HENNING, DAVID A., M.S. Predictors of Flow in Recreational Participants at a Large Group Event. (2013)
Directed by Dr. Jennifer L. Etnier. 53 pp.

The concept of "flow" as it relates to performance was first introduced and described in the 1970's by Csikszentmihalyi. When experiencing flow during a particular task, an individual is focused on and consumed with the task the individual is currently involved in. In sport and physical activity flow has been related to increased enjoyment and performance. Previous research on flow in physical activity has primarily focused on elite level athletes, however, it is expected that flow can be experienced by anyone during almost any activity. The purpose of this research was to investigate flow in recreationally active individuals and attempt to identify potential personal predictors of flow such as age and gender. The project was introduced to individuals who completed the US Marine Corps Ultimate MudRun Challenge, and interested participants filled out a consent form and questionnaire. The questionnaire included the Flow State Scale (FSS-2 Jackson, 2010) and questions about demographic information (age, race, gender). Individuals were offered soap and a washcloth as an incentive for participating.

The results demonstrated that recreational participants (n=144) experienced a significantly greater level of flow than the population means provided for the Flow State Scale (FSS-2), t (143) = 12.79, $p < .001$, in previous research. Showing that recreationally active individuals are a viable sample for conducting future research on flow. Age of participants (18-61) was not observed to be a significant predictor of flow, $p < .05$. There was however, a significant difference in flow as a function of gender, f (1,142) = 1.65, $p < .05$. When looking at the gender effects of flow, male participants

had significantly greater level of global flow. This difference was based on greater levels in five dimensions: Challenge-Skill Balance, Action-Awareness Merging, Clear Goals, Unambiguous Feedback, Sense of Control.

The results of this study may be used to inform future testing methods in flow research, designed to isolate the experience of the unique dimensions of flow. Additionally these findings can inform research in flow, in that flow can be observed in recreationally active adults of almost any age after an acute group activity. Future research could aim to reproduce these findings at different recreational group events, or even in the lab setting, and further observe the effects of the nine dimensions of flow.

PREDICTORS OF FLOW IN RECREATIONAL PARTICIPANTS AT A LARGE GROUP EVENT

by

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A Thesis Submitted to
the Faculty of The Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements of the Degree
Master of Science

Greensboro
2013

Approved by

_____
Committee Chair

To…

My advisor, Dr. Jennifer Etnier for her patience, humor,

and assistance whenever things got rough.

And, to my wife Elyse

whose unwavering love and relentless support

made all of this possible.

APPROVAL PAGE

This thesis has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

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ACKNOWLEDGEMENTS

I would first like to thank my mentor, Dr. Jennifer Etnier for making this project and the past two years immeasurably rewarding.

I also want to thank the members of my committee, Dr. Diane Gill and Dr. Lavon Williams, whose insight left-no-stone-unturned in their guidance in the design and execution of this study.

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CHAPTER I

INTRODUCTION

The concept of "flow" as it relates to performance was first introduced and described in the 1970's by Csikszentmihalyi, who outlined flow as, "the wholistic sensation present when we act with total involvement" (Csikszentmihalyi, 1975, pg. 43). When experiencing flow during a particular task, an individual is focused on and consumed with the task the individual is currently involved in. Flow is a psychological state that is linked with some form of performance/task that may be physical (e.g., sports, arts, speech) or cognitive (e.g., reading, writing, school-work). There are countless activities that can elicit these optimal experiences and they include sports, the arts, daily tasks (gardening), recreation, and even reading (Csikszentmihalyi, 1975). In his 1975 study, Csikszentmihalyi conducted interviews with individuals who are considered elite in their activities (e.g. rock climbing, chess, dance, basketball, swimming, composing, handball). Based upon the responses during the interviews, flow was characterized as being composed of various elements. The elements described in this article were used to develop the nine dimensions now used to define the experience of flow (Csikszentmihalyi, 1990, 1999). The nine dimensions are also the guiding factors used in the development and implementation of the Flow State Scales developed by Jackson and colleagues (1996, 2002).

Because flow (or being "in-the-zone" as flow is anecdotally referred to by athletes) in sport or physical activity is often associated with peak performance, most of the research on flow has used collegiate or elite-level athletes as participants. This research has most often focused on describing the experience(s) from the performer's perspective. For example, Jackson (1995) recruited twenty-eight elite athletes from seven different sports. The athletes were asked to describe the details of their flow experiences, what they remembered and what they were most aware of, as well as any specific characteristics of the experience. The researcher was not focused on describing flow, but instead, was interested in identifying factors related to the occurrence of the event, which determined whether or not the athletes achieved flow. Ten factors that help an athlete achieve flow were identified. For the most part these factors pertained to the challenge-skill balance during the activity and/or to the athlete having the proper preparation/mindset. In addition to describing factors that helped in the achievement of flow, athletes also mentioned factors that prevented flow. These factors included a general disinterest and a low level of arousal.

The second goal of Jackson's study was to identify the perceived controllability of flow. Athletes were asked whether or not they thought flow was something they (the athlete) had control over. Most (79%) of the athletes interviewed reported that they did have control over flow. Some athletes felt that they had total control of flow, stating, "I make it happen" (Jackson 1995, p.158). Athletes who perceived flow as being controllable described their perceptions of a challenge-skill balance and the importance of the proper preparation and mindset in the time period (up to 24 hours) leading up to

the activity. The athletes emphasized the importance of preparation and mindset by explaining that even a presumably minor event could impact the experience of flow. Regardless of their perceptions pertaining to controllability and frequency of flow, the athletes unanimously felt that flow is an important aspect of athletic success; to quote one of the participants, "someone who can ideally or totally control that [flow], has got a lot of power in the sport" (Jackson 1995, p. 159). In the end, of the 361 total responses provided by the athletes, 67.9% of these responses indicated that flow was viewed as controllable and 82.4% of the responses indicated that the variables that predict the experience of flow were viewed as controllable.

