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ABSTRACT OF DISSERTATION

Leslie Lynn Phillips

The Graduate School

University of Kentucky

2005

EXAMINING FLOW STATES AND MOTIVATIONAL
PERSPECTIVES OF ASHTANGA YOGA PRACTITIONERS

ABSTRACT OF DISSERTATION

A dissertation submitted in partial fulfillment of the
Requirements for the degree of Doctor of Philosophy in the
College of Education
at the University of Kentucky

By

Leslie Lynn Phillips

Lexington, Kentucky

Co-Directors: Dr. Lynda Brown Wright, Associate Professor and Department Chair and
Dr. Tim Smith, Associate Professor

Lexington, Kentucky

2005

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ABSTRACT OF DISSERTATION

EXAMINING FLOW STATES AND MOTIVATIONAL PERSPECTIVES OF ASHTANGA YOGA PRACTITIONERS

Flow state refers to an optimal psychological experience and is associated with a number of experiential qualities one of which is complete absorption in the task at hand. Self-determination theory provides a framework for examining the relation between different types of motivation and flow because it distinguishes among different forms of motivation based on the degree that they can be considered self-determined. Although flow has been studied among athletes and, to a lesser degree, exercisers, no studies have focused on the flow experiences of yoga practitioners. Yoga, which originated in India, has been gaining popularity in the United States. The purpose of this descriptive study was to examine the flow experiences and motivational perspectives of ashtanga yoga practitioners. Five specific aims were addressed.

A sample of 127 ashtanga yoga practitioners were recruited from six yoga studios in various locations across the United States. Participants completed a series of questionnaires related to flow experiences, motivational orientation, yoga practice characteristics, and sociodemographic information.

The majority of the participants of the study were women, highly educated, and approximately 40 years old. The participants demonstrated a strong commitment to yoga practicing on average 4 times per week for over 1.5 hours. The majority had more than 2.5 years of ashtanga yoga experience. They reported strong intrinsic and self-determined extrinsic motivation to practice ashtanga yoga. They reported experiencing flow during ashtanga yoga practice and at least moderately endorsed all nine dimensions of flow state. Higher scores on the EMS subscales of intrinsic motivation (IM) to accomplish things and IM to experience sensation were predictive of higher flow state for the practitioners. The respondents' yoga flow scores were significantly higher than the flow scores associated with a comparison "other" physical activity participated in currently or in the past. Finally, age (inversely) and years of ashtanga yoga experience

were predictive of flow experiences for this group of yoga practitioners. For those interested in the study of motivation, these findings contribute to the understanding of the relation between flow and motivation and how “enjoyment” may be manifested within the context of physical activity.

KEYWORD: FLOW, INTRINSIC MOTIVATION, YOGA, ASTANGA, ASHTANGA

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April 28, 2005

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DISSERTATION

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Chapter 1

Introduction

Background

In the field of psychology there has been much less study on wellness and prevention than there has been on psychological problems and what causes them. However, in the last several years there has been “a movement toward understanding and promoting a preventative and positive approach to health and acceptance of the importance of psychological factors in health outcomes” (Jackson 2000, p. 136). The study of Mihaly Csikszentmihalyi’s (pronounced "chick-SENT-me-high", 1975/2000) flow state model is in line with this movement. Flow is considered to be an optimal psychological state in which there is complete absorption in the task at hand which leads to a number of positive experiential qualities (Jackson, 2000). The flow experience is an emotional state that is “more positive than the humdrum existence of everyday life” (Kimiecik & Stein, 1992, p. 146) and is thought to cultivate enjoyment and, ultimately, overall happiness and well-being. Nakamura and Csikszentmihalyi (2002) suggest that the study of flow contributes to “positive psychology” from three perspectives. First, it sheds light on the phenomenology of optimal experience. Second, it adds to the understanding of long-term consequences of optimal experience and its relationship to overall happiness and well-being. And third, leads to a better understanding of possible facilitators and/or obstacles to optimal experiences.

There appears to be a clear link between flow and intrinsic motivation in the literature, although it is unclear as to exactly how the constructs relate to one another.

When one is intrinsically motivated for an activity they do the activity strictly for the sake of doing it (Deci & Ryan, 1985). Theoretically, flow state experienced within an activity and the presence of intrinsic motivation for an activity would have desirable consequences in terms of setting off a positive motivation cycle for the activity. Flow has been studied in a variety of contexts including sport and physical activity. Whereas flow is an important topic of study within the athletic domain due to its relationship to peak performance, its significance in the context of exercise and physical activity relates to its possible contribution to the motivation for the maintenance of an active lifestyle for optimal health and well-being. This is important since few health practices are thought to impact a greater array of health conditions than regular physical activity.

Unfortunately, Healthy People 2010 states that approximately 25 percent of U.S. adults report no physical activity at all and more than 60 percent do not engage in the recommended amount of activity (USDHHS, 2004). Thus, there is a need to further our understanding of the process of developing and maintaining physically active lifestyles.

One activity that has been attracting participants in the U.S. in the last several years is yoga. The results of a Harris Interactive poll showed that approximately 15 million Americans practiced yoga in 2002 and according to sociologist Paul Ray, member of the Board of Directors of Gaiam (a large wellness corporation), 28 million Americans practiced yoga in 2003 (Namasta, 2004). In his book *Flow: the Psychology of Optimal Experience* (1990), Csikszentmihalyi states that “it is not unreasonable to regard yoga as one of the oldest and most systematic methods of producing the flow experience” (p. 106). Only time will tell how the yoga scene will evolve in the U.S. Although the number of yoga practitioners is increasing, American researchers have not

studied yoga nearly as extensively as other traditional U.S. forms of physical activity. Because its roots are in India much of the research that has been conducted on yoga is difficult to obtain because it has been published in Indian journals. Nevertheless, given the increasing popularity of yoga in the U.S., it is of value to examine the flow state experiences of yoga practitioners as well as the relationship of flow state to motivational orientation given the implications that flow state and motivational orientation have for the motivation to maintain active lifestyles and facilitate well-being, in general.

Purpose of the Study

The broad, long-term objective of this study was to advance the knowledge in the field of positive psychology through improvement of the understanding of optimal experience/positive states of consciousness in the context of physical activity. According to Csikszentmihalyi's (1975/2000) theory, the elements of flow provide the keys to understanding the optimal experience of enjoyment. Although Csikszentmihalyi (1990) has speculated that yoga may be highly associated with flow experiences, he says "the details of *how* the experience is produced are unique to yoga just as they are unique to every other flow activity, from fly-fishing to racing a Formula One car" (p. 106). Whereas practicing yoga might be considered a direct path to the flow experience, no scientific studies utilizing current methods of measuring flow state occurrence were found in the literature that examine the flow experiences of yoga practitioners. Furthermore, it is generally accepted that the flow state is elusive and not easily achieved. While it has been established that elite athletes experience flow state, it appears that they do so rather infrequently (Jackson, 1992).

Specific Aims

The specific aims of this study were to:

1. Describe the characteristics (socio-demographic, yoga practice, yoga motivational orientation) of the ashtanga yoga practitioners.

Socio-demographics- age, gender, education level, ethnicity

Yoga practice- ashtanga yoga experience (months/years), practice frequency (per week), practice duration (per session), practice format, practice location

Motivational orientation-8 dimensions

2. Describe the state and trait flow experiences of ashtanga yoga practitioners (9 dimensions).
3. Examine the relationship between yoga practitioner's flow experiences and motivational orientation (intrinsic, extrinsic, amotivation).
4. Compare the yoga practitioner's flow experiences while doing yoga with flow experiences associated with another physical activity.
5. Explore the relationship between yoga practitioner's characteristics (socio-demographic and yoga practice variables) and their flow experiences.

Significance

This descriptive study was designed to assess the flow experiences of yoga practitioners and examine the relationship between flow experience and motivational orientations as well as other personal and situational variables. This research has important implications for furthering the understanding of motivation for physical activity. Kimiecik and Harris (1996) promote the idea that flow experiences set off a positive motivation cycle whereby flow leads to positive affect (enjoyment), which leads

to intrinsic motivation (i.e., the desire to do an activity for its own sake). Although it is widely accepted that enjoyment is related to motivation to be physically active it is unclear how to go about cultivating such an experience. Thus, a clearer understanding of flow in the context of physical activity may contribute to the illusive goal of understanding how individuals may be motivated to adopt and maintain physically active lifestyles which continues to be a significant challenge in the field of exercise psychology. Furthermore, since the actual flow experiences themselves, regardless of the activity in which they are experienced, are thought to contribute to overall health, happiness and well-being, it is worthwhile to study this positive psychological state. The information gained from this study may provide information that will lead to further investigation about (a) the potential for flow experiences within the physical activity/yoga context (b) what positive outcomes in relation to overall health, happiness, and well-being may be the result of such experiences and (c) how such optimal experiences may be facilitated in the context of physical activity.

Chapter 2

Review of the Literature

Flow Theory

In the mid 1970's Mihaly Csikszentmihalyi developed the concept of flow and began a line of inquiry on the subject in work, social and educational settings. The ensuing twenty-five plus years of research has made a contribution toward the understanding of a fundamental question related to positive psychology and posed by Nakamura & Csikszentmihalyi (2002): What constitutes a "good life"? The concept of flow provides a perspective to this question.

Definition and dimensions of flow. Flow is an optimal psychological state that occurs when there is a balance between perceived challenges and skills in an activity and where both (challenge and skills) are higher than the person's subjective average experience. It is a state characterized by total absorption in the task and a number of other positive experiential qualities (Mihaly Csikszentmihalyi, 1990). The nine experiential qualities of flow that have been supported by qualitative and quantitative research are:

1. Challenge-skill balance-The perceived challenges for an activity stretch one's existing skills but there is the sense that one is engaging at a level appropriate to one's capabilities.
2. Merging of action and awareness-One is no longer aware they are separate from their actions; things are happening automatically.

3. Clear goals-One understands the goals of the activity ahead of time or the goals are developed while engaged in the activity.
4. Unambiguous feedback-One clearly understands how they are doing.
5. Concentration on the task at hand-All psychic energy is focused.
6. Sense of control-One perceives this control especially over difficult situations.
7. Loss of self-consciousness-One is not worried about how he/she is perceived by others.
8. Time transformation-Time is distorted in some way; it either speeds up or slows down.
9. Autotelic (intrinsically rewarding) experience-This is the end product of a flow experience; the experience is such a positive state that one desires to perform the activity for its own sake.

Flow and consciousness. The concept of flow refers to a human subjective experience. Kimiecik and Jackson (2002) explain that we can think of our humanness as a combination of three concepts--behavior, cognition and affect. They go on to describe subjective experience as the underlying core concept that connects these three areas together to create meaning in our lives; it's the bottom line of existence. Thus, flow research is concerned with trying to understand the *quality of the experience* related to a behavior which is different than understanding cognitions and affect associated with a behavior.

Subjective experience refers to states of consciousness. Nakamura & Csikszentmihalyi (2002) describe consciousness as "the complex system that has evolved in humans for selecting from an overwhelming amount of information, processing it, and

storing it” (p. 91). According to Csikszentmihalyi (1990), states of consciousness can range from disordered to harmonious. He further explains that when we experience order in our consciousness (e.g. flow) we experience psychic negentropy meaning that we create or perpetuate energy within ourselves that contributes to our overall functioning. Conversely, when we experience disorder in consciousness we experience psychic entropy meaning the state has a tendency to deplete one’s psychic energy. Aside from flow being a state of ordered consciousness it can be described as a higher than normal state of consciousness as well. When there is a merging of action and awareness and loss of self-consciousness one experiences self-transcendence i.e. one goes beyond being aware of the “self” since all available attention is on the action (Nakamura & Csikszentmihalyi, 2002).

Positive outcomes of flow. The flow experience itself is considered to be neutral according to Csikszentmihalyi (1997) but it is after the experience of flow that people consider it to be optimal, enjoyable, and highly valuable. Csikszentmihalyi (1997) explains that this positive relationship between positive affect and flow is important because “emotions focus attention by mobilizing the entire organism in an approach or avoidance mode” (p. 25). Therefore, having flow experiences in a specific activity would likely draw a person to repeat the activity again and again in the effort to duplicate the positive flow experience.

