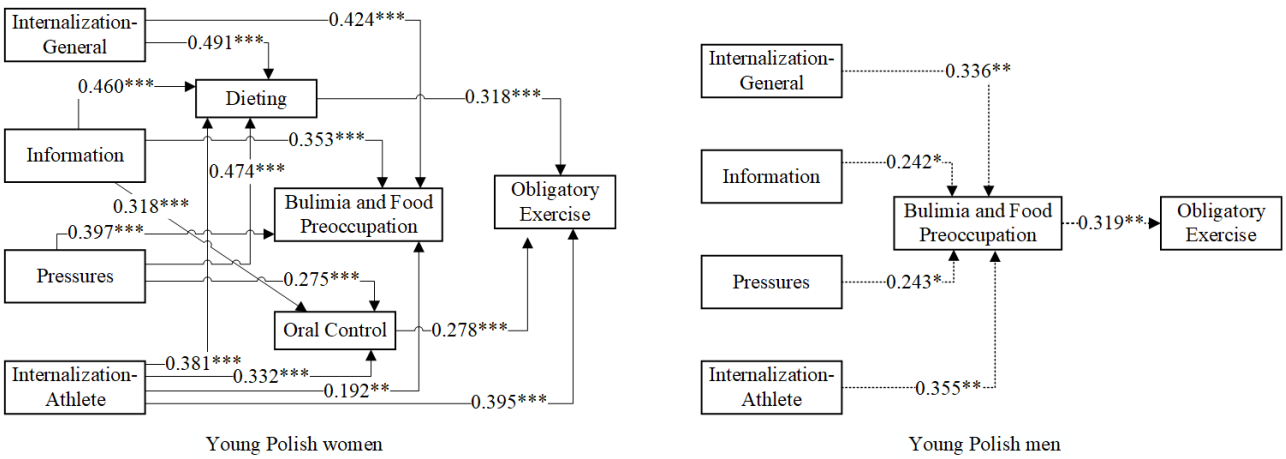

FIGURE 3 | Sociocultural (Internalization-General, Information, Pressures, and Internalization-Athlete) and eating attitude (Dieting, Bulimia and Food Preoccupation, and Oral Control) predictors of obligatory exercise among young Polish men and women (n=265). Note: Non-standardized estimates are presented; *p<0.05, **p<0.01, ***p<0.001; to improve the readability of the presentation; only paths with significance levels <0.05 were retained.

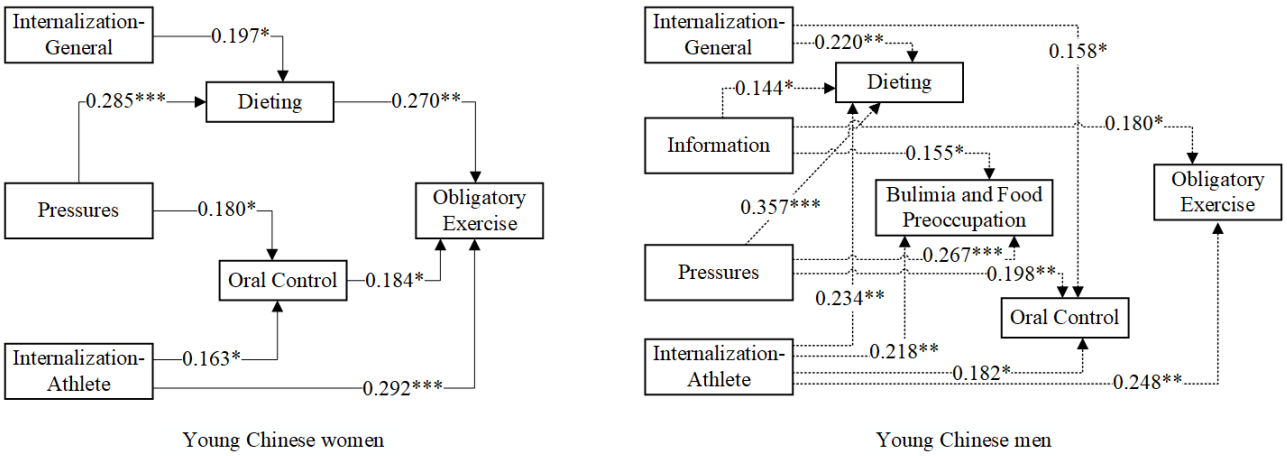

FIGURE 4 | Sociocultural (Internalization-General, Information, Pressures, and Internalization-Athlete) and eating attitudes (Dieting, Bulimia and Food Preoccupation, and Oral Control) predictors of obligatory exercise among young Chinese men and women (n=355). Note: Non-standardized estimates are presented; *p<0.05, **p<0.01, ***p<0.001; to improve the readability of the presentation; only paths with significance levels <0.05 were retained.

In summary, the research presented in *Article 2* and Article *3* addresses the *second question* of this study. The findings reveal that some factors of sociocultural attitudes toward the body were directly and significantly related to obligatory exercise among Polish and Chinese young people, with cross-cultural differences evident. Internalization-Athlete in sociocultural attitudes toward the body is a common positive direct predictor of obligatory exercise among young Polish and Chinese women. Information and Internalization-Athlete in sociocultural attitudes toward the body were specific direct positive predictors of obligatory exercise in young Chinese men. Internalization-General and Internalization-Athlete in sociocultural attitudes toward the body were a direct positive predictor of obligatory exercise for young men in Poland, but this relationship is unstable.

The mediating role of motivation for physical activity and eating attitudes between sociocultural attitudes toward the body and obligatory exercise among Polish and Chinese young people

Published in *Article 2 and Article 3*:

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Guo, S., Kamionka, A., Izydorczyk, B., Lipowska, M., Lizinczyk, S., Radtke, B. M., Sajewicz-Radtke, U., & Lipowski, M. (2023). The Mediating Role of Eating Attitudes in Sociocultural

Attitudes toward the Body in Predicting Obligatory Exercise among Young People: A Polish and Chinese Comparison. *Nutrients, 15*(4), 952. https://doi.org/10.3390/nu15040952

Based on the results of research *questions 1* and *2*, to address the *third research question*, we have proposed the following hypotheses grounded in our theoretical review:

H5: Significant differences exist in eating attitudes among Polish and Chinese young people who grew up in European and Asian cultures.

H6: Among Polish and Chinese young men, motivations for physical activity mediate the relationship between sociocultural attitudes toward the body and obligatory exercise, with cross-cultural differences evident.

H7: Among Polish and Chinese young people, eating attitudes play a mediating role in the relationship between sociocultural attitudes toward the body and obligatory exercise, with noticeable cross-cultural differences.

Similarities and differences among young Polish and Chinese's eating attitudes

In terms of eating attitudes, the results of this study indicate (*Article 3*) that both Polish and Chinese men are very concerned about thinness and the avoidance of fatty foods, but in other areas, young Polish and Chinese people show significant differences. Compared to young Chinese women, young Polish women were more concerned with thinness and the avoidance of fatty foods, showed lower levels of bulimia and uncontrolled eating, and had slightly lower levels of self-control over eating requirements and perceived pressure to gain weight. Compared to young Chinese men, young Polish men showed lower levels of bulimia and uncontrolled eating, as well as lower self-control over eating requirements and perceived pressure to gain weight. This confirms the hypothesis **H5** proposed in this study.

The mediating role of motivation for physical activity between sociocultural attitudes toward the body and obligatory exercise among Polish and Chinese young men (Figure 2)

The results of this study (*Article 2*) suggest that motivation for physical activity is a predictor of obligatory exercise in both Polish and Chinese young men, that motivation for physical activity mediates the relationship between sociocultural attitudes toward the body and obligatory exercise, and that there are both general mediators that apply to both young Polish and Chinese men, and mediators that apply only to a specific culture (Polish or Chinese culture). All three factors of motivation for physical activity predict obligatory exercise in Polish and Chinese young men. However, only social adaptation goals mediated the Information and Pressures factors in predicting obligatory exercise in young Chinese and Polish men. In addition, social adaptation goals mediated the Internalization-General and Internalization-Athlete in predicting obligatory exercise in young

Polish men. This suggests that the frequency with which young men seek out information about sociocultural standards of the body promoted by the mass media and the level of perceived stress about sociocultural standards of the body promoted by the mass media indirectly positively predict their obligatory exercise by adapting to social relationships and promoting socialized physical activity goals.

This study (*Article 2*) also shows that the acceptance of universal sociocultural standards about the body promoted by the mass media and the receptivity to the athletic body idea promoted by the mass media among young Polish men indirectly positively predicted their obligatory exercise by adapting to social relationships and promoting socialized physical activity goals. However, this relationship does not exist among young Chinese men.

The above results confirm the hypothesis **H6** proposed in this study.

The mediating role of eating attitudes between sociocultural attitudes toward the body and obligatory exercise among Polish and Chinese young men (Figure 3, 4)

The results of this study (*Article 3*) also suggest that eating attitudes mediate the relationship between sociocultural attitudes toward the body and obligatory exercise and that there are general mediators that apply to both Poland and China and mediators that apply only to a specific culture (Polish or Chinese culture), and that there are clear gender differences. Among Polish and Chinese young women, Internalization-General and Pressures in sociocultural attitudes toward the body indirectly and positively predict obligatory exercise through Dieting in eating attitudes. This demonstrates that the higher the level of acceptance and perceived pressure of the general sociocultural standards regarding the body promoted by the mass media among young women, the more concerned they are about being thin and avoiding fatty foods, and the more likely they are to engage in obligatory exercise.

In addition, the results of this study show that the more frequently young Polish women seek information about sociocultural standards of body and appearance promoted by the mass media, the more they focus on thinness and avoiding fatty foods, and the more likely they are to engage in obligatory exercise. The frequency with which young Polish women seek information about sociocultural standards of body and appearance promoted by the mass media, the perceived pressure of sociocultural body standards promoted by the mass media, and the recognition of the ideal of the athletic body promoted by the mass media indirectly positively influence their obligatory exercise through dietary self-control and pressure to gain weight. However, this was not the case for young Chinese women. Young Polish men's acceptance of prevailing sociocultural standards regarding the body promoted by the mass media, the frequency of seeking information about sociocultural standards regarding the body and appearance promoted by the mass media, the pressure to meet

sociocultural standards regarding the body promoted by the mass media, and the endorsement of the ideal of the athletic body promoted by the mass media indirectly and positively influence their obligatory exercise through overeating and uncontrolled eating. However, this was not the case among young Chinese men.

The results mentioned above confirm hypothesis **H7** proposed in this study.

In summary, the research presented in *Article 2* and *Article 3* addresses the *third question* of this study. The findings reveal that some factors of motivations for physical activity and eating attitudes play a mediating role in the relationship between sociocultural attitudes toward the body and obligatory exercise among Polish and Chinese young people, with cross-cultural differences evident. The social adaptation goal of motivation for physical activity mediated the relationship between sociocultural attitudes toward the body and obligatory exercise among young Polish and Chinese men. Information and Pressures in sociocultural attitudes toward the body indirectly and positively predicted obligatory exercise in young Polish and Chinese men through the social adaptation goals of motivation for physical activity. Internalization-General and Internalization-Athlete in sociocultural attitudes toward the body indirectly and positively predicted obligatory exercise in young Polish men through the social adaptation goal of motivation for physical activity. Among Polish and Chinese young women, Internalization-General and Internalization-Athlete in sociocultural attitudes toward the body indirectly and positively predict obligatory exercise through Dieting and Oral control in eating attitudes, respectively; Bulimia and food preoccupation were only mediators of the relationship between sociocultural attitudes toward the body and obligatory exercise in young Polish men.

Limitations and future directions / *Ograniczenia i przyszłe kierunki*

Several limitations of this study should be noted. Firstly, although the sample size is sufficient for statistical analysis, it is relatively small for a cross-cultural study. For example, the total sample size of *Article 1* was 467, *Article 2* was 273, and *Article 3* was 620. Secondly, although this study focuses on the cognition of unhealthy physical activity (obligatory exercise) rather than exercise behavior, the lack of measurement of exercise behavior may be a limitation. Thirdly, this study adopts a cross-sectional design so that no causal inference can be made regarding the bidirectional nature of the relationship under consideration.

Despite these limitations, the current study has significant theoretical and practical implications. First, this study confirms a significant association between young people's sociocultural attitudes toward the body and unhealthy physical activity (obligatory exercise), but this is specific to particular factors for sociocultural attitudes toward the body. Future research should focus on more specific

factors for sociocultural attitudes toward the body (e.g., Information, Pressures, Internalization-Athlete) and different measurement approaches to analyze their relationships with unhealthy physical activity (obligatory exercise), and to investigate gender differences and obligatory exercise behavior. Longitudinal studies should also be conducted to understand further the bidirectional nature of the relationship between young people's sociocultural attitudes toward the body and unhealthy physical activity (obligatory exercise).

Second, the present study provides a rare and even unique opportunity for comparison between two different cultures and demonstrates cross-cultural differences in the relationships considered. Future research should conduct additional cross-cultural comparisons to identify further factors of universal sociocultural attitudes toward the body associated with unhealthy physical activity (obligatory exercise) in young people and factors that apply only to specific cultures.

Third, given the significant relationship between sociocultural attitudes toward the body and unhealthy physical activity (obligatory exercise), as well as the mediating role of some factors of the motivation for physical activity and eating attitudes, it is valuable to develop relevant prevention and intervention plans. This may include the use of cognitive diagnostic techniques and cognitive behavioral therapy interventions, such as helping young women to develop appropriate body image and dietary attitudes, guiding young Chinese men to selectively receive body-related information, and guiding young Polish and Chinese men to establish appropriate social concepts.

Conclusions / *Wnioski*

First, the comparison between young Polish and Chinese people showed that the variables studied differed in terms of culture and gender. Young Polish women and young Chinese men showed a higher intensity in obligatory exercise (dependent variable). Young Chinese men and women showed a higher intensity in Internalization-General and Information (independent variables), young Chinese men showed a higher intensity in Pressures (independent variable), and young Polish women showed a higher intensity in Internalization-Athlete (independent variable). In terms of the motivation for physical activity (mediating variable), a comparison between Polish and Chinese young people shows that although well-being is the most important objective of their physical activity, there are significant differences in the importance of partial physical activity objectives and the motivational function of the objective, such as motivational value, motivational conflict. In terms of eating attitudes (mediating variable), young Polish men showed a higher intensity in Dieting, while young Chinese women and men showed a higher intensity in Bulimia and Food Preoccupation and Oral Control.

Second, the sociocultural attitudes toward the body and the motivation for physical activity among young people in Poland and China are closely related. Internalization of athletic and general

appearance ideals, as well as perceived pressure from media and others, are universal predictors of motivation for physical activity among young people in Poland and China. However, information from media and other sources is a specific sociocultural predictor of motivation for physical activity only in Polish young people. The sociocultural attitude towards the body may be important for Polish and Chinese young people undertaking physical activity and how they perceive the objectives of their physical activity.

Third, some factors of sociocultural attitudes toward the body were directly and significantly related to obligatory exercise among Polish and Chinese young people. Internalization-Athlete in sociocultural attitudes toward the body is a common positive direct predictor of obligatory exercise among young Polish and Chinese women. Information and Internalization-Athlete in sociocultural attitudes toward the body were specific direct positive predictors of obligatory exercise in young Chinese men. Internalization-General and Internalization-Athlete in sociocultural attitudes toward the body were a direct positive predictor of obligatory exercise for young men in Poland, but this relationship is unstable.

Fourth, the social adaptation goal of motivation for physical activity mediated the relationship between sociocultural attitudes toward the body and obligatory exercise among young Polish and Chinese men. Information and Pressures in sociocultural attitudes toward the body indirectly and positively predicted obligatory exercise in young Polish and Chinese men through the social adaptation goals of motivation for physical activity. Internalization-General and Internalization-Athlete in sociocultural attitudes toward the body indirectly and positively predicted obligatory exercise in young Polish men through the social adaptation goal of motivation for physical activity.

Fifth, some of the variables in eating attitudes mediate the relationship between the independent variable and the dependent variable, and that there are common mediating variables that apply to both Polish and Chinese women, and specific mediating variables that apply only to young Polish men or women. Among Polish and Chinese young women, Internalization-General and Internalization-Athlete in sociocultural attitudes toward the body indirectly and positively predict obligatory exercise through Dieting and Oral control in eating attitudes, respectively; Bulimia and food preoccupation were only mediators of the relationship between sociocultural attitudes toward the body and obligatory exercise in young Polish men.

In summary, the present study achieved the research objectives and answered the three questions posed. There is a significant association between young people's sociocultural attitudes toward the body and unhealthy physical activity (obligatory exercise), but this is specific to particular factors for sociocultural attitudes toward the body, and significant cross-cultural differences exist, with some factors of motivation for physical activity and eating attitudes playing a mediating role. The present

study further confirms existing cross-cultural related research and contributes to exploring global universal or culture-specific predictors of unhealthy physical activity (obligatory exercise) in young people. Preventive interventions for unhealthy physical activity (obligatory exercise) in young people should pay attention to the sociocultural standards toward the body promoted by the mass media, with particular attention to the mediating role of motivation for physical activity and eating attitudes and the various effects of different sociocultural contexts and different genders. The authors recommend including such interventions in health universities and national fitness programs. The practical implications of this study revolve around professionals involved in physical activity and wellness programs for university students. In the practices of educators, physicians, psychologists, and other specialists who support the healthy development of young people, measures of sociocultural attitudes toward the body, motivation for physical activity, and eating attitudes may be necessary.

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(2) **Guo, S.**, Feng, X. (2021). A Study of University Physical Education Instruction in Information Age based on Idea and Evidence. Journal of Physical Education, 28(1), 108.