Studies like this have established which experiences define flow in sport performance/ physical activity. By gathering reports of the perceptions of the experiences of flow, researchers have been able to identify the athletes' perceptions of the beneficial effects of flow. The most commonly reported benefits of flow in physical activity are improved performance (Jackson, 1995), and the perception of an extremely positive (autotelic) experience. The idea of being, "totally immersed in an activity and enjoy[ing] it intensely" (Nielson, 2010, pg. 180) is something that competitive athletes, recreational exercisers, and even people engaged in everyday activities are expected to be able to achieve. But most research on the topic of flow has been conducted on elite level athletes. Although all types of individuals can experience flow during almost any activity (Csikszentmihalyi, 1975); flow in recreational exercisers has yet to get the same level of attention from researchers. The variations of settings and emotional responses to activities are part of the reason(s) that researchers need to test the general populations'

ability to achieve flow in which all participants are exposed to the same stimuli to measure perceived experiential differences.

The studies on predictors of flow conducted by Jackson (1995) and others were focused on elite level athletes, using self-reports and interviews of what being in flow "felt like" and how flow states occurred. Although interviews of elite athletes have been important to understanding the phenomenon of flow, the results are only generalizable to elite athletes. Observing the potential personal predictors that may exist for recreationally active individuals' ability to achieve flow could affect activity program development/planning and exercise tailoring across experience levels; and (with future research) could even impact academic teaching/testing strategies and managerial techniques.

In 1995, Stein et al. conducted three studies, each aimed at observing different aspects of flow. Each of the studies was conducted using individuals who were recreationally active in their activity. In the first study, the researchers recruited participants competing at a small weekend tennis tournament. Researchers measured the difference in flow experiences between individuals based upon their task or ego focus and also based upon the outcome of the tennis match. The second study was conducted in a college basketball activity course. In this study, the researchers observed the relationship(s) between challenges, boredom, and ego/task goals and flow experiences/enjoyment. In the third study, the researchers attempted to identify antecedents that lead to flow experiences in golfers over the age of 65. Although there were some statistically significant findings, the authors concluded that the results of all 3

studies were fundamentally weak due to the small sample sizes. The authors determined that although flow was observed, the measured determinants had inconsistent connections to flow depending on the activity. In particular, ego-focused individuals in the tennis study experienced less flow, while students playing basketball and who were ego-focused experienced greater flow. Thus, the mechanisms that facilitate flow for one activity may not have the same impact in all activities; but with reports of flow being similar in amounts across activities, it is likely that there are some key common variables that predict the experience of flow in physical activity.

Nearly fifteen years later, a Danish study was conducted to record flow in inactive participants during an exercise treatment (Elbe et. al., 2010). The researchers tested flow during both individual and team sports/activities in both male and female groups. In this study all subjects reported being regularly inactive for at least the last two years and were 22-46 years of age. One group of men and one group of women were randomly assigned to either play football (soccer) or complete a jogging intervention at a difficulty equivalent to playing soccer (measured by average heart rate). Another group of men either completed a strength training or interval running intervention. The researchers observed the effect of activity type on flow and worry, and also tested gender effects. The researchers reported two primary findings: first that perceived exertion did not predict flow. Second, that flow was observed in all of the regularly inactive individuals. This is an important finding because past research has used either regularly active individuals or elite athletes (Jackson, 1995; Bakker, 2011; Kimiecik & Stein, 1995; Marsh & Jackson, 1999; Young & Pain, 1999). Interestingly there were gender

differences in relation to the activity (running versus playing soccer). Males experienced greater flow while playing soccer versus running, and the opposite was seen in female participants. Greater flow was also observed in males during interval training over strength training. Another interesting finding was that each exercise intervention elicited flow in all of the inactive participants; this demonstrates that elite athletes are not the only population that report flow experiences in physical activity or sport performance. Inactive individuals can enjoy the effects of flow after a short exercise intervention of running, soccer, weight training, and/or interval running interventions.

Overview of the Problem

Flow is a very positive and rewarding psychological emotional experience that has been related to enjoyment and peak performance. Learning more about flow is important because the experience of flow may influence the happiness and overall well-being of individuals. If more is learned about flow as it relates to recreational activities, this information could benefit physical activity and exercise experiences for all individuals regardless of age, gender, and activity level.

The Elbe et al. (2010) study was among the first (along with Stein et al., 1995) to use non-elite participants to measure flow during physical activity/sport performance. Many studies examining flow have focused on elite level participants. Elite athletes have been described as being either collegiate, Olympic, and national team members; studies have also used active and retired professional athletes as participants. But there is more to learn about the experience of flow by recreational athletes. In particular, it would be beneficial to know if flow is experienced by recreational athletes participating in a self-

selected physical activity. Also, it is important to learn whether or not certain personal predictors (gender, age, previous experience) which were observed but not analyzed in previous research of elite-level athletes are related to whether recreational athletes are more or less likely to experience flow.