Beyond the positive inner experience of flow Csikszentmihalyi (1993) has proposed that flow is associated with several positive consequences including: creativity, peak performances, talent development, productivity, increased self-esteem, and stress reduction. Furthermore, Csikszentmihalyi (1990) has postulated that flow leads to

individual growth through the psychological processes of “differentiation” and “integration.” Differentiation occurs as a result of flow when one overcomes challenges and obtains new skills and therefore becomes more unique through “stretching one’s limits.” Simultaneously, one also, as result of flow, becomes more integrated.

Csikszentmihalyi (1997) explains that while in flow, consciousness is very ordered and there is a feeling of harmony, not only with oneself but also with respect to other people and the world in general.

Measurement of flow. Those interested in flow research have acknowledged the challenge of accurately and reliably measuring a construct such as flow (Mihaly Csikszentmihalyi, 1992; Jackson, 2000; Kimiecik & Jackson, 2002; Kimiecik & Stein, 1992). Jackson (2002) states “like all experiential phenomena, flow cannot easily be quantified by psychometrics or illuminated through investigative interviewing” (p. 519). Csikszentmihalyi (1992) further warns:

All through the roughly twenty years since I have been doing research on this phenomenon, I have been very ambivalent about coming out with a hard and fast measure of flow. It would have been easy to develop a test, or checklist, or questionnaire that would make it possible to assign some score to a person’s intensity and frequency of experiencing flow. But, I have always resisted the urge of doing so, because history of psychology is replete with examples of how barren important ideas become as soon as they are precisely “measured”--we need only remember what happened to the idea of intelligence once it was identified with the IQ scores. (p. 182)

Csikszentmihalyi (1992) goes on to question his reservations about flow measurement explaining “I’ve often wondered if whether this reluctance to operationalize was not a form of cowardice, a way to avoid exposing the theory to testing and to potential falsification” (p. 183). Those interested in flow seem to agree that it is too important of a concept to ignore and that whatever imperfect measures are available to measure it should be utilized. In doing so Csikszentmihalyi (1992) emphasizes, “any measure of flow that we create will only be a partial reflection of this reality...all we can say is: By such and such a definition of flow and using such and such measures, it happens only once in a lifetime. Or: By using these other definitions, and using these other measures, flow happens once a day” (p. 183). The general consensus is that there is a need for more research using a variety of methodologies.

Qualitative methods were the first used to investigate the flow model in the physical activity context (Mihaly Csikszentmihalyi, 1975/2000; Jackson, 1992, 1995, 1996). While qualitative approaches to the measurement of flow provide rich accounts of the construct that are typically not attained with pencil and paper questionnaire assessments, there are trade offs. The labor intensiveness of this approach necessitates small sample sizes. In addition, the retrospective element and interpretive bias of the researchers are limitations to qualitative methods (Kimiecik & Jackson, 2002). Nonetheless, qualitative approaches to the study of flow continue to be important and it is this approach that has provided the foundation for the development of psychometric instruments in order to examine flow from a quantitative perspective.

In the effort to examine associations between flow and other psychological constructs, Jackson and Marsh (1996) developed the FSS (Flow State Scale) and a

corresponding dispositional version of the instrument, the DFS (Jackson, Kimiecik, Ford, & Marsh, 1998) for the measurement of flow in sport and physical activity settings. The FFS was designed to be administered after a specific activity and assesses flow occurrence in relation to that specific event. The DFS (Dispositional Flow Scale) was designed to assess the frequency with which respondents experience flow, in general, in relation to a specific activity. Thus, while the FFS is a “state” measure, the corresponding DFS provides a measure of a possible “trait” characteristic of flow with the underlying assumption that individuals may differ in their propensity to experience flow on a regular basis. Both scales are 36-item measures with four items corresponding to each of the nine flow dimensions: challenge-skill balance, action-awareness merging, clear goals, unambiguous feedback, concentration on the task at hand, sense of control, loss of self-consciousness, transformation of time, and autotelic experience. An example of an item on the FFS answered in relation to a specific event/activity is “I was challenged, but I believed my skills would allow me to meet the challenge” and respondents would answer on a 5-point Likert scale ranging from 1=“strongly disagree” to 5=“strongly agree.” Similarly, an example of a DFS item answer in relation to an activity in general is “I am challenged, but I believe my skills will allow me to meet the challenge” and respondents would answer on a 5-point Likert scale ranging from 1=“never” to 5=“always.”

Preliminary support for the construct validity of the FFS and DFS has been established by the work of Jackson and Marsh (1996) and Marsh and Jackson (1999) who showed that confirmatory factor analyses supported the nine scales as well as one global flow factor score. Additional studies have demonstrated theoretically expected patterns of

relationship between flow (as measured by the FFS and DFS) and psychological constructs logically related to flow such as perceived ability, anxiety, intrinsic motivation athletic self-concept and athletes use of psychological skills as well as, performance measures such as subjective performance rating and overall finishing position (Jackson et al., 1998; Jackson, Thomas, Marsh, & Smethurst, 2001). These findings lend further support for the construct validity of the FFS and DFS measures.

Vlachopoulos, Karageorghis and Terry (2000), on the other hand, found results inconsistent to the previously mentioned studies. Through a series of factor analyses on the FFS responses of exercise participants, these investigators determined that the 9-factor model and hierarchical model did not show adequate fit to the data. The loss of self-consciousness and transformation of time dimensions were weak in their intercorrelations with the other flow dimensions and the global flow factor. Jackson and Eklund (2002) questioned the method of statistical analysis used by Vlachopoulos, Karageorghis and Terry (2000) citing Marsh (2000, Aug. 30) who explained that the conventional CFA goodness of fit criteria may be too restrictive making it extremely difficult for scales with numerous factors and items to achieve acceptable fit. Jackson and Eklund (2002) did, however, acknowledge the weakness of two of the flow dimensions (loss of self-consciousness and transformation of time) on the original FFS and DFS scale. Therefore, they designed a two part study to assess the usefulness of a small pool of new items for the flow scales and examine the psychometric performance of the scale, its subscales and the new items based on confirmatory factor analyses. Item modifications for the loss of self-consciousness and transformation of time factors were developed by reviewing the related literature describing flow experience as well as

through a discussion with M. Csikszentmihalyi. The initial study examined the performance of several possible item replacements via confirmatory factor analyses. The second study provided cross-validation to ensure the results of the first study were not sample specific and that the items behaved appropriately in the context of the final measure. Confirmatory factor analyses of the cross validation sample of sport and exercise participants demonstrated good fit for the new scales. The mean item loadings on the first order factor were .80 for the FSS-2 and .73 for the DFS-2. Reliability estimates ranged from .80 to .92 for the FFS-2 and .78 to .86 for the DFS-2.

The Experience Sampling Method (ESM) has been the primary approach to study flow utilized by Csikszentmihalyi and colleagues (Mihaly Csikszentmihalyi, 1975/2000). This method involves the use of a beeper, programmed to go off usually eight random times a day for one week, in order to prompt assessments of subjective states as they occur. At the time of the beep, subjects record measurements of flow characteristics, mood, and other factors such as motivation for the activity at the time of the signal. By using an operational definition of flow based on an equivalence of challenges and skills, the ESM assesses quality of experience in and out of flow.

The ESM approach has not been widely used in the physical activity context and when it has been used the procedures have been significantly modified (Marsh & Jackson, 1999; Stein, Kimiecik, Daniels, & Jackson, 1995). The modification relates to the problem of interrupting individuals who are participating in a physical activity, especially competing in sport. Stein, Kimiecik, Daniels and Jackson (1995) had a research assistant inform study participants (students at a university enrolled in a basketball activity class) when it was time to fill out the experience sampling form and

these were at random times (once per week) over the course of the semester. Marsh and Jackson (1999) used a component of the Experience Sampling Form in their study of elite athletes however, did not employ the random and multiple assessment of flow during activity. While modifications of the true ESM approach may be necessary for widespread use in the study of flow in the physical activity context it seems feasible that this can be done satisfactorily. But, beyond this issue is the complicated nature of scoring ESM data (Jackson, 2000). There is a need for further refinement of ESM procedures in order to successfully apply this approach to the study of flow in the physical activity context.

Flow research in sport and exercise. In the context of physical activity, significantly more work has focused on “athletes” as opposed to “exercisers” although in the non-elite or recreational athlete context individuals may likely be performing their sport as a form of exercise therefore the line can become blurred between sport and exercise.

One of the first populations examined by Csikszentmihalyi (1975/2000) was a group of rock climbers. This work along with several other studies examining elite athletes (Jackson, 1992, 1995; Russell, 2001) took a qualitative approach to exploring the construct of flow in the context of physical activity. Jackson (1992) explored the factors associated with achieving flow states during performance for elite figure skaters. Factors perceived as most important to getting into flow included: positive mental attitude, positive pre-competitive and competitive affect, maintaining appropriate focus, physical readiness, and for pairs skaters, unity with partner. The factors perceived to prevent or disrupt flow were: physical problems/mistakes, inability to maintain focus, a negative

mental attitude, and lack of audience response. Skaters placed very high value on the flow state. Similarly, Jackson (1995) questioned athletes from seven different sports-- track & field, rowing, swimming, cycling, triathlon, rugby, and field hockey about what facilitated, prevented and disrupted flow. Factors that appear to have the biggest influence on whether or not flow occurred were: preparation (physical and mental), confidence, focus, how the performance felt and progressed, and optimal motivation and arousal level.

Another qualitative study by Jackson (1996) was designed to further examine the flow experience of elite athletes from seven different sports by using Csikszentmihalyi's (1990) conceptual model as the base. The results showed that 97% of the raw data themes were categorized into one of the nine flow dimensions providing support that athletes do experience flow as the model put forth by Csikszentmihalyi (1990) describes. More recently, Russell (2001) examined the flow state occurrence within a group of college athletes from nine different sports. The qualitative questions related to optimal performance (flow) and (a) what factors helped them achieve flow, (b) what factors prevented flow, and (c) what factors disrupted flow. The results overlapped previous qualitative research except, this population perceived flow to be less controllable than elite athletes. This study also included a quantitative analysis which showed that college athletes appear to have similar experiences of flow regardless of gender or sport type.

Several relatively recent studies have used either the FFS (Flow State Scale) or DFS (Dispositional Flow Scale) to quantitatively examine psychological "correlates" of flow. Kowal and Fortier (1999) had non-elite athletes (masters swim club participants) complete 3 questionnaires following a swim practice to assess: 1) situational

motivational determinants—autonomy, competence and relatedness; 2) situational motivation; and 3) and flow state (using the FFS). The results of this study show that, as hypothesized, self-determined forms of motivation (intrinsic motivation and self-determined extrinsic motivation) and perceptions of autonomy, competence, and relatedness were positively related to flow, whereas amotivation was negatively related to flow. The purpose of a study by (Jackson et al., 2001) was to assess the relevance of self-concept and selected psychological skills to the flow concept using both the FFS and DFS with athletes from three different sports. As expected, perceptions of the self as an athlete (self-concept) and psychological skills were associated with the experience of flow during athletic competition. Four of the five psychological skills predicted to relate most highly to flow (absence of negative thinking, goal setting, emotional control and relaxation) were found to have moderate to high associations with the flow dimensions. Additionally, as expected, the dispositional psychological predictors were found to be more strongly related to the dispositional flow measure (DFS) than the state version (FFS). Similarly, Jackson et al. (1998) sampled older athletes competing in the World Masters Games and found associations between dispositional flow and three psychological variables--intrinsic motivation (positive), perceived ability (positive) and cognitive anxiety (negative).

Contrary to the previously mentioned research, a preliminary study by (Stein et al., 1995) found no substantial relationship between the psychological constructs of goals, competence and confidence and the attainment of flow in three different recreational sport settings. It should be noted that this study was conducted before the development of the FSS and DFS measures and utilized an 8-item flow state scale. Stein et al. (1995)

questioned the validity of the 8-item flow scale as well as their method of using a median split to separate subjects into flow and non-flow groups.

Only two studies were found in the literature that addressed the flow experiences of exercisers, specifically (Grove & Lewis, 1996; Vlachopoulos et al., 2000). The primary purpose of the Grove and Lewis (1996) study was to assess hypnotic susceptibility and prior experience as correlates of flow states. Measures of flow and hypnotic susceptibility were taken twice per session during each session of a circuit training class meeting twice per week for six weeks. The results of this study showed that flow states increased from early to late in the sessions and that the magnitude was greater for participants with “high hypnotic susceptibility” versus “low hypnotic susceptibility.” Level of experience was also significantly related to flow with participants having more than 6 months experience expressing higher ratings than those with less than 6 months experience. The flow measure used in this study was 10-items that were selected from the Privette Experience Questionnaire (Privette & Bundrick, 1987; Privette & Sherry, 1986), a 42-item inventory design to evaluate various aspects of flowlike states. This instrument is not based on Csikszentmihalyi’s (1990) nine dimensional flow model nor is it designed specifically to measure flow in the context of physical activity.