Projects

(1) Project category: Philosophy and Social Science Planning Project of Guangdong Province
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Academic conferences attended during doctoral studies

(1) Physical activity during pregnancy and after childbirth on different continents - how do we differ and which taboo topics are common?
Date: January 11, 2023
Time: 16.00-17.20 CET

Organizer of the event: Super Mama Birth School and the Academy of Physical Education and Sport in Gdańsk

(2) International Methodical-Scientific Conference entitled "Strength, Power, Hypertrophy - the foundation of sports training"

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Organizer of the event: Academy of Physical Education and Sport in Gdańsk

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RESEARCH Open Access

Socio-cultural attitudes toward the body as a predictor of motivation for physical activity in young people brought up in Asian and European culture—Chinese-Polish comparison

Shuai Guo[1,2], Bernadetta Izydorczyk[3*], Małgorzata Lipowska[4], Agata Kamionka[2], Sebastian Lizińczyk[5], Urszula Sajewicz-Radtke[6], Bartosz M. Radtke[6], Taofeng Liu[7] and Mariusz Lipowski[8]

Abstract

The influence of sociocultural attitudes toward the body on young people's physical activity has received increasing attention. However, there is a lack of cross-cultural research in this area. The main aim of this research was to identify the similarities and differences in the sociocultural attitudes toward the body of Polish and Chinese young people who grew up in European and Asian cultures and to analyze their effect on the motivation for physical activity. A cross-sectional research study was conducted among 18- to 30-year-old Polish (n = 259) and Chinese (n = 208) young people. The variables were measured using the Sociocultural Attitudes towards Appearance Questionnaire 3 (SATAQ 3) and the Inventory of Physical Activity Objectives (IPAO). Descriptive and comparative statistics, Spearman's rho, and the stepwise multiple regression analysis were used. The main analysis showed There are both similarities and significant differences in the performance of young Polish and Chinese men and women on the variables studied; Internalization-Athlete, Pressures, and Internalization-General are universal sociocultural predictors of motivation for physical activity among young people in Poland and China; Information is a specific sociocultural predictor of motivation for physical activity in Polish young people. The cultural nuances need to be considered in understanding young people's Motivation for undertaking physical activity.

Keywords Motivation, Physical activity objectives, Sociocultural standards, Body, Physical appearance, Mass media, Cross-cultural

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Introduction

Studies on body image from different regions, such as Europe, Asia and the Americas, generally suggest that sociocultural factors are an important source of desirable body image for young people [1–11]. Social comparisons and attention to cultural norms motivate young people, including those in China and Poland, to take action for an ideal body image, and changing attitudes and behaviors towards physical activity are one of the results [8, 9, 12, 13]. Global public health data confirm that physical inactivity is still highly prevalent among young people in European countries [14], including Poland [15], the Americas [16, 17], and Asia [18], including China [19, 20]. This phenomenon is an essential source of obesity, cardiovascular disease and other health problems in young people [21]. Therefore, investigating the relationship between sociocultural factors and physical activity among young people, and identifying the facilitators and barriers, is a highly significant research topic. Research on physical activity has demonstrated that specific motivation drive engagement in any physical activity [22]. However, the motivation for physical activity vary systematically across demographic variables, such as age [23, 24], gender [25], cultural background [26, 27], and specific preferences [28, 29]. Conducting cross-cultural comparisons of same-gendered young people who grew up in different cultural backgrounds, exploring sociocultural attitudes toward the body, and analyzing the relationship with physical activity motivation can enhance an overall understanding of young people's physical activity. However, there are relatively few such studies available. Therefore, the main aim of this research was to identify the similarities and differences in the sociocultural attitudes toward the body of Polish and Chinese young people who grew up in European and Asian cultures and to analyze their effect on the motivation for physical activity.

This relationship can be considered based on self-determination theory and social cognitive theory. Self-determination theory is a macro-theory of human motivation concerned with how social contextual factors support or hinder people's thriving by satisfying their basic psychological needs for competence, relatedness, and autonomy [30, 31]. Research on physical activity from the self-determination theory perspective has demonstrated that motivation for physical activity is related to body satisfaction, disordered eating behaviors, and social-cultural attitudes about the body [32–34]. Thompson and his team [35] proposed a three-factor model of sociocultural, psychological, and eating behavior based on sociocultural theory. The model argues that individuals are pressured by powerful social factors (i.e., media, information) to comply with culturally defined appearance ideals and that the internalization of these ideals will alter an individual's behavior to meet social norms [36]. Anić et al. [34] surveyed young women aged 18–29, and the results showed that sociocultural pressure and internalization of appearance ideals mediate BMI and exercise (or physical activity) motivation in women. Jankauskiene and team [1] tested the association of sociocultural ideas of appearance with health-compromising physical activity in a study of a sample of 736 (437 women, 299 men) adolescents, body image concerns and internalization of sociocultural norms were significantly higher in the health-compromising physical activity group. Hu et al. [37] conducted a systematic review from the social-ecological model perspective and showed that parental, friend, and teacher support was a positive predictor of adolescent participation in physical activity. The literature review confirms that sociocultural attitudes toward the body are closely related to motivation for physical activity in young people. However, social culture is closely related to historical traditions, environment, ethnicity, etc., and will evolve with the development of society. Therefore, considering the potential differences and similarities in sociocultural, psychological, and other aspects of young men and women growing up in different environments and ethnic groups, it is necessary to conduct cross-cultural comparisons of the sociocultural attitudes toward the body of young people growing up in different cultures and measure its significance for motivation for physical activity. For evidence-based practice, measuring motivation for physical activity in young people requires constant verification with various European, Asian, and American populations to expand knowledge on universal and specific sociocultural predictors of motivation for physical activity [38].

With globalization and media information development, the aesthetic standards of different countries' social cultures are merging and unifying [39]. Still, the researchers confirmed cross-cultural differences, such as the desire to be thin among young people in Asian countries, China [40]; and in the Americas, young people in the United States are very concerned about muscles [39]. A literature review of the sociocultural attitudes toward the body influencing motivation for physical activity in young people confirms that further research is needed in different ethnic groups to determine which factors are universal and which are specific. Culture shapes the context in which people's ideas about their bodies are formed, and there are many classifications and typologies of culture, such as the dichotomy of individualistic and collectivistic cultures, where individualistic types focus on the importance of their own needs, self, and individual characteristics; collectivistic consider the importance of group perspectives, needs, and goals more critical [41, 42]. The Polish cultural identity is individualistic; on the contrary, the Chinese cultural identity is collectivistic [43]. Although the cultural factors that influence

the growth of young people in Poland and China may be different, there are some cultural similarities due to the increasing internalization of the sociocultural norms of globalization promoted by mass media in both countries [44].

Drawing on the research of Thompson et al. [35, 36] and Fan et al. [45], we surveyed young people in Poland and China with SATAQ-3 to assess the explanatory variables.

Research variables and research questions

The independent variable was the sociocultural attitude towards the body. Based on the literature review [35, 36], this variable is defined as a variable with a four-factor structure and describes the degree of internalization of sociocultural standards of body appearance. The first component was the internalization of sociocultural standards, which describes the level of internalization of sociocultural standards of body and appearance promoted by the mass media (TV, magazines, commercials, etc.). The second component was pressure from sociocultural standards, which describes the level of pressure a person feels about the sociocultural standards of body and appearance promoted by the mass media. The third component was information, which describes the frequency with which a person searches for information on sociocultural standards of body and appearance promoted by the mass media. The fourth component was the internalization of the athlete, which describes the level of internalization of the athletic body ideas promoted by the mass media.

The dependent variable was the motivation for physical activity. The physical activities here are performed without medical recommendations. Drawing on the study of Lipowski et al. [22], this variable describes the objectives of consciously undertaken physical activity by the person and the motivational function of the objectives.

The following research questions were considered:

(1) Are there differences in motivations for physical activity and sociocultural attitudes toward the body among Polish and Chinese same-sex young people brought up in European and Asian cultures? If so, which characteristics are common to them and which are specific?

(2) How do sociocultural attitudes toward the body among young people in Poland and China relate to their objectives of physical activity and the motivational effects of these objectives? If so, are there cross-cultural differences in this relationship?

Materials and methods

Participants

The groups were selected by purposeful sampling. The inclusion criteria were: age (18–30 years old), Polish or Chinese nationality and growing up in that country (lived with the family from childhood to now in Poland or China for the respective groups), lack of physical disability or somatic diseases that prevents physical activity, students or graduates in the humanities and social sciences. The criteria were validated through a questionnaire, which allowed the identification of exclusion factors.

The research was carried out simultaneously in 2021 in two academic cities in Poland (Krakow and Gdansk) and two academic cities in China (Beijing and Zhengzhou). Qualified researchers with psychological training (students and team members of the study authors) conducted the research. The researchers first disseminated information about the project among students majoring in humanities and social sciences at the aforementioned urban university and collected the email addresses of voluntary participants who met the selection criteria. Simultaneously, these students were asked to invite their peers to participate and collect their email addresses. Finally, the project details and a link to the online survey were emailed to participants. Participants must first complete an electronic informed consent form in order f access the questionnaire completion page.

From January to December 2021, we distributed research materials to 800 individuals, comprising 400 participants from Poland and 400 from China. Ultimately, 594 individuals (303 from Poland and 291 from China) participated in the study, resulting in 76% and 73% response rates for Poland and China, respectively. After preliminary screening to exclude samples which did not meet the inclusion criteria, provided conflicting information, or exhibited response biases, 44 young Polish and 83 young Chinese participants were excluded from the analysis. The final sample consisted of 186 Polish females (Mean age=25.4, SD=3.03), 73 Polish males (Mean age=24.3, SD=3.37), 98 Chinese females (Mean age=22.2, SD=3.11), and 110 Chinese males (Mean age=22.3, SD=2.82). Among the Chinese sample, 75.5% of females and 74.5% of males were university students, while 52.2% of females and 60.3% of males were university students in the Polish sample. The mean BMI for young Polish females and males was 21.32 and 24.16, respectively, while the mean BMI for young Chinese females and males was 21.67 and 23.27, respectively. All participants had humanities and social sciences backgrounds and had no prior experience as athletes or professional sports learners.

Procedure

The data used for this study were part of a large international research project registered in the Protocol Registration and Results System (ClinicalTrials.gov; https://clinicaltrials.gov/ct2/show/NCT04432038). The procedure carried out in the project consisted of an online

survey. The study was carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for research involving humans. The protocol of this study was approved by the Ethics Board for Research Projects at the Institute of Psychology, University of Gdansk, Poland (decision no. 33/2020). All participants were acquainted with the purpose of the conducted research and asked to complete an electronic informed consent form before registration on the project's website.

Methods

The sociocultural attitudes towards appearance questionnaire 3 (SATAQ 3)

The independent variables were measured by the Polish [46] and Chinese [47] versions of the Sociocultural Attitudes Towards Appearance Questionnaire 3 (SATAQ 3) [36]. The SATAQ 3 has a total of 30 items, organized into four-factor structures, which contain the following subscales: Internalization-General (assess the extent to which respondents internalization of sociocultural standards; consist of nine items; e.g., I would like my body to look like the people who are in the movies), Internalization-Athlete (measure to what extent respondents internalized athletic body standards; consist of five items; e.g., I wish I looked as athletic as sports stars), Pressures (assess the level of pressure of sociocultural standards felt by a person; consist of seven items; e.g., I have felt pressure from TV and magazines to be thin), Information (measure the frequency of seeking for information on sociocultural standards of body and appearance; consist of nine items; e.g., Magazine advertisements are an important source of information about fashion and "being attractive"). The SATAQ 3 questionnaire was completed by the participants on a 5-point Likert scale. The Polish and Chinese versions of the SATAQ 3 demonstrated sound psychometric properties, including internal consistency and convergent validity [46, 47]. In the present study, the Cronbach's alpha coefficients were: Internalization-General (0.897 in Polish studies and 0.868 in Chinese studies), Internalization-Athlete (0.859 in Polish studies and 0.654 in Chinese studies), Pressures (0.950 in Polish studies and 0.857 in Chinese studies), Information (0.862 in Polish studies and 0.793 in Chinese studies).

The inventory of physical activity objectives (IPAO)

We measured the dependent variable using the Inventory of Physical Activity Objectives (IPAO) of Polish scholars Lipowski and Zaleski [48]. There are some extensive demographic questions in IPAO, such as gender, age, height, weight, engagement in physical activity, etc. IPAO also includes two scales that measure the objectives of undertaken physical activity (consisting of twelve items, on a 5-point Likert scale) and the motivational function of the objectives (consisting of eighteen items, on a 5-point Likert scale). On the scale of the objectives of undertaken physical activity, the attitude of the subjects toward particular objectives was measured (e.g., Physical fitness, being 'in shape'). Four subscales of goal-oriented behaviors associated with physical activity are distinguished in the scale of the motivational function of the objectives: motivational value (e.g., I am deeply convinced that I will achieve this goal), time management (e.g., I devote my entire free time to accomplishing this goal), persistence in action (e.g., I am worried that I won't fully achieve this goal), and motivational conflict (e.g., I have other goals that are just as satisfying as the one described). The Chinese version of the questionnaire was translated using a standard forward-backwards translation procedure. IPAO has shown sound psychometric properties in existing studies of in Poland and China [48, 49]. In the present study, Cronbach's alpha for the scale of the motivational function of objectives of IPAO was: Polish version = 0.831, Chinese version = 0.899.

Statistical methods

According to the research objectives and research question, statistical analyses were performed in Excel (Microsoft office 365) and IBM SPSS Statistics 28.0.

Stage 1 - descriptive statistics for all variables, include mean, median, standard deviation, variance, skewness, kurtosis, and percentile.

Stage 2 - as the subject variables were not normally distributed, the Mann-Whitney U test was used to measure the significance of the difference between the two groups.

Stage 3 - the significance of the difference in the strength of the relationship and the strength of the correlation between the two groups of variables was measured using Spearman's rank correlation coefficient.

Stage 4 - measure the strength of the relationship between the dependent and independent variables using stepwise multiple regression analysis. This stage aimed to search for predictors of the dependent variables in the groups of Polish and Chinese for young men and young women.

First, we conducted separate tests to assess the multicollinearity among the four independent variables in Poland and China's male and female samples. Table 1 shows that all tolerance (TOL) values are greater than 0.10, and all variance inflation factor (VIF) values are less than 10, indicating no multicollinearity among the independent variables. Second, we performed stepwise multiple regression analysis to determine the most predictive independent variables for the dependent variable in Poland and China's male and female samples. Taking the "Health" variable in the female sample of Poland as an example, we selected the independent and dependent

Table 1 Results of multicollinearity test for all independent variables

Independent variable	Polish				Chinese			
	Female		Male		Female		Male	
	TOL	VIF	TOL	VIF	TOL	VIF	TOL	VIF
Internalization-General	0.368	2.720	0.286	3.496	0.346	2.888	0.554	1.805
Information	0.307	3.260	0.324	3.088	0.638	1.567	0.649	1.542
Pressures	0.287	3.479	0.487	2.054	0.359	2.786	0.497	2.014
Internalization-Athlete	0.741	1.350	0.618	1.619	0.799	1.252	0.789	1.267

Note: TOL, tolerance value; VIF, variance inflation factor value

variables and then used the stepwise regression analysis method. The criterion for selecting variables was based on the F-probability value, with a critical value of 0.05 for inclusion in the model and 0.10 for exclusion. Both forward selection and backward elimination methods were employed, and the best multiple regression analysis models were selected using statistical software features. We followed the same steps to test the most predictive independent variables for each dependent variable (Health; Physical Fitness; Company of Others; Fit, Shapely Body; Well-Being; Fashion; Boosting Confidence; Pleasure from Physical Activity; Escape from Everyday Life; Managing Stress; Fulfilling the Need for Activity; Promoting Physical Activity; Motivational Value; Time-Management; Persistence in Action; Motivational Conflict) in Poland and China's male and female samples.

Results

Characteristics of objectives of undertaken physical activity, the motivational function of the objectives, and sociocultural attitude of body appearance in young Polish and Chinese (differences between the groups)

A comparative analysis of all variables in the Polish and Chinese groups showed that (Table 2):

(1) The most important objective for young Polish and Chinese men and women undertaking physical activity is Well-Being. Among young Polish and Chinese women, the 12 physical activity objectives showed significant differences only in the importance of the Company of Others objective and the Managing Stress objective, with young Polish women performing better on the Company of Others objective and young Chinese women performing better on the Managing Stress objective. The importance of more physical activity objectives among young Polish and Chinese men showed significant differences, with young Polish men performing better in terms of the importance of the Escape from Everyday Life objective, while young Chinese men performed better in terms of the importance of Health objective, Fit, Shapely Body objective, Fashion objective, Boosting Confidence objective and Promoting Physical Activity objective.

(2) In terms of motivational functions of objectives, Polish and Chinese young women showed significant differences in Motivational Value, Persistence in Action, and Motivational Conflict, with Polish women having a higher of Motivational Value than Chinese women and a lower of Persistence in Action, and Motivational Conflict than Chinese women. On the other hand, Polish and Chinese young men showed significant differences in Time-Management, Persistence in Action, and Motivational Conflict, and all three variables were higher for Chinese young men than for Polish young men.

(3) In terms of sociocultural attitudes toward the body, Polish and Chinese young women showed significant differences in the variables Information and Internalization-Athlete, with young Polish women showing significantly lower levels on the Information variable than Chinese young women and higher levels on the Internalization-Athlete variable than Chinese young women. Polish and Chinese young men showed significant differences in the three variables of Internalization-General, Information, and Pressures, with Chinese young men showing significantly higher on all three variables than Polish young men.

The relation between studied variables among Polish and Chinese young men and women

The results of correlation obtained for young men and women in the Poland group are listed in Table 3. In the young Polish women, the frequency of seeking information about body image and physical appearance from mass media, the endorsement, and acceptance of an athletic body ideal were significant correlations with most the physical activity objectives, the motivational function of the objectives, these correlations are both positive and negative. In Polish young men, the frequency of seeking information about body image and physical appearance from mass media, the endorsement, and acceptance of an athletic body ideal was still significant correlations with half of the physical activity objectives, which are all positive.