Purpose

In order to improve the generalizability of flow research, data needs to be collected from more diverse (age, experience level) populations. Events considered for this project were large footraces (marathons, 5-10k's, etc.), biking races, or triathlons. But these events have entry ability requirements and/or attract individuals who could be very similar (e.g. trained runners). However, there is an event that attracts over 10,000 participants from a range of ages, backgrounds, states, and physical fitness levels; the US Marine Corps Ultimate Challenge MudRun in Columbia, South Carolina. The results from a more diverse sample group than is typically used could help identify which populations are prone to achieving flow and could also influence event planning to promote flow. Flow experiences will be measured based on responses to the FSS-2. The mean scores reported by MudRun participants will be compared to a composite sample which is made up of participants from a range of activity settings including elite athletes (n=1544). The purpose of the present study is to measure flow in a recreational event, to explore differences in flow as a function of potentially relevant demographic variables, and to explore relationships between the 9 dimensions of flow. There are four main research questions:

1). Do non-elite participants performing a self-selected recreational physical activity event report flow? Early research by Csikszentmihalyi (1975) and recent research by Elbe (2010) support that flow can be experienced by elite and non-elite athletes. Flow reports will be based on each of the nine dimensions as well as a global measure of flow.

2). Does gender account for differences in experiencing flow during the event? Elbe (2010) observed gender differences in flow in relation to activity setting/type; the present study will contribute to our understanding of the effects gender may have on flow. It is likely that there will be gender differences, however based on the 2010 Elbe study it is unclear as to what the differences might be.

3). Does age have an impact on flow experiences during the event? Considering the existing research, flow can be experienced at any age (Stein et al., 1995), but age has yet to be considered as a variable influencing flow based on activity. Stein and colleagues researched flow in participants ranging from 18-65+ but aside from a brief mention, age was not considered in the analysis or comparisons of participants. Even though flow can be experienced at any age, given the importance of the challenge/skill balance to the experience of flow, it is likely that due to the difficulty of the event, older participants may have a greater difficulty completing the event. Therefore age may negatively influence the experience of flow in participants in this event.

4). Csikszentmihalyi and Jackson (1999) identified that flow occurs when skills are tested at a level that is not too difficult, or too easy. Other than the challenge-skill balance, the autotelic experience dimension of flow has been recognized (Csikszentmihalyi, 1975) as being integral to flow. The relationships between each of the nine dimensions of flow,

measured by the FSS-2 will be considered as will the relationships between each of the nine dimensions and overall flow and perceived flow. Sources of variance will also be considered to determine which, if any, of the dimensions has the most impact on experiencing flow. Based on the existing literature, it is expected that the challenge-skill balance and autotelic experience will account for a majority of the variance, compared to the other seven dimensions.

The study will also include exploratory measures to see if they predict flow. These are: performance (time to finish), team type as determined by the event (all male, all female, co-ed, military, Junior Officer Reserve Corps (JROTC), corporate, homeland heroes), and past experience with the event. These exploratory measures may provide valuable information regarding predictors of flow, but lack research-based support to formulate formal hypotheses.

CHAPTER II

EXTENDED LITERATURE REVIEW

Flow has been described as a state of consciousness, which is desirable for competitive athletes, recreational exercisers, and even people engaged in everyday activities and while working. Specifically, flow is defined by Csikszentmihalyi (1975) as the holistic sensation felt when one acts with complete involvement in a variety of activities (play and/or other enjoyable situations). The experiences, felt while in flow during an activity, are unified from one moment to the next. While in flow one is in full control of one's actions, "there is little distinction between self and environment; between stimulus and response; or between past, present and future." (Csikszentmihalyi, 1975, p. 43). Flow is thought to be desirable in a variety of settings because when the mind and body are working together in an ideal state of synchronization, performance is expected to improve. Experiencing flow is also related to positive emotional responses after the activity. These positive (autotelic) experiences can impact a desire to continue the activity (adherence) as well as a desire to continue improving skills in the activity, when applicable.

In 1985, Csikszentmihalyi and Massimini described a method created to measure flow experiences in daily life/activities, the experience sampling method (ESM). This technique for measuring flow requires a participant to carry a pager and complete a

provided questionnaire whenever alerted. Results showed that individuals were happiest when their skills and daily challenges were in balance. This finding of the challenge/skill balance as a source of happiness is related to, but not equivalent to flow. This study provided an introduction to the ESM as a viable technique to measure happiness and flow in daily life. The results of the study served as a forum for authors to describe their philosophical beliefs about flow and cognition. The integral concept is that of challenge skill balance as a predictor of both flow and overall happiness in daily life activities.

Flow in sport is a unique and subjective experience, which makes it difficult to measure. Jackson (1995) investigated which factors influence the experience of flow in elite level athletes. Subjects were 28 elite athletes (14 male, 14 female) from Australia and New Zealand. The athletes participated in seven sports, four subjects per sport. Jackson asked the athletes about their experiences and whether or not the athlete was in control of the factors that influenced the experience of flow. Jackson interviewed the elite athletes asking them to describe a time in which they were in flow as well as asking them questions regarding the specific dimensions of flow. Questions focused on the factors that help athletes achieve flow and those that hinder (prevent or decrease the likelihood of) or disrupt (interrupt) flow. The results of the interview process yielded multiple factors/dimensions, which were facilitating of flow, hindered/prevented flow, or were disrupting of flow. The factors that made up the three topics were mostly reported to be controllable by the athlete. Uncontrollable environmental factors (e.g., weather, spectators.) were also reported to contribute to flow, however, personally controllable factors were reported to have much more of an influence on whether or not flow was

experienced.