As discussed in the previous section on the measurement of flow, Vlachopoulos et al. (2000) examined the factorial structure and internal consistency of the Flow State Scale (FSS) with a sample of aerobic exercisers. The FSS subscales displayed acceptable internal consistency ($\alpha > .70$), with the exception of the transformation of time dimension ($\alpha = .65$). However, this study showed only adequate fit to the data for nine-factor or

hierarchical model resulting in the authors questioning the appropriateness of the use of the FSS in the exercise setting. As previously discussed, Vlachopoulos et al. (2000) acknowledge the use of a more rigorous cut-off criteria in their statistical analyses and it should be noted that the original FSS has been recently modified and re-evaluated (Jackson & Eklund, 2002).

Flow and intrinsic motivation. The concept of intrinsic motivation is a component of Deci and Ryan's (1985) self-determination theory (SDT). The framework of self-determination theory distinguishes among different forms of motivation based on the degree to which one experiences choice in their behavior or "internal perceived locus of causality" (Deci & Ryan, 1985, p. 166). Deci and Ryan (1985) propose four main types of motivation that exist along a continuum. From most self-determined to least self-determined they are: intrinsic motivation, self-determined extrinsic motivation, non-self-determined extrinsic motivation, and amotivation.

Amotivation refers to engaging in an activity without perceiving any contingencies between the behavior and subsequent outcomes i.e. one is neither intrinsically or extrinsically motivated. Extrinsic motivation refers to pursuing a behavior for incentives that extend beyond those inherent in the activity i.e. the activity is a vehicle toward a separate end. Extrinsic motivation is further delineated into four categories that describe the process of internalization i.e. the process of transferring the regulation of behavior from outside to inside the individual (1985; Ryan & Deci, 2000).

The four types of extrinsic motivation going from external to internal regulation are:

1. External regulation where regulation comes from outside the individual in the form of rewards or constraints.
2. Introjected regulation which is internal regulation based on feelings that one has to do the activity (e.g. guilt or peer pressure)
3. Identified regulation which is internal regulation based on behavior done for the value of the result (e.g. studying hard to get good grades to get into college).
4. Integrated regulation whereby regulation is based on what is harmonious and important to the self.

External regulation and introjected regulation are considered the non-self-determined extrinsic motivation category of behavior. Identified regulation and integrated regulation create the self-determined extrinsic motivation category although even this type of behavior is not fully internalized and self-determined as is the case with intrinsic motivation.

It is only with intrinsic motivation that one engages in an activity for its own sake, because of an interest, or for the pleasure and satisfaction derived from the experience (Deci & Ryan, 1975). Vallerand (2001) has extended the work of Deci and Ryan in proposing a Hierarchical Model of Intrinsic and Extrinsic Motivation in Sport and Exercise. In this model intrinsic motivation is subdivided into intrinsic motivation: to know, to accomplish things, and to experience stimulation.

Although there is agreement in the literature that the concepts of flow and intrinsic motivation are related it remains unclear as to how so. It is apparent that intrinsic motivation and Csikszentmihalyi's (1990) concept of autotelic experience are similar constructs and thus a positive relationship would be expected between flow and

intrinsic motivation. However, whereas Csikszentmihalyi (1975/2000) has implied that flow experiences lead to intrinsic motivation, Deci and Ryan (1985) describe flow as a purer instance (result) of intrinsic motivation. Vallerand (2001) has hypothesized that it may be more appropriate to consider flow a motivational consequence in his model (as opposed to the two concepts being synonymous). More recently, Nakamura and Csikszentmihalyi (2002) described flow as the subjective phenomenon of intrinsic motivation. This is similar to Eccles and Wigfield's (2002) stance that although the theories of Deci and Ryan and Csikszentmihalyi seem different at first, they are in fact two sides of the same coin. That is, where as Deci and Ryan (1985) conceptualize motivation in terms of innate, basis needs, Csikszentmihalyi is emphasizing the subjective experience hence there is a difference in the immediate reasons for the for behavior (e.g. enjoyment/flow) and the ultimate reasons (e.g. survival/intrinsic motivation) for behavior. Kimiecik and Harris (1996) conclude that "whatever the case, it is certainly likely that a bidirectional and symbiotic relationship exists between flow and intrinsic motivation" (p. 255).

Nevertheless, previous research has demonstrated a link between flow and intrinsic motivation as well as self-determined extrinsic motivation. Martin and Cutler (2002) recently examined flow state and motivational orientations among theater actors. In this study flow was significantly correlated to intrinsic motivation to experience stimulation and to accomplish things although was not significantly correlated to intrinsic motivation to know or any of the other motivational subscales (extrinsic and amotivation). In the context of physical activity, Kowal and Fortier (1999) found that flow state was significantly and positively correlated with intrinsic and self-determined

extrinsic motivation for a group of masters swimmers. Additionally, a significant negative correlation was found for flow and amotivation and no significant association was found between the experience of flow and non-self-determined extrinsic motivation in this study. Jackson et al. (1998) examined the relation of flow to intrinsic motivation in a sample of masters athletes from several sports and found that only the intrinsic motivation to experience stimulation was significantly related to flow experience in this sample. Since there was no relationship with any of the other dimensions of motivation Jackson et al. (1998) speculate that perhaps the relation between flow and motivation may be most connected to the sensations of the activity and acknowledge the need for further research to understand the relationships between motivational variables and the propensity to experience flow.

Yoga

Yoga originated in India and is an extremely multifaceted science and/or philosophy that is difficult to easily define. The word “yoga” comes from the Sanskrit root “yug” and translates literally into English as “to yoke” or “union.” This idea of “union” relates to uniting the individual self with a higher (supreme) Self. Whereas self (with a lower case “s”) refers to ordinary consciousness and personality (the ego), Self (with a capital “S”) implies another dimension which could be called “Spirit”, “Pure Consciousness”, “God”, and/or the “Absolute” which is our true (divine) nature (Feuerstein, 1998). Yogic philosophy puts forth the idea that it is the endless distracting activity of the mind that keeps us from the realization this connection. Patanjali defines yoga in the Yoga Sutras (a Classical Yoga text) as “the restriction of the whirls (fluctuations) of consciousness” or interpreted another way “restraining the thought-

streams natural to the mind” (Feuerstein, 1998). This definition embodies the idea that yoga is concerned with self-transcendence or going beyond ordinary consciousness which is the unifying feature of a variety of types of yoga most of which are not familiar to Americans.

The large majority of the yoga practiced in the U.S. is various types of hatha yoga. While the fundamental objective of hatha yoga is the same as mentioned above, hatha yoga or “forceful yoga” involves the use of postures and breath control and is a physical (although the mind is very much involved) approach to yoga. Although most all of the yoga being taught and practiced in the U.S today is hatha yoga, there is much variation as to what aspects of the practice are emphasized. Some styles have a stronger emphasis on the meditative and philosophical aspects of yoga while others greatly emphasize the physical nature of the practice and thus are practiced as a means of exercise and fitness. With such a wide variation in styles it is difficult to make general statements about the physical and/or psychological effects of hatha yoga in general.

Ashtanga yoga. Ashtanga yoga is a system of hatha yoga that is said to have been detailed in an ancient manuscript called the Yoga Korunta. Sri K Pattabhi Jois (who learned this system of yoga from his teacher, Sri T. Krishnamacharya) has taught this style of yoga since 1948. Now in his late eighties, he continues to teach today and is credited with the worldwide spread of ashtanga yoga. Ashtanga yoga literally means “eight-limbed yoga” and takes its name from the classical framework outlined by Patanjali in the Yoga Sutras. In the briefest sense the eight limbs are (Jois, 2002; Stiles, 2000):

1. yamas (moral codes or self-restraints)-non-violence, truthfulness, non-stealing, non-lust, and non-coveting
2. niyamas (rules of conduct or observances)-cleanliness, contentment, discipline, self study and acknowledgement of a supreme being
3. asana (postures)
4. pranayama (breath control)
5. pratyahara (sense withdrawal)
6. dharana (concentration)
7. dhyana (meditation)
8. samadhi (self-realization)

A westernized approach is to emphasize the third and fourth limbs, postures and breath control, with the philosophy that the other limbs begin to sprout organically and not necessarily in a linear fashion.

From a physical standpoint, ashtanga yoga is a rigorous, challenging style of yoga but modifiable for individuals of multiple fitness levels. One distinguishing feature of ashtanga yoga is a focus on breath synchronized movement (called “vinyasa”) which allows one to flow from one posture to the next and contributes to the meditative aspects of the practice. The ashtanga yoga system incorporates many classical yoga postures into a specific series with multiple levels of advancement. The series is meant to be committed to memory by the practitioner. As one learns the series or is led through it by a teacher it becomes a meditation in motion due to the breathing movement synchronization as well as other focusing techniques fundamental to ashtanga yoga.

Yoga and flow. It is logical to assume that the practice of yoga would be an activity ideally set up to produce the flow experience. While no scientific studies were found in the literature that examined the flow experiences of yoga practitioners, Csikszentmihalyi (1990) has discussed the similarities between yoga and flow. From a broad philosophical standpoint, he references Patanjali's eight stages and draws parallels between yoga and flow. To paraphrase, the first two stages, yamas (moral codes) and niyamas (self-restraints) are aimed at "ordering consciousness" and reducing the psychic disorder as much as possible before the actual attempts at mental control begin. The third and fourth limbs, asana (postures) and pranayama (breath control) are designed to strengthen, purify, align and heal the body to make it the perfect vehicle for furthering the journey i.e. sitting in meditation. In the yogic view this is done through work with not only the physical body but with the subtle body which is the emotional sense of vitality and energy that is flowing through the body (Stiles, 2000). The third and fourth limbs are preparatory for the growth of the final four limbs: sense withdrawal (pratyahara), concentration (dharana), meditation (dhyana) and self-realization (samadhi). Csikszentmihalyi (1990) points out the strong similarity between these stages and the flow experience but recognizes that it can be argued that, ultimately, flow and yoga diverge into opposite outcomes i.e. flow attempts to fortify the self and the goal of yoga is to abolish it. But, he further explains,

This opposition may be more superficial than real. After all, seven of the eight stages of yoga involve building up increasingly higher levels of skill in controlling consciousness. *Samadhi* and the liberation that is supposed to follow it may not, in the end be that significant—they may in one sense be regarded as

the justification of the activity that takes place in the previous seven stages, just as the peak of the mountain is important only because it justifies climbing, which is the real goal of the enterprise. Another argument favoring the similarity of the two processes is that, even till the final stage of liberation, the yogin must maintain control over consciousness. He could not surrender his self unless he was even at the very moment of surrender, in complete control of it. Giving up the self with its instincts, habits, and desires is so unnatural an act that only someone supremely in control can accomplish it. (p. 105)

From a more narrow perspective, it could be argued that the physical practice of ashtanga yoga (postures and breath control) is well designed to cultivate the flow experience. Csikszentmihalyi (1975) has pointed out that the structure of some activities provide fertile ground for the flow experience to occur and has termed these “flow activities.” Such activities, “provide opportunities for action which match a person’s skill, limit the perceptual field, exclude irrelevant stimuli, contain clear goals and an adequate means for reaching them and give clear and consistent feedback to the actor” (p. 182). In the system of ashtanga yoga there are three techniques fundamental to the practice that, among other purposes, are used to continually guide the practitioner’s focus inward. First, is the use of a breathing technique called “ujjayi breath” which produces a soft sound on which the practitioner brings his or her focus and contributes to the meditative aspect of the practice. Second, is the continual engagement of “energetic locks” called “bandhas” designed to redirect breath/energy within the body. This technique involves maintaining a subtle contraction of core muscles which requires consistent attention without which the contractions will wane. And third, a “dristi” or

gaze point is associated with each posture which helps the practitioner focus inwardly instead of “looking” outwardly (Scott, 2000).

