Spanish Journal of Psychology (2015), **18**, e13, 1–10.

doi:10.1017/sjp.2015.12

CAMBRIDGE UNIVERSITY PRESS

Dispositional Differences of Collegiate Athletes' Flow State: A Cross-Cultural Comparison

Weina Liu[1], Liu Ji[1] and Jack C Watson II[2]

[1] *East China Normal University (China)*
[2] *West Virginia University (USA)*

Abstract. Csikszentmihalyi (1990) suggested that certain types of people might be better psychologically equipped to experience flow. The purpose of this study was to determine if differences exist in one's ability to experience flow based upon factors such as cultural background, gender, years of specialized training, skill level, and sport event type. The English and Chinese versions of the Dispositional Flow Scale-2 were used to assess trait flow in American (N = 160) and Chinese collegiate athletes (N = 341). Using a one-way ANOVA analysis, the flow scores of American participants were found to be higher than those of Chinese participants, η^2 = 0.175, 95% CI: 3.536-3.622, $p < .005$. The flow scores of male athletes were higher than those of female athletes within the Chinese sample, η^2 = 0.032, 95% CI: 3.390-3.486, $p < .005$. The flow scores of university athletes were higher than those of national team level athletes within the Chinese sample, η^2 = 0.044, 95% CI: 3.279-3.501, $p < .005$. Flow scores for athletes in skill-showing events were higher than those of athletes participating in physical ability-showing events for the American participants, η^2 = 0.074, 95% CI: 3.812-3.948, $p < .005$. This study suggests that individual differences exist in the psychological characteristics of athletes' trait flow.

Received 12 February 2014; Revised 2 August 2014; Accepted 16 September 2014

Keywords: collegiate athlete, trait flow, psychological characteristics, individual differences.

In the domain of sport, flow is defined as a coveted but elusive experience where an athlete performs to the best of his or her ability, mainly as a result of being totally focused on the task at hand (Moran, 2004). Kee and Wang (2008), with insight derived from other authors (e.g., Jackson & Csikszentmihalyi, 1999; Orlick, 1990), have argued that instructions encouraging performers to stay in the present are a psychological component of peak sport performance. Kee and Wang (2008) further contend that:

> "Despite the potential link between a present focus and peak performance, little research has been conducted to examine athletes' present moment focus in relation to their performance. To begin with, it is difficult to directly assess athletes' present focus while they are in competition. Asking athletes in action whether they are focusing on the present moment will inevitably disrupt their current attention toward the task at hand, diverting their attention out of the present. An alternative for studying present moment focus is to examine the issue at the dispositional level" (p. 394).

Kimiecik and Stein (1992) presented an interactionist framework that suggested that certain dispositional (e.g., attentional style) and state (e.g., state anxiety) psychological factors interact with various factors (e.g., type of sport) to determine whether an athlete is likely to experience flow. Trait-state distinctions in sport psychological constructs have been used to measure concepts such as anxiety (e.g., Martens, Vealey, & Burton, 1990) and confidence (Vealey, 1986). Spielberger (1966) developed a trait-state distinction in the anxiety research literature based on the idea that individuals can have both an immediate emotional state and a disposition to perceive situations in a particular way. Applying this idea to the concept of flow, in accordance with studies by Csikszentmihalyi (1990), Kimiecik and Stein (1992), and Jackson, Kimiecik, Ford, and Marsh (1998) proposed that flow is a specific psychological state applicable to state-based assessments (state flow), and also that people differ in their propensity to experience flow on a regular basis (trait flow).

Conceptual and methodological issues related to flow research have been noted (Kimiecik & Stein, 1992). Conceptual concerns such as the nature of flow and how it occurs have been addressed in qualitative

Correspondence concerning this article should be addressed to Liu Ji, The Key Laboratory of Adolescent Health Assessment and Exercise Intervention, Ministry of Education, School of Physical Education & Health Care, East China Normal University, 500 Dongchuan Road, Shanghai (China). 200241. E-mail: lji@tyxx.ecnu.edu.cn and Jack C. Watson II, Department of Sport Sciences, West Virginia University, P.O. Box 6116, Morgantown (USA). 26506–6116.

E-mail: Jack.Watson@mail.wvu.edu

Special thanks to Dr. Amanda Visek, Heather Deaner, Jessica Creasy, Katherine Cowan, Justine Vosloo, and Jamie Shapiro for their help with the data collection in America. This work was supported by the Major Project of the National Social Science Fund of China (No. 10ZD&052), and the Collaborative Innovation Center of POWER Project for Adolescent (No. 44801400).

analyses of the flow concept (Jackson, 1995; 1996), yet other personal and situational variables such as gender and sport setting remain largely unexamined in their relationship with flow occurrence. Csikszentmihalyi and Csikszentmihalyi (1988) proposed that individual differences exist in capacity to attain optimal experience. That is, there are large differences in the frequency and intensity with which people experience flow. Accordingly, it has been reported that the amount of time spent in flow varies across individuals (LeFevre, 1988). Scott (1992) argues that what individuals experience is already mediated, situated and constituted by factors such as race, class, power and normalized societal standards. Therefore, the experience of flow is situated within specific structures, systems, and perspectives that need interpretation, analysis, and critique (e.g., culture, race, gender, socio-economic levels, or ability).