Kimiecik and Stein (1992) examined the methods that had been used in previous research to record athletes' subjective experiences during their sport/activity, and to observe the quality of flow. According to their findings, one of the barriers of studying flow is its elusive nature. Many elite level athletes will report being "in the zone" (which was equated to having a flow experience) but they also report that it does not occur every time they are involved in the activity or that it may occur during practice but not during competition. Some athletes report that they "chase" flow as it is related to extremely positive emotions, experiences, and performances. In their review, Kimiecik and Stein identified and discussed methodological and conceptual concerns in conducting flow research in the field of sport and exercise. Through their review, they found that both qualitative (interviews) and quantitative (questionnaire) measures had been used to demonstrate that when flow states occur there is interplay of the structure of the event/activity and the person's ability. Researchers observed that there is a difference in flow in athletes who participate in either task-focused or ego-focused activities. The researchers deemed that it was uncertain whether the difference was in the individual or resulted from the emphasis within the activity. In general, those participating in task-focused activities tend to have clearer goals and feedback (completion of a task) versus those who are participating in tasks that are ego-focused and, hence, are more concerned about their individual success. In addition, those who were task focused were also more likely to experience flow. The authors concluded that ego-focused individuals *can* experience flow and that flow can be experienced in ego-focused activities, but they

suggested that flow is less likely because the activity and the mindset are less nurturing of flow. Kimiecik and Stein (1992) considered that this is because ego-focused individuals/activities more likely produce psychological states that counter flow. Feelings of either anxiety or boredom relate to the skill of the individual and their competition and are not considered to produce either optimal experiences or performance.

The research focus on flow in sport has been on the experiences of elite level athletes, when conceptually it is expected that flow is a universal experience that can be experienced by almost anyone, during any activity, and at any skill level. Elite athletes have more experience in their given field which promotes an environment in which they are comfortable discussing previous flow state experience(s). However, these results may not be accurately generalizable to recreational exercisers/competitors.

In 1995, Stein and colleagues reported on three studies. In the first study, the researchers measured and observed flow experiences in 44 adult recreationally-competitive tennis players. The participants were competing in a first-round match at a local tennis tournament; data were collected in the form of pre- and post-match questionnaires. Flow was measured using a scale that used the then eight dimensions of flow; each dimension had a corresponding question to assess the level of flow experienced. Based on the results, the researchers divided the responses into two groups; flow achieved or flow not achieved. A simple median split of flow responses determined the groups. The researchers found that the individuals who achieved flow had greater satisfaction with their performance than those who did not achieve flow (Stein, Kimiecik, Daniels, & Jackson, 1995). Interestingly, there was little difference in the enjoyment of

the experience between the groups, even though those who achieved flow won more matches than they lost.

The goal of the two additional studies was to observe the relationship between goals and flow observed in three groups involved in different activities: tennis players, basketball players, and golfers. The researchers examined the relationship to flow of two separate constructs: individual motivation/goals and activity environment. In the second study, the researchers observed the experiences of students (ages 19-24) in a college basketball class. The researchers distributed a questionnaire approximately once a week at random times during the class. The questionnaire was a modified version of the questionnaire used as part of the Csikszentmihalyi (1985) study, and was administered using the experience sampling method (ESM). In this case, the researcher acted as the beeper and interrupted the activity to gather data during the activity. Participant debriefing indicated that filling out the forms was not bothersome.

When playing basketball, some individuals reported that they need competition to "fuel" their motivation and to determine their goals by comparing their performance to that of others in order to get the feedback required to enjoy the activity and achieve flow. This was often the case for participants playing basketball. In this case those who were more ego-focused experienced flow, rather than their ego-focus impeding flow. Researchers believed that this was due to the nature/goals of the activity and the environment of the activity. While playing basketball, success was reported based directly on performance against other students. Playing basketball in a class setting, the

feedback and performance/implementation of skills learned competitively (ego-focused) provided an environment that facilitated flow.

In the third study, the researchers reported on a study with golfers. The golfers (n=17) were an average of 65 years old, had been playing golf for an average of 35 years and were playing several times a week at the time of the study. They chose golf for this study because the natural breaks in action between holes allowed researchers to administer a questionnaire before and after each hole without disrupting the participant's typical experience. In this study, the researchers observed psychological antecedents of flow (confidence and competence) by asking questions before and after each hole. The findings of this particular study were non-significant for perceived confidence as a predictor of flow. Confidence levels were identified as having a relationship with flow, this finding however, was weak and the researchers did not draw any conclusions with regards to this effect.

In 2012, Ullen and colleagues set out to determine if there were particular traits that people had that would make them more or less likely to experience flow throughout their day-to-day lives. They conducted the study using two separate samples; sample 1 (college students aged 19-49) was recruited through responses to posters and sample 2 consisted of twins aged 51-68 years. In this study, flow experiences were identified in three domains of daily life: work, household chores, and leisure. The researchers used the five-factor personality model (Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism) and a measure of general intelligence to investigate their associations with flow proneness. For this study, flow proneness was described and

measured as the likelihood of an individual experiencing flow. Flow proneness was measured using the Swedish Flow Proneness Questionnaire (SFPQ), which was designed for this study. The SFPQ asked questions regarding the participants' experiences at play/leisure time, at work, and while doing daily household chores. Each of the questions of the SFPQ were designed to capture the main flow dimensions, each of the three domains were measured individually and were also combined for a global measure of flow proneness. The researchers hypothesized that there would be a negative relationship between neuroticism and flow proneness while a positive relationship would exist between flow proneness and measures of intelligence (concentration and working memory). Findings supported the hypothesis that those who had higher levels of neuroticism and lower levels of conscientiousness experienced flow less often in their daily lives. None of the other "big-five" elements of personality (openness, extraversion, agreeableness) were related to flow. As for intelligence, neither sample showed a statistically significant relationship between the measures of flow proneness and intelligence. This study highlights that there are individual personality differences in people, which make them more or less likely to report flow throughout the different environments in which flow can be experienced.