The results obtained for young men and women in the Chinese group are listed in Table 4. In Chinese young

Table 2 Comparative analysis between groups of Polish and Chinese young people in terms of the variables included in the study model

Variables	Female						Male					
	Polish (n = 186)		Chinese (n = 98)		Differences		Polish (n = 73)		Chinese (n = 110)		Differences	
	M	SD	M	SD	U	p	M	SD	M	SD	U	p
Health	4.60	0.70	4.53	0.78	9351.00	0.658	4.08	1.00	4.40	0.92	3173.00	0.008
Physical Fitness	4.60	0.67	4.52	0.75	9505.50	0.471	4.45	0.90	4.34	1.03	4145.00	0.663
Company of Others	3.87	1.14	3.42	1.29	10909.00	0.005	3.73	1.26	3.99	1.09	3585.50	0.199
Fit, Shapely Body	4.58	0.71	4.39	0.90	10098.00	0.074	4.04	1.06	4.42	0.88	3169.00	0.008
Well-Being	4.77	0.48	4.59	0.80	9802.50	0.151	4.53	0.78	4.54	0.80	3995.00	0.944
Fashion	3.41	1.32	3.16	1.24	10239.50	0.079	2.41	1.45	3.47	1.26	2347.50	< 0.001
Boosting Confidence	3.62	1.29	3.83	1.08	8477.50	0.316	2.81	1.30	4.07	1.00	1875.00	< 0.001
Pleasure from Physical Activity	4.55	0.67	4.37	0.89	9910.50	0.158	4.52	0.69	4.39	0.80	4289.00	0.373
Escape from Everyday Life	3.67	1.05	3.54	1.16	9578.50	0.464	3.97	1.08	3.54	1.16	4909.00	0.008
Managing Stress	4.04	0.88	4.26	0.90	7741.00	0.026	3.99	1.25	4.11	1.04	3938.50	0.815
Fulfilling the Need for Activity	4.28	0.79	4.12	1.01	9637.00	0.390	4.12	1.07	4.19	0.92	3965.00	0.878
Promoting Physical Activity	3.74	1.15	3.74	1.09	9169.00	0.931	3.07	1.43	3.67	1.10	3013.50	0.003
Motivational Value	33.06	5.19	29.73	4.85	12574.00	< 0.001	32.33	5.32	31.38	4.80	4388.50	0.286
Time-Management	16.98	4.46	16.53	3.64	9997.00	0.178	14.70	4.39	17.78	3.41	2258.50	< 0.001
Persistence in Action	7.78	2.67	9.76	2.73	5468.50	< 0.001	7.62	2.64	10.32	2.66	1926.00	< 0.001
Motivational Conflict	7.10	1.84	7.87	1.63	7044.50	0.001	7.26	1.95	8.01	1.71	3140.50	0.011
Internalization-General	24.98	8.15	26.83	6.83	8169.50	0.151	19.07	7.16	27.51	4.96	1272.50	< 0.001
Information	24.09	7.88	27.73	5.32	6846.00	< 0.001	16.68	6.37	27.28	4.01	663.00	< 0.001
Pressures	20.01	7.94	19.65	5.17	9873.50	0.248	12.04	5.84	19.25	4.23	1324.00	< 0.001
Internalization-Athlete	17.93	5.07	15.43	3.21	12182.00	< 0.001	15.81	4.62	15.75	2.59	4276.50	0.453

Note: The significance threshold was set at 0.05; N, number of people; M, mean; SD, standard deviation; U, Mann-Whitney U; p, significance level

Table 3 Correlation analysis for all variables for the group of young Polish men and women (Spearman's rho coefficient)

IPAO	SATAQ 3							
	Internalization-General		Information		Pressures		Internalization-Athlete	
	Female	Male	Female	Male	Female	Male	Female	Male
Health	0.13	0.18	0.26**	0.25*	0.22**	0.15	0.32**	0.05
Physical Fitness	-0.13	0.10	-0.12	0.02	-0.08	-0.20	0.07	0.18
Company of Others	0.03	0.33**	0.15*	0.25*	-0.01	0.07	0.19**	0.37**
Fit, Shapely Body	0.28**	0.17	0.29**	0.34**	0.28**	0.08	0.43**	0.29*
Well-Being	0.05	0.00	0.05	0.06	0.02	-0.22	0.19**	0.24*
Fashion	0.41**	0.37**	0.53**	0.52**	0.40**	0.37**	0.47**	0.13
Boosting Confidence	0.42**	0.19	0.60**	0.25*	0.48**	0.19	0.56**	0.26*
Pleasure from Physical Activity	-0.10	-0.22	-0.14*	-0.22	-0.13	-0.14	0.10	0.10
Escape from Everyday Life	-0.03	0.00	-0.21**	0.06	-0.084	-0.13	-0.13	0.25*
Managing Stress	-0.06	0.07	-0.32**	0.15	-0.18*	-0.05	-0.24**	0.20
Fulfilling the Need for Activity	-0.10	0.05	-0.11	0.15	-0.09	-0.09	0.09	0.14
Promoting Physical Activity	-0.01	0.37**	0.02	0.30**	0.00	0.20	0.22**	0.35**
Motivational Value	-0.02	-0.04	0.14	-0.06	0.06	-0.26*	0.39**	0.30*
Time-Management	0.11	0.15	0.42**	0.21	0.24**	0.00	0.60**	0.26*
Persistence in Action	0.06	0.21	-0.23**	0.20	-0.16*	0.20	-0.42**	0.03
Motivational Conflict	-0.29**	-0.07	-0.25**	-0.14	-0.17*	-0.18	-0.13	-0.02

Note: SATAQ 3- the Sociocultural Attitudes Towards Appearance Questionnaire 3; IPAO- the Inventory of Physical Activity Objectives;$^{*}P < 0.05$;$^{**}P < 0.01$

Table 4 Correlation analysis for all variables for the group of young Chinese men and women (Spearman's rho coefficient)

IPAO	SATAQ 3							
	Internalization-General		Information		Pressures		Internalization-Athlete	
	Female	Male	Female	Male	Female	Male	Female	Male
Health	0.07	0.08	0.10	-0.06	0.07	0.01	0.22*	0.06
Physical Fitness	-0.06	-0.16	-0.04	-0.29**	-0.14	-0.26**	0.21*	0.06
Company of Others	0.07	-0.12	0.10	0.06	0.13	0.03	0.11	0.05
Fit, Shapely Body	0.14	0.00	0.19	-0.08	0.14	-0.04	0.19	0.02
Well-Being	0.00	-0.17	-0.02	-0.06	0.04	-0.15	0.14	-0.01
Fashion	0.17	-0.07	0.04	0.20*	0.12	0.15	0.06	-0.15
Boosting Confidence	0.24*	0.02	0.18	0.15	0.25*	-0.01	0.25*	0.10
Pleasure from Physical Activity	0.01	-0.18	0.12	-0.12	0.01	-0.23*	0.22*	0.07
Escape from Everyday Life	0.29**	-0.23*	0.20*	-0.02	0.32**	-0.12	0.30**	-0.15
Managing Stress	0.03	-0.24*	0.12	-0.02	0.08	-0.16	0.10	-0.20*
Fulfilling the Need for Activity	0.06	-0.09	0.07	0.16	-0.02	-0.01	0.28**	0.11
Promoting Physical Activity	-0.07	-0.06	-0.01	0.17	-0.09	0.11	0.13	-0.11
Motivational Value	0.08	-0.04	0.15	0.01	0.04	0.04	0.10	0.09
Time-Management	0.15	-0.15	0.13	0.05	0.20	0.01	0.11	0.04
Persistence in Action	0.37**	-0.02	0.34**	0.13	0.35**	0.17	0.13	0.00
Motivational Conflict	0.00	-0.13	0.10	-0.08	-0.05	-0.04	0.04	0.03

Note: SATAQ 3- the Sociocultural Attitudes Towards Appearance Questionnaire 3; IPAO- the Inventory of Physical Activity Objectives;$^{*}P < 0.05$;$^{**}P < 0.01$

women, the endorsement and acceptance of an athletic body ideal were the significant correlations with most physical activity objectives; these correlations are both positive and negative. In Chinese young men, the sociocultural attitude toward the body and motivational function of the physical activity objectives did not significant correlation.

The sociocultural predictors of motivation for physical activity in the Polish and Chinese young people

Table 5 shows the stepwise regression analysis results for the Polish and Chinese young men and women groups. It is worth mentioning that some of the dependent variables in the Chinese and Polish samples of men and women did not find relevant predictor variables and could not be executed in stepwise regression analysis. It can be seen from Table 5 that:

Table 5 Comparison of predictor factors for the development of motivation for physical activity in the Polish and Chinese young men and women

Dependent variable	Polish		Chinese	
	Female	**Male**	**Female**	**Male**
Health	$R^2 = 0.092$ F = 9.259*** **M1**, Adj $R^2 = 0.066$ **M2**, Adj $R^2 = 0.082$ Predictors: **IA**, β = 0.202** **P**, β = 0.157*	$R^2 = 0.063$ F = 4.781* Adj $R^2 = 0.050$ Predictors: **I**, β = 0.251*	$R^2 = 0.063$ F = 6.453* Adj $R^2 = 0.053$ Predictors: **IA**, β = 0.251*	
Physical Fitness		$R^2 = 0.139$ F = 5.632** **M1**, Adj $R^2 = 0.062$ **M2**, Adj $R^2 = 0.114$ Predictors: **P**, β=-0.462*** **IG**, β = 0.315*		$R^2 = 0.046$ F = 5.216* Adj$R^2 = 0.037$ Predictors: **P**, β=-0.215*
Company of Others	$R^2 = 0.045$ F = 8.645** Adj $R^2 = 0.040$ Predictors: **IA**, β = 0.212**	$R^2 = 0.115$ F = 9.217** Adj $R^2 = 0.102$ Predictors: **IG**, β = 0.339**		
Fit, Shapely Body	$R^2 = 0.188$ F = 21.208*** **M1**, Adj $R^2 = 0.157$ **M2**, Adj $R^2 = 0.179$ Predictors: **IA**, β = 0.338*** **IG**, β = 0.176*	$R^2 = 0.152$ F = 6.277** **M1**, Adj $R^2 = 0.081$ **M2**, Adj $R^2 = 0.128$ Predictors: **I**, β = 0.535*** **P**, β=-0.333*	$R^2 = 0.084$ F = 8.812** Adj $R^2 = 0.075$ Predictors: **IA**, β = 0.290**	
Well-Being	$R^2 = 0.030$ F = 5.628* Adj $R^2 = 0.024$ Predictors: **IA**, β = 0.172*	$R^2 = 0.233$ F = 10.642*** **M1**, Adj $R^2 = 0.092$ **M2**, Adj $R^2 = 0.211$ Predictors: **P**, β=-0.664*** **I**, β = 0.494***	$R^2 = 0.102$ F = 5.422** **M1**, Adj $R^2 = 0.039$; **M2**, Adj $R^2 = 0.084$ Predictors: **IA**, β = 0.329** **IG**, β=-0.255*	
Fashion	$R^2 = 0.336$ F = 46.290*** **M1**, Adj $R^2 = 0.258$ **M2**, Adj $R^2 = 0.329$ Predictors: **I**, β = 0.351*** **IA**, β = 0.316***	$R^2 = 0.245$ F = 22.989*** Adj $R^2 = 0.234$ Predictors: **I**, β = 0.495***		
Boosting Confidence	$R^2 = 0.397$ F = 60.120*** **M1**, Adj $R^2 = 0.334$ **M2**, Adj $R^2 = 0.390$ Predictors: **I**, β = 0.437*** **IA**, β = 0.283***	$R^2 = 0.093$ F = 7.244** Adj $R^2 = 0.080$ Predictors: **IA**, β = 0.304**	$R^2 = 0.071$ F = 7.374** Adj $R^2 = 0.062$ Predictors: **IA**, β = 0.267**	
Pleasure from Physical Activity	$R^2 = 0.066$ F = 6.477** **M1**, Adj $R^2 = 0.017$ **M2**, Adj $R^2 = 0.056$ Predictors: **I**, β=-0.272*** **IA**, β = 0.244**	$R^2 = 0.059$ F = 4.473* Adj $R^2 = 0.046$ Predictors: **P**, β=-0.243*	$R^2 = 0.076$ F = 7.920** Adj $R^2 = 0.067$ Predictors: **IA**, β = 0.276**	$R^2 = 0.040$ F = 4.497* Adj$R^2 = 0.031$ Predictors: **P**, β=-0.200*
Escape from Everyday Life	$R^2 = 0.065$ F = 6.369** **M1**, Adj $R^2 = 0.028$ **M2**, Adj $R^2 = 0.055$ Predictors: **I**, β=-0.370*** **IG**, β = 0.260*	$R^2 = 0.065$ F = 4.946* Adj $R^2 = 0.052$ Predictors: **IA**, β = 0.255*	$R^2 = 0.131$ F = 7.140** **M1**, Adj $R^2 = 0.074$; **M2**, Adj $R^2 = 0.12$ Predictors: **P**, β = 0.232* **IA**, β = 0.225*	$R^2 = 0.038$ F = 4.218* Adj$R^2 = 0.029$ Predictors: **IG**, β=-0.194*
Managing Stress	$R^2 = 0.136$ F = 14.392*** **M1**, Adj $R^2 = 0.087$ **M2**, Adj $R^2 = 0.126$ Predictors: **I**, β=-0.524*** **IG**, β = 0.305**			$R^2 = 0.080$ F = 9.377** Adj$R^2 = 0.071$ Predictors: **IG**, β=-0.283**

Table 5 (continued)

Dependent variable	Polish		Chinese	
	Female	**Male**	**Female**	**Male**
Fulfilling the Need for Activity			$R^2=0.103$ $F=11.027^{**}$ Adj $R^2=0.94$ Predictors: **IA**, $\beta=0.321^{**}$	
Promoting Physical Activity	$R^2=0.074$ $F=14.634^{***}$ Adj $R^2=0.069$ Predictors: **IA**, $\beta=0.271^{***}$	$R^2=0.105$ $F=8.354^{**}$ Adj $R^2=0.069$ Predictors: **IA**, $\beta=0.324^{**}$		
Motivational Value	$R^2=0.153$ $F=16.469^{***}$ **M1**, Adj $R^2=0.112$ **M2**, Adj $R^2=0.143$ Predictors: **IA**, $\beta=0.415^{***}$ **IG**, $\beta=-0.201^{**}$	$R^2=0.182$ $F=7.808^{***}$ **M1**, Adj $R^2=0.080$ **M2**, Adj $R^2=0.159$ Predictors: **P**, $\beta=-0.355^{**}$ **IA**, $\beta=0.303^{**}$		
Time-Management	$R^2=0.403$ $F=40.989^{***}$ **M1**, Adj $R^2=0.295$ **M2**, Adj $R^2=0.310$ **M3**, Adj $R^2=0.393$ Predictors: **IA**, $\beta=0.468^{***}$; **IG**, $\beta=-0.433^{***}$; **I**, $\beta=0.460^{***}$	$R^2=0.056$ $F=4.222^{*}$ Adj $R^2=0.043$ Predictors: **IA**, $\beta=0.237^{*}$		
Persistence in Action	$R^2=0.266$ $F=22.014^{***}$ **M1**, Adj $R^2=0.295$ **M2**, Adj $R^2=0.310$ **M3**, Adj $R^2=0.393$ Predictors: **IA**, $\beta=-0.398^{***}$; **IG**, $\beta=0.553^{***}$; **P**, $\beta=-0.430^{***}$	$R^2=0.091$ $F=7.101^{**}$ Adj $R^2=0.043$ Predictors: **P**, $\beta=0.302^{**}$	$R^2=0.182$ $F=21.399^{***}$ Adj $R^2=0.174$ Predictors: **P**, $\beta=0.427^{***}$	
Motivational Conflict	$R^2=0.096$ $F=19.430^{***}$ Adj $R^2=0.091$ Predictors: **IG**, $\beta=-0.309^{***}$			

*Note: R^2, coefficient of determination; F, Fisher test; $^{*}P<0.05$, $^{**}P<0.01$, $^{***}P<0.001$; **M1**, model 1; **M2**, model 2; Adj R^2, model-adjusted coefficients of determination; β, standardized regression coefficient; **IG**, Internalization-General; **I**, Information; **P**, Pressures; **IA**, Internalization-Athlete.*

(1) Internalization-Athlete was a common predictor factor for the importance of physical activity objectives of Health, Fit, Shapely Body, Well-Being, Boosting Confidence, and Pleasure from Physical Activity in the Polish and Chinese young women. Their β coefficients are all positive, indicating that the effects of Internalization-Athlete on these objectives are all positive.

(2) Pressures were a common predictor factor for the importance of physical activity objectives of Physical Fitness and Pleasure from Physical Activity in the Polish and Chinese young men. Their β coefficients are all negative, indicating that the effects of Pressures on both objectives are all negative.

(3) Among the predictors of physical activity objectives, Information was a common predictor factor for the importance of physical activity objectives of Fashion in Polish young women and men, Internalization-Athlete was a common predictor factor for the importance of physical activity objectives of Boosting Confidence and Promoting Physical Activity in the Polish young women and men, and their effects are all positive. In addition, the predictors of physical activity objectives showed significant differences in Polish women and men. Such as Pressures is a predictor of Health objective in young Polish women, but no predictor effect in young Polish men; Information is a predictor of Well-Being objective in young Polish men, but no predictor effect in young Polish women; etc. At the same time, the predictors of physical activity objectives were more significantly different among young Chinese men and women, who did not have any common predictors.