Csikszentmihalyi and Csikszentmihalyi (1988) argued for the universality of flow, but most empirical research on flow has been conducted with Caucasian and Western populations (Moneta, 2004a). Consequently, little is known about the features, occurrence rates, situational/personal determinants, and behavioral implications of flow in other cultures. Duda and Hayashi (1998) argued that "if research on the psychological dimensions of sport and exercise behavior is delimited to the mainstream group only, such studies are running contrary to the very essence of scientific inquiry" (p. 473). It is therefore crucial to examine cross-cultural (both non-Western cultures and minority cultures embedded within Western cultures) similarities and differences in flow experience (Moneta, 2004a).

Research has indicated that athletes' national culture plays a role in how they act and perceive the sport experience (Moneta, 2004a; Wang, 1997). It is suggested that the "autotelic personality" in American makes them experience flow more frequently than others. Further, flow research has been critiqued from various feminist perspectives for the inherent masculine biases within the frameworks of the theories and models (Fox & Walker, 2002). Besides cultural background and gender, specialized training time, skill level, and sport event type also appear to be strongly related to flow (Catley & Duda, 1997; Hu, Zhang, Liu, Sun, & He, 2002). With regard to sport type, two commonly used sport classifications have been identified: (a) skill-showing events, and (b) physical ability showing events. According to Event-Group Training Theory (Tian, 1983), all sports can be divided into one of these two sport classifications. The former classification of sports require more specialization in accuracy, difficulty, and beauty, such as tennis and basketball; while the latter group of sports require more specialization in speed, strength, and endurance, such as swimming and cannoning. Psychological factors, the key elements for skill-showing events, have been found to influence well-being and satisfaction, which are related to flow. Accordingly, athletes in skill-showing events are supposed to be more susceptible to flow.

Based upon the above-mentioned studies, along with Csikszentmihalyi's (1990) theory of flow, the purpose of this study was to determine if differences exist in one's ability to experience flow based upon factors such as cultural background, gender, years of specialized training, skill level, and sport event type. Accordingly, five hypotheses were developed for the current study: (a) the flow scores of American participants would be higher than those of Chinese participants; (b) the flow scores of male athletes would be higher than those of female athletes; (c) more years of specialized training would result in higher flow scores; (d) higher skill levels would result in higher flow scores; and (e) the flow scores for athletes in skill-showing events would be higher than those of athletes participating in physical ability-showing events.

Method

Participants

Chinese sample

The Chinese sample consisted of 341 Chinese collegiate athletes recruited from sport universities, 193 of whom were male athletes (56.6%). Participants' ages ranged from 18 to 25 years (M = 21.2, SD = 1.5) and their years of specialized training ranged from 0~5 years (n = 174), 5~8 years (n = 63), to over eight years (n = 104). Chinese participants ranged in participation levels from national (n = 36), prefecture/regional (n = 62), university (n = 168), and recreational (n = 75) participation. Further, Chinese participants reported participation in 10 different sports. Skill-showing events included basketball (n = 79), gymnastics (n = 44), soccer (n = 44), volleyball (n = 44), tennis (n = 36), hockey (n = 10), baseball (n = 4), and softball (n = 1); physical ability-showing events included swimming (n = 53) and kayaking (n = 26).

American sample

The American sample consisted of 160 collegiate athletes recruited from three large universities (two Division I and one Division II) in the United States with strong athletic programs, 101 of whom were female athletes (63.1%). Participants' ages ranged from 18 to 23 years (M = 19.6, SD = 1.2) and their years of specialized training ranged from 0~5 years (n = 13), 5~8 years (n = 20), to over eight years (n = 127). The participation levels of these athletes ranged from Division I (n = 139) to Division II (n = 21), and the sample reported

https://doi.org/10.1017/sjp.2015.12 Published online by Cambridge University Press

participation in 10 different sports. Skill-showing events included baseball (n = 30), soccer (n = 25), softball (n = 24), volleyball (n = 14), basketball (n = 9), tennis (n = 6), gymnastics (n = 3), and hockey (n = 2); physical ability-showing events included swimming (n = 30) and kayaking (n = 17).

Instruments

English version of DSF-2

The Dispositional Flow Scale-2 (DFS-2; see Jackson & Eklund, 2002) is a 36-item questionnaire designed as a dispositional assessment of flow experience and has nine subscales (four items each) corresponding to the nine flow dimensions (i.e., challenge-skills balance, action-awareness merging, clear goals, unambiguous feedback, total concentration on the task at hand, sense of control, loss of self-consciousness, transformation of time, and autotelic experience). This instrument assesses the general tendency to experience flow characteristics within a particular setting nominated by the respondents. The questionnaire adopts a 5-point Likert-type response format, with responses ranging from 1 (*Never*) to 5 (*Always*). By summing the scores, a global flow score can be derived to represent an individual's overall propensity to experience flow. The higher the scores, the more likely the individual will be to experience flow. It has been suggested by Jackson and Eklund (2004), that 15 years old may be an appropriate minimum age for individuals to validly complete this scale. No maximum age range has been suggested. Internal coefficient alphas ranged from .78 to .86, with a mean coefficient of .82 (Jackson & Eklund, 2002). Given the aforementioned information, the DFS-2 was deemed to have good construct validity, and perceived to be a reliable and valid instrument for studying flow dispositions in the current sample.