Beyond this, the very nature of the ashtanga yoga practice would seem to contribute to the cultivation of flow in that it is a non-competitive (not even competitive with oneself) exploration of postures utilizing breath awareness to very sensitively nudge or approach one’s appropriate positions in the postures. The shapes of the postures provide the “opportunities for action” with many levels leading up to the full expression of the poses which allows one to create a challenge-skill balance with unending levels of progression. The specific sequences of postures provide clear goals and through sensitivity to one’s breath, bodily sensations and mind, one receives unambiguous feedback throughout the process. The perceptual field is limited through focusing techniques and with a heightened awareness and increased sensitivity one can receive feedback offered through the body and creatively adapt to this feedback in an appropriate way in what becomes a “dialogue with the body.”

Health/fitness effects of yoga. The focus on doing yoga in order to receive “results” is contrary to the underlying philosophy. However, it can’t be denied that yoga has become increasingly popular in our culture as a means of exercise and fitness training. With the recent increase in American yoga practitioners, there appears to be a corresponding increased interest in the scientific study of yoga, however, more research is needed in order have a better understanding of the beneficial health effects of yoga. Yoga is not easy to study from this standpoint. As stated previously, the wide variation in the types of hatha yoga, their physiologic intensity, and corresponding results is a confounding issue (Ives & Sosnoff, 2000). Nevertheless, in a recent review article, Raub

(2002) concluded that the practice of hatha yoga can improve strength and flexibility and may help control such physiological variables as blood pressure, respiration and heart rate, and metabolic rate to improve overall exercise capacity. A recent study by Tran, Holly, Lashbrook, & Amsterdam (2001) is most relevant to this discussion due to its research design. This is the first study to assess all health-related aspects of physical fitness—muscular strength, muscular endurance, flexibility, cardiorespiratory endurance, and body composition—in the same subjects by direct measures. Ten subjects completed two yoga classes per week for 8 weeks. Each session consisted of 10 minutes of breathing exercises (pranayama), 15 minutes of dynamic warm-up exercises and 50 minutes of postures (asanas), and 10 minutes of supine relaxation. The results of this study showed significant increases in muscular strength and endurance, flexibility, and cardiorespiratory endurance although the investigators acknowledge the small sample size and consider this a pilot study. Although in this study no significant effect on either body composition or pulmonary function was found, the investigators conclude that hatha yoga is a form of physical activity that would meet the objectives of current recommendations to improve physical fitness and health (USDHHS, 1996). Two previous studies (Bera & Rajapurkar, 1993; Raju, V., Venkata, Murthy, & Reddy, 1997) did however show improved body composition with “intensive” yoga training although both studies had relatively small sample sizes and relied on less accurate skinfold measures to assess body fat as opposed to the more accurate measure of hydrostatic weighing used by Tran et al. (2001).

The general population typically associates psychological health benefits with yoga more than physical health benefits. There is support in the literature for

psychological health benefits associated with yoga practice. For example, Venkatesh et al. (1994) found that yoga practitioners had lower state and trait anxiety scores as well as Stressful Life Event scores than controls. The investigators concluded that yoga helps practitioners be more emotionally stable in terms of state and trait anxiety, and enhances their tolerance to perceived stressful day-to-day events. Another study by Berger and Owen (1992) examined mood alterations with yoga, swimming and a lecture control group. Results showed that the yoga and swimming groups had greater decreases on anger, confusion, tension and depression scores than did the control group.

The previously mentioned studies are a sampling of the preliminary support for a variety of beneficial health/fitness outcomes associated with yoga. It must be emphasized however, that there is a wide range of practices under the umbrella term hatha yoga and that the associated results can vary widely. No scientific studies were found in the literature that examined ashtanga yoga practitioners. Fraser Watts (2000), in his recent discussion of future directions for research on yoga pointed out,

It is important to acknowledge the breadth of what is subsumed under the word 'yoga'. Research about yoga has tended to focus largely on yoga techniques. However, it is important to be clear that there is much more to yoga than a set of practical techniques. Yoga is a science and philosophy of the human person, mind and body; it is also in the fullest sense a way of life, moral as well as practical. Too often research on yoga transplants in into our consumer culture in which yoga is valued just for its immediate and practical benefits. (p. 72)

Summary

Although difficult to achieve and to measure, the literature reflects support for the positive psychological state of flow and its nine experiential qualities. Within the physical activity context there has been much more scientific study of flow as it relates to sports than to exercise. It is logical that there would be a relationship between flow and intrinsic motivation and this is supported by the literature although many questions remain about the nature of this relationship.

Yoga has become increasingly popular in the U.S. over the last several years. From a broad perspective, yoga is a very complex personal development system with many facets including a large philosophical background and a myriad of styles to approach the physical practice of postures. Ashtanga yoga offers a structured approach to the practice of yoga and can be considered a “major” form of hatha yoga from the standpoint that it (a) is a relatively old form of yoga, (b) originated in India, and (c) is practiced by a large number of people worldwide. The philosophy of yoga, in general, and the specific techniques involved in the practice of ashtanga yoga make it a potentially strong “flow activity.” Furthermore, evidence supports the potential for yoga to positively affect health-related variables. The study of flow in the context of yoga can have important implications in terms of psychological and physical health. Therefore, this study provides a foundation from which to build an understanding of the flow experiences of yoga practitioners and determine the relationship between their motivational orientations and their flow experiences. In the following chapter, the methods used in this investigation are described.

Chapter 3

Methodology

In this descriptive/exploratory study, a correlational design was used to examine the flow experiences and motivational orientations of ashtanga yoga practitioners. This chapter presents the sample and setting, measures, data collection procedures and statistical analysis strategy for this investigation.

Sample and Setting

Setting. The participants were recruited from various yoga centers around the U.S. including Louisville and Lexington, KY, Chicago, IL, Encinitas, CA, Burlington, VT, and Atlanta, GA. The sites were chosen based on their emphasis on ashtanga yoga practice as well as convenience and accessibility for the investigator.

Sample. The sample was comprised of 127 ashtanga yoga practitioners who volunteered for the study. The criteria for inclusion was (a) some prior experience with ashtanga yoga (as little as one class) and (b) age 18 or older.

Power analysis. A power analysis was run based on the most demanding test that was to be used in the statistical analysis. This was multiple linear regression with nine independent variables (age, gender, ethnicity, education, years of ashtanga experience, practice frequency, practice duration, practice format, and practice location) assessed to predict the dependent variable, trait flow associated with yoga. According to standards recommended by Cohen (1992) a medium effect size is $f^2 = 0.15$. As shown in Figure 1, in order to detect a medium effect size at an alpha level of .05 with 80% power, a sample size of 114 was needed.

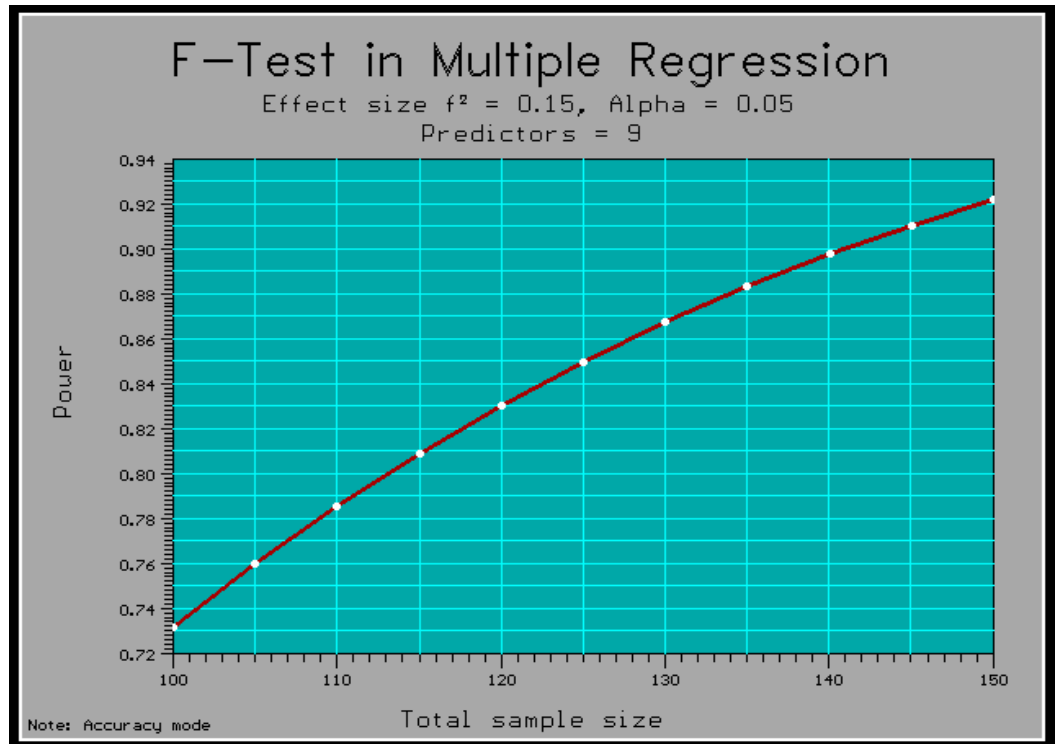


Figure 1. Power analysis of multiple regression model (9 predictors).

Measures

Table 1 summarizes the instruments used to achieve each of the five specific aims of this study and a discussion of these instruments follows.

Sociodemographics. Data was gathered on age, gender, ethnicity, and education level (Appendix A). The demographic data was used for descriptive purposes and for analyzing associations between demographic characteristics and flow experiences.

Yoga practice variables. Data was collected on the yoga practitioner's (a) yoga experience, (b) frequency of practice per week, (c) duration of practice per session, and (d) practice format and (e) practice location (Appendix B). This information was used for descriptive purposes and for analyzing associations between yoga practice variables and flow experiences.

Flow experience. Using the Flow State Scale (FFS-2) and Dispositional Flow Scale (DFS-2) three assessments of flow were collected from the yoga practitioners: (a) flow associated with a specific ashtanga yoga session; (b) flow associated with ashtanga yoga, in general; and (c) flow associated with another form of physical activity (chosen by the subjects), in general (See Appendix C for information on where to obtain the flow state scales). The Flow State Scale-2 (FSS-2) was used to measure flow associated with the ashtanga yoga session that the practitioners had just completed and the Dispositional Flow Scale-2 (DFS-2) was used to assess flow associated with ashtanga yoga, in general as well as, another activity of the subjects' choosing, in general. Jackson and Eklund (2002) have presented these two parallel scales for measuring flow—the FFS-2 to assess flow experiences within a particular event and the Dispositional Flow Scale-2 DFS-2 to assess the flow experiences associated with a particular physical activity, in general.

Table 1

Specific Aims and Their Corresponding Measures

Specific Aim	Instrument / Questionnaire
1. Describe the characteristics of the ashtanga yoga practitioners.	Demographic Information Questionnaire Yoga Practice Information Questionnaire Exercise Motivation Scale (EMS)
2. Describe the state and trait flow experiences of ashtanga yoga practitioners.	Event Experience Scale (state: FSS-2) Activity Experience Scale (trait: DFS-2)
3. Examine the relationship between yoga practitioner's flow experiences and motivational orientation.	Event Experience Scale (state: FSS-2) Activity Experience Scale (trait: DFS-2) Exercise Motivation Scale (EMS)
4. Compare the yoga practitioner's flow experiences while doing yoga with flow experiences associated with another physical activity.	Activity Experience Scale (DFS-2; completed in relation to yoga) Activity Experience Scale (DFS-2; related to another physical activity)
5. Explore the relationship between yoga practitioners' characteristics and their flow experiences.	Demographic Information Yoga Practice Information Activity Experience Scale (trait: DFS-2)

Both scales contain four items for each of the nine flow dimensions: 1) challenge-skill balance, 2) merging of action and awareness, 3) clear goals, 4) unambiguous feedback, 5) concentration on the task at hand, 6) sense of control, 7) loss of self-consciousness, 8) transformation of time, and 9) autotelic experience. The responses on the FSS-2 indicate the degree (1 = strongly disagree, 5 = strongly agree) to which each of the flow dimensions is experienced during an activity (yoga session) just completed. The responses on the DFS-2 indicate the frequency (1 = never, 5 = always) with which each flow dimension is experienced during the particular activity (yoga and another chosen physical activity), in general. The four items corresponding to each factor were averaged in order to obtain the nine flow factor scores ranging from a possible score of 1 to 5. Confirmatory factor analysis conducted by Jackson and Eklund (2002) supported the nine factor model, as well as a higher order model with a global flow factor. Additionally, reliability of both of the scales was shown to be acceptable with alphas ranging from .80 to .92 for the FSS-2 and from .78 to .86 for the DFS-2.