(4) Internalization-Athlete was a common predictor factor for the development of Motivational Value and Time-Management among Polish young men and women, and their effects are all positive. Apart from that, the predictors of the motivational function of

objectives showed significant differences in Polish and Chinese women and men. Such as, Pressure is a positive predictor of Persistence in Action in Chinese young women but has no predictor effect in Chinese young men; conversely. Internalization-General is a negative predictor of Motivational Conflict in young Polish women but does not affect young Polish men.

Discussion

Similarities and differences between Polish and Chinese young people

The results of this study confirm that there are significant differences between Polish and Chinese young people in terms of the importance of physical activity objectives and the motivation function of the objectives, but this difference is only presented in some of the variables. Well-Being objective and Physical Fitness objective show high importance in both Polish and Chinese young men and women. Polish and Chinese young women differed significantly in the importance of only two of the 12 physical activity objectives, Company of Others and Managing Stress, while Polish and Chinese young men differed significantly in six objectives, Health, Fit, Shapely Body, Fashion, Boosting Confidence, Escape from Everyday Life, and Promoting Physical Activity. Research on motivation for physical activity among Chinese young people also demonstrated that male participants pay more attention to physical fitness, shape, and well-being goals [49]; female participants focus more on health, well-being, and fit body [50, 51]. Lipowski et al. [22, 52] indicate, that well-being, physical fitness, and health were the most important objectives of physical activity for young men and women in their research conducted on Polish young people. The study by Kuśnierz et al. [53] also demonstrates this theme. It is worth mentioning that the study by Wilczyńska et al. [49] on the motivation for physical activity among young people in China and Poland was carried out under the influence of the COVID-19 epidemic, which is similar to the social background of the questionnaire survey conducted in this study in 2021, and they obtained the same understanding with this study.

Compared to young Chinese men and women, the physical activity objectives of young Polish men and women show greater efficiency and persistence of action, and the ability to cope with adversity, and their physical activity objectives are less vulnerable to conflict with other objectives. The physical activity objectives of young Polish women have a greater influence on the actions taken by the individual. Young Chinese men are more focused to planning, arranging, and organizing their physical activity time. Although there are no comparative studies describing the motivational function of physical activity objectives in Polish and Chinese young people, some studies have confirmed that the gender of the participants and whether they have an athlete experience modulates the motivational functions of physical activity objectives [22, 52]. The present study demonstrates that there are both similar and significantly different perceptions of the importance of the purpose of physical activity and the motivational value of the goal between young Polish and Chinese men and women, this can confirm the findings of other authors.

On the other hand, the results of this study also show that there are significant differences between young people in Poland and China in terms of the average level of some variables of sociocultural attitudes towards the body. Young Polish women seek information about body image and appearance from the mass media less frequently than young Chinese women, but they have higher endorsement and acceptance of an athletic body ideal than young Chinese women. Young Chinese men prefer to have the same appearance as people in mass media such as TV or magazines more often than young Polish men, seek information about body image and physical appearance from mass media more frequently, and feel more pressure from mass media regarding physical appearance standards. A comparative study of the body image of university students in 22 countries in regions Pacific Asia, North-Western Europe and the USA, Central and Eastern Europe, et al. by Wardle et al. [54] demonstrated that both men and women from Asian countries showed higher levels of weight concern and weight loss attempts. A cross-cultural study of Polish (age m = 21.5) and Vietnamese (age m = 20.4) young people by Lipowska et al. [55] showed that Polish young women are more satisfied with their body appearance than Vietnamese young women, and they pay more attention to body strength and muscles. A study by Izydorczyk et al. [44] on young Polish and Japanese women showed that young Japanese women were significantly higher than Polish women in terms of seek information about body image and appearance from the mass media. Some studies on sociocultural attitudes towards appearance also show that young Chinese men show higher levels of Internalization-General, Information, and Pressures [47, 56, 57]. This study demonstrates that young Chinese men performed significantly higher than young Polish men on all three variables Internalization-General, Information and Pressures, except for Internalization-Athlete; young Chinese women performed significantly higher than young Polish women on the Information variable, but significantly lower than young Polish women on the Internalization-Athlete variable.

The sociocultural predictors of motivation for physical activity of young people in Poland and China

Regarding question 2, the results of this study confirm that the sociocultural attitudes towards the body in the

Polish and Chinese young people predicted their physical activity objectives and the motivational function of these objectives, and there are cross-cultural differences, but this predictive function is limited to some of the variables. Importantly for this work, in the Polish and Chinese young people internalization of sociocultural standard for the body appearance, internalization of athletic body idea, and seeking information about body image was positively associated with the sense of the importance of physical activity objectives, such as Health, Company of Others, Fit, Shapely Body, Boosting Confidence, etc.; Pressures was negatively associated with the sense of the importance of physical activity objectives, such as Physical Fitness, and Pleasure from Physical Activity. This is a result that indicates that the sociocultural attitude towards the body may be of importance for Polish and Chinese young people who undertaking physical activity and how they perceive the objectives of their physical activity.

Internalization-Athlete was a positive predictor factor for the importance of physical activity objectives of Health, Fit, Shapely Body, Well-Being, Boosting Confidence, and Pleasure from Physical Activity in the Polish and Chinese young women. The self-determination theory indicated that positive health, fitness, enjoyment, mood improvement, etc. can be considered intrinsic motivation for physical activity [32, 58, 59]. Further research by the scholars showed that intrinsic motivation in young people was associated with more strenuous physical activity, and internalization of athletic body ideas was a positive predictor of them [33, 34, 60]. Mieziene et al. [60] showed that internalization of athletic body ideas leads to higher body shape requirements in young men and women, pushing them to engage in more physical activity, this supports the results of this study on the predictive effect of Internalization-Athlete on Fit, Shapely Body objective, Fulfilling the Need for Activity objective, and Promoting Physical Activity. The above research also supported the results of this study on the predictive effect of Internalization-Athlete Polish young people on Motivational Value, Time-Management, and Persistence in Action. These are important results, indicating that the internalization of the athletic body ideas promoted by the mass media may help young women in Poland and China better understand the objectives of physical activity and promote their physical activity.

Pressures were a negative predictor factor for the importance of physical activity objectives of Physical Fitness, and Pleasure from Physical Activity in the Polish and Chinese young men. The results of this study showed that the pressure young men feel about the sociocultural standards of body and appearance promoted by the mass media will affect the psychological experience of undertaking physical activities, reducing the experience of the pleasure of physical activity and the focus on physical fitness. Similar results were obtained by Anić et al. [34], showing that the perceived sociocultural pressures by young people will further change their motives for physical activity, they will exercise for reasons of body appearance rather than pleasure.

Internalization- General was a positive predictor factor for the importance of physical activity objectives of Physical Fitness and Company of Others for Polish young men, and a positive predictor factor for the importance of physical activity objectives of Escape from Everyday Life and Managing Stress for Chinese young men. Several studies support this result, stating that under the influence of the media and interpersonal interactions, young men internalize the body shape advertised by the media as their ideal body shape and in turn engage in suitable physical activities, which improve their self-esteem, stress, and social interactions [59, 61–63]. This means that the General internalization of sociocultural standards of body and appearance promoted by the mass media will contribute to the physical fitness of young Polish men through physical activity and help young Chinese men to relieve stress of life through physical activity.

Information was a significant predictor factor for the importance of physical activity objectives of Health, Fit, Shapely Body, Well-Being, Fashion, and Boosting Confidence in Polish young people, and a positive predictor factor for Time-Management. However, Information has no predictive effect on the importance of physical activity objectives and the motivational function of objectives in Chinese young men and women. A comparative study of sociocultural standards of body image for Polish and Japanese young women by Izydorczyk et al. [44] shows that Polish and Japanese young women (age 18–29) display clear cultural differences in seeking information on the sociocultural standards of body and appearance promoted by the mass media, with Polish young women responding more impulsive, such as translating information into goals for physical activity, carrying out physical activities with corresponding goals, etc., while Japanese young women choose to avoid these messages whenever possible. Polish and Japanese women grew up in completely different cultural environments. Japanese women tend to be less individualistic, which will influence them to translate the information from the mass media they acquire into individual activity, whereas Polish women who have been brought up in European culture are more willing to break with tradition and use information from the mass media to directly guide their personal physical activity [44, 54, 64, 65]. China and Japan are both parts of Asia and share a similar cultural environment. This relationship between young Poles growing up in European culture and young Chinese growing up in Asian culture is similar. The results suggest that seeking information on

the sociocultural standards of body and appearance promoted by the mass media may help Polish young people to better understand the objectives of physical activity and promote their physical activity, whereas this was not shown to be the case among young Chinese.

The predictors of the motivational function of objectives showed significant differences in Polish and Chinese women and men. Such as Pressures is a positive predictor of Persistence in Action in Chinese young women, but no predictor effect in Chinese young men; conversely, Pressures is a positive predictor of Persistence in Action in Polish young men, but no predictor effect in Polish young women. Internalization-General is a negative predictor of Motivational Conflict in Polish young women, but no predictor effect in Polish young men. This may also since that young people in Poland and China grew up in very different cultural environments. The study by Wilczyńska et al. [49] indicated that Polish young people tend to respond to the influence of sociocultural attitudes toward the body promoted by the mass media through more physical activity whereas this phenomenon was close to zero in the Chinese subjects. The results prove that sociocultural attitudes toward the body promoted by mass media has a significant predictive effect on the motivational function of physical activity objectives among young Poles and tends to guide the physical activity of young Poles, whereas no such significant effect was found among young Chinese.

The analysis of the results obtained suggests that education and interventions for physical activity of young people should focus on sociocultural standards of body and appearance, influencing young people's physical activity and associated motivation for physical activity by guiding the specific ideal body appearance promoted by the mass media.

Limitations and future directions

This study presents a rare and unparalleled opportunity to compare and contrast the cultural differences between two distinct populations. However, the results of the study are subject to some limitations. Firstly, although the sample size was adequate for statistical analysis (total sample 467), it was relatively small for cross-cultural studies [66]. Secondly, there is a dearth of research that compares the predictive effects of different sociocultural factors on physical activity. Thirdly, it is worth noting that the study was focused on specific age groups, and there were differences in the age distributions of the samples. Future research should consider expanding similar studies to encompass different age groups, such as older adults and adolescents. Additionally, efforts should be made to increase sample sizes, ensure precise age distributions, and foster collaborative research between sports academics from both countries.

Conclusions

This study advances the cross-cultural knowledge of how sociocultural attitudes toward the body affect motivation for physical activity among young people in Poland and China. The findings indicate that internalization of athletic and general appearance ideals, as well as perceived pressure from media and others, are universal predictors of motivation for physical activity among young people in Poland and China. However, information from media and other sources is a specific sociocultural predictor of motivation for physical activity only in Polish young people. These results imply that different cultural contexts may shape different sources of information and influence body image and motivation for physical activity. Therefore, interventions to foster physical activity among young people should take into account both universal and specific sociocultural factors that may impact their motivation.

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Author Contribution
BI, MLa, ML study design; SG, BI, MLa, AK, SL, USR, BMR, TL, ML data collection; SG, SL statistical analysis; SG, BI, MLa, data interpretation; SG, BI, MLa, AK, SL, USR, BMR, TL, ML manuscript preparation; SG, BI, MLa, AK, SL, USR, BMR literature search; SG, ML fundings.

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Data Availability
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
The study was carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for research involving humans. The protocol of this study was approved by the Ethics Board for Research Projects at the Institute of Psychology, University of Gdansk, Poland (decision no. 33/2020). All participants were acquainted with the purpose of the conducted research and asked to complete an electronic informed consent form before registration on the project's website.

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Not applicable.

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None.

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Sociocultural predictors of obligatory exercise in young men: A Polish-Chinese comparison

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Background: Obligatory exercise has been shown to have negative physical and mental effects on exercisers and is more prevalent among young people. However, there is limited research on obligatory exercise among young men. Social comparison theory offers a novel perspective to explore the relationship between sociocultural factors and obligatory exercise among young men, which offers an opportunity to understand potential factors contributing to obligatory exercise among young men across different cultures.

Method: We recruited a purposive sample of young people aged 18-30 from Poland (n=79) and China (n=194). Participants completed self-report measures including the Sociocultural Attitudes Toward Appearance Questionnaire3, Inventory of Physical Activity Objectives, and Obligatory Exercise Questionnaire. In the data analysis stage, we examined the strength of the relationships between the independent variables and the dependent variable through multiple regression analysis, and tested the role of the mediating variables.

Results: The main analyses revealed that Internalization-Athlete was a common direct predictor of obligatory exercise for both Polish and Chinese young men; that there were direct sociocultural predictors of obligatory exercise that were only used in relation to Polish or Chinese young men; and that social adaptation goals for motivation for physical activity mediated the development of obligatory exercise for Polish and Chinese young men, and that there were cross-cultural differences.

Conclusion: Attention should be paid to their attitudes towards the idea of a muscular and athletic body and socially adapted physical activity motivations when understanding young men's obligatory exercise, while also considering cross-cultural differences.

KEYWORDS

sociocultural, obligatory exercise, motivation for physical activity, body, mass media, cross-cultural

1. Introduction

Regular exercise positively affects the physical and mental health of young people, such as improving cardiovascular function, enhancing respiratory function, regulating mood, reducing depression and anxiety, and improving social adjustment (1–7). However, when the duration and frequency of exercise exceed safety upper limits, the adverse effects (skeletal muscle damage,

metabolic disturbances, cardiovascular stress, etc.) may outweigh the positive effects (8–11). Researchers have studied this phenomenon using different terms such as exercise addiction (12), exercise dependence (13), compulsive exercise (14), and obligatory exercise (15). In this study, obligatory exercise was considered the most appropriate because it incorporates addiction, dependence, and compulsion. Obligatory exercise, defined by Polivy (16), is continued participation in physical activity despite the pain, lack of leisure time, interference with work or meaningful relationships, and the social consequences of indulgence. A systematic review on the prevalence of obligatory exercise risk confirmed that obligatory exercise risk in general exercisers is more prevalent in young people, including college students, probably due to body image (17). However, most of the available studies have focused on obligatory exercise in athletes, female college students, and adolescents (17–19), and few studies have focused on predictors of obligatory exercise in young men.

Social comparison theory suggests that people tend to compare themselves to others in terms of specific attributes (e.g., thinness, muscular) and that once the image promoted by the media is internalized, women and men will compare themselves to the media image and will act out for what they should look like and what they can do to achieve this goal (20). Internalization is the incorporation of specific values to the point that they become guiding principles or, as Thompson and Stice noted, "the extent to which an individual cognitively buys into" societal norms of size and appearance, to the point of modifying one's behavior in an attempt to approximate these standards (21). Research with university student populations found that obligatory exercise was associated with sociocultural pressure to be thin, investment in appearance, weight problems, and body dissatisfaction (22, 23). Obligatory exercise among young people was associated with concerns about appearance, and the internalization of sociocultural standards of thinness would predict their obligatory exercise (22, 24, 25). Sociocultural influences are theorized to promote young people's attitudes toward their bodies through three general processes: information, internalization of social standards, and responses to internalization (24, 26). Under the influence of globalization and industrialization, the esthetic standards of Asian, European, and American countries are merging and unifying with each other, and the ideal body shape of Western cultures is being widely promoted (27–29). However, cross-cultural differences in sociocultural attitudes about the body persist (30). In Europe, the Polish cultural identity is individualistic, seeking individuality and personal experience and emphasizing the autonomous individual's respect toward the body norms of his or her approval; in Asia, the Chinese cultural identity is collectivistic, concerned with the playing of social roles and focusing on the individual's physical submission to social norms (31–33). The literature review confirmed that obligatory exercise exists among young men in both Poland and China (17, 34, 35). Therefore, a cross-cultural comparison of young Polish and Chinese men brought up in different cultures could significantly improve the understanding of the predictors of obligatory exercise for young men in these cultures.

All human physical activities are driven and controlled by motivation (36). In addition to sociocultural factors, the motivational factors that support the development of obligatory exercise behavior are also worth mentioning. Recent literature has demonstrated that motivation appears to be an important factor in influencing physical activity and that young people's attitudes toward physical and sporting activity will influence motivation and excessive physical activity intake (37). Pritchard and Beaver (15) showed that exercise motivation can predict obligatory exercise of young people, and the gender difference is noticeable, improved body tone, enjoyment, and perceived attractiveness predict the obligatory exercise of men, and improved body tone, fitness, and enhanced mood predict the obligatory exercise of women. A cross-sectional analysis of young people with an average age of 24.15 showed that their motivation for physical activity directly affects when, how often, and how they engage in physical activity (38). It is worth noting that research based on self-determination theory has demonstrated that extrinsic motivation for physical activity is associated with body dissatisfaction, internalization of sociocultural standards of body and appearance, and intrinsic motivation for physical activity is associated with higher body satisfaction and lower internalization of sociocultural standards of body and appearance (39–41). Karazsia and Crowther (42) demonstrated that Thompson's three-factor model is applicable to explain body dissatisfaction and muscle development strategies in young men. Given these, this study not only measured the predictive role of sociocultural factors on obligatory exercise in young men but also assessed the mediating role of motivation for physical activity in the relationship between sociocultural factors and obligatory exercise in young men.

The literature sources suggest that the sociocultural factors proposed in this study as potential predictors of obligatory exercise have been analyzed in other studies and have typically focused on measures of sociocultural attitudes toward the body (22, 34). Given this, the independent variable in this study was sociocultural attitudes toward the body, which describes the extent to which sociocultural standards of body appearance are internalized (21). The dependent variable was obligatory exercise, describing attitudes and behaviors associated with exercise (43). The mediating variable was the motivation for physical activity, which describes how important a specific objective is to a person's participation in physical activity (44). The physical activities here are performed without medical recommendations.

This article focuses on Polish and Chinese young men. The main aim of this study was to determine which sociocultural factors predicting obligatory exercise in young men are universal or common to each young man and which are specific to a particular cultural condition (Polish or Chinese culture). The authors believe that the stated research topic is not only related to obligatory exercise but can also become a health preference for a healthy and balanced physical activity treatment. The following research questions will be considered in this study.