Nielson and Cleal (2010) designed a study to identify workplace predictors of flow. By administering a questionnaire (using the ESM), the researchers asked subjects about workplace activities that were considered to elicit flow (brainstorming, planning, problem solving, and evaluation). They were also asked to describe how these activities related to dimensions of flow (i.e., activity, role clarity, cognitive demands, influence).

The flow measures used in this study were based upon the pre-existing nine dimensions of flow. The researchers were able to measure workplace experiences of flow in line managers who were responsible for between 4 and 30 employees. The managers either worked in elderly care facilities (*n*=28) or in accountancy firms (*n*=30). One of the findings of the study was the difference in flow as a function of profession. Managers who worked in elderly care experienced greater levels and frequency of flow than those who worked in accountancy firms. The researchers determined that this might have been due to the higher level of daily variability in the elderly care positions; compared to the more stable environment experienced by the accountancy firm managers. Managers in both fields did experience flow. Flow was reported when the managers were engaged in higher level of cognitive excitement/involvement like problem solving, planning, and evaluation. Specifically flow was experienced most when the task was perceived as offering a challenge, which tested the skills of the employee and/or required a greater amount of effort. Simple or tedious tasks resulted in much lower levels of flow in managers. If flow is valuable to an employer, than the work environment/ tasks should be variable and mentally challenging, as long as the employee is trained well enough to accomplish the task at hand.

Measures of Flow in Sport

As previously described, flow is an optimal psychological state in which the individual is totally involved in an activity and has a significant positive reaction due to the experience. The subjective experience of a complex cognitive state is difficult for individuals to describe which contributes to the challenges with measuring flow.

Additionally, to achieve flow, the individual must participate in some form of activity but there is no guarantee that flow will be experienced.

In 1996, Jackson and Marsh validated their Flow State Scale (FSS). The FSS measures an individual's experience on nine dimensions of flow that had been identified in previous research and reports (Csikszentmihalyi 1975, Csikszentmihalyi 1990, Jackson 1996, Csikszentmihalyi & Jackson 1999): 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 (Jackson 1996). One of the goals of developing the FSS was to provide a fast and accurate assessment of flow that could be used as close as possible to when flow occurs; thus making it possible to gain a better understanding of flow and how it is related to various other psychological constructs. To validate the FSS, researchers distributed the questionnaire to 394 athletes from 38 different nationalities. Participants were active in 41 different sports at various abilities but each had at least five years' experience in that sport. When responding, athletes were asked to recall a time in which they had optimal performance paired with a high level of focus and enjoyment. All responses were in the form of a five-point Likert scale. Utilizing first the pilot FSS, which was a 56-item measure, the researchers, were able to identify the most crucial items and shortened the questionnaire to 36 items without impacting reliability (each of the 9 dimensions were at or above 0.8).

There are many reliable and validated measures of flow, several of which are based on Jackson's FSS (Jackson, 1996) and others are simply adjusted to be language or

activity specific. In 2002, Jackson and Eklund updated the FSS and developed the Flow-State Scale 2 (FSS-2) and the Dispositional Flow Scale-2 (DFS-2) that showed consistent factor loading across samples (Jackson & Eklund, 2002). The update was primarily focused on the phrasing of the questions to observe flow based on the most recent activity rather than reporting based on past experiences. The difference between the FSS-2 and the DFS-2 is that the FSS-2 provides data relevant to state experiences, that is, events that were recently experienced. The DFS-2 provides information relevant to characteristic traits and previous experiences. These measures closely reflect the nine dimensions of flow by asking multiple questions pertinent to each dimension, as well as being written specifically to relate to the field of physical activity/sport involvement.

Determinants of Flow in Athletes

Many athletes struggle to achieve a flow-state and some have experienced burnout while "chasing" the feeling of "being in the zone" as flow is often described (Kimiecik & Jackson, 2002). "Winning" or "doing your best" is an integral element of sport and motivation for athletes. Flow has been connected with higher levels of performance (Bakker et al., 2011), which would increase chances of winning and/or peak performance. There have been many training methods that attempt to increase flow-state experiences, or to get athletes "in the zone". Bakker et al. (2011) studied factors that may result in flow. This study focused on three factors that they predicted would elicit flow: autonomy, social support (from the coach), and performance feedback. All three elements were recorded on a 1-to-5 scale for both competitions (the results of the matches were also gathered as losses, draws, or wins) and practices, and were recorded using the

FSS. The researchers measured both the athletes' reports of flow experiences as well as the coach's observations of flow states in the athletes they were coaching. Based on the responses, there was a positive relationship between the coach's observations of flow and the reports of the athletes. But most interesting was the relationship between flow and the result of the game. The researchers found that flow across the team was higher when the game resulted in a draw, where losses and wins were not significantly related to experiencing flow. Bakker et al. suggested that this phenomenon relates to the challenge-skill balance dimension of flow because games that resulted in a draw offered a challenge that was ideal for eliciting flow. If the competition is too easy the athletes may fail to be faced with a challenge to test their skill and performance and, hence, would be unlikely to experience flow. On the other hand, if the competition (challenge) is too difficult, for a player's skills, performance is likely to decrease or at least the experience will not be viewed as a positive one.