Exercise motivation orientation. The Exercise Motivation Scale (EMS; Appendix D) is a 31-item scale developed by Li (1999). It is designed to assess motivational orientation in the context of exercise and physical activity. The EMS is built upon the motivational framework proposed by Deci and Ryan (1985) as well as a parallel instrument designed to measure sport motivation (Pelletier, Tuson, Fortier, Vallerand, & Briere, 1995). The EMS assesses eight different factors including three types of intrinsic motivation (IM; to learn, to accomplish things, to experience sensations), four types of extrinsic motivation (EM; external, introjected, identified, and integrated regulation), and amotivation. The EMS utilizes a 6-point Likert scale ranging from 1 (Strongly Disagree)

to 6 (Strongly Agree). The total score for each of the eight factors indicates the degree to which that factor is contributing to the yoga practitioner's motivation for engaging yoga practice. The scale contains four items for each motivational dimension with the exception of amotivation which contains only three items. The average score for each of the eight motivational factors will range from 1 to 6. The following are sample items from the EMS for each of the eight factors. The subjects answered in relation to the question: "Why do you practice *ashtanga yoga*?" Intrinsic Motivation—to know, "For the satisfaction it gives me to increase my knowledge about this activity"; Intrinsic Motivation—to accomplish things, "For the pleasure of mastering this activity"; Intrinsic Motivation—to experience sensations, "For the pleasure and enjoyment that comes from how good it feels to do the activity"; External Regulation, "To comply with the expectations of others (e.g., friends)"; Introjected Regulation, "Because I would feel guilty if I did not take the time to do it"; Identified Regulation, "Because I think that exercise (yoga) allows me to feel better about myself"; Integrated Regulation, "Because it is consistent with what I value"; and Amotivation, "I have no idea."

In the development of the EMS, Li (1999) performed a series of studies and a variety of statistical analyses that showed adequate evidence for the hypothesized EMS factorial structure and nomological validity of the instrument by linking the EMS constructs to selected constructs theorized to be antecedents and consequences of motivation. The reliability of the items used to measure the eight exercise motivation subscales was shown to be acceptable with alphas ranging from .71 to .85 (mean alpha = .77).

Procedure

Data collection. Yoga studio directors and teachers were briefed regarding the study. The investigator attended classes at the various yoga studios in order to request the participation of the yoga practitioners. When individuals agreed to participate they were assured that their confidentiality would be protected and received a packet including a cover letter, and the six study questionnaires: (a) Activity Experience Scale (DFS-2; in relation to ashtanga yoga in general), (b) Event Experience Scale (FFS-2; in relation to the yoga session just completed), (c) Activity Experience Scale (DFS-2; in relation to another physical activity of the subject's own choosing), (d) Exercise Motivation Scale (EMS), (e) Yoga Practice Information, and (f) Demographics. Subjects who met the study criteria were asked to complete the first questionnaire (Activity Experience Scale; DFS-2; in relation to ashtanga yoga in general) prior to the yoga class they were about to attend. The subjects were then asked to complete the remaining questionnaires upon completion of their yoga class. It was estimated that this would take approximately 15 minutes of the subjects' time in all. The investigator collected the questionnaires.

Statistical analysis. Internal reliability of all items in the flow and motivation instruments was determined by computing Cronbach (1951) alpha coefficients. An alpha coefficient was also computed for the overall score on the flow instruments to assess the reliability of using the global state or trait flow score. To achieve Specific Aim 1 and 2 descriptive statistics (frequency, percentage, means, and standard deviation, median, range) were used. To achieve Specific Aim 3, multiple regression analysis was used. Two regression analyses were run, one with the total trait (DFS-2) score as the dependent variable and the other with the total state (FSS-2) score as the dependent

variable. The independent variables were the mean scores of each of the eight dimensions of the Exercise Motivation Scale (EMS). To achieve Specific Aim 4, paired t-tests were performed with the total trait flow scores for yoga practice paired with that of the “other” physical activity of the subjects’ choosing.

To accomplish Specific Aim 5 multiple regression was used. The global trait (DFS-2) score was the dependent variable. The nine independent variables were: (a) age, (b) ethnicity, (c) education, (d) gender, (e) years of ashtanga yoga experience, (f) frequency of practice per week, (g) length of practice per session, (h) location of practice, and (i) practice format.

Chapter 4

Results

In this chapter, a description of the sample and the results of the data analysis to accomplish the five specific aims of this study are presented. The chapter begins with a description of the socio-demographic, yoga practice characteristics, and motivational orientation of the sample which addresses Specific Aim 1. The results of the data analysis conducted to achieve Specific Aim 2, a description of subjects' state and trait flow experiences is next. This is followed by the results of the data analysis to examine the relationship between the yoga practitioners' flow experiences and motivational orientations which addresses Specific Aim 3. Next is a presentation of findings whereby yoga practitioners flow experiences while doing yoga are compared to flow experiences with another activity (Specific Aim 4). Finally, findings of an exploration of the relationship between yoga practitioner characteristics (socio-demographic and yoga practice characteristics) and their flow experiences are presented (Specific Aim 5).

Descriptive Results

Specific Aim 1: Describe the characteristics of the ashtanga yoga practitioners.

Sociodemographics.

One hundred and twenty seven ashtanga yoga practitioners from six U.S. cities – Lexington, KY, Louisville, KY, Chicago, IL, Atlanta, GA, Encinitas, CA, and Burlington, VT – participated in this study. As shown in Table 2, the largest percentage of subjects were recruited from Encinitas, CA (25.4%) followed by Atlanta, GA (21.4%).

Table 2

Subject Recruitment Sites

Variable	<i>N</i>	%
Lexington, KY	11	8.7
Louisville, KY	24	19.0
Atlanta, GA	27	21.4
Encinitas, CA	32	25.4
Burlington, VT	18	14.3
Chicago, IL	14	11.1
Total	126	

The demographic profile of the respondents is presented in Table 3. The respondents were predominantly female (72.2%). Most of them were White/Caucasian (83.1%). Almost all of the practitioners reported having at least some college education. As shown in Figure 1, over 80% of the practitioners had a bachelor's degree or beyond. The ashtanga yoga practitioners ranged in age from 23 to 64 years (mean age = 39.5 years, median age = 37 years).

Yoga practice characteristics.

A description of the subjects' level of ashtanga yoga experience and normal practice frequency, duration, and format are shown in Table 4 through Table 6. The participants' ashtanga yoga experience ranged from 1 month to 27.5 years. Half of the participants had more than 2.5 years ashtanga yoga experience (median = 2.5 years). The respondents practiced ashtanga yoga 4 times per week on average (mean = 3.89). The duration of practice per session ranged from 30 minutes to 2 hours and 45 minutes. The average length of practice session was 1 hour and 38 minutes. Subjects were asked about the percentage of time spent practicing in four different formats (led class, mysore-style class, home/personal practice, practice group). The most common practice format was led class, reported by 97 people (76% of the respondents). Eighty-one people reported spending some time in mysore class (64% of the respondents) which entails receiving individualized instruction within a group setting and is the way ashtanga yoga is traditionally taught by Sri K. Pattabhi Jois and his grandson, Sharath Rangaswamy at the Ashtanga Yoga Research Institute in Mysore, South India). Seventy people (55% of the respondents) reported that they practiced at home. A relatively small number of the participants (only 17 people) were involved in a practice group.

Table 3

Sociodemographic Characteristics of Ashtanga Yoga Practitioners

Variable	<i>N</i>	%
Race	124	
Caucasian	103	83.1
African- American	7	5.6
Hispanic	4	3.2
Asian	7	5.6
Other	3	2.4
Gender	126	
Male	35	27.8
Female	91	72.2
Education	127	
High school	1	.8
Some college	17	13.4
Associate degree	6	4.7
Bachelor's degree	40	31.5
Some graduate school	11	8.7
Master's degree	37	29.1
Professional degree	9	7.1
Doctoral degree	6	4.7

Table 3 (continued)

Sociodemographic Characteristics of Ashtanga Yoga Practitioners

Variable	<i>N</i>	%
Age	121	
20 to 29	21	17.4
30 to 39	45	37.2
40 to 49	29	24.0
50 to 59	22	18.2
60+	4	3.3

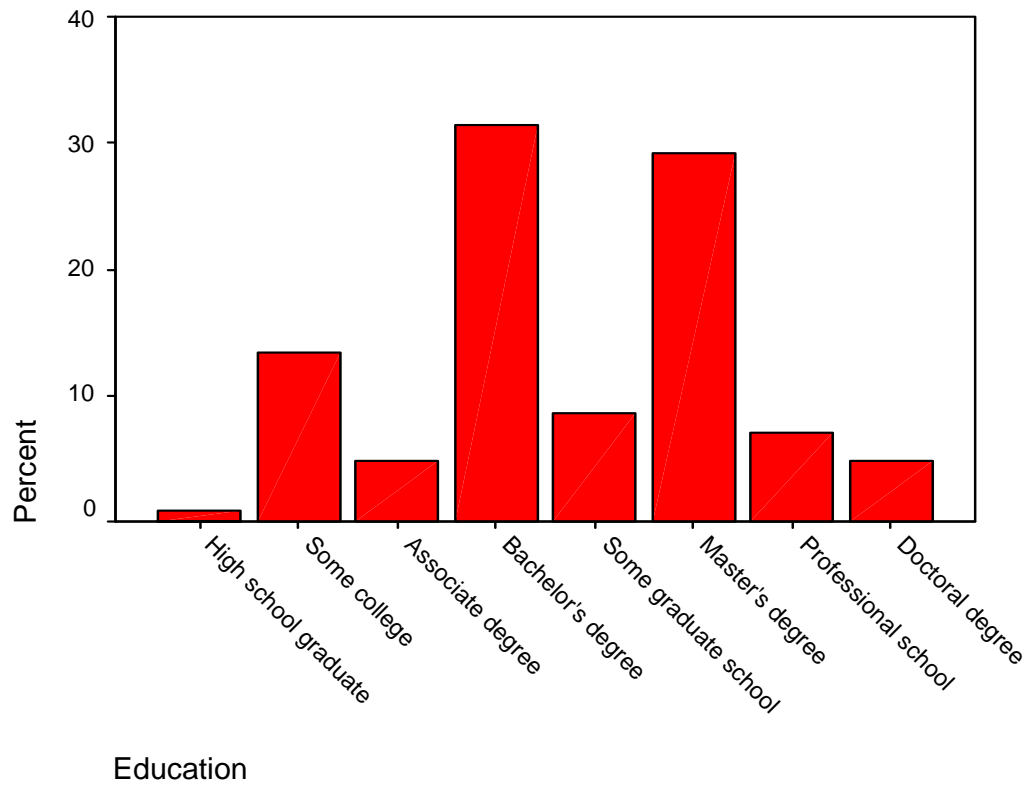


Figure 2. Education of ashantga yoga practitioners (N = 127).

Table 4

Experience Level of Ashtanga Yoga Practitioners

Variable	<i>N</i>	%
Years of Ashtanga Yoga Experience	127	
Less than 1 year	20	16
1 year to under 3 years	50	39
3 years to under 5 years	28	22
5 years to under 15 years	27	21
15 plus years	2	2

Table 5

Practice Characteristics of Ashtanga Yoga Practitioners

Variable	<i>N</i>	%
Practice Frequency	127	
1-2 days per week	23	18
3-4 days per week	55	43
5-7 days per week	49	39
Practice Duration	127	
Less than 45 minutes	2	2
45-90 minutes	64	50
More than 90 minutes	61	48
Practice Format*		
Personal/Home Practice	70	55.1
Led Class	97	76.4
Mysore Class	81	63.8
Practice Group	17	13.4

*Percents didn't add up to 100% because people reported more than one type of practice

Table 6

Means, Standard Deviations, and Ranges for Age and Yoga Practice Variables

Variable	<i>N</i>	<i>M</i>	<i>SD</i>	Range
Age	121	39.49	10.26	23-65
Yrs. of ash. experience	127	3 yr. 5mo.	3 yr. 7mo.	1 mo.–27 yr. 5 mo.
Freq. of pract. / week	127	3.89	1.5	1-7
Length of pract. / session	127	1 hr. 38 min.	22 min.	30 min.–2 hr. 15 min.