1. Are there differences in the intensity levels of obligatory exercise, sociocultural attitudes toward the body, and motivation for physical activity between the young Chinese and Polish men surveyed?
2. Are there factors that together predict obligatory exercise in young Polish and Chinese men regarding sociocultural attitudes toward the body, and what are these factors?
3. What is the role of motivation for physical activity in the emergence of obligatory exercise among young Polish and Chinese men? Is it an intermediate variable in their development? If so, which factors in the research model mediated the development of obligatory exercise?

2. Materials and methods

2.1. Participants

The groups were chosen by purposeful sampling. Participants were recruited using convenience and purposive sampling methods. The inclusion criteria were: age (18–30 years old), Polish or Chinese nationality and growing up in that country (lived with the family from childhood to now in Poland or China for the respective groups), lack of physical disability or somatic diseases that prevents physical activity, and no requests for exercise have been received from doctors, students, or graduates in the humanities and social sciences.

The data used for this study were part of a large international research project registered in the Protocol Registration and Results System (ClinicalTrials.gov; https://clinicaltrials.gov/ct2/show/NCT04432038). In 2021, the project was conducted simultaneously in two academic cities in Poland (Krakow and Gdansk) and two academic cities in China (Beijing and Zhengzhou). The study authors trained qualified researchers (students and team members of the study authors) on research procedures and ethics, then conducted and coordinated the study simultaneously in China and Poland. Researchers disseminated information about the possibility of participating in the study among university students in the four cities and sent informed consent forms and questionnaires *via* email to volunteers who met the inclusion criteria. Volunteers who met the inclusion criteria were asked to help invite their classmates to participate in the study (non-random sampling method). Informed consent forms and questionnaires were sent to invitees *via* email by the researchers.

The study was planned to survey 150 young Polish men and 150 young Chinese men. However, a total of 125 young Poles and 257 young Chinese participated in the study. Forty-six young Poles and 63 young Chinese were excluded from the study due to errors in completing the questionnaire and failure to meet all inclusion criteria. The mean age of young Polish men was 24.3 (SD = 3.30), and the mean age of young Chinese men was 22.0 (SD = 2.61). The mean BMI for both young Polish and Chinese men is between the normal values of 20 and 25. The two groups of respondents were undergraduate and postgraduate students currently living in the surveyed Polish and Chinese cities and university graduates entering the workforce. Of all respondents, 72% were students, 25% were employed for wages, 83% were single and never married, 11% were in a Married or domestic partnership, and no respondents were widowed or separated. The respondents' university majors were all in the humanities and social sciences; they had no experience as athletes and were not professional sports learners. All respondents reported that they participated in physical activity, and their average monthly participation was 14 (SD = 9.69).

2.2. Ethical approval

This study was conducted following national and international regulations and guidelines. The study was carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for research involving humans. The protocol of this study was approved by the Ethics Board for Research Projects at the Institute of Psychology, University of Gdansk, Poland (decision no. 33/2020).

2.3. Methods

The Sociocultural Attitudes Toward Appearance Questionnaire 3 (SATAQ 3) (21) was used to measure the variable sociocultural attitudes toward the body. The Inventory of Physical Activity Objectives (IPAO) (44) was used to measure the motivation for physical activity. The Obligatory Exercise Questionnaire (OEQ) (43) was used to measure the variable of obligatory exercise. In addition, demographic variables such as gender, nationality, age, height, and weight were collected. BMI is obtained by dividing the weight in kilograms by the square of the height in meters.

2.3.1. The sociocultural attitudes toward appearance questionnaire 3

The Sociocultural Attitudes Toward Appearance Questionnaire 3 (SATAQ 3) by Thompson et al. (21), in Polish adaptation by Izydorczyk and Lizińczyk (45) and Chinese adaptation by Jackson and Chen (46), was used. The original version of the SATAQ 3 had 30 items and consisted of four subscales: Internalization-General (assesses the extent to which respondents internalization of sociocultural standards, consists of nine items, e.g., I compare my body to the bodies of TV and movie stars); Information (measures the frequency of seeking information about the sociocultural standards of body and appearance, consists of nine items, e.g., TV commercials are an important source of information about fashion and "being attractive."); Pressures (assesses the level of pressure of sociocultural standards felt by a person, consists of seven items, e.g., I have felt pressure from TV or magazines to lose weight); and Internalization-Athlete (measures the level of internalization of athletic body shape, consists of five items, e.g., I wish I looked as athletic as sports stars). The respondents assessed each item of the SATAQ 3 by marking their answers on a five-point Likert scale. The Cronbach's alpha coefficients for the four subscales in the presented study were as follows: Internalization-General (0.803 in Polish studies and 0.931 in Chinese studies), Information (0.766 in Polish studies and 0.922 in Chinese studies), Pressures (0.882 in Polish studies and 0.897 in Chinese studies), and Internalization-Athlete (0.746 in Polish studies and 0.839 in Chinese studies).

2.3.2. The inventory of physical activity objectives

We used the Inventory of Physical Activity Objectives (IPAO) developed by Lipowski and Zaleski (44). The questionnaire consists of demographic variables, 12 physical activity objectives, and a motivational function of objectives scale. The first two parts of the questionnaire were investigated according to the needs of the study. Based on the research needs and drawing on Lipowski and Zaleski (44), and Sebire et al. (39) studies, this study divided the 12 physical activity goal items into three factors: physical development goals (containing four items; e.g., Physical fitness, being "in shape"), mental development goals (containing four items; e.g., Pleasure from physical activity), and social adjustment goals (containing four items; e.g., Company of other people). Respondents assessed the importance of the listed objectives by marking their answers on a five-point Likert scale, with 1 being not at all important and 5 being very important. The questionnaire obtained ideal Cronbach's alpha coefficients in existing studies on both Chinese and Polish populations (44, 47). The Chinese version of the questionnaire was obtained using a standard forward-backward translation procedure. The Cronbach's alpha

coefficients were as follows: Polish version = 0.831, Chinese version = 0.855.

2.3.3. The obligatory exercise questionnaire

We used the Obligatory Exercise Questionnaire (OEQ) by Thompson and Pasman (43). The questionnaire contains 20 items that measure attitudes and activities related to exercise (e.g., "Then I do not exercise, I feel guilty"). Respondents rated how often they experienced each exercise-related situation on a four-point Likert scale, with higher scores indicating a more substantial obligation to exercise. The questionnaire obtained ideal Cronbach's alpha coefficients in existing studies on both Chinese and other national populations (34, 48). The Polish version and Chinese of the questionnaire were obtained using a standard forward-backward translation procedure. The Cronbach's alpha coefficients for the OEQ were as follows: Polish version = 0.854, Chinese version = 0.869.

2.4. Statistical methods

The survey data were analyzed in Excel (Microsoft Office 365) and IBM SPSS Statistics 26. The steps in the statistical analysis were as follows.

Stage 1: Measure the mean, quartile, and standard deviation of all variables in the model, depending on the research objective and question.

Stage 2: Given that the tested variables were not all normally distributed, the Mann–Whitney U test was used to measure the significance of the difference between variables in the groups of Polish and Chinese.

Stage 3: The significance of differences in the strength of relationships and strength of correlations between variables in the study model was measured using Spearman's rank correlation coefficient.

Stage 4: Measures the strength of the relationship between the independent and dependent variables using multiple regression analysis while testing the role of mediating variables. Six basic hypotheses of the multiple regression analysis were tested. The Shapiro–Wilk test significance values for the dependent variable (mandatory exercise) were 0.258 (China) and 0.385 (Poland), satisfying the condition of normal distribution, and other characteristics of the analyzed data allowed the use of multiple regression analysis. This stage aimed to find predictors of the dependent variable in the Polish and Chinese young male populations. Calculations were performed using the PROCESS macro for SPSS (49).

The study proposes an integrated model of hypothesized relationships between variables to explain the direct predictive role of sociocultural attitudinal factors about the body, the mediating role of motivation factors for physical activity in explaining the emergence of obligatory exercise. Model 4 in the PROCESS macro for SPSS was used to test for direct and indirect effects (49). The significance of the indirect effects was tested using bootstrapping, and a bootstrap sample of 5,000 was used to model the data distribution better. The confidence interval (CI) was 95%. The effect is insignificant if the confidence interval contains a zero value. Only unstandardized estimates could be calculated. The hypothesized relationships used for testing include only those variables for which there is a significant relationship.

3. Results

3.1. Sociocultural attitudes toward the body, motivation of physical activity, and obligatory exercise characteristics of young Polish and Chinese men (differences between the groups)

A comparative analysis of all variables in the research model between the Polish and Chinese groups shows significant differences between the two groups regarding certain variables (Table 1).

1. In terms of sociocultural attitudes toward the body, Polish and Chinese young males showed significant differences on variables other than Internalization-Athlete, and young Polish males showed significantly lower levels on average than Chinese males. This result suggests that young Polish and Chinese males show similar levels of recognition and acceptance of the athletic body ideals promoted by the mass media. However, young Chinese men show a higher level of acceptance of the general sociocultural standards of body and appearance promoted by the mass media, they seek information about sociocultural standards of body and appearance more frequently in the mass media, and they feel higher pressure from the sociocultural standards of body promoted by the mass media.
2. In terms of motivation for physical activity, young Polish and Chinese males do not differ significantly in terms of physical development goals, while significant differences are shown in terms of psychological development goals and social adaptation goals. Compared to young Chinese men, young Polish men are more focused on psychological development goals and less on social adjustment goals. This result suggests that young Polish men place more emphasis on motivation for physical activities such as pleasure, happiness, and stress elimination, while young Chinese men place more emphasis on motivation for physical activities such as adapting to social relationships and promoting socialization.
3. The comparative analysis of the quartiles also shows significant differences between Polish and Chinese young men in obligatory exercise. Young Polish men were significantly lower than young Chinese men. This suggests that Young Chinese males are more likely to undertake obligatory exercise.

3.2. The relation between studied variables among Polish and Chinese young men

From Table 2, it can be see that: among young Polish men, there were significant correlations between some of the variables in the study model. All factors of sociocultural attitudes toward the body except Pressures were significantly correlated with obligatory exercise, all factors of motivation for physical activity were significantly correlated with obligatory exercise, and all correlation coefficients were positive. Between sociocultural attitudes toward the body and motivation for physical activity, Internalization-Athlete and Physical development goals were significantly correlated, and the four factors of sociocultural attitudes toward the body were significantly correlated

TABLE 1 Comparative analysis of the Polish and Chinese young male groups according to the variables included in the research model.

Variables	Polish (n=79)			Chinese (n=194)			Difference
	Q1	Median	Q3	Q1	Median	Q3	p
Internalization-general	15.00	19.00	24.00	25.00	27.00	30.00	<0.001
Information	11.00	16.00	21.00	25.75	27.00	30.00	<0.001
Pressures	7.00	11.00	15.00	17.00	20.00	21.00	<0.001
Internalization-athlete	13.00	16.00	19.00	14.00	15.00	18.00	0.448
Physical	15.00	17.00	19.00	15.75	18.00	20.00	0.202
Psychological	15.00	18.00	20.00	14.00	17.00	19.00	0.019
Social	8.00	12.00	15.00	13.00	14.50	17.00	<0.001
Obligatory exercise	40.00	47.00	54.00	44.00	51.00	58.00	0.005

The significance threshold was set at 0.05; n, number of people; Q1, 25% Quartile; Q2, 75% Quartile.

TABLE 2 Correlation analysis for all variables for the groups of Polish and Chinese young men.

		Internalization-general	Information	Pressures	Internalization-athlete	Obligatory exercise
Physical	Polish	0.147	0.208	−0.010	0.273*	0.479**
	Chinese	0.041	0.062	−0.102	0.087	0.349**
Psychological	Polish	−0.059	0.040	−0.171	0.149	0.404**
	Chinese	−0.107	0.045	−0.095	0.010	0.300**
Social	Polish	0.379**	0.425**	0.314**	0.345**	0.466**
	Chinese	0.100	0.232**	0.150*	0.102	0.370**
Obligatory exercise	Polish	0.231*	0.226*	0.041	0.318**	1.000
	Chinese	0.165*	0.254**	0.188**	0.264**	1.000

*$p < 0.05$; **$p < 0.01$.

with social adaptation goals, and all correlation coefficients were positive.

Among young Chinese men, significant correlations were also found between some of the variables in the study model. Four factors on sociocultural attitudes toward the body were significantly and positively correlated with obligatory exercise, and three factors on motivation for physical activity were significantly and positively correlated with obligatory exercise. Between sociocultural attitudes about the body and motivation for physical activity, only Information and Pressures were significantly positively correlated with social adjustment goals.

To sum up, sociocultural attitudes about the body may predict compulsory exercise among young Polish and Chinese men but may only hold for some factors, and there may be cross-cultural differences. Some factors of motivation for physical activity may mediate between sociocultural attitudes toward the body and obligatory exercise, with cross-cultural differences. These results provide the premise for the next stage of model testing.

3.3. Predictors of obligatory exercise among young men in Poland and China

Figure 1 illustrates the predictive role of the four factors regarding sociocultural attitudes toward the body among young Polish and Chinese men. In order to improve the readability of the presentation, only paths with a significance level < 0.05 were retained. Table 3 shows the model estimates for the three factors of motivation for physical activity as mediators of the four variables on sociocultural attitudes toward the body as predictors of obligatory exercise. The group effect is insignificant if a zero value is included between the Lower 95% CI and the Upper 95% CI.

From Figure 1, it can be seen that: among young Polish men, some of the pathways in the study model reached significant levels. Internalization-General and Internalization-Athlete were predictors of obligatory exercise. All three factors of motivation for physical activity were predictors of obligatory exercise. All four factors on sociocultural attitudes toward the body were predictive of social adaptation goals, while there was no predictive effect for the other two factors of motivation for physical activity.

Among young Chinese men, all factors on sociocultural attitudes toward the body, except Internalization-General, were predictors of obligatory exercise. All three factors of motivation for physical activity were predictors of obligatory exercise. Only Information and Pressures predicted the social adaptation goal of motivation for physical activity; the other factors of sociocultural attitudes toward the body did not have a predictive effect on motivation for physical activity.

Based on the results in Table 3, it can be seen that: the degree of mass media-driven internalization of the athletic body ideal is a common direct positive predictor of obligatory exercise among young males in Poland and China. The degree of internalization of universal sociocultural standards about the body promoted by mass media was

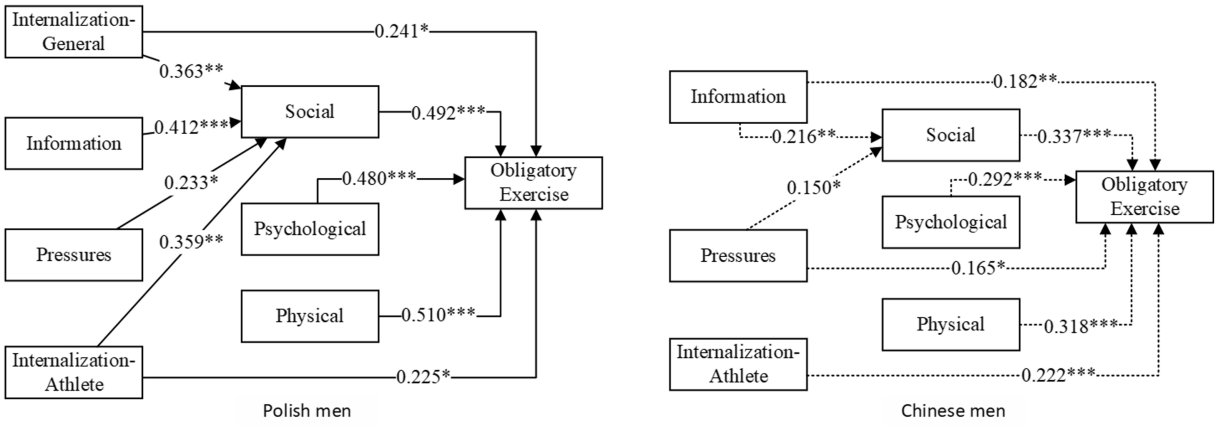

FIGURE 1
Sociocultural attitudes about the body (Internalization-General, Information, Pressures, and Internalization-Athlete) and motivation for physical activity (Physical, Psychological, and Social) as predictors of obligatory exercise among young Polish and Chinese men. Non-standardized estimates are presented; #$p<0.05$, **$p<0.01$, ***$p<0.001$: to improve the readability of the presentation. Only paths with significance levels < 0.05 were retained.

TABLE 3 Model estimates of the four factors of sociocultural attitudes toward the body as direct predictors of obligatory exercise and indirect predictors through the three factors of motivation for physical activity.

		Estimates	SE	*p*	Lower 95% CI	Upper 95% CI
Direct effects						
Young Polish men	Internalization-General	0.241	0.099	0.017	0.044	0.438
	Internalization-Athlete	0.225	0.100	0.027	0.026	0.424
Young Chinese men	Information	0.182	0.068	0.008	0.048	0.316
	Pressures	0.165	0.068	0.017	0.030	0.300
	Internalization-Athlete	0.222	0.066	<0.001	0.092	0.352
Indirect effects Social						
Young Polish men	Internalization-General	0.179	0.056		0.078	0.295
	Information	0.210	0.067		0.100	0.360
	Pressures	0.125	0.060		0.012	0.248
	Internalization-Athlete	0.162	0.055		0.065	0.290
Young Chinese men	Information	0.073	0.027		0.026	0.131
	Pressures	0.052	0.024		0.009	0.103

Non-standardized estimates are presented.

only a direct positive predictor of obligatory exercise among young Polish men. The frequency of mass media messages seeking sociocultural standards about body and appearance and the level of pressure from mass media promotion of sociocultural standards about body and appearance was only direct positive predictors of obligatory exercise for young Chinese men.