According to Jackson (1995), the autotelic experience is a reliable predictor/component of the experience of flow, along with the challenge-skill balance. These two dimensions have been linked most closely with flow. When researching the autotelic experience and flow, it was important for the researchers to focus the subjects on how they felt during the game in order to reduce the impact of the result of the game on their recall. The researchers found that the positive emotional outcomes that are associated with the experience of flow promoted the athletes to continue working harder as a team and focus on positive outcomes (having fun, working together, not giving up) rather than the negative consequences (losing, errors).

Aherne and colleagues' (2011) study focused on specific training interventions to achieve flow and compared the effectiveness of mindfulness training to standard psychological or cognitive methods of achieving flow as well as improving performance. Athletes in the experimental group (n=6) were led via audio through four different mindfulness exercises, while the control group (n=7) continued with their regular athletic training. A measure of mindfulness was gathered at baseline for both groups using the Cognitive and Affective Mindfulness Scale-Revised (CAMS-R). The mindfulness training included "breath", "breath and body", "standing yoga" and "body scan". Significant main effects were observed when comparing the change from baseline to follow-up in the experimental group to that change in the control group. The increase in FSS-2 scores was large (p<.01, d =1.56) for the experimental group, but nonsignificant (p>.05) for the control group. Although overall flow was improved, two dimensions of flow were shown to have a much greater level of improvement: clear goals and sense of control. Mindfulness training has been shown to improve attentional and cognitive skills. By having keener self-regulation of attention skills, more mindful individuals can have a greater awareness of their goals; this relates to research done by Bishop et al. (2004), which observed a direct relationship between mindfulness and the self-regulation of attention

Predictors of Flow From Non-Elite Athletes

The research that has been done to identify predictors of flow has had a few main focuses. First, many have relied heavily on data from elite athletes (Bakker 2011, Jackson 1995, Kimiecik & Stein 1992, Marsh & Jackson 1999, Young & Pain 1999).

Second, when observing flow, researchers have identified the impact of different environments/activities (Bakker, 2011; Elbe, 2010; Stein et al., 1995). Additionally, researchers have looked at factors that impact the onset, interruption, and/or impedance of flow (Aherne, 2011; Jackson, 1995; Martin 2008; Moneta & Csikszentmihalyi, 1996; Stein et al., 1995). These studies have been important in establishing predictors and identifying factors of flow for elite athletes. However, only two studies have been completed using non-elite samples to study flow in physical activity (Elbe, 2010; Stein et al., 1995). Further, although one study has tested the effects of personality on the experience of flow (Kimiecik 1992), there has been little to no observation on the potential effects that demographics (age, gender, race) may have on the experience of flow. This study will be designed to identify demographic factors that are related to the experience of flow in recreational athletes.

Based upon the existing research, it is expected that recreationally active individuals will experience flow through their experience in a large group event. It is also expected that there will be differences in reports of flow based on demographic factor(s). The findings from this study may have possible implications for designing future research on the topic of flow in physical activity. The results may also influence exercise routines, in both private and public settings to incorporate flow, which may lead to an increase in the various benefits of physical activity.

CHAPTER III

METHODS

Participants

The participants of this study were individuals who completed the United States Marine Corps Ultimate Challenge Mud Run. This event attracts over 10,000 participants from a range of different ages, races, backgrounds and fitness levels. In this study the researcher planned to get results from at least 100 individual participants but was prepared for more. The event is a 6.2-mile outdoor obstacle course containing 36 obstacles that include mud holes, walls, trenches, and more that require swimming, crawling, climbing, and jumping. Each obstacle must be completed as a team. In order to maintain safety and provide information for participants, a trained marine supervises each obstacle which. Although there is a competitive element to the event, the focus and motivation provided by the event coordinators is the goal of completion "…you will find the point where you think you can't go any further and you will push on. When you cross the finish line your sense of accomplishment and pride will be with you forever!" Participation in this study was voluntary and individuals were invited to participate after they had crossed the finish line. To help ensure that participants could accurately reflect upon their experience during the run, individuals began the questionnaire as soon as possible after crossing the finish line.

Procedure

The first step was to introduce the study and offer a bar of soap and washcloth as an incentive for participation in the study. Interested participants were given a consent form to sign. Once consent was obtained, the researcher administered the survey, the *MudRun Experience Questionnaire* (MREQ), which was made-up of a general demographic/experience section and the Flow-State Scale-2 (FSS-2) (Jackson, 2002), and questions designed specifically for this study/event. The survey was administered manually if the participant's hands were clean of mud, but, if necessary, the research team filled out the form for the participant who provided answers orally.

Measures

The MREQ (see Appendix A) contains questions relating specifically to the event and to the participant's experience as part of a team. The MREQ also obtained general demographic and competitor information for each participant: age, race, gender, team type (as determined by the event) performance (time to complete course), the length of time since finishing the run, and state of residency. The event coordinator also requested that we ask subjects what their motivation for participation was.