Motivational orientation.

An initial confirmatory factor analysis was performed using the statistical program Amos 4 (James L. Arbuckle, Small Waters Corporation) with the items of the Exercise Motivation Scale (EMS) in order to confirm the underlying dimensions of the construct. The goodness-of-fit measure of chi-square was not significant ($p = .08$) indicating that the yoga practitioners' data fits the proposed research model for the structure of EMS scale. In addition, the CFI (comparative fit index) of 0.978 indicated that 90% of the covariation in the data can be reproduced by the given model. Finally, the TLI (Tucker and Lewis index) of 0.95 indicated good fit. Therefore, it was concluded that the proposed 8-dimensional EMS scale could be used to study the population of ashtanga yoga practitioners. The 8 dimensions of the EMS scale are: (a) amotivation, (b) external regulation, (c) introjected regulation, (d) identified regulation, (e) integrated regulation, (f) IM (Intrinsic motivation) to learn, (g) IM to accomplish things, and (h) IM to experience sensation.

The internal consistency of items assessing each of the EMS dimensions was determined with alpha coefficients (Cronbach, 1951) and are reported along with the descriptive data in Table 7. The alpha coefficients for amotivation, IM (intrinsic motivation) to learn, IM to experience sensation are strong ($>.8$) indicating that more than 80% of the variance of the total scores on those subscales can be attributed to reliable variance. The alpha coefficients for external regulation and integrated regulation were low and will not be relevant in further statistical analysis. Because of the small sample size the .67 alpha for introjected regulation was considered adequate (Nunnally, 1978).

Table 7

Means, Standard Deviations, Ranges and Alpha Coefficients for the EMS (N = 127)

Variable	<i>M</i>	<i>SD</i>	Min	Max	Range	α
EMS (31 item scale)*						.84
Amotivation	1.29	0.57	1	4.33	3.33	.84
External regulation	1.48	0.55	1	3.25	2.25	.54
Introjected regulation	3.05	1.06	1	6	5	.67
Identified regulation	5.25	0.59	3.25	6	2.75	.71
Integrated regulation	5.09	0.58	3.5	6	2.5	.56
IM to learn	5.28	0.72	3	6	3	.86
IM to accomplish things	5.16	0.69	3	6	3	.72
IM to experience sensation	5.55	0.53	3.5	6	2.5	.84

Note. IM = Intrinsic motivation

The yoga practitioners scored highest on intrinsic motivation (IM) to experience sensation and IM to learn subscales. The average score on the exercise motivation subscales ranged from 1.29 to 5.55. Standard deviations ranged from .53 to 1.06.

The correlations among the EMS subscales are presented in Table 8. Examination of the correlation matrix (absolute values) indicated that all items from the scale were correlated $\geq .30$ with at least two other items, but no inter-item correlation exceeded $r = .7$, indicating no problems with multicollinearity. The correlations between the subscales range from $r = .029$ (for introjected regulation and amotivation) to $r = .735$ (for identified regulation and integrated regulation).

Specific Aim 2: Describe the state and trait flow experiences of ashtanga yoga practitioners.

Flow experiences.

The nine dimensions of the flow scales are: (a) challenge – skill balance, (b) merging of action and awareness, (c) clear goals, (d) unambiguous feedback, (e) concentration on the task, (f) sense of control, (g) loss of self-consciousness, (h) transformation of time, and (i) autotelic (enjoyable) experience. The internal consistency of items assessing these subscales of both the Flow State Scale (FFS-2) and the Dispositional Flow Scale (DFS-2) were determined with alpha coefficients. These results along with the means, standard deviations and ranges for both scales are shown in Table 9. The alphas for the DFS-2 and FFS-2 subscales were strong. All were .8 or higher with the exception of the autotelic experience dimension on the DFS-2 scale which was determined to be acceptable at .7. The alpha coefficients for the total DFS-2 and FFS-2 scales were .92 and .94 respectively.

Table 8

Correlations Among Exercise Motivation Subscales

	Amot.	Ext.	Intr.	Iden.	Inte.	Learn	Accom.	Ex. Sen.
Amot.	1	.30**	.03	-.34**	-.35**	-.20*	-.28**	-.32**
Ext.	.30**	1	.39**	.05	.06	-.03	-.05	-.09
Intr.	.03	.39**	1	.37**	.43**	.09	.12	.08
Iden.	-.34**	.05	.37**	1	.74**	.38**	.43**	.50**
Integ.	-.35**	.06	.43**	.74**	1	.45**	.53**	.46**
Learn	-.20*	-.03	.09	.38**	.45**	1	.53**	.62**
Accom.	-.28**	-.05	.12	.43**	.53**	.53**	1	.57**
Ex. Sen.	-.32**	-.09	.09	.50**	.46**	.62**	.57**	1

Note. * $p < .05$; ** $p < .01$. Amot. = amotivation; Ext. = external regulation; Intr. = introjected regulation; Iden. = identified regulation; Inte. = integrated regulation; Learn = intrinsic motivation to learn; Accom. = intrinsic motivation to accomplish things; Ex. Sen. = intrinsic motivation to experience sensation

Table 9

*Means, Standard Deviations, Ranges and Alphas Coefficients for the Flow Scales
(N=127)*

Questionnaire Subscale	DFS-2				FSS-2			
	<i>M</i>	<i>SD</i>	Range	<i>a</i>	<i>M</i>	<i>SD</i>	Range	<i>a</i>
Challenge-Skill Balance	3.82	.60	3.00	.78	3.87	.71	3.50	.87
Action-Awareness Merging	3.32	.60	3.00	.82	3.36	.84	3.25	.90
Clear Goals	3.91	.69	3.00	.85	4.03	.65	2.75	.88
Unambiguous Feedback	3.72	.72	3.75	.88	3.94	.74	3.75	.93
Concentration on the Task	3.60	.52	3.00	.78	3.58	.70	3.25	.83
Sense of Control	3.66	.60	3.00	.83	3.75	.69	3.00	.87
Loss of Self-Consciousness	3.82	.80	4.25	.90	3.94	.80	3.00	.86
Transformation of Time	3.63	.72	4.00	.84	3.71	.74	4.00	.85
Autotelic Experience	4.57	.43	1.50	.67	4.56	.49	2.50	.80
Total score	3.78	.40	2.00	.92	3.86	.48	2.31	.94

The mean flow subscale scores show at least moderate endorsement of all the items on both scales for the yoga practitioners as a whole. The DFS-2 and FSS-2 items mirrored each other with very similar mean scores for all dimensions. The item endorsed most strongly by the yoga practitioners was autotelic (enjoyable) experience with mean scores of 4.57 and 4.56 for the DFS-2 and FSS-2 respectively. The loss of self-consciousness and clear goals subscale were also among the top three subscales endorsed by the practitioners for both flow scales (DFS-2 and FSS-2).

The correlations among the flow subscales (DFS-2 and FSS-2) are presented in Tables 10 and Table 11. The correlation matrix for each scale indicates that all items from the scale were correlated $\geq .30$ with at least two other items, but no inter-item correlation exceeded $r = .7$, indicating no problems with multicollinearity.

Specific Aim 3: Examine the relationship between yoga practitioners' flow experience and motivational orientation (intrinsic, extrinsic, amotivation).

Relation between Flow Experiences and Motivational Orientation

To assess the independent contribution of the motivational orientation subscale scores in predicting the state and trait global flow scores two linear multiple regressions were performed. In the first regression analysis the trait global flow score (DFS-2) was the dependent variable and the total scores of each of the eight dimensions of the Exercise Motivation Scale (EMS) were independent variables. In the second regression analysis the state global flow score (FSS-2) was the dependent variable and, again, the total scores of each of the 8 EMS dimensions were the independent variables.

Table 10

Correlations Among Flow State Subscales (FSS-2)

	Chal.	Act.	Goal.	Fdbk.	Conc.	Cont.	Loss.	Tran.	Auto.
Chal.	1	.45**	.55**	.54**	.33**	.65**	.26**	.22*	.47**
Act.	.45**	1	.48**	.45**	.47**	.50**	.26**	.34**	.32**
Goal.	.55**	.48**	1	.66**	.44**	.66**	.26**	.36**	.42**
Fdbk.	.54**	.45**	.66**	1	.33**	.51**	.21*	.32**	.33**
Conc.	.33**	.47**	.44**	.33**	1	.59**	.29**	.29**	.40**
Cont.	.65**	.50**	.66**	.51**	.59**	1	.38**	.27**	.47**
Loss.	.26**	.26**	.26**	.21*	.29**	.38**	1	.22*	.27**
Tran.	.22*	.34**	.36**	.32**	.29**	.27**	.22*	1	.32**
Auto.	.47**	.32**	.42**	.33**	.40**	.47**	.27**	.32**	1

Note. * $p < .05$; ** $p < .01$. Chal. =challenge-skill balance; Act. = action-awareness merging; Goal. = clear goals; Fdbk. = unambiguous feedback; Conc. = total concentration; Cont. = sense of control; Loss. = loss of self-consciousness; Tran. = transformation of time; Auto. = autotelic (enjoyable) experience.

Table 11

Correlations Among Dispositional Flow State Subscales (DFS-2)

	Chal.	Act.	Goal.	Fdbk.	Conc.	Cont.	Loss.	Tran.	Auto.
Chal.	1	.44**	.41**	.47**	.23**	.55**	.35**	.17	.41**
Act.	.49**	1	.37**	.41**	.20*	.40**	.33**	.26**	.19*
Goal.	.41**	.37**	1	.69**	.32**	.66**	.30**	.22*	.35**
Fdbk.	.47**	.41**	.69**	1	.06	.58**	.32**	.17	.26**
Conc.	.23**	.20*	.32**	.06	1	.37**	.18*	.24**	.30**
Cont.	.55**	.40**	.66**	.58**	.37**	1	.42**	.28**	.37**
Loss.	.35**	.33**	.30**	.32**	.18*	.42**	1	.20*	.24**
Tran.	.17	.26**	.22*	.17	.24**	.28**	.20*	1	.28**
Auto.	.41**	.19*	.35**	.26**	.30**	.37**	.24**	.28**	1

Note. * $p < .05$; ** $p < .01$. Chal. = challenge-skill balance; Act. = action-awareness merging; Goal. = clear goals; Fdbk. = unambiguous feedback; Conc. = total concentration; Cont. = sense of control; Loss. = loss of self-consciousness; Tran. = transformation of time; Auto. = autotelic (enjoyable) experience.

As shown in Table 12, with DFS-2 (trait flow) as the dependent variable, the regression coefficients (B) for IM to accomplish things ($B = .164, p = .009$) and IM to experience sensation ($B = .28, p = 0.002$) are significant at the $p < .05$ level. Thus, for every one unit increase in IM to accomplish things, flow score increased an average of .164 after controlling for the other predictor variables (motivation subscales) in the regression model. Similarly, for every one unit increase in IM to experience sensation, flow score increased an average of .28 after controlling for the other motivation subscales. None of the other EMS dimensions were found to be significant predictors of the DFS-2 total score. The strength of the regression analysis expressed by R^2 was 0.275 indicating that 28% of the variance in global trait flow score was explained by the regression model.

The results of second multiple regression analysis were similar to the first. As shown in Table 13, the same two EMS subscales were found to be significant predictors for the FSS-2 total score: IM to accomplish things ($B = .198, p = .009$) and IM to experience sensation ($B = .238, p = .025$). The strength of the regression analysis expressed by R^2 was .241 indicating that 24% of the variance in global state flow score was explained by the regression model.

Residual analysis was used in order to assess the goodness of fit. Standardized residuals were plotted against the dependent variable (global DFS-2 and FSS-2 scores); there were no problems with outlying values or equal variance assumptions. Additionally, the global flow scores (dependent variable) were plotted versus each of the independent variables (EMS subscales) in the regression model. There were no violations of the assumption of linearity.