Among young Chinese and Polish men, the frequency of mass media messages seeking sociocultural standards about body and appearance and the level of stress associated with mass media promotion of sociocultural standards of body and appearance indirectly predicted their obligatory exercise through the physical activity goal of adapting to social relationships and promoting socialization. This means that the social adaptation goal of physical activity is a common mediator of the development of obligatory exercise among young Polish and Chinese men. Furthermore, social adaptation goals for physical activity are also a mediator of young Polish men's level of internalization of general sociocultural norms about the body promoted by the mass media and the level of internalization of the athletic body ideal as a predictor of obligatory exercise. However, this relationship was not present among young Chinese men.

4. Discussion

4.1. Similarities and differences among young Polish and Chinese men

The results of this study show that there are both similarities and significant differences between young Polish and Chinese men in terms of their sociocultural attitudes toward the body. Young Polish and Chinese men show similar levels of recognition and acceptance

of the athletic body ideal as promoted by the mass media. However, compared to young Polish men, young Chinese men prefer to have the same appearance as figures in mass media such as TV or magazines, they seek information about body image and appearance more frequently from mass media, and they feel more pressure from mass media regarding appearance standards. Lipowska et al. (50) demonstrated in a comparative study of university students from Poland and Vietnam aged 19–25 that Young Polish men are significantly more satisfied with their physical appearance than young Vietnamese men due to cultural differences, young Polish men are concerned with their personalities and individual experiences, and they value their personal physical attractiveness; young Vietnamese men are susceptible to the social environment (significant social audience effect), and they value muscle, strength, and male-dominated social roles. Although there are no direct comparative studies of young Chinese and Polish people, Vietnam and China are part of the same East Asian cultural sphere and studies on them still provide support for this study. Furthermore, the study on sociocultural attitudes toward the body proved that young Chinese men show higher levels of Internalization-General, Information and Pressures (46, 51). Therefore, sociocultural attitudes toward the body differ significantly between young Polish and Chinese men, which could confirm the findings of other researchers.

In terms of motivation for physical activity, the results of this study show that young Polish and Chinese men show a similar level of emphasis on physical development goals; however, there are significant differences in the level of emphasis on psychological development and social adaptation goals. Compared to young Chinese men, young Polish men placed more importance on physical activity goals of pleasure, happiness, and stress elimination and less on physical activity goals of adapting to social relationships and promoting socialization. Established research on adults' motivation for physical activity proves that the five most common motivations for adults (over 18 years old) to participate in physical activity are health and fitness, the improvement of physical appearance, enjoyment, socialization, and the psychological benefits it brings, and are influenced by gender, age, area of living, level of education, etc. (52–55). Wilczyńska et al. (47) demonstrated that culture moderates physical activity motivation between Poles and Chinese and that there are significant cross-cultural differences between the two in the company of other people, escape from everyday life, and managing stress. This provides support for the equally valued physical activity goals of young Polish and Chinese men in this study, as well as evidence that there may be cross-cultural differences in the physical activity goals of young Polish and Chinese men living in different regional and cultural environments. The study by Lipowska et al. (50) and Wilczyńska et al. (47) demonstrated that young Polish men brought up in a guilt-ridden culture focused on personal appearance and personal experiences; young Chinese men brought up in a culture of shame were vulnerable to the social environment. This supports the findings of this study that young Polish men place more emphasis on personal psychological development goals, while young Chinese men place more emphasis on social adjustment goals.

On the other hand, this study's results also show significant differences in obligatory exercise between young Polish and Chinese men. Obligatory exercise was less likely among young Polish men than young Chinese men. Although there are no studies that directly show significant differences in obligatory exercise between Polish and Chinese young people. However, some studies have shown that solid sociocultural backgrounds influence people's obligatory exercise behavior through different aesthetic standards (34, 56, 57). A systematic review by Reynolds et al. (58) demonstrated that obligatory exercise was associated with multiple sociocultural factors (e.g., family, peers, and media) in young people and that social comparison, body-related information, and pressure to conform to body ideals predicted this relationship. The differences in obligatory exercise in this study also provide the premise for the differential predictors of young Polish and Chinese men raised in different cultures, providing the basis for the second question of the study.

4.2. Predictors of obligatory exercise in the study group of young Polish and Chinese men

4.2.1. The direct predictive role of sociocultural attitudes toward the body in obligatory exercise

This study aimed to determine which sociocultural factors predicting obligatory exercise in young men are common or universal for each young man and which are specific to a particular cultural condition (Polish culture or Chinese culture). The findings suggest that Internalization-Athlete is a common direct positive predictor of obligatory exercise for young men in Poland and China, Internalization-General is only a direct positive predictor of obligatory exercise for young men in Poland, and Information and Pressures are the only direct positive predictor of obligatory exercise for young men in China. Importantly, this study suggests that young men's acceptance of the athletic body ideal promoted by the mass media will positively influence their obligatory exercise. This result supports other authors' evidence across countries and regions that young men place greater emphasis on muscle and strength, which may lead them to engage in obligatory exercise (12, 22, 59–64). The study also suggests that young Polish men's recognition of universal sociocultural norms about the body as promoted by mass media is a direct positive predictor of their compulsory exercise. The frequency with which young Chinese men seek information about sociocultural standards of the body promoted by mass media and the level of perceived pressure from body and appearance sociocultural standards promoted by mass media would directly and positively predict their obligatory exercise. According to Lipowska et al. (50), young Polish men focus on individuality and personal body experiences, while young Chinese men are more concerned with personal social roles. Thus, cultural background idiosyncrasies may lead young Polish men to value active personal recognition and acceptance of social culture, whereas young Chinese men value passive personal adaptation and fit into social culture. The study by Izydorczyk et al. (65) also confirmed that the higher the recognition and acceptance of general sociocultural attitudes about the body promoted by the mass media among young Polish men, the more likely they were to exhibit bulimic behavior. According to social comparison theory (20), young Polish men may exercise more frequently and with greater intensity to maintain their athletic body shape and attractiveness to counteract the adverse effects of overeating. On the other hand, to maintain their male-dominated social role, young Chinese men's heightened attention to mass media information about sociocultural standards of the body and perceived higher pressure about sociocultural standards of the body may translate into

higher frequency and intensity of exercise. Fan et al. (34) also confirmed that Information and Pressures were highly associated with obligatory exercise among young Chinese men. These support the findings of this study to some extent.

4.2.2. Motivation for physical activity as a mediator between sociocultural attitudes toward the body and obligatory exercise

The results of this study also suggest that motivation for physical activity is a predictor of obligatory exercise in both Polish and Chinese young men, that motivation for physical activity mediates the relationship between sociocultural attitudes toward the body and obligatory exercise, and that there are both general mediators that apply to both young Polish and Chinese men, and mediators that apply only to a specific culture (Polish or Chinese culture). All three factors of motivation for physical activity predict obligatory exercise in Polish and Chinese young men. However, only social adaptation goals mediated the Information and Pressures factors in predicting obligatory exercise in young Chinese and Polish men. In addition, social adaptation goals mediated the Internalization-General and Internalization-Athlete in predicting obligatory exercise in young Polish men. This suggests that the frequency with which young men seek out information about sociocultural standards of the body promoted by the mass media and the level of perceived stress about sociocultural standards of the body promoted by the mass media indirectly positively predict their obligatory exercise by adapting to social relationships and promoting socialized physical activity goals. Studies on social identity theory confirm that higher levels of attention to information and perceived stress about sociocultural standards of the body promoted by the mass media among young people indicate greater concern about the socialization of one's body and social identity, and lower levels of current body satisfaction (66–68). According to social comparison theory, this phenomenon may translate into specific goals and goal-directed behavior in young people (69). The study by Pritchard and Beaver (15) confirmed that motivation for physical activity in young men in tone, enjoyment, and attractiveness was a predictor of their obligatory exercise. This study also shows that the acceptance of universal sociocultural standards about the body promoted by the mass media and the receptivity to the athletic body idea promoted by the mass media among young Polish men indirectly positively predicted their obligatory exercise by adapting to social relationships and promoting socialized physical activity goals. However, this relationship does not exist among young Chinese men. Studies by Malchrowicz-Mośko et al. (57) and Lopuszanska-Dawid et al. (70) confirm that under the influence of media and interpersonal interactions, young Polish men internalize body images promoted by the media as their ideal body shape, which may lead them to engage in specific physical activities in order to enhance their physical attractiveness and social identity. However, there are few relevant studies on young Chinese men, which makes the present study significant. Furthermore, a systematic review by Teixeira et al. (71) indicated that motivation was a key factor in supporting sustained exercise and that more autonomous forms of motivation, such as pleasure and personal achievement, were positively associated with exercise in young people and predicted the duration and frequency of their exercise. The results of this study further support these studies.

The results of the resulting analysis suggest that prevention interventions for obligatory exercise in young men should pay attention to the promotion of a reasonable athletic body ideal and to the assessment of motivation for physical activity and specific sociocultural contexts. The authors recommend the inclusion of such interventions in health universities and national fitness programs. The practical implications of the authors' study revolve around the professionals involved in physical activity and health programs for young people. Measures of sociocultural attitudes toward the body and motivation for physical activity may be necessary in the practice of educators, physicians, psychologists, and other specialists who support the healthy development of young men.

4.3. Limitations of the study

This study is a rare, even unique, opportunity to make cultural comparisons between two different people. However, this study also has noteworthy limitations. Firstly, while sufficient for statistical analysis, the study's sample size is not large. Secondly, the research analysis provides an opportunity to compare two distinctly different cultures, which has been lacking in previous literature. Thirdly, although the study focused on compulsive motor cognition rather than motor behavior, the lack of a measure of motor behavior may be a limitation. Future research will consider combining motor behavior with compulsive motor cognition and work toward larger sample sizes and different age groups.

5. Conclusion

The cultural differences between young Polish and Chinese men indicate that young Chinese men show higher intensity on the independent variables Internalization-General, Information, and Pressures. However, Chinese and Polish young men showed similar strengths on the independent variable Internalization-Athlete. Young Chinese men showed higher intensity on the social adaptation goal of motivation for physical activity and lower intensity on the psychological development goal of motivation for physical activity than young Polish men. They were more likely to engage in obligatory exercise.

The findings suggest that the sociocultural factor of Internalization-Athlete is a common direct predictor of obligatory exercise for both Polish and Chinese young men, Internalization-General is a direct positive predictor of obligatory exercise for Polish young men only, and Information and Pressures were the direct positive predictors of obligatory exercise for young Chinese men only. Motivation for physical activity positively predicted obligatory exercise among young Polish and Chinese men.

It is worth mentioning that the social adaptation goal of motivation for physical activity mediates the prediction of obligatory exercise by sociocultural attitudes toward the body. The sociocultural factors Information and Pressures indirectly and positively predicted obligatory exercise in young Polish and Chinese men through the social adaptation goals of motivation for physical activity. The sociocultural factors Internalization-General and Internalization-Athlete indirectly and positively predicted obligatory exercise in young Polish men through the social adaptation goal of motivation for

physical activity. However, BMI does not act as a mediator for the development of obligatory exercise in young men.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by the Ethics Board for Research Projects at the Institute of Psychology, University of Gdansk, Poland (decision no. 33/2020). The patients/participants provided their written informed consent to participate in this study.

Author contributions

BI, MałL, and SG contributed the conception and design of the study. SG was primarily responsible for the manuscript writing and performed initial data analysis. SL performed a statistical analysis check. BI, MałL, SL, and AK commented on the manuscript revisions. MałL, MarL, BI, US-R, BR, and TL were responsible for data collection. MarL, BI, and MałL were responsible study supervision. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

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Article

The Mediating Role of Eating Attitudes in Sociocultural Attitudes toward the Body in Predicting Obligatory Exercise among Young People: A Polish and Chinese Comparison

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Abstract: The main aims of this study were to determine which sociocultural predictors of obligatory exercise are universal for young men or women and which are specific to particular cultural conditions (Polish or Chinese culture) and to examine the mediating role of eating attitudes. A cross-sectional study was conducted among Poles (n = 259) and Chinese (n = 208) aged 18 to 30. Descriptive and comparative statistics, Spearman's rho, and multiple regression analysis were used. The main analyses showed that Internalization—Athlete was a common positive direct predictor of obligatory exercise among young Polish and Chinese women; Information and Internalization—Athlete were only specific direct positive predictors of obligatory exercise in young Chinese men; some variables in eating attitudes mediated the development of obligatory exercise in young Polish and Chinese men and women and indicated that there were cross-cultural differences. In understanding obligatory exercise among young people, attention should be paid to their sociocultural attitudes toward the body and eating, and cultural and gender differences need to be considered.

Keywords: obligatory exercise; eating attitudes; body; mass media; cross-cultural; sociocultural attitudes toward the body

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1. Introduction

Regular exercise has been demonstrated to promote physical and mental health and enhance well-being [1–4]. However, when exercise time and frequency exceed safe upper limits, adverse effects such as skeletal muscle damage, metabolic disturbances, and mood disorders can occur [5–8]. One of these outcomes is known as obligatory exercise, defined by Polivy [9] as continued participation in physical activity despite the pain, lack of leisure time, interference with work or important relationships, and the social consequences of indulgence. Obligatory exercise has a full range of effects on the exerciser's body, psychology, work, social relationships, family life, etc. [10,11]. From a global public health perspective, obligatory exercise is more prominent among emerging adults aged 18 to 30 and is becoming a threat to young people's health in Europe, Asia, and the Americas, including Poland and China [11–19]. Sociocultural factors have been shown to play a crucial role in developing obligatory exercise [15]. With the development of modern communication media in the form of the Internet, mass media and public information profoundly influence people's lives and thoughts. An increasing number of young men and women are engaging in anti-health behaviors, including excessive exercise, dietary restriction,

and medication use, to achieve the ideal body image promoted by the media [5,20–22]. In the context of globalization, Western culture is widely promoted worldwide, but the cultures of different regions and nationalities remain distinct [23]. Therefore, cross-cultural comparisons of young men and women brought up in different cultures can significantly deepen the diagnostic potential of the sociocultural predictors of obligatory exercise specific to these cultures.

However, cross-cultural and cross-regional studies are rare. This study considers young people from Poland and China who grew up in emerging countries in Europe and Asia. Polish culture is individualistic and Chinese culture is collectivistic [24,25]. However, with the development of globalization, Western culture has been promoted in different countries [26]. Poland and China were extensively influenced by Western culture after the communist period and the start of reform and opening up, respectively [27]. Considering the potential differences and similarities between the cultures of different countries, research on young people in European and Asian countries should consider these potential differences and similarities [28]. For evidence-based practice, measures of obligatory exercise need to be continually validated across different populations from Europe, the Americas, Asia, Africa, and Oceania to expand knowledge about the prevalent and specific sociocultural predictors of obligatory exercise.

In addition, eating attitudes deserve attention in the relationship between sociocultural factors and obligatory exercise in young people. The study by Goodwin et al. [29] confirmed that obligatory exercise is a problematic drive to exercise that is closely associated with eating disorders and will always continue even when exercise is prohibited by injury or illness. A systematic review has shown that up to 85% of people with eating disorders have poor exercise cognition and behaviors [30]. The three-factor model by Thompson et al. explains the strength and nature of the relationship between sociocultural factors (including mass media) and psychological and eating attitudes, and is widely used and validated [31–34]. The study by Izydorczyk et al. [35] confirmed that the internalization of sociocultural standards of body, Information, Pressures, and Internalization—Athlete were differentially predictive of eating attitudes and behaviors across gender groups. A study on college students' eating attitudes demonstrated that women felt more pressure from the media about sociocultural standards of the body than men and predicted their restrictive and bulimic behavior [36]. A comparative study on risk factors for eating disorders among Australian and French female university students revealed significant differences in the internalization of body ideals promoted by the mass media and restrictive and bulimic behavior among female university students in the two countries [37]. Furthermore, research based on social comparison theory suggests that obligatory exercise in young people is associated with concerns about appearance and that the internalization of sociocultural standards will predict their obligatory exercise [15,38]. Thus, eating attitudes may mediate the relationship between sociocultural attitudes and obligatory exercise in young people, and there are gender and cultural differences.

This study focuses on young men and women in Poland and China. The main aims are to determine which sociocultural predictors of obligatory exercise are universal for young men and women and which are specific to particular cultural conditions (Polish or Chinese culture) and to examine the mediating role of eating attitudes (Figure 1). The study of this issue may extend the scientific field related to physical activity and eating behavior to support young people's healthy behavioral choices. The authors found existing studies do not compare predictors of eating disorders and obligatory exercise among young people in Poland and China.

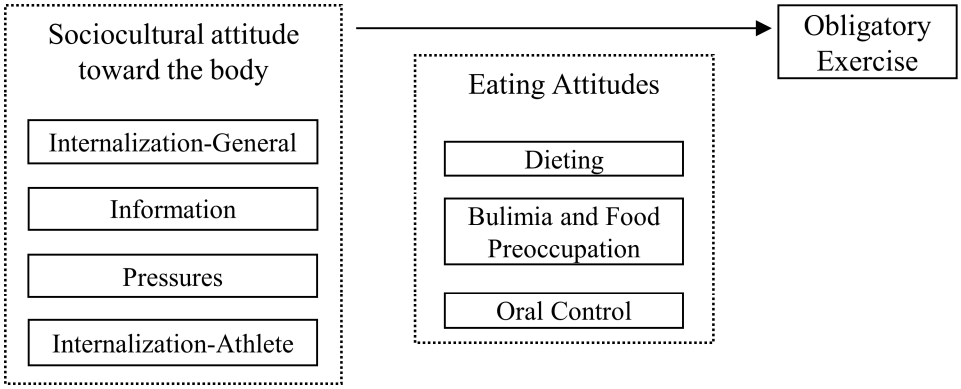

Figure 1. Theoretical model of the research variables (own elaboration).