The Flow-State Scale-2 (FSS-2) (M=0.83/r=0.74) (Jackson & Eklund, 1996) is a 36-point, 1-5 Likert (5=strongly agree) questionnaire that provides both a global flow rating as well as a rating for each of the nine dimensions of flow (see Appendix). There are four unique questions for each of the nine dimensions of flow, and the means for each dimension combined provides a global measure of flow. Flow is determined by scores are at or above 4. In 1996, Jackson and Eklund conducted two concurrent studies to

establish and validate the FSS-2 and DFS-2. In the first study, they determined the goodness of fit of the questions (whether the items on the questionnaire were appropriate) and established strong item identification and cross validation (90% confidence intervals for each dimension ranging from 0.038-0.059). In the second study, 897 participants either responded to the FSS-2 (*n*=449) or DFS-2 (*n*=584). The statistical analysis of the results provided reliability estimates for each of the 9 dimensions of both measures. Overall the reliability measures for the FSS-2 ranged from 0.80-0.92 with a mean of 0.87; for the DFS-2 reliability measures ranged from 0.78-0.86 with a mean of 0.82.

Statistical Analysis

Flow reported by the results of the FSS-2 were analyzed using a single-sample t-test to relate the results to the means from a composite sample of physically active participants (n=1544) (Jackson et al., 2010). This is to assess the extent to which recreational athletes experience flow relative to data reported on a composite group of elite and recreational athletes (hypothesis 1). To analyze the effects of gender on flow (hypothesis 2), a between-subjects analysis of variance (ANOVA) was used for the global measure of flow and a multivariate ANOVA was used for the 9 dimensions of flow. Simple regression was used to analyze age as a predictor of flow (hypothesis 3). Correlations reported the relationships between the nine dimensions of flow, and a regression analyses was used to identify which of the nine dimensions had a greater impact on overall flow (hypothesis 4). Whether time to complete the event (performance) was a predictor of flow or not was determined utilizing regression analysis. Differences in flow as a function of team-type were analyzed using ANOVA.

The effect of past experience on flow was examined in two ways. First, previous experience participating in this event was categorized as “first time” or “having previous experience” and the effect on flow was tested using an independent samples t-test. Second, for those who had participated in this event previously, the number of years of participation was tested as a predictor of flow using regression.

CHAPTER IV

RESULTS

The Ultimate Challenge MudRun attracts over 10,000 participants, from these participants 144 individuals participated in the study and filled-out the questionnaire (99 male, 45 female) with ages ranging from 18 to 61 with a mean age of 31. See Table 1 for demographic information. Reliability was established for each of the dimensions of flow with Cronbach's alpha values all above 0.75 (See Table 2).

Table 1

Sample Data

	Frequency	Percent
Race / Ethnicity		
Asian / Pacific Islander	6	4.2
Black / African American	6	4.2
Hispanic/Latino	4	2.8
Native American	1	0.7
Other	1	0.7
White/Caucasian	126	87.4
Total	144	100.0

Team Type		
All-Female	10	6.9
All-Male	31	21.5
Co-Ed	88	61.1
Corporate	6	4.2
Homeland Heroes	1	0.7
Military	8	5.6
Total	144	100.0
Times Previously Participated		
0	98	68.1
1	18	12.5
2	12	8.3
3	7	4.9
4	7	4.9
7	1	0.7
8	1	0.7
Sample Total	144	100.0

Table 2

Reliability Statistics

Factor	Cronbach's	N of Items
Flow	.930	36
Balance	.929	4
Merging	.796	4
Goals	.757	4
Feedback	.870	4
Concentration	.839	4
Control	.871	4
Consciousness	.807	4
Time	.803	4
Autotelic	.841	4

Primary Analysis

Single-sample t-tests were conducted to compare the reported scores from this study with those reported by Jackson (2010) which were considered to represent normative data for physically active individuals, including elite athletes (n=1544). After making Bonferoni corrections for the multiple tests so that alpha = .05/10=.005 results showed that the MudRun participants experienced significantly greater levels of flow expressed both by each individual dimension and by global flow (t's (143) = 5.91-12.79, p's < .001) as compared to mean scores for physically active individuals (See Table 3).

Table 3

Means and Standard Deviations for the sample used in this study (MudRun) and the composite sample data reported in Jackson, 2010 (FSS-2)

	MudRun Mean	MudRun SD	FSS-2 Mean	FSS-2 SD
Balance	4.17	0.61	3.68	0.68
Merging	4.09	0.63	3.48	0.85
Goals	4.34	0.51	4.01	0.64
Feedback	4.16	0.59	3.87	0.65
Concentration	4.20	0.65	3.71	0.81
Control	4.12	0.70	3.72	0.76
Consciousness	4.37	0.69	3.87	0.91
Time	3.85	0.79	3.44	0.81
Autotelic	4.55	0.52	4.02	0.78
Flow	4.21	0.43	3.75	0.50

There were significant differences in global flow as a function of gender, F (1, 142) = 9.546, $p < .005$, with male participants experiencing significantly greater flow. Significant differences were also observed in several (but not all) dimensions of flow as a function of gender based on multivariate testing, F (9,134)=3.24, p=.001. The difference in flow by gender was due to significant differences ($p<.05$) in five dimensions: Challenge-Skill Balance, F(1,142)=8.613, Action-Awareness Merging, F(1,142)=10.909, Clear Goals, F(1,142)=10.969, Unambiguous Feedback, F(1,142)=8.418, and Sense of Control, F(1,142) =20.873. In all cases, flow in these dimensions was significantly higher for men than for women. There were no significant differences ($p>.05$) in the other four dimensions: Concentration on the task at hand, F(1,142)=2.028), Loss of Self-Consciousness, F(1,142) =0.355, Time transformation, F(1,142)=0.021, Autotelic

Experience, $F(1,142)=0.181$. Perceived flow did not differ as a function of gender, $F(1,142)=.002$, $p>.05$ (see Table 4).