Table 12

Summary of Regression Analysis for EMS Subscales Predicting Trait Flow (N = 127)

EMS Subscale	<i>B</i>	<i>SE B</i>	β
Amotivation	.022	.065	.030
External regulation	-.030	.066	-.041
Introjected regulation	-.026	.037	-.068
Identified regulation	-.017	.083	-.025
Integrated regulation	.060	.092	.086
IM to learn	-.076	.059	-.136
IM to accomplish things	.164	.061	.280*
IM to experience sensation	.280	.086	.371*

* $p < .05$

Table 13

Summary of Regression Analysis for EMS Subscales Predicting State Flow (N = 127)

EMS Subscale	<i>B</i>	<i>SE B</i>	β
Amotivation	.049	.079	.058
External regulation	-.033	.080	-.038
Introjected regulation	-.014	.045	-.032
Identified regulation	.009	.101	.012
Integrated regulation	.045	.112	.054
IM to learn	-.015	.072	-.023
IM to accomplish things	.198	.075	.284*
IM to experience sensation	.238	.105	.264*

* $p < .05$

Specific Aim 4: Compare the subjects' flow experiences associated with yoga with flow experiences associated with another physical activity

Yoga Flow Experiences versus Flow Experience with another Physical Activity

In an exploratory analysis, a paired t-test was performed to determine if there was a significant difference between flow scores associated with yoga (DFS-2: yoga) and flow scores associated with another physical activity of study participants' own choosing (DFS: other activity). The average global yoga flow score was 3.77 and the average global "other activity" score was 3.67. The test statistic of $t_{df} = 108$ and had a value of 2.128 ($p = .036$). Thus, the global yoga flow scores were significantly higher than the flow scores associated with the "other" physical activities that subjects currently participate in or have participated in the past.

Specific Aim 5: Explore the relationship between yoga practitioner's characteristics (socio-demographic and yoga practice variables) and their flow experiences.

Relation of Yoga Practitioners' Characteristics and their Flow Experiences

Multiple regression analysis was used in order to assess the predictive capability of yoga practitioner's sociodemographic and yoga practice characteristics for flow experiences. In the linear regression model the trait global flow score (DFS-2) was the dependent variable. The independent variables were: (a) age, (b) ethnicity, (c) education, (d) gender, (e) years of ashtanga yoga experience, (f) frequency of practice per week, (g) length of practice per session, (h) location of practice, and (i) practice format. Practice format was assessed by creating a variable whereby a value of "1" was assigned to people who practice more than 50% of the time at home and/or in mysore class (i.e. they are

doing a self-directed practice more than 50% of the time) and “0” for those who do not. There were no problems with multicollinearity among the independent variables.

As shown in Table 14, the regression coefficients (B) for years of ashtanga yoga experience ($B = .036, p = .003$) and age ($B = -.082, p = .023$) were significant at the $p < .05$ level. Thus, for every one year increase in ashtanga yoga experience, flow score increased .036 after controlling for the other predictor variables in the regression model. Similarly, for every one year *decrease* in age, flow score increased .082 after controlling for the other predictor variables in the multiple regression model. The strength of the linear association expressed by R^2 was 0.14 indicating that 14% of the variance in global flow score is explained by the regression model.

Residual analysis was used in order to assess the goodness of fit of the regression models in the same manner explained for the regression analysis performed for Specific Aim 3. There were no problems with outlying values, violations of linearity, or equal-variance assumptions.

To assess whether age and years of experience of ashtanga yoga may be producing an interaction effect on flow scores another multiple regression analysis was run. The age and years of experience variables were centered by subtracting the means of these variables, leaving the deviation scores. An interaction term was then created representing the product of the “centered age” and “centered experience” variables. In this regression model the independent variables were: a) age (centered), b) years of ashtanga yoga experience (centered), c) age/experience interaction term d) ethnicity, e) education, f) gender, g) frequency of practice per week, h) length of practice per week, i) location of practice, and j) practice format. The dependent variable was trait global flow

score. The results indicated that there was no significant interaction between age (centered) and years of ashtanga yoga experience (centered).

Summary

The findings of this study were presented in this chapter to accomplish the five specific aims of the study. The analysis included a description of the ashtanga yoga practitioners including their motivational orientations and flow experiences associated with ashtanga yoga, the relation between their flow experiences and their motivational orientation, a comparison of yoga flow experiences with yoga to flow associated with another physical activity of their choosing, and the relation between yoga practitioner characteristics (socio-demographic and yoga practice variables) and their flow experiences.

The yoga practitioners were a highly educated group who demonstrated dedication to the ashtanga yoga practice. They reported strong intrinsic and self-regulated extrinsic motivation to practice ashtanga yoga. They reported experiencing flow during ashtanga yoga practice and at least moderately endorsed all nine dimensions of flow state. Higher scores on the EMS subscales of IM to accomplish things and IM to experience sensation were predictive of higher flow state for the practitioners. The respondents' yoga flow scores were significantly higher than the flow scores associated with a comparison "other" physical activity participated in currently or in the past. Finally, age and years of ashtanga yoga experience were predictive of flow experiences for this group of yoga practitioners.

Table 14

Summary of Regression Analysis for Variables Predicting Flow (N =117)

Variable	<i>B</i>	<i>SE B</i>	β
Age	-.082	.036	-.226*
Ethnicity	-.017	.035	-.044
Education	-.013	.022	-.053
Gender	.040	.087	.044
Years of ashtanga yoga experience	.036	.012	.327*
Frequency of practice per week	.006	.030	.021
Length of practice per session	-.067	.130	-.060
Practice format	.111	.084	.138
Practice location	.018	.031	.064

* $p < .05$

Chapter 5

Discussion

The purpose of this study was to examine the flow states and motivational perspectives of ashtanga yoga practitioners. This chapter presents relationships of the major findings to existing literature, limitations of the study, and implications for future research.

Descriptive Results

Sociodemographics.

A large percentage of the yoga practitioners who participated in this study were Caucasian, women from 30 to 40 years old. One predominant sociodemographic characteristic of the yoga practitioners was that they were a highly educated group. About 99% of the practitioners had some college education. The majority of the participants held either a bachelor's degree (32%) or master's degree (29%). This is not surprising given that it has been well established that education level is positively associated with physical activity, in general (King et al., 1992). Furthermore, it may be that yoga, with its' large philosophical foundation, tends to appeal to people of higher education levels who enjoy the "study" of this aspect of the discipline in addition to the physical practice of postures (asanas) and breathwork (pranayama).

Although the yoga practitioners were recruited from ashtanga yoga centers around the U.S., the sites were selected based on accessibility by the investigator and the subjects were volunteers. Thus, it is acknowledged that this sample of ashtanga yoga practitioners may differ from the true population of U.S. ashtanga yoga practitioners. In preliminary

analysis for this study it was found that the ashtanga yoga practitioners in Lexington, KY demonstrated significantly lower flow scores in comparison to the rest of the subjects however, this difference disappeared after controlling for ashtanga yoga experience. Several of the recruitment sites (Encinitas, CA, Chicago, IL, and Atlanta, GA) are U.S. ashtanga yoga “hubs” whereby highly experienced and capable ashtanga teachers reside and have built strong ashtanga yoga communities and this could bias the results of the study. In addition, it may be that ashtanga yoga practitioners may differ from practitioners of other styles of yoga. The physically rigorous and demanding nature of ashtanga yoga may be appealing to individuals who enjoy the challenge that the practice presents.

Yoga practice characteristics.

The yoga practitioners were a fairly experienced group overall with half of the practitioners having more than 2.5 years of experience. The respondents practiced ashtanga yoga on average four times per week for about an hour and a half indicating a strong commitment to their yoga practice. These statistics make a statement about the level of dedication of this sample of yoga practitioners. A question for further study is to what degree various personal and situational factors as well as flow experiences predict adherence to an ashtanga yoga practice. Baldwin (1999) has postulated that “hatha” yoga, because of its moderate intensity level may be more appealing than high intensity aerobic exercise to the majority of Americans who do not exercise regularly. Future research is needed to determine if this is the case. While the largest percentage of practitioners practiced in a led class (76%) and/or mysore class (64 %) format, the

majority (55 %) of the respondents reported having a personal (home) practice as well. Further study might assess the impact of practice format on flow experiences.

Motivational orientations.

The yoga practitioners' demonstrated a positive motivational orientation toward ashtanga yoga in ranking high all three forms of intrinsic motivation (IM)—IM to learn, IM to experience sensation, and IM to accomplish things (> 5 on a scale of 6). The highest motivational score was for IM to experience sensation indicating that the yoga practitioners are drawn strongly to the positive sensations that can be felt through the body and the senses within a yoga practice. They are also motivated to practice yoga in order to learn, explore and understand with regard to the physical and/or psychological aspects of the ashtanga yoga system as well as for the pleasure and satisfaction experienced in attempting to accomplish tasks or surpass themselves with regard to their yoga practice.

The yoga practitioners were also motivated by self-determined extrinsic reasons ranking identified regulation and integrated regulation high (> 5 on a scale of 6). Thus, the practitioners were motivated because ashtanga yoga practice was consistent with their values (integrated regulation) and because the results of the yoga practice were highly valued (identified regulation). The practitioners did not endorse the non-self-determined motivational perspectives—external regulation and introjected regulation. The lowest mean score for the EMS was for amotivation (1.29) indicating that the participants were quite motivated and very aware of their reasons for practicing ashtanga yoga. The motivational profile demonstrated by the yoga practitioners in this study is similar to what Martin and Cutler (2002) found in their study examining flow state and

motivational orientations of theater actors as well as what Kowal and Fortier (1999) found in their examination of flow state and motivational orientations of master swimmers.

Flow experiences.

The global flow scores indicate moderate endorsement for the items on the scales for the yoga practitioners as a whole with the average for the trait (dispositional) items being 3.78 and the state items being 3.86 (on a 5-point scale). Jackson et al. (2001) found similar results in their study of flow experiences among athletes with global scores of 3.68 and 3.51 for trait and state flow respectively. Martin and Cutler (2002) reported a higher global flow score (4.17) for theater actors however this may be due to a difference in the study procedure. The actors were asked to remember an optimal experience during theater which was defined as “one where you were totally absorbed in what you were doing, and which was very enjoyable” and then asked to answer the flow state scale in relation to this experience. This approach would likely yield higher flow scores than the approach used in this study of asking participants to respond to the flow questionnaire in relation to yoga, in general and/or to respond to the flow scale in relation to the specific session that the practitioner had just completed (which may or may not have been a particularly enjoyable session). Similarly, Jackson et al. (2001) had the athletes respond to the flow (state) questionnaire immediately following and in relation to a specific competitive event. This procedural difference may explain the lower mean flow scores that were found in this study and by Jackson et al. (2001) in comparison to the results of Martin and Cutler (2002).

The rank order of the nine dimensions of flow indicates that ashtanga yoga provides clear goals either ahead of time or while participants are engaged in the activity, allows individuals to be unconcerned about how they are perceived by others and, most of all is an enjoyable (autotelic) experience. In contrast, having things happen automatically and being no longer aware that one is separate from their actions appears to be less relevant for the yoga practitioners. These results are congruent with the work of Martin and Cutler (2002) and Jackson et al. (2001) who also found that clear goals and autotelic (enjoyable) experience ranked high among the flow subscales.

Relation between Flow Experience and Motivational Orientation

Of the eight motivational orientations assessed, intrinsic motivation (IM) to accomplish things and IM to experience sensation were found to be significant predictors of both state and trait flow experiences (FSS-2 and DFS-2 global scores). These two variables combined to explain 24% and 28% of the variance in state and trait flow scores, respectively. These findings converge with related studies that have also found intrinsic motivation to be predictive of (Jackson et al., 1998; Kowal & Fortier, 1999) or correlated with (Martin & Cutler, 2002) flow experiences albeit with different populations (athletes and actors). Furthermore, both Jackson et al. (2001) and Martin and Cutler (2002) found that intrinsic motivation to experience stimulation (or “sensation” as it is worded on the EMS) was most relevant to the experience of flow prompting Jackson et al. (2001) to question the relative importance of the other motivational scales. However, these findings are congruent with the work of Martin and Cutler (2002) who found flow to be significantly related to both IM to accomplish things and IM to experience stimulation (sensation). It should be noted that Martin and Cutler (2002) used a different but parallel

instrument to assess motivational orientation, the Sport Motivation Scale, with modifications in wording to apply to actors.

Yoga Flow Experiences versus Flow Experiences Associated with Another Physical Activity

In comparing the global flow scores associated with yoga in general (DFS-2) with the global flow scores associated with another physical activity of the yoga practitioners' own choosing, it was found that yoga flow scores were significantly higher than the flow scores of the "other activity." These lend preliminary support for Csikszentmihalyi's (1990) contention that yoga may be a very direct path to the experience of flow.