Chinese version of the CDFS-2

The Chinese version of the Dispositional Flow Scale-2 (CDFS-2; see Liu et al., 2012) is a 33-item questionnaire adapted from the corresponding English version, deleting three items from the subscale (i.e., action-awareness merging, clear goals, and sense of control). Liu et al. (2012) outline the procedures used in the development of this version of the instrument and provided strong support for the validity and reliability of the CDFS-2 in assessing flow experience in physical activities for Chinese participants. Internal coefficient alphas ranged from .67 to .78 (M = .75), and stability coefficients ranged from .53 to .70 (M = .62) over a four-week period; χ^2 / df = 2.8, CFI = .90, NNFI = .89, SRMR = .05, RMSEA = .05 have been documented.

Procedures

Both the English and Chinese versions of the Dispositional Flow Scale-2 were completed under the supervision of a graduate student in physical education. When responding to the questionnaire, respondents were asked to recall how they have generally felt during previous participation in their sport. While the dispositional version of the flow scale is designed for grounding in a particular activity, it was completed at a time separate from immediate involvement in this activity.

Data Analysis

Data collected from the participants were entered into a database, and double checked by a trained research assistant. To control for the number of analyses conducted and the increased likelihood of a type I error, using the Bonferoni correction ($\alpha = .05/n$, where α is the probability of Type I error and n is the number of comparisons; Huberty & Morris, 1989), the alpha levels for assessing the significance of results in this study were all reduced to .005. A Multivariate Analysis of Variance (MANOVA) was used to compare the effects of different demographic factors on measured variables. Wilks' Lambda results revealed that there was no interaction among the demographic variables, and only cultural background had a main effect on flow, $F(10, 455) = 5.688$, $p < .005$. Results from the follow-up univariate tests were as follows.

Results

Cultural Differences of Athletes' Trait Flow

A one-way ANOVA was conducted with Flow as the dependent variable and Cultural Background (American vs. Chinese) as the independent variable to test the results of hypothesis 1. The results supported the hypothesis that the flow scores of the American participants would be higher than those of the Chinese participants. As shown in Table 1, with the exception of the Transformation of Time dimension, American participants were significantly higher than those of the Chinese participants, $p < .005$ in all of the dimensions of flow including total flow score. Moreover, the sorting order of flow scores for the Chinese and American participants was nearly the same, with the highest score on Clear Goals (M = 3.85 for Chinese participants, M = 4.25 for American participants) and the lowest score on Loss of Self-Consciousness (M = 2.86 for Chinese participants, M = 3.30 for American participants).

Gender Differences of Athletes' Trait Flow

Two one-way ANOVAs were conducted with Flow as the dependent variable and Gender as the independent variable to test hypothesis 2. Results from the Chinese

https://doi.org/10.1017/sjp.2015.12 Published online by Cambridge University Press

Table 1. *Cultural Differences of Trait Flow*

Country / Flow	China (n = 341)		USA (n = 160)			
	M	*SD*	*M*	*SD*	*F*	*P*
Balance	3.37	.63	4.09	.56	154.682	.001*
Merging	3.38	.72	3.76	.56	34.028	.001*
Goals	3.85	.72	4.25	.60	37.629	.001*
Feedback	3.75	.69	4.08	.63	25.265	.001*
Concentration	3.61	.70	3.83	.67	10.946	.001*
Control	3.48	.70	4.01	.68	60.873	.001*
Consciousness	2.86	.78	3.30	.75	35.715	.001*
Time	3.24	.74	3.41	.68	5.985	.015
Autotelic	3.51	.83	4.22	.62	92.128	.001*
Total	3.44	.45	3.88	.44	106.210	.001*

Note: *$P < .005$.

participants supported the hypothesis that flow scores of male athletes would be higher than those of female athletes, while results from the American participants failed to support this hypothesis. As shown in Table 2, significant gender differences existed within the Chinese sample for the Challenge-Skills Balance, $F(1, 339) = 12.429$, $p < .005$; Loss of Self-Consciousness, $F(1, 339) = 13.588$, $p < .005$; Autotelic Experience, $F(1, 339) = 24.456$, $p < .005$; and the total flow, $F(1, 339) = 11.278$, $p < .005$. In all cases, the male participants possessed higher scores than the female participants. No gender differences existed within the American sample.