2. Materials and Methods

2.1. Study Design

The data used for this study were part of a large international research project registered in the Protocol Registration and Results System (ClinicalTrials.gov; https://clinicaltrials.gov/ct2/show/NCT04432038). The study was conducted simultaneously in 2021 in four academic cities in Poland and China (Krakow, Gdansk, Beijing, and Zhengzhou). The research team first trained qualified researchers (members of the research team and students of the authors) on research procedures and ethics. The researchers then disseminated information about the possibility of participating in the study among university students in the four cities and sent informed consent forms and online addresses for completing questionnaires via email to those who met the inclusion criteria. At the same time, university students who met the inclusion criteria were asked to help invite their classmates to participate ("snowball sampling technique"). All survey participants provided informed consent and questionnaires.

2.2. Participants

Groups were selected by purposive sampling. Participants were recruited using convenience and purposive sampling methods. The following inclusion criteria were used: age (18–30 years), Polish or Chinese nationality and having grown up in the country, no physical disability or physical illness preventing physical activity, not receiving treatment for any eating disorder, and student or graduate in humanities and social sciences. These criteria were validated with the help of a questionnaire, which allowed for the identification of exclusion factors.

The study was planned to cover 300 young Poles and 300 young Chinese. The final study included 303 Poles and 400 Chinese. Due to errors in filling out the questionnaire (incomplete data obtained) and not meeting the inclusion criteria, 38 Poles and 45 Chinese were excluded. The mean age of young Polish men and women was 24.3 (SD = 3.30) and 25.3 (SD = 3.04), respectively; the mean age of young Chinese men and women was 22.0 (SD = 2.61) and 22.1 (SD = 3.11), respectively. The average BMI values for young Polish men and women were 24.3 and 21.5, respectively, and for young Chinese men and women, they were 22.7 and 20.9, respectively; both fell within the normal range of 20 to 25. All respondents were undergraduate and postgraduate students and university graduates currently living in Poland or the surveyed cities in China; 68% were students, and the remainder (32%) were college graduates who were employed at the time of the study; 69% were single and had never married, 21% were married or in a domestic partnership, and 9% were living apart together (LAT). All respondents had no experience as athletes and were not professional physical education learners.

2.3. Ethical Approval

The study was conducted following the World Medical Association's Ethical Guidelines for Research Involving Human Beings (Declaration of Helsinki). The Ethics Committee of the Institute of Psychology, University of Gdansk, Poland (Decision No. 33/2020) approved the protocol of this study of the Research Project. All participants were informed about the research's purpose and were asked to complete an electronic informed consent form before registering on the project website.

2.4. Methods

The independent variable in this study was sociocultural attitudes toward the body. This is defined by Thompson et al. [34] as a four-factor structural variable describing the degree of internalization of sociocultural standards of body and appearance. The dependent variable in this study was obligatory exercise. Based on the study by Ackard et al. [39], this variable was defined as describing attitudes and behaviors associated with exercise. The mediating variable in this study was eating attitudes. This variable was defined as a three-factor structural variable describing eating disorder attitudes and behaviors [40].

The Sociocultural Attitudes Toward Appearance Questionnaire 3 (SATAQ 3) [34] was used to measure the variable of sociocultural attitudes toward the body. The Obligatory Exercise Questionnaire (OEQ) [39] was used to measure the variable of obligatory exercise. The Eating Attitude Test (EAT-26) [40] was used to measure the variable of eating attitudes. In addition, variables such as gender, country of residence, year of birth, weight, and height were also collected. The BMI was obtained by dividing the body weight in kilograms by the square of the height in meters.

2.4.1. The Sociocultural Attitudes toward Appearance Questionnaire 3 (SATAQ 3)

This study used the Sociocultural Attitudes Toward Appearance Questionnaire 3 (SATAQ 3) by Thompson et al. [34] with a Polish adaptation by Izydorczyk and Lizińczyk [41] and a Chinese adaptation by Jackson and Chen [42]. The SATAQ 3 consists of 30 questions, including four subscales: Internalization—General (assesses the extent to which general sociocultural standards regarding the body and appearance are internalized; includes nine items), Information (measures the frequency of seeking information about sociocultural standards of the body and appearance; includes nine items), Pressures (assesses the perceived pressure of sociocultural standards regarding the body; includes seven items), and Internalization—Athlete (measures the extent to which the ideal of the athletic body is internalized; includes five items). Participants completed the SATAQ 3 questionnaire by marking their answers on a 5-point Likert scale. The total score for each subscale was calculated, with higher scores indicating higher internalization or acceptance. The Cronbach's alpha coefficients for the four subscales are as follows: Internalization—General (0.937 in Polish groups, 0.941 in Chinese groups), Information (0.899 in Polish groups, 0.922 in Chinese groups), Pressures (0.956 in Polish groups, 0.897 in Chinese groups), Internalization—Athlete (0.871 in Polish groups, 0.841 in Chinese groups).

2.4.2. The Obligatory Exercise Questionnaire (OEQ)

Thompson and Pasman's [39] Obligatory Exercise Questionnaire (OEQ) was used. The Polish and Chinese versions of the questionnaire were translated using standard forward–backward translation procedures. The OEQ contains 20 items that measure attitudes and activities related to exercise. Respondents completed the questionnaire by marking their answers on a 4-point Likert scale. Higher total OEQ scores indicated that they were more likely to undertake obligatory exercise. The Cronbach's alpha coefficients for the OEQ were as follows: Polish groups = 0.873, Chinese groups = 0.873.

2.4.3. The Eating Attitude Test (EAT-26)

This study used Thompson et al.'s Eating Attitude Test (EAT-26) with a Polish adaptation by Wlodarczyk-Bisaga and Dolan [43] and a Chinese adaptation by Lee and Lee [44].

The EAT-26 consists of 26 items and contains three subscales: Dieting (assesses attitudes and behaviors that are focused on being thin and avoiding fattening foods; 13 items), Bulimia and Food Preoccupation (assesses overeating, loss of control overeating, and subordination of thoughts and behaviors to food; 6 items), Oral Control (assesses self-control over diet and perceived pressure to gain weight; 7 items). Participants completed the EAT-26 questionnaire by marking their answers on a 6-point Likert scale. Higher scores on the total EAT-26 and the three subscales indicated a greater likelihood of eating attitudes and behavioral disorders. The Cronbach's alpha coefficients for the three subscales were as follows: Dieting (0.821 for the Polish group, 0.866 for the Chinese group), Bulimia and Food Preoccupation (0.906 for the Polish group, 0.929 for the Chinese group), and Oral Control (0.895 for the Polish group, 0.878 for the Chinese group).

2.5. Statistical Methods

The data were analyzed in Excel (Microsoft Office 365) and IBM SPSS (Statistical Package for the Social Sciences) Statistics 26 according to the research objectives and research questions. The statistical analysis stages were as follows:

Stage 1—Descriptive statistics. Cross-cultural similarities and differences between Polish and Chinese young men and women in terms of sociocultural attitudes toward the body, eating attitudes, and obligatory exercise were elucidated by measuring the mean, quartile, etc., of each variable in the study model.

Stage 2—Assessing between-group differences of all variables. For the purposes of further statistical analysis, the variables were tested for normality of distribution using the Shapiro–Wilk test. The obtained results indicate that the variables do not meet the conditions of the normal distribution; therefore, non-parametric tests (Mann–Whitney U test) were used for further analysis. The Mann–Whitney U test was used to measure the significance of the differences between the Polish and Chinese groups.

Stage 3—Measuring the strength of relationships between variables in the Polish and Chinese groups. The significance of the difference in the strength of the relationship and the strength of the correlation between the variables in the Polish and Chinese groups was measured using Spearman's rank correlation coefficient.

Stage 4—Measuring the strength of the relationship between independent and dependent variables using multiple regression analysis and testing the mediating role of eating attitudes. This phase aimed to find predictors of obligatory exercise among young men and women in Poland and China. Calculations were performed using the PROCESS macro for SPSS [45].

The study presents an integrated model of the hypothesized relationship between variables to explain the direct predictive role of sociocultural factors and the mediating role of eating attitudes factors in explaining the emergence of obligatory exercise. The direct and indirect effects were tested using Model 4 in the PROCESS macro of SPSS. The significance of the indirect effects was tested using bootstrapping, and a bootstrap sample of 5000 was used to model the data distribution better. The confidence interval (CI) was 95%. The effect is not considered significant if the confidence interval contains a zero value. Only unstandardized estimates can be calculated. The hypothesized relationships for validation include only those variables for which there is a significant relationship.

3. Results

3.1. Characteristics of Sociocultural Attitudes toward the Body, Eating Attitudes, and Obligatory Exercise in Young Polish and Chinese (Differences between the Groups)

Table 1 shows the results of the comparative analysis of the quartiles of all variables for the Polish and Chinese male and female groups. It can be seen that there are significant differences between young Polish men and women and young Chinese men and women in some variables.

Table 1. Comparative analysis of the young Polish and Chinese male and female groups according to the variables included in the research model.

Variables	Female							Male						
	Polish (N = 186)			Chinese (N = 161)				Polish (N = 79)			Chinese (N = 194)			
	Q1	Median	Q3	Q1	Median	Q3	*p*	Q1	Median	Q3	Q1	Median	Q3	*p*
Internalization—General	18	26	31	24	27	31	0.003	15	19	24	25	27	30	<0.001
Information	17	26	30	26	27	31	<0.001	11	16	21	26	27	30	<0.001
Pressures	13	21	27	17	20	23	0.507	7	11	15	17	20	21	<0.001
Internalization—Athlete	13	19	22	13	15	18	<0.001	13	16	19	14	15	18	0.448
Dieting	33	41	47	27	35	41	<0.001	25	31	38	25	32	40	0.81
Bulimia and Food Preoccupation	9	11	13	12	14	17	<0.001	7	9	12	10	13	16	<0.001
Oral Control	14	17	20	16	18	20	0.047	11	14	18	15	18	21	<0.001
Obligatory Exercise	43	52	57	40	46	53	<0.001	40	47	54	44	51	58	0.005

The significance threshold was set at 0.05; N, number of people; Q1, 25% Quartile; Q2, 75% Quartile.

In terms of sociocultural attitudes toward the body, young Polish and Chinese women show significant differences in all variables except the Pressures variable, and young Polish and Chinese men show significant differences in all variables except the Internalization—Athlete variable. Young Polish women are significantly lower than young Chinese women in the Internalization—General and Information variables and significantly higher than young Chinese women in the Internalization—Athlete variable. On the other hand, young Polish men show significantly lower levels of Internalization—General, Information, and Pressures variables than young Chinese men.

In terms of eating attitudes, there were significant differences between young Polish and Chinese women in the Dieting, Bulimia and Food Preoccupation, and Oral Control variables, with young Chinese women showing higher levels than young Polish women, except for Dieting. There were significant differences between young Polish and Chinese men in the Bulimia and Food Preoccupation and Oral Control variables, with young Polish men showing lower levels than young Chinese men.

The comparative analysis of the quartiles also shows significant differences between young Polish men and women in obligatory exercise. The mean level of obligatory exercise for young Polish women was significantly higher than that of young Chinese women. The mean level of obligatory exercise for young Polish men was significantly lower than that of young Chinese men.

3.2. Relationship between Studied Variables among Young Polish and Chinese Men and Women

Table 2 shows the statistical analysis results of all variables for the different groups. It can be seen that the partial variables of sociocultural attitudes toward the body were significantly associated with the partial variables of eating attitudes and obligatory exercise among young Polish and Chinese men and women; the partial variables of eating attitudes were significantly associated with obligatory exercise. The correlations between the study model variables were both similar and different between young Polish and Chinese men and women. In addition, the significance of the correlations between the variables in the study model offers the possibility of analyzing the direct and indirect predictive effects of sociocultural attitudes toward the body.

Table 2. Correlation analysis for all variables for the groups of Polish and Chinese.

Variables		Internalization—General		Information		Pressures		Internalization—Athlete		Obligatory Exercise	
		Polish	Chinese	Polish	Chinese	Polish	Chinese	Polish	Chinese	Polish	Chinese
Dieting	female	0.447 **	0.173 *	0.428 **	0.068	0.448 **	0.304 **	0.365 **	0.062	0.450 **	0.258 **
	male	0.129	0.245 **	0.182	0.206 **	0.138	0.382 **	0.151	0.226 **	0.380 **	0.143 *
Bulimia and Food Preoccupation	female	0.372 **	0.010	0.359 **	−0.113	0.414 **	0.106	0.272 **	0.005	0.298 **	0.185 *
	male	0.326 **	0.189 **	0.230 *	0.182 *	0.255 *	0.272 **	0.358 **	0.197 **	0.258 *	0.056
Oral Control	female	0.077	0.150	0.342 **	0.099	0.276 **	0.217 **	0.392 **	0.167 *	0.412 **	0.245 **
	male	0.172	0.190 **	0.107	0.136	0.175	0.252 **	0.191	0.179 *	−0.029	0.095
Obligatory Exercise	female	0.267 **	0.020	0.392 **	0.057	0.318 **	0.076	0.540 **	0.314 **	1.000	1.000
	male	0.231 *	0.165 *	0.226 *	0.254 **	0.041	0.188 **	0.318 **	0.264 **	1.000	1.000

* $p < 0.05$; ** $p < 0.01$

3.3. Predictors of Obligatory Exercise among Young Men and Women in Poland and China

Figures 2 and 3 show the predictive effects of the four variables on social attitudes toward the body for young Polish and Chinese men and women, respectively, with only paths with significance levels <0.05 retained to improve the readability of the presentation. Table 3 shows the model estimates for the three variables of eating attitudes as mediators of the four variables on sociocultural attitudes toward the body as predictors of obligatory exercise. The group effect is insignificant if a 0 value is included between the Lower 95% CI and the Upper 95% CI.

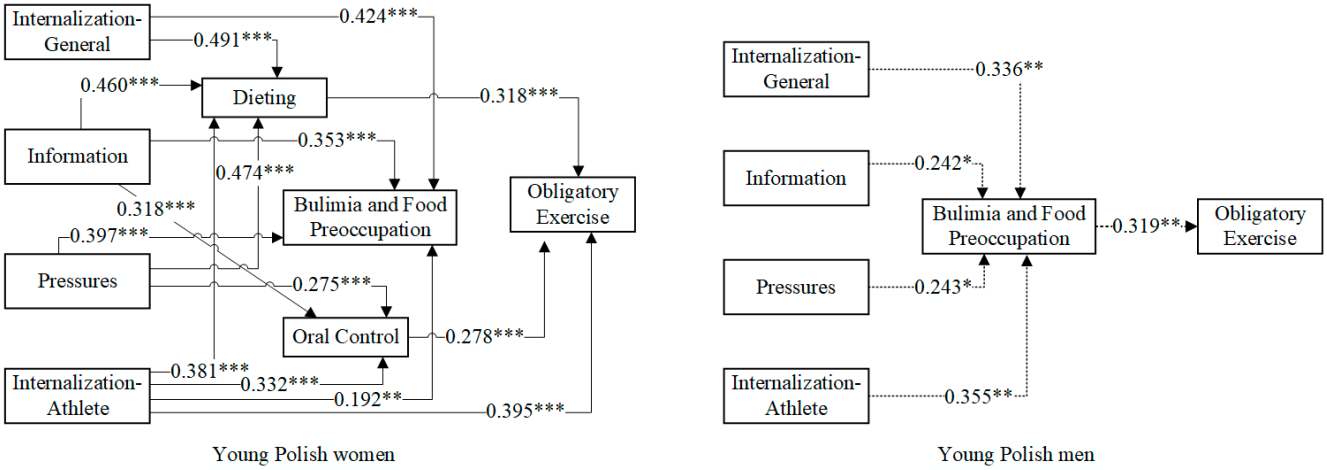

Figure 2. Sociocultural (Internalization—General, Information, Pressures, and Internalization—Athlete) and eating attitude (Dieting, Bulimia and Food Preoccupation, and Oral Control) predictors of obligatory exercise among young Polish men and women (n = 265). Note: Non-standardized estimates are presented—* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$—to improve the readability of the presentation; only paths with significance levels <0.05 were retained.

From Figure 2, we can see the following:

Among young Polish women, all four variables on sociocultural attitudes toward the body were significant in predicting the path of the three variables on eating attitudes, except for the path of the Internalization—General variable predicting the Oral Control variable. The Internalization—Athlete variable was a predictor of obligatory exercise. In addition, the Dieting and Oral Control variables were predictors of obligatory exercise.

Among young Polish men, all four variables on sociocultural attitudes toward the body were predictors of the Bulimia and Food Preoccupation variable. Furthermore, the Bulimia and Food Preoccupation variable was a predictor of obligatory exercise.

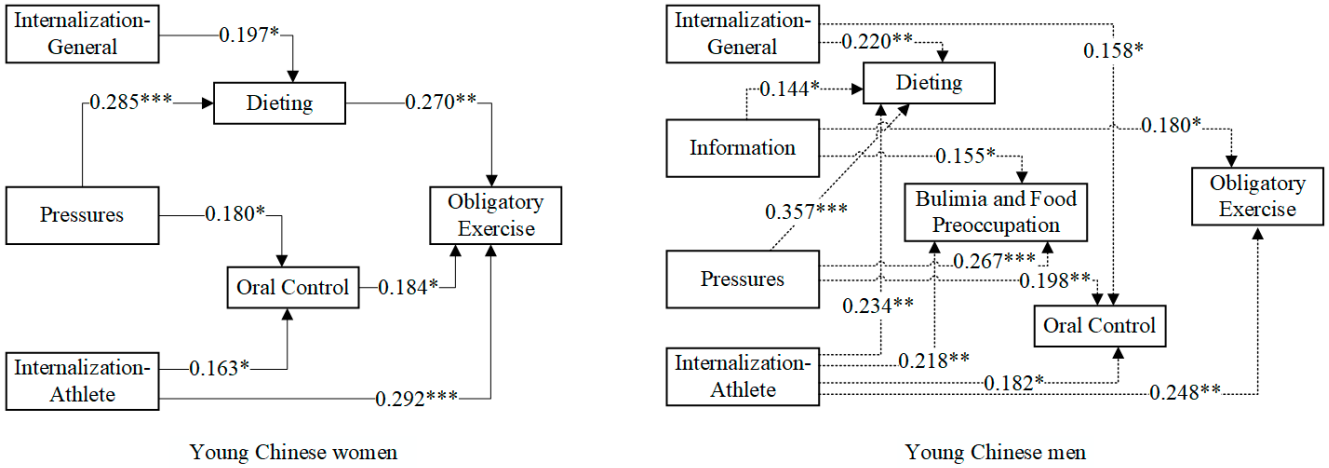

Figure 3. Sociocultural (Internalization—General, Information, Pressures, and Internalization—Athlete) and eating attitudes (Dieting, Bulimia and Food Preoccupation, and Oral Control) predictors of obligatory exercise among young Chinese men and women (n = 355). Note: Non-standardized estimates are presented—* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$—to improve the readability of the presentation; only paths with significance levels <0.05 were retained.