Futures studies are needed to more accurately assess the propensity for various activities to produce flow experiences and how the structure and nature of certain activities promote (or prevent) flow state.

Relation of Yoga Practitioners' Characteristics and their Flow Experiences

In assessing the relation of sociodemographic and yoga practice characteristics to flow experiences it was found that years of ashtanga yoga experience and age (inversely) were predictive of flow combining to explain a small (14%) percent of the variance in flow scores. Grove and Lewis (1996) also found level of experience to be related to flow state occurrence in their study of circuit weight trainers as subjects with more than six months prior experience provided higher ratings of flow than those with less than six months experience. They speculate that "prior experience facilitates flow state via (a) reducing anxiety, (b) enhancing feelings of competence, confidence and control, and/or (c) reducing the need for conscious attention on the task facilitating absorption and dissociation from surroundings (p. 387)." To speculate about the mechanism by which experience level might impact flow state in this study, it may be that with increased

experience there is an increase in skill level to meet the physical and mental demands of an ashtanga yoga practice which in turn results in more flow experienced during this activity. It should be noted that “skill level” is a term that could mean different things to different people within the context of yoga. In the flow state questionnaires it is left up to the individual to determine how they define and assess their skill level. In other words, one yoga practitioner may define skill level in terms of their ability to perform challenging yoga postures or higher series within the ashtanga yoga system whereas others would define skill level in terms of their ability to maintain the fundamentals of the ashtanga yoga practice (breath, bandhas, and drishtis) and most importantly, to know how to perform the practice in an appropriate manner given one’s individual needs. One respondent actually informed the investigator as he was turning in his questionnaire that he was grappling with the meaning of “skills” in this survey as they relate to ashtanga yoga practice.

It is unclear as to why increased age predicts reduced flow experiences. It could be that flexibility levels are reduced with increased age which results in reduced pleasure in moving the body throughout the wide range of motions associated with ashtanga yoga practice. Future studies are needed to see if these findings are replicated and if so, to determine the mechanism by which they occur.

Limitations

The findings of this study were, overall, encouraging and as expected however the exploratory and non-experimental nature of the study prevents establishing any causal relationships. The reliance on retrospective, self-report data inherently presents issues

related to the validity of the practitioners' responses. The participants' responses could have been affected by social desirability or other factors not accounted for in this study.

The results of this study are also limited by the scope of the investigation. In examining a very specific and structured style of yoga practice, the findings of this study may not transfer across other physical activities or even other styles of yoga. Although subjects were recruited from a variety of yoga studios across the U.S., their characteristics were rather homogenous--educated, Caucasian women. Given the size and nature of the sample, generalizing these findings must be done with caution.

Although the instruments used in this study were either newly revised (flow scales) or newly developed (exercise motivation scale) they demonstrated acceptable reliability level and should prove to be useful tools for future studies. A recommendation for future use of the flow scales in the yoga context would be to change the word "performing" as it is used throughout the questionnaire to "practicing" (e.g. "I was aware of how I was *performing*"). It was pointed out that, for some, the word "performing" connotes doing yoga with an exhibitionist attitude of there being an audience which is, of course, very "anti-yoga."

Similarly, in using the EMS in the yoga context, it may be more appropriate to change the word "exercise" to "practice and/or practicing yoga." This wording change may convey the recognition that yoga is more than a "workout" but rather a physical, mental and for some, spiritual, discipline. These minor changes in the wording of the questionnaires may lead to improved interpretation of the questions within the yoga context.

Implications

This descriptive investigation extends the line of research on flow in the physical activity context to yoga. The findings indicate that the ashtanga yoga practitioners do experience the nine dimensions of flow put forth by Csikszentmihalyi (1975/2000). In looking at flow experiences in relation to motivational perspectives, these findings also support the theoretical prediction that intrinsic motivation would predict flow experiences. The findings of this study converge with the results of previous research (Jackson et al., 1998; Kowal & Fortier, 1999; Martin & Cutler, 2002) based on SDT which have indicated that intrinsic motivation to experience sensation (stimulation) is particularly relevant to the experience of flow in the physical activity context.

These findings provide preliminary support for the possibility that yoga may have a strong propensity to cultivate flow experiences as compared to other physical activities. Further investigations may compare flow experience across activities (among different individuals) and among the same individuals who are involved in yoga and another physical activity.

Although the majority of Americans do not meet the recommended standards for physical activity, yoga is attracting participants at fast pace. These findings are relevant for those interested in the dynamics of motivation especially as it relates to the maintenance of a physically active lifestyle and how “enjoyment” is manifested within the context of physical activity. If yoga is shown to be an activity with a propensity to cultivate flow experiences and if yoga practice yields positive physical and psychological health benefits on par with other “traditional” forms of exercise then it may be that

individuals for whom maintaining regular physical activity is difficult will have better success complying with regular yoga practice.

Conclusion

The purpose of this descriptive study was to provide fundamental knowledge about the flow state experiences and motivational perspectives of ashtanga yoga practitioners. The findings contribute to the understanding of how motivational perspectives and yoga practitioner characteristics relate to flow states. It also provides preliminary support for the propensity flow states to occur during ashtanga yoga practice as compared other physical activities. Thus, the results of this study raise questions for future research: (a) how do flow states associated with ashtanga yoga compare to those associated with other styles of (hatha) yoga and/or other physical activities? (b) do flow experiences associated with yoga predict adherence to regular practice? and (c) how can the achievement of flow states be cultivated and/or maximized within the context of yoga or other forms of physical activity? Considering the recent rise in the number of yoga practitioners in the United States, these questions are pertinent for health and exercise psychologists concerned with understanding how to promote the maintenance of healthy and active lifestyles. Furthermore, these findings relate to the field of positive psychology and contribute to the answer of Csikszentmihalyi (1997) fundamental question related to the study of flow, “what constitutes a good life”? It appears the continued goal of understanding the optimal and enjoyable experience of flow states will elucidate the answer to this question.

APPENDIX A

Questionnaire: Demographic Information

APPENDIX A

Demographic Information

The following are questions about you. Please complete the answer or mark "X" in the line that best describes you.

1. Date of Birth: _____(Month/Day/Year)

2. Gender: 0 _____ Male 1 _____ Female

3. How far did you go in school?

1 _____ Less than high school graduate

2 _____ High school graduate

3 _____ Some College

4 _____ Associate degree

5 _____ Bachelor's degree

6 _____ Master's degree

7 _____ Professional degree

8 _____ Doctoral degree

4. What is your ethnicity?

1 _____ Caucasian

2 _____ African-American

3 _____ Hispanic

4 _____ Asian

5 _____ Native American

6 _____ Other

APPENDIX B

Questionnaire: Yoga Practice Information

APPENDIX B

Yoga Practice Information

The next questions relate to your ashtanga yoga practice.

1. How long have you been practicing ashtanga yoga? _____ years _____ months

2. How many times per week, on average, do you normally practice ashtanga yoga?

- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____
- 6 _____
- 7 _____

3. On average, how long do you practice ashtanga yoga?

1 _____ less than 45 minutes

2 _____ 45-90 minutes

3 _____ more than 90 minutes

4. What percent of the time do you practice ashtanga yoga in the following format?

_____ Personal/Home Practice

_____ Led Class

_____ Mysore Class

_____ Practice Group

Must total 100%

5. Please record the location in which you are completing this questionnaire.

_____ Yoga Studio Name

_____ City/State

APPENDIX C

Questionnaires: Flow State Scales (FFS-2 and DFS-2)

APPENDIX C

The flow state scales may be obtained from <http://www.fitinfotech.com>.

APPENDIX D

Questionnaires: Exercise Motivation Scale (EMS)

APPENDIX D

Exercise Motivation Scale

Please answer the following questions related to why you practice ashtanga yoga. There are no right or wrong answers. Read each of the statements listed below and indicate how strongly you agree or disagree with each statement by circling the appropriate response to the right of the statement.

	Why do you practice ashtanga yoga?	Strongly Disagree	Disagree	Moderately Disagree	Moderately Agree	Agree	Strongly Agree
1	For the pleasure it gives me to experience positive sensations from the activity.	1	2	3	4	5	6
2	For the satisfaction it gives me to increase my knowledge about this activity.	1	2	3	4	5	6
3	Because other people believe that it's a good idea for me to exercise.	1	2	3	4	5	6
4	Because I must exercise to feel good about myself.	1	2	3	4	5	6
5	Because I believe that regular exercise is a good way to enhance my overall development.	1	2	3	4	5	6
6	Because it is consistent with what I value.	1	2	3	4	5	6
7	I can't understand why I am doing this.	1	2	3	4	5	6
8	Because I feel pressure from others to participate.	1	2	3	4	5	6
9	Because I think that exercise allows me to feel better about myself.	1	2	3	4	5	6
10	For the pleasure I experience while learning about this activity.	1	2	3	4	5	6
11	For the satisfaction I feel when I get into the flow of this activity.	1	2	3	4	5	6
12	Because I feel I have to do it.	1	2	3	4	5	6
13	To satisfy people who want me to exercise.	1	2	3	4	5	6
14	Because exercising is an important aspect of how I perceive myself.	1	2	3	4	5	6
15	For the pleasure of understanding this activity.	1	2	3	4	5	6
16	I have no idea.	1	2	3	4	5	6

	Why do you practice ashtanga yoga?	Strongly Disagree	Disagree	Moderately Disagree	Moderately Agree	Agree	Strongly Agree
17	For the pleasure of mastering this activity.	1	2	3	4	5	6
18	Because I think it is a good thing for my personal growth.	1	2	3	4	5	6
19	For the pleasure I experience when I feel completely absorbed in the activity.	1	2	3	4	5	6
20	For the satisfaction I feel while I try to achieve my personal goals during the course of this activity.	1	2	3	4	5	6
21	Because I would feel guilty if I did not take the time to do it.	1	2	3	4	5	6
22	Because I value the way exercise allows me to make changes in my life.	1	2	3	4	5	6
23	I have no idea.	1	2	3	4	5	6
24	Because I think exercise contributes to my health.	1	2	3	4	5	6
25	To comply with expectations of others (e.g., friends).	1	2	3	4	5	6
26	For the enjoyment that comes from how good it feels to do the activity.	1	2	3	4	5	6
27	Because I enjoy the feelings of discovering more about this activity.	1	2	3	4	5	6
28	Because I enjoy the feelings of improving through participating in this activity.	1	2	3	4	5	6
29	Because I feel that changes that are taking place through exercise are becoming part of me.	1	2	3	4	5	6
30	For the pleasure I experience while trying to become the person I want to be.	1	2	3	4	5	6
31	Because I would feel ashamed if I was not doing anything to improve my current situation.	1	2	3	4	5	6

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LIFE DESIGNS YOGA-Lexington, KY
Self Employed Yoga Teacher, 2000-present

- Teaching yoga classes, workshops, private and semi-private sessions
- Offering Thai yoga bodywork sessions

CENTER FOR HEALTH SERVICES MANAGEMENT AND RESEARCH (University of Kentucky)-Lexington, Kentucky

Research Assistant, 1998

- Contributed to health-related research projects at various stages of development.
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- Performed literature searches and reviews.

GEORGETOWN COLLEGE-Georgetown, Kentucky

Adjunct Faculty Member, 1998

- Taught course: Lifetime Fitness and Wellness.

UNIVERSITY OF KENTUCKY WELLNESS PROGRAM-Lexington Kentucky

Associate Director, 1995-1997

- Solely responsible for developing and delivering health promotion programs to the University of Kentucky's community college system and cooperative extension service.
- Coordinated yearly health screenings at 17 sites.
- Implemented programs in physical fitness, weight management, and smoking cessation.
- Managed community college site coordinators and graduate assistants
- Hired, trained and supervised fitness instructors.
- Assisted with the day-to-day management and operation of the Wellness Program.

UNIVERSITY OF KENTUCKY WELLNESS PROGRAM-Lexington Kentucky
Wellness Specialist, 1990-1995

- Managed employee fitness center and fitness classes including hiring and supervising instructors and coordinating facilities and equipment.
- Developed an approach to recruiting blue collar employees into wellness programs.
- Administered health screenings and fitness assessments.
- Developed and implemented preventive back safety programs.
- Assisted in the planning and implementation of health promotion programs.

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- Implemented a “Lifestyle Program” involving fitness testing and personal training.
- Coordinated and taught group fitness programs.
- Organized special events and programs.

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- Thai Yoga Bodywork
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