Differences of Specialized Training Time of Athletes' Trait Flow

Two one-way ANOVAs were conducted with Flow as the dependent variable and Years of Specialized

Table 2. *Gender Differences of Trait Flow*

Gender / Flow	Male		Female			
	M	*SD*	*M*	*SD*	*F*	*P*
Chinese Participants						
Balance	3.48	.63	3.24	.59	12.429	.001*
Merging	3.39	.76	3.36	.68	.209	.648
Goals	3.84	.72	3.86	.72	.045	.832
Feedback	3.76	.68	3.75	.71	.018	.892
Concentration	3.65	.70	3.56	.69	1.375	.242
Control	3.56	.67	3.39	.74	5.242	.023
Consciousness	2.99	.80	2.68	.71	13.588	.001*
Time	3.29	.77	3.17	.70	2.323	.128
Autotelic	3.70	.80	3.26	.81	24.456	.001*
Total	3.51	.47	3.35	.41	11.278	.001*
American Participants						
Balance	4.05	.55	4.12	.56	.554	.458
Merging	3.80	.46	3.73	.62	.481	.489
Goals	4.22	.63	4.27	.58	.249	.618
Feedback	4.09	.56	4.07	.68	.045	.832
Concentration	3.89	.73	3.79	.64	.985	.323
Control	4.07	.70	3.97	.68	.797	.373
Consciousness	3.41	.69	3.23	.78	2.197	.140
Time	3.43	.64	3.39	.70	.153	.696
Autotelic	4.30	.60	4.17	.63	1.586	.210
Total	3.92	.42	3.86	.45	.681	.410

Note: *$P < .005$.

https://doi.org/10.1017/sjp.2015.12 Published online by Cambridge University Press

Training as the independent variables. Results failed to support hypothesis 3 that more years of specialized training would result in higher flow scores. As shown in Table 3, no significant differences were found as a result of years of specialized training for either the Chinese or American participants.

Skill level Differences of Athletes' Trait Flow

Two one-way ANOVAs were conducted with Flow as the dependent variable, and Skill level as the independent variables. Results failed to support hypothesis 4 that higher skill levels would result in higher flow scores. As shown in Table 4, significant skill level differences existed within the Chinese sample for Total Concentration on the Task at Hand, $F(3, 337) = 4.695$, $p < .005$; Autotelic Experience, $F(3, 337) = 15.419$, $p < .005$; and the total flow, $F(3, 337) = 5.157$, $p < .005$. Multiple comparisons (between all pairs of means) showed that the flow scores of university level participants were higher than those of national level participants. Although no significant skill level differences existed within the American sample (see Table 5), all of the dimensions and the total flow scores of Division-II participants were higher than those of the Division-I participants. Taken together, these results were primarily contrary to hypothesis 4.

Sport Event Differences of Athletes' Trait Flow

Two one-way ANOVAs were conducted with Flow as the dependent variable and Sport Event Type as the independent variable. Results from the American participants supported hypothesis 5 that the flow scores for athletes in skill-showing events would be higher than those of athletes participating in physical ability-showing events, while results from the Chinese participants failed to support this hypothesis. As shown in Table 6, significant sport event differences existed within the American sample for Action-Awareness Merging, $F(1, 158) = 12.500$, $p < .005$; Total Concentration on the Task at Hand, $F(1, 158) = 8.880$, $p < .005$; Sense of Control, $F(1, 158) = 16.408$, $p < .005$; and the total flow, $F(1, 158) = 12.622$, $p < .005$. All of these significant differences occurred with athletes from skill-showing events having higher flow scores than those from physical ability-showing events. Sport event differences existed within the Chinese sample only for Autotelic Experience, $F(1, 158) = 15.044$, $p < .005$, but not for the total flow score.

Discussion

Cultural Differences of Athletes' Trait Flow

One could contend that the underlying dimensions of flow are somewhat rooted within a Western and mostly

Table 3. *Differences of Specialized Training Time on Trait Flow*

Time / Flow	0~5 years		5~8 years		Over 8 years			
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	*P*
Chinese Participants								
Balance	3.34	.58	3.33	.67	3.46	.66	1.479	.229
Merging	3.39	.70	3.27	.70	3.42	.77	.933	.394
Goals	3.84	.66	3.77	.77	3.91	.78	.860	.424
Feedback	3.70	.66	3.69	.72	3.88	.71	2.635	.073
Concentration	3.55	.68	3.61	.78	3.70	.67	1.494	.226
Control	3.43	.71	3.50	.69	3.56	.71	1.054	.350
Consciousness	2.87	.78	2.87	.80	2.83	.76	.138	.872
Time	3.32	.72	3.15	.68	3.11	.77	2.907	.056
Autotelic	3.59	.84	3.40	.87	3.44	.79	1.778	.170
Total	3.44	.43	3.39	.50	3.47	.45	.582	.559
American Participants								
Balance	4.10	.40	4.04	.72	4.10	.55	.116	.890
Merging	3.60	.42	3.64	.53	3.79	.58	1.227	.296
Goals	4.21	.55	4.23	.63	4.25	.60	.045	.956
Feedback	4.14	.49	4.06	.81	4.07	.62	.063	.939
Concentration	3.73	.61	3.96	.76	3.81	.67	.562	.571
Control	3.81	.60	3.96	.73	4.03	.69	.674	.511
Consciousness	3.19	.79	3.19	.68	3.33	.76	.427	.653
Time	3.44	.34	3.23	.41	3.43	.73	.801	.451
Autotelic	4.12	.55	3.96	.89	4.27	.57	2.267	.107
Total	3.81	.35	3.81	.50	3.90	.44	.537	.585

https://doi.org/10.1017/sjp.2015.12 Published online by Cambridge University Press