Table 3. Model estimates for direct prediction of four variables on sociocultural attitudes toward the body and indirect prediction of obligatory exercise through three variables on eating attitudes.

		Estimates	SE	*p*	Lower 95% CI	Upper 95% CI
	Direct effects					
Young Polish women	Internalization—Athlete	0.395	0.067	<0.001	0.264	0.527
Young Chinese women	Internalization—Athlete	0.292	0.075	<0.001	0.143	0.440
Young Chinese men	Information	0.180	0.072	0.013	0.038	0.322
	Internalization—Athlete	0.248	0.072	0.001	0.106	0.391
	Indirect effects via Dieting					
Young Polish women	Internalization—General	0.156	0.054		0.056	0.268
	Information	0.118	0.047		0.030	0.213
	Pressures	0.133	0.049		0.042	0.237
	Internalization—Athlete	0.062	0.038		−0.011	0.142
Young Chinese women	Internalization—General	0.053	0.027		0.005	0.111
	Pressures	0.059	0.029		0.010	0.121
	Indirect effects via Bulimia and Food Preoccupation					
Young Polish men	Internalization—General	0.107	0.048		0.023	0.211
	Information	0.078	0.036		0.015	0.157
	Pressures	0.092	0.043		0.016	0.183
	Internalization—Athlete	0.099	0.045		0.019	0.198
	Indirect effects via Oral Control					
Young Polish women	Information	0.088	0.034		0.033	0.166
	Pressures	0.081	0.033		0.028	0.153
	Internalization—Athlete	0.066	0.031		0.016	0.137
Young Chinese women	Pressures	0.028	0.020		−0.002	0.073
	Internalization—Athlete	0.030	0.021		−0.003	0.076

Non-standardized estimates are presented; non-significant effects are depicted in bold; the indirect effect is not considered significant if the confidence interval contains a zero value.

From Figure 3, the following can be seen:

Among young Chinese women, the Internalization—General variable was a predictor of the Dieting variable, the Pressures variable was a predictor of the Dieting and Oral Control variables, and the Internalization—Athlete variable was a predictor of the Oral Control variable. The Internalization—Athlete variable was a predictor of obligatory exercise. Finally, Dieting variables and Oral Control variables were predictors of obligatory exercise.

In young Chinese men, the Internalization—General variable was a predictor of the Dieting and Oral Control variables, the Information variable was a predictor of the Dieting and Bulimia and Food Preoccupation variables, and the Pressures and Internalization—Athlete variables were predictors of all three variables of eating attitudes. The Pressures variable and the Internalization—Athlete variable were both predictors of the three eating attitudes variables. The Information variable and the Internalization—Athlete variable were predictors of obligatory exercise.

In combination with Table 3, the following can be observed:

The level of internalization of athletic body ideals promoted by mass media directly predicted obligatory exercise among young Polish women, young Chinese women, and young Chinese men. The frequency of seeking mass media information on sociocultural standards of body and appearance directly predicted obligatory exercise only among young Chinese men. Among Polish and Chinese young men and women, acceptance of the general sociocultural standards of body and appearance promoted by the mass media and the level of perceived pressure from the sociocultural standards of body and appearance promoted by the mass media were not direct predictors of obligatory exercise.

Among young Polish women, all three remaining variables of sociocultural attitudes toward the body, except for the Internalization—Athlete variable, indirectly predicted obligatory exercise through the Dieting variable. All three remaining variables on sociocultural attitudes of the body, except for the Internalization—General variable, indirectly predicted obligatory exercise through the Oral Control variable.

Among young Chinese women, only the Internalization—General variable and the Pressures variable indirectly predicted obligatory exercise through the Dieting variable.

Among young Polish men, all four variables of sociocultural attitudes toward the body indirectly predicted obligatory exercise through the Bulimia and Food Preoccupation variable.

Among young Chinese men, no eating attitudes variables could mediate sociocultural attitudes toward the body to predict obligatory exercise.

4. Discussion

4.1. Characteristics of Sociocultural Attitudes toward the Body, Eating Attitudes, and Obligatory Exercise in Young Polish and Chinese

The results of the study indicate that there is no significant difference between young Polish and Chinese women in terms of perceived pressure to sociocultural standards regarding the body promoted by mass media, and no significant difference between young Polish and Chinese men in terms of recognition and acceptance of the athletic body ideal promoted by mass media. Other sociocultural attitudes toward the body differed significantly between young Polish and Chinese people in a same-gender comparison. Compared to young Chinese women, young Polish women showed a higher acceptance of the athletic body ideal promoted by mass media, while they were less receptive to the general sociocultural standards regarding the body promoted by mass media and less frequently sought information about sociocultural standards regarding the body and appearance promoted by mass media. Compared to young Chinese men, young Polish men were less receptive to general sociocultural standards regarding the body promoted by the mass media, less frequently sought information about sociocultural standards regarding the body and appearance promoted by the mass media, and felt less pressure about sociocultural standards regarding the body and appearance promoted by the mass media. The findings of several cross-cultural studies of sociocultural attitudes toward the body confirm these results. A comparative study of Polish and Vietnamese university students proved that,

due to cultural differences, Vietnamese female university students focus on quietness and submissiveness and favor bodies that conform to general sociocultural norms; Vietnamese male university students focus on muscle, strength, and male-dominated social roles; and Polish young men and women focus on personality, personal experience, and personal physical attractiveness [46]. A comparative study of young Polish and Japanese women also proves that Japanese women are more eager to seek information about sociocultural standards of the body and appearance promoted by the mass media [47]. Furthermore, research on the sociocultural attitudes toward the body of young Chinese people proves that young Chinese men show higher levels of recognition of general sociocultural standards regarding the body, frequency of seeking information on sociocultural standards regarding the body promoted by the mass media, and perceived pressure from sociocultural attitudes toward the body and appearance in the mass media [42,48]. Although there is no direct comparative study of young people in Poland and China, Vietnam, Japan, and China are part of the same East Asian cultural sphere and are deeply related in terms of history and cultural environment [49]. These findings are further supported by the fact that more factors of sociocultural attitudes toward the body were shown to be higher among the young Chinese men and women in this study than among the young Polish men and women.

In terms of eating attitudes, the results of this study indicate that both Polish and Chinese men are very concerned about thinness and the avoidance of fatty foods, but in other areas, young Polish and Chinese people show significant differences. Compared to young Chinese women, young Polish women were more concerned with thinness and the avoidance of fatty foods, showed lower levels of bulimia and uncontrolled eating, and had slightly lower levels of self-control overeating requirements and perceived pressure to gain weight. Compared to young Chinese men, young Polish men showed lower levels of bulimia and uncontrolled eating, as well as lower self-control overeating requirements and perceived pressure to gain weight. A study by Li et al. [50] on eating attitudes in Chinese and American female university students demonstrated that European and American women in individualistic societies actively pursue thinness, compared to Chinese female university students who do not perceive themselves as being larger and needing to lose weight and diet. Izydorczyk et al. [28] showed that young Polish women were significantly higher than their Vietnamese peers in monitoring their weight and dieting overall, while they were significantly lower than their Vietnamese peers in binge-eating behavior. These studies, to some extent, support the findings of this study on Dieting and Bulimia and Food Preoccupation among young Polish and Chinese women. Moreover, sociologically and anthropologically, eating has a vital social function in Chinese culture, and Chinese adults may overeat or feel pressure from others to gain weight in order to maintain relationships and celebrate important events [51,52]. However, the eating patterns of European and American adults with individualistic cultural values are more akin to a "functional diet", with a focus on personal experience and achieving maximum results (e.g., providing nutrition, satisfying hunger) at minimal cost (e.g., saving time) [53,54]. This partly supports the fact that young Chinese men and women in this study performed higher than young Polish men and women in terms of uncontrolled eating and feeling pressure from others to gain weight.

Furthermore, the findings of this study suggest that compared to young Chinese people of the same gender, young Polish women are more likely to undertake obligatory exercise, while young Polish men are less likely to do so. Although no comparative studies on obligatory exercise between Polish and Chinese young people were found, a study on the physical activity of French and Japanese adults confirmed that adult physical activity varies by gender and culture and that the global wave of Western sports and physical culture has not turned Japanese sports into an exact replica of Western sports [55]. Some studies also demonstrated that a solid sociocultural background influences obligatory exercise through body ideals [14,16,56]. The differences in obligatory exercise exhibited by young Polish and Chinese men and women in this study may be due to differences in

their sociocultural attitudes toward the body. This provides support for the analysis of the subsequent questions in this study.

4.2. Sociocultural Attitudes toward the Body Predicting Obligatory Exercise with a Comparison between Young Polish and Chinese

4.2.1. Sociocultural Attitudes toward the Body as a Direct Predictor of Obligatory Exercise

This study aimed to determine which sociocultural predictors of obligatory exercise are universal for young men or women and which are specific to particular cultural conditions (Polish or Chinese culture) and to examine the mediating role of eating attitudes. The results of this study show that Internalization—Athlete in sociocultural attitudes toward the body is a common direct positive predictor of obligatory exercise among young women in Poland and China. Importantly, this study suggests that the acceptance of the athletic body ideal promoted by the mass media among young women will directly and positively predict their obligatory exercise. A study by Homan [57] on female college students indicated that female college students' internalization of athletic ideals predicted their obligatory exercise. Bell et al. [58] and Girard et al. [59] confirmed that the internalization of athletic ideals directly predicted obligatory exercise in adult women. The results of the present study further support these studies.

On the other hand, this study's results confirm the existence of specific sociocultural predictors of obligatory exercise in young Chinese men. Information and Internalization—Athlete in sociocultural attitudes toward the body were direct positive predictors of obligatory exercise in young Chinese men. In contrast, this was not the case among young Polish men. Research on the body image of young Polish men also confirmed that the frequency with which young Polish men seek information about the body and appearance in mass media, perceived pressure to look good, and endorsement of athletic body ideals do not directly predict their physical behavior [35,60,61]. However, there is a paucity of existing research on the factors influencing obligatory exercise in young Chinese men, making the results of this study significant. Young Chinese males grow up in a climate of collectivist cultural values, where their attitudes and behaviors are easily influenced by their social environment and are more concerned with male-dominated social status as well as muscle and strength [46,62]. Combined with social comparison theory [63], to maintain their male-dominated social role, the heightened focus on information about sociocultural standards of the body promoted by the mass media and higher acceptance of the athletic body ideal promoted by the mass media among young Chinese men may translate into more frequent and intense exercise.

4.2.2. Eating Attitudes as Mediators between Sociocultural Attitudes toward the Body and Obligatory Exercise

The results of this study also suggest that eating attitudes mediate the relationship between sociocultural attitudes toward the body and obligatory exercise and that there are general mediators that apply to both Poland and China and mediators that apply only to a specific culture (Polish or Chinese culture), and that there are clear gender differences. Among Polish and Chinese young women, Internalization—General and Pressures in sociocultural attitudes toward the body indirectly and positively predict obligatory exercise through Dieting in eating attitudes. This demonstrates that the higher the level of acceptance and perceived pressure of the general sociocultural standards regarding the body promoted by the mass media among young women, the more concerned they are about being thin and avoiding fatty foods, and the more likely they are to engage in obligatory exercise. Some studies also confirm that, with the global spread of Western aesthetic standards of beauty based on thinness, the sociocultural acceptance of this and the perceived pressure on young women will translate into body dissatisfaction, which will lead to an increase in their dieting rates and excessive exercise [15,57,64]. Although few studies have examined the same mediating role of eating disorders as this study, the above findings still support the results of this study to some extent.

In addition, the results of this study show that the more frequently young Polish women seek information about sociocultural standards of body and appearance promoted by the mass media, the more they focus on thinness and avoiding fatty foods, and the more likely they are to engage in obligatory exercise. The frequency with which young Polish women seek information about sociocultural standards of body and appearance promoted by the mass media, the perceived pressure of sociocultural body standards promoted by the mass media, and the recognition of the ideal of the athletic body promoted by the mass media indirectly positively influence their obligatory exercise through dietary self-control and pressure to gain weight. However, this was not the case for young Chinese women. Young Polish men's acceptance of prevailing sociocultural standards regarding the body promoted by the mass media, the frequency of seeking information about sociocultural standards regarding the body and appearance promoted by the mass media, the pressure to meet sociocultural standards regarding the body promoted by the mass media, and the endorsement of the ideal of the athletic body promoted by the mass media indirectly and positively influence their obligatory exercise through overeating and uncontrolled eating. However, this was not the case among young Chinese men. This may be due to cultural differences between Poland and China. Polish culture is individualistic; Polish people focus on individual characteristics and personal experiences and insist on achieving their personal goals and aspirations through practical behavior [46,65]. Studies by Brytek-Matera et al. [66], Gramaglia et al. [67], and Izydorczyk et al. [68] demonstrated the frequency with which young Polish women seek out mass media information on sociocultural standards of body and appearance and the perceived stress as predictors of their drastic dieting and focus on thinness. According to the culture of individualism, the pursuit of thinness and dieting among young Polish women may lead them to exercise more frequently or at higher intensities. A study of predictors of bulimia behavior in young Polish demonstrated that the higher the level of recognition and acceptance of general sociocultural attitudes toward body and appearance promoted by the mass media among young men, the higher the incidence of bulimia or uncontrolled eating among them [35]. According to social comparison theory [63], under the influence of sociocultural attitudes toward body and appearance, young Polish men may choose to exercise more frequently and with greater intensity in order to counteract the adverse effects of bulimic eating on one's body and mind, which may lead to an increased incidence of obligatory exercise among them. On the other hand, a literature review by Pike and Dunne [69] on the rise of eating disorders in Asia suggests that the development of eating disorders and disordered eating attitudes and behaviors is closely related to urbanization and industrialization, with some cases of eating disorders reported in Japan, yet disordered eating attitudes and behaviors are rarely reported in other countries and regions, including mainland China. Thus, symptoms such as binge eating and uncontrolled eating are less reported among young people in mainland China, which may be why no eating attitude mediators similar to those found in young Polish men and women were found in this study. As the economy develops, it is questionable whether eating attitude mediators that predict current mandatory exercise among young Polish men and women will emerge in China. This study team will also continue to follow up.

The findings of the resulting analysis suggest significant cultural differences in the predictors of obligatory exercise for young men and women. Both common and culture-specific predictors exist. The present study further confirms existing cross-cultural related research and contributes to exploring global universal or culture-specific predictors of obligatory exercise in young people. Preventive interventions for obligatory exercise in young people should pay attention to the sociocultural standards regarding the body promoted by the mass media, with particular attention to the mediating role of eating attitudes in the development of obligatory exercise and the various effects of different sociocultural contexts and different genders. The authors recommend including such interventions in health universities and national fitness programs. The practical implications of this study revolve around professionals involved in physical activity and wellness programs for university

students. In the practices of educators, physicians, psychologists, and other specialists who support the healthy development of young people, measures of sociocultural attitudes toward the body and eating attitudes may be necessary.

4.3. Limitations of the Study

This study presents a rare, even unique, opportunity to make comparisons between two different cultures. However, it also has notable limitations. Firstly, the study's sample size, although sufficient for statistical analysis, was not large. Secondly, although the paper focuses on obligatory exercise perceptions rather than exercise behavior, the lack of measures of exercise behavior may be a limitation. The research analysis provided an opportunity to compare two distinctly different cultures and yielded new results lacking in the literature. Future research will consider obligatory exercise behavior in conjunction with forced exercise perceptions and work toward larger sample sizes. Meanwhile, a long-term longitudinal study will be considered that will continue to follow the comparison of predictors of compulsive exercise among Polish and Chinese youth.

5. Conclusions

The comparison between young Polish and Chinese people showed that the variables studied differed in terms of culture and gender. Young Polish women and young Chinese men showed a higher intensity in obligatory exercise (dependent variable). Young Chinese men and women showed a higher intensity in Internalization—General and Information (independent variables), young Chinese men showed a higher intensity in Pressures (independent variable), and young Polish women showed a higher intensity in Internalization—Athlete (independent variable). In terms of eating attitudes (mediating variable), young Polish men showed a higher intensity in Dieting, while young Chinese women and men showed a higher intensity in Bulimia and Food Preoccupation and Oral Control.

The findings suggest that Internalization—Athlete in sociocultural attitudes toward the body is a common positive direct predictor of obligatory exercise among young Polish and Chinese women. At the same time, the study found that Information and Internalization—Athlete in sociocultural attitudes toward the body were only specific direct positive predictors of obligatory exercise in young Chinese men, but not in young Polish men.

It is worth noting that some of the variables in eating attitudes mediate the relationship between the independent variable and the dependent variable, and that there are common mediating variables that apply to both Polish and Chinese women, and specific mediating variables that apply only to young Polish men or women.

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