Table 4. *Skill level Differences of Trait Flow of Chinese Athletes*

Level / Flow	National (n = 36)		Regional (n = 62)		University (n = 168)		Recreational (n = 75)			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	*P*
Balance	3.15	.57	3.35	.67	3.44	.59	3.35	.67	2.267	.081
Merging	3.15	.73	3.38	.76	3.44	.71	3.34	.71	1.727	.161
Goals	4.03	.73	3.90	.83	3.82	.65	3.78	.76	1.164	.323
Feedback	3.73	.76	3.85	.68	3.78	.65	3.61	.76	1.599	.189
Concentration	3.33	.68	3.68	.68	3.71	.68	3.45	.70	4.695	.003*
Control	3.26	.78	3.58	.73	3.55	.65	3.37	.73	2.711	.045
Consciousness	2.62	.86	2.86	.77	2.94	.73	2.79	.81	1.945	.122
Time	2.94	.73	3.32	.74	3.23	.76	3.32	.69	2.584	.053
Autotelic	2.77	.74	3.33	.79	3.70	.73	3.57	.91	15.419	.001*
Total	3.20	.44	3.46	.43	3.50	.43	3.39	.48	5.157	.002*

Note: *$P < .005$.

individualistic culture of self-oriented competence and achievement (i.e., dominant cultural perspective in western culture), while little attention has been devoted to understanding flow in cultures and group settings where competence and well-being are derived mostly from relatedness with the social group and from the attainment of collective goals (i.e., eastern culture; Fournier et al., 2007). Cultural mores contend that Americans believe strongly in individualism, while Chinese advocate for collectivism. Individualism contributes to the development of an "autotelic personality", which is consistent with the American sample in the current study. Flow theory postulates that individuals who have an ''autotelic personality'' experience flow more frequently and more intensely than others (Moneta, 2004a). On the contrary, findings from three studies (Asakawa, 2004; Bassi & Delle Fave, 2004; Moneta, 2004b) employing the Experience Sampling Method (Csikszentmihalyi & Larson, 1987) suggest that the East-West dichotomy fails to capture relevant cultural differences in flow experience, and that the flow model might be highly sensitive to specific cultural factors over and beyond the individualism-collectivism continuum (Moneta, 2004a). Therefore, whether the underlying dimensions of flow and the factors that facilitate it are different in collectivist cultures is an issue that warrants further investigations (Fournier et al., 2007).

Gender Differences of Athletes' Trait Flow

Flow, from numerous feminist perspectives, is perceived as problematic. First, the original research was conducted primarily with men in primarily privileged positions (i.e., surgeons, highly-ranked chess players, rock climbers, dancers and composers); second, there was little attention paid to class, culture, ethnicity, or ability (Fox & Walker, 2002). Further complaints from the interweaving of flow and ethics indicate that very little attention has been paid to comparative analysis, constitutive elements, criticism of hegemonic and oppressive practices and self-reflexivity. Furthermore,

Table 5. *Skill level Differences of Trait Flow of American Athletes*

Level / Flow	Division-I (n = 139)		Division-II (n = 21)			
	M	*SD*	*M*	*SD*	*F*	*P*
Balance	4.08	.58	4.21	.40	1.136	.288
Merging	3.72	.56	3.99	.56	4.205	.042
Goals	4.22	.61	4.44	.47	2.587	.110
Feedback	4.03	.63	4.36	.59	4.920	.028
Concentration	3.81	.68	3.92	.66	.447	.505
Control	3.98	.69	4.17	.60	1.362	.245
Consciousness	3.28	.79	3.39	.42	.397	.529
Time	3.38	.68	3.55	.67	1.073	.302
Autotelic	4.18	.64	4.46	.39	3.923	.049
Total	3.85	.45	4.06	.31	3.914	.050

https://doi.org/10.1017/sjp.2015.12 Published online by Cambridge University Press

Table 6. *Sport Event Differences of Trait Flow*

Event / Flow	Skill-showing		Physical-showing			
	M	*SD*	*M*	*SD*	*F*	*P*
Chinese Participants						
Balance	3.40	.63	3.29	.60	1.671	.197
Merging	3.41	.73	3.28	.69	1.972	.161
Goals	3.82	.69	3.93	.81	1.213	.272
Feedback	3.75	.69	3.75	.71	.000	.991
Concentration	3.62	.72	3.58	.63	.156	.693
Control	3.46	.71	3.57	.69	1.383	.240
Consciousness	2.85	.76	2.90	.84	.244	.622
Time	3.25	.72	3.20	.81	.201	.655
Autotelic	3.60	.80	3.20	.86	15.044	.001*
Total	3.45	.46	3.39	.43	1.007	.316
American Participants						
Balance	4.16	.52	3.93	.61	5.880	.016
Merging	3.85	.55	3.52	.54	12.500	.001*
Goals	4.31	.53	4.11	.71	3.778	.054
Feedback	4.14	.61	3.91	.66	4.648	.033
Concentration	3.93	.65	3.59	.68	8.880	.003*
Control	4.14	.62	3.68	.73	16.408	.001*
Consciousness	3.37	.74	3.12	.75	3.927	.049
Time	3.41	.73	3.39	.54	.018	.895
Autotelic	4.30	.59	4.02	.66	7.101	.009
Total	3.96	.41	3.70	.45	12.622	.001*

Note: *$P < .005$.

flow theories must be consistently analyzed as a set of processes mediated through the simultaneous operation of gendered, sexualized and racialized hierarchies (Fox & Walker, 2002).

With regard to possible gender differences in the flow experiences of Chinese athletes, the result was clear: similar to previous research (Sun, 2005; Wang & Fu, 2005), the flow scores of male participants were higher than those of female participants. Because of the cultural "sexual role expectations", the female participants are apt to underestimate their own skills but overstate the task challenge, which leads to their lower scores in "Challenge-Skills Balance". In physical activities, male participants display much more self-confidence, which contributes to "Loss of Self-Consciousness". Over time, female Chinese athletes have competed with more international success than Chinese male athletes, but have had less attention paid to them with regard to material and spiritual benefits, which makes it difficult to have "Autotelic Experience" for female athletes.

In contrast, no significant gender differences existed for the American participants. This result supported the findings of Russell (2002), who indicated that college athletes appear to have similar experiences of flow, regardless of gender. This result could be indicative of less distinctive "sexual role" expectations in American society, and may also have been affected by an increased focus on and expectation for sport participation by women since the passing of Title IX of the Education Amendments Act of 1972. The passing of this Amendment has had dramatic effects upon women's sport experiences in terms of numbers and available resources.

Differences of Specialized Training Time of Athletes' Trait Flow

Hu et al. (2002) found that specialized training time was one of the major factors influencing how baseball and softball players experienced flow. Wang and Fu (2005) found that more years of specialized training led to higher flow scores, indicating that they experienced flow to a greater extent than those with less training. Unfortunately, the current study failed to find similar support for the effects of the length of specialized training on how athletes experience flow. In the American sample, this lack of support may have been the result of the "autotelic personality" that is supported in Western cultures. Csikszentmihalyi (1990) suggested that certain types of people might be better psychologically equipped, regardless of the situation, to experience flow. The individual difference factor is termed

https://doi.org/10.1017/sjp.2015.12 Published online by Cambridge University Press

the "autotelic personality". Personality should be relatively constant across time (i.e., years of specialized training). Although the autotelic personality is a central construct in flow theory and it presents one of the promising directions in flow research (Nakamura & Csikszentmihalyi, 2002), it has received little empirical attention from researchers (Asakawa, 2004). Therefore, there remains much "to be learned about the nature of the autotelic personality and what qualities, meta-skills, and dispositions characterize individuals inclined and able to find flow in daily life" (Nakamura & Csikszentmihalyi, 2002, p. 100).

Skill level Differences of Athletes' Trait Flow

According to the expertise effect, individuals with higher ability are more likely to experience flow (Rheinberg, 2008). Catley and Duda (1997) have stated that skill level is strongly related to flow. While Oh (2001) found that more skilled golfers did not experience flow with more frequency than less skilled golfers. Some studies (Hu et al., 2002; Liu, 2005) have demonstrated that the higher the skill levels, the higher the flow scores (i.e., experienced with more intensity). However, the opposite was true in the present study (i.e., the higher the skill levels, the lower the flow scores), which is consistent with the research of Li and Sun (2000). Results from analyses of the current Chinese sample may have been influenced by the level of competition. Athletes with higher levels of competitive experience (i.e., national team vs. regional team) may have focused more attention on outcome, while neglecting enjoyment. The expertise effect is based on the premise that expertise brings about more flow, instead of flow improving performance. Therefore, it is necessary to control for expertise differences so as to ascertain whether flow leads to better performance (Engeser & Rheinberg, 2008). While these same significant differences were not found in the American sample, the trend was in this same direction. Given these cultural differences, further study is necessary before drawing any conclusions.

Sport Event Differences of Athletes' Trait Flow

Wang and Fu (2005) found that athletes participating in skill-showing sports were more likely to experience flow than those in physical ability-showing events, and the present study supported their results. Psychological factors such as emotional stability, mental control, and self-regulation are common in skill-showing events (Tian, 1983), which have been found to influence well-being (Geng & Zheng, 2006) and satisfaction (Markland & Tobin, 2010). If such events are truly able to influence these factors, it is certainly conceivable that they would also influence how athletes experience flow. However, it is interesting that analyses of the Chinese sample failed to support this hypothesis. Given these cultural differences, further study is necessary before drawing any conclusions.

Limitation & Future Directions

Although the findings from this study provide strong support for the individual differences of collegiate athletes' trait flow, which fills a theoretical gap in trait flow research, it should be acknowledged that several salient limitations apply. First, it can not be determined whether or not these differences are sample-specific/generalizable due to the small sample size. This is especially true for the American samples (eg., only 21 Division II athletes were recruited). Second, only individual differences of trait flow were studied, making no reference to state flow and the relationship between the two. Third, both the experience of training and competing were included, no distinguishing the two. Lastly, the psychological characteristics of flow were examined, but the internal mechanisms influencing the experience of flow were not studied. Future research should focus on how the brain works during flow, what other physiological changes occur following the flow experience.

Despite the abovementioned limitations, the present study provided strong support for the understanding of culturally and gender based individual differences in trait flow. Nonetheless, further studies examining flow differences in athletes are necessary. One challenge is to determine if the cultural differences identified in this study consist of differences between two or more differing ways of experiencing flow. If such cultural differences do exist in how individuals experience flow, one means of experiencing flow might be consistent with the way flow was originally defined (through research with Western participants), and the other(s) would be qualitatively distinct context(s) of optimal functioning that are perhaps more salient and relevant to some non-Western cultures or diverse Western cultures. Marsh and Jackson (1999) suggested that a more appropriate evaluation of flow would be to evaluate it within a similar cultural context, rather than to evaluate it between different cultural contexts. In this approach, cultural context might constitute the unit of analysis (instead of the individual), and systematic differences among individuals might reflect residual variance that could not be explained by the variation in cultural context (and either disregarded or used as an "error term" to evaluate cultural differences).

There appears to be a need for employing qualitative research methods in the study of flow that ask respondents from different cultures to freely provide their culturally-specific definitions of optimal states.

https://doi.org/10.1017/sjp.2015.12 Published online by Cambridge University Press

This line of inquiry may eventually lead to identifying indigenous constructs of optimal experience that are more valuable for understanding and promoting the subjective well-being of members of a specific culture (Moneta, 2004a).

Lastly, it is important to study the internal mechanism of flow from both the psychological and physiological perspectives. Zhang (2004), a Chinese sport psychologist, put forward six hot topics deserving of exploration by sport psychologists, one of which was the feature of brain processing when athletes are in an optimal competitive state. This topic of research would certainly provide many opportunities to better understand how and why athletes experience flow.

References

Asakawa K. (2004). Flow experience and autotelic personality in Chinese college students: How do they experience challenges in daily life? *Journal of Happiness Studies*, *5*, 123–154.

Bassi M., & Delle Fave A. (2004). Adolescence and the changing context of optimal experience in time: Italy 1986–2000. *Journal of Happiness Studies*, *5*, 155–179.

Catley D., & Duda J. L. (1997). Psychological antecedents of the frequency and intensity of flow in golfers. *International Journal of Sport Psychology*, *28*, 309–322.

Csikszentmihalyi M. (1990). *Flow: The psychology of optimal experience*. New York, NY: Harper & Row.

Csikszentmihalyi M., & Csikszentmihalyi I. (1988). *Optimal experience: Psychological studies of flow in consciousness*. New York, NY: Cambridge University Press.

Csikszentmihalyi M., & Larson R. (1987). Validity and reliability of the experience sampling method. *Journal of Nervous and Mental Disease*, *175*, 526–536. http://dx.doi.org/10.1097/00005053-198709000-00004

Duda J. L., & Hayashi C. T. (1998). Measurement issues in cross-cultural research within sport and exercise psychology. In J. L. Duda (Ed.), *Advances in Sport and Exercise Psychology Measurement* (pp. 471–483). Morgantown, WV: Fitness Information Technology.

Engeser S., & Rheinberg F. (2008). Flow, performance and moderators of challenge-skill balance. *Motivation and Emotion*, *32*, 158–172. http://dx.doi.org/10.1007/s11031-008-9102-4

Fournier J., Gaudreau P., Demontrond-Behr P., Visioli J., Forest J., & Jackson S. (2007). French translation of the Flow State Scale-2: Factor structure, cross-cultural invariance, and associations with goal attainment. *Psychology of Sport and Exercise*, *8*, 897–916. http://dx.doi.org/10.1016/j.psychsport.2006.07.007

Fox K. M., & Walker G. (2002). Reconsidering the relationship between flow and feminist ethics: A response. *Leisure Studies*, *21*, 15–26. http://dx.doi.org/10.1080/02614360110117719

Geng X.-W., & Zheng Q.-Q. (2006). A study of influences of self-monitor on subject well-being. *Chinese Journal of Clinical Psychology*, *14*, 63–65.

Hu Y.-M., Zhang J., Liu S.-P, Sun Y.-L., & He P. (2002). The main characteristics of flow state of baseball and softball athletes in china. *Journal of Tianjin Institute of Physical Education*, *17*, 27–29.

Huberty C. J., & Morris J. D. (1989). Multivariate analysis versus multiple univariate analyses. *Psychological Bulletin*, *105*, 302–308. http://dx.doi.org/10.1037//0033-2909.105.2.302

Jackson S. A. (1995). Factors influencing the occurrence of flow in elite athletes. *Journal of Applied Sport Psychology*, *7*, 138–166. http://dx.doi.org/10.1080/10413209508406962

Jackson S. A. (1996). Toward a conceptual understanding of the flow experience in elite athletes. *Research Quarterly for Exercise and Sport*, *67*, 76–90. http://dx.doi.org/10.1080/02701367.1996.10607928

Jackson S. A., & Csikszentmihalyi M. C. (1999). *Flow in sports: The keys to optimal experiences and performances*. Champaign, IL: Human Kinetics.

Jackson S. A., & Eklund R. C. (2002). Assessing flow in physical activity: The Flow StateScale-2 and Dispositional Flow Scale-2. *Journal of Sport and Exercise Psychology*, *24*, 133–150.

Jackson S. A., & Eklund R. C. (2004). *The flow scale manual*. Morgantown, WV: Fitness Information Technology.

Jackson S. A., Kimiecik J. C., Ford S. K., & Marsh H. W. (1998). Psychological correlates of flow in sport. *Journal of Sport and Exercise Psychology*, *20*, 358–378.

Kee Y. H., & Wang C. K. J. (2008). Relationships between mindfulness, flow dispositions and mental skills adoption: A cluster analytic approach. *Psychology of Sport and Exercise*, *9*, 393–411. http://dx.doi.org/10.1016/j.psychsport.2007.07.001

Kimiecik J. C., & Stein G. L. (1992). Examining flow experiences in sport contexts: Conceptual issues and methodological concerns. *Journal of Applied Sport Psychology*, *4*, 144–160. http://dx.doi.org/10.1080/10413209208406458

LeFevre J. (1988). Flow and the quality of experience during work and leisure. In M. Csikszentmihalyi & I. S. Csikszentmihalyi (Eds.), *Optimal experience: Psychological studies of flow in consciousness* (pp. 307–318). New York, NY: Cambridge University Press.

Li S., & Sun Y.-L. (2000). Research on flow psychology of Chinese basketball athlete. *Journal of Sports and Science*, *21*, 40–43.

Liu S.-J. (2005). Research on flow state characteristic of university soft-tennis athletes. *Journal of Nanjing Institute of Physical Education*, *19*, 99–101.

Liu W.-N., Liu X.-T. Ji L., Watson J. C. II, Zhou C.-L., & Yao J.-X. (2012). Chinese translation of the Flow State Scale-2 and the Dispositional Flow Scale-2: Examination of factorial validity and reliability. *International Journal of Sport Psychology*, *43*, 153–175.

Markland D., & Tobin V. J. (2010). Need support and behavioral regulations for exercise among exercise referral scheme clients: The mediating role of psychological need satisfaction. *Psychology of Sport and Exercise*, *11*, 91–99. http://dx.doi.org/10.1016/j.psychsport.2009.07.001

Marsh H. W., & Jackson S. A. (1999). Flow experience in sport: Construct validation of multidimensional, hierarchical state

and trait responses. *Structural Equation Modeling*, *6*, 343–371. http://dx.doi.org/10.1080/10705519909540140

Martens R., Vealey R. S., & Burton D. (1990). *Competitive anxiety in sport*. Champaign, IL: Human Kinetics.

Moneta G. B. (2004a). The flow experience across cultures. *Journal of Happiness Studies*, *5*, 115–121. http://dx.doi.org/10.1023/B:JOHS.0000035913.65762.b5

Moneta G. B. (2004b). The flow model of intrinsic motivation in Chinese: Cultural and personal moderators. *Journal of Happiness Studies*, *5*, 181–217. http://dx.doi.org/10.1023/B:JOHS.0000035916.27782.e4

Moran A. P. (2004). *Sport and exercise psychology: A critical introduction*. New York, NY: Routledge.

Nakamura J., & Csikszentmihalyi M. (2002). The concept of flow. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of Positive Psychology* (pp. 89–105). New York, NY: Oxford University Press.

Oh S.-Y. (2001). Flow in golf: Motivation, goal orientation, and challenge determinant. *Dissertation Abstracts International Section A: Humanities and Social Sciences*, *62*, 2237.

Orlick T. (1990). *In pursuit of excellence*. Champaign, IL: Leisure Press.

Rheinberg F. (2008). Intrinsic motivation and flow-experience. In H. Heckhausen & J. Heckhausen (Eds), *Motivation and action* (pp. 323–348). Cambridge, UK: Cambridge University Press.

Russell W. D. (2002). An examination of flow state occurrence in college athletes. *Journal of Sport Behavior*, *24*, 83–107.

Scott J. W. (1992). Experience. In J. Butler & J. W. Scott (Eds.), *Feminists theorize the political*. New York, NY: Routledge.

Spielberger C. D. (1966). *Anxiety and behavior*. New York, NY: Academic Press.

Sun J. (2005). Research on flow state of volleyball athlete. *Journal of Beijing Sport University*, *28*, 1347–1348.

Tian M.-J. (1983). *Sports training*. Beijing, China: People's Sports Press.

Vealey R. S. (1986). Conceptualization of sport-confidence and competitive orientation: Preliminary investigation and instrument development. *Journal of Sport Psychology*, *8*, 221–246.

Wang H., & Fu M.-Q. (2005). Research on flow state's characters of elite athletes. *Journal of Xi'an Institute of Physical Education*, *22*, 127–129.

Wang W.-X. (1997). Comparative study of basketball in China and America. *Journal of Shenyang Institute of Physical Education*, *3*, 5–7.

Zhang L.-W. (2004). Six questions in competitive sport psychology research. *Journal of Psychology*, *36*, 116–126.