Table 4

Gender Differences

Dependent Variable	Male Mean	Male Std. Dev.	Female Mean	Female Std. Dev.
balance	4.27*	.60	3.96	.60
merging	4.2*	.59	3.84	.66
goals	4.23*	.49	4.13	.51
feedback	4.26*	.61	3.96	.51
concentration	4.26	.65	4.09	.65
control	4.29*	.63	3.75	.72
consciousness	4.39	.61	4.32	.86
time	3.85	.84	3.87	.70
autotelic	4.57	.55	4.83	.45
flow	4.28*	.43	4.05	.39
perceived flow	4.05	.85	4.04	.80

* Difference is significant at the .05 level (2-tailed)

The second hypothesis was that age would be predictive of flow. Due to the intense nature of the event, it was suspected that older participants might find the course more physically difficult which would lead to lower likelihood of achieving flow. However, age was not a significant predictor of flow, $F(1,142)=0.22$, $R^2=.002$, $p > .05$ or perceived flow, $F(1,142)=0.120$, $R^2=.001$.

Based on the results of correlation analyses, positive relationships were reported between almost all of the nine dimensions (see Table 5) and between all 9 dimensions and both global flow (as expected because global flow is a composite of the 9

dimensions) and perceived flow. The only dimension that did not have a significant relationship with all of the other dimensions, was time transformation (p >.05); this dimension only had a significant relationship to global flow, the autotelic experience, and perceived flow. Based on correlations, perceived flow was significantly related to actual flow and to all of the nine dimensions except feedback, p < .05, with r-values ranging from 0.11-0.51.

The results of a regression analysis indicated that the autotelic and challenge-skill balance dimensions were not, in fact, the most significant predictors of flow. Instead, results showed that control accounted for most of the variance (68%), with concentration (13%) and the autotelic experience (6%) being the second and third strongest predictors; and the other six dimensions combining to account for just over 12% of the variance in global flow (see Table 6). Although some of the dimensions only accounted for a small proportion of overall flow, all dimensions were statistically significant predictors, and most of the dimensions were significantly related to one-another (see Table 5).

Table 5

Correlations Amongst Perceived Flow, Global Flow, and Flow Dimensions

		a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
Perceived Flow-a.	Pearson Correlation											
Flow-b.	Pearson Correlation	.440**										
Balance-c.	Pearson Correlation	.338**	.754**									
Merging-d.	Pearson Correlation	.338**	.782**	.608**								
Goals-e.	Pearson Correlation	.211*	.754**	.544**	.544**							
Feedback-f.	Pearson Correlation	.114	.658**	.523**	.438**	.611**						
Concentration-g.	Pearson Correlation	.448**	.798**	.514**	.612**	.565**	.500**					
Control-h.	Pearson Correlation	.299**	.825**	.680**	.671**	.637**	.576**	.622**				
Consciousness-i.	Pearson Correlation	.181*	.628**	.325**	.427**	.431**	.270**	.483**	.454**			
Time-j.	Pearson Correlation	.257**	.312**	.035	.159	.004	-.038	.143	.060	.059		
Autotelic-k.	Pearson Correlation	.512**	.636**	.478**	.338**	.443**	.263**	.474**	.379**	.372**	.256**	

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed). N=144 for all Dimensions, Flow, and Perceived Flow

Table 6

Model Summary

Predictors	df1	df2	F Change	P	R Square Change	R Square	B	Beta
a.	1	142	303.492	.000	.681	.681	.111	.182
b.	1	141	100.403	.000	.133	.814	.111	.170
c.	1	140	64.670	.000	.059	.873	.111	.135
d.	1	139	58.970	.000	.038	.911	.111	.164
e.	1	138	44.413	.000	.022	.932	.111	.155
f.	1	137	88.862	.000	.027	.959	.111	.206
g.	1	136	168.017	.000	.023	.982	.111	.181
h.	1	135	183.652	.000	.011	.992	.111	.159
i.	1	134	912872.013	.000	.008	1.000	.111	.133

a. Predictors: (Constant), control
b. Predictors: (Constant), control, concentration
c. Predictors: (Constant), control, concentration, autotelic
d. Predictors: (Constant), control, concentration, autotelic, merging
e. Predictors: (Constant), control, concentration, autotelic, merging, feedback
f. Predictors: (Constant), control, concentration, autotelic, merging, feedback, time
g. Predictors: (Constant), control, concentration, autotelic, merging, feedback, time, consciousness
h. Predictors: (Constant), control, concentration, autotelic, merging, feedback, time, consciousness, balance
i. Predictors: (Constant), control, concentration, autotelic, merging, feedback, time, consciousness, balance, goals

Secondary Analysis

The results of an ANOVA demonstrated that there was not a significant difference in flow as a function of Team-Type, F (1, 143) = 0.073, p > 0.05, nor was there a significant difference in experiencing flow based on race/ethnicity, F (1,143) = 1.206, p > 0.05. The results of a regression demonstrated that performance (time to finish the event), was not a significant predictor of flow, F (1,143) = 2.326, r = .127 p > 0.05. The individuals who made up the sample (n=144) were mostly first time participants. Based on the results of a single sample t-test, there were no significant differences in flow between first time participants and those with previous experience, t (142) = 2.097, p > .05, 2-tailed. Then, based on the results of a regression analysis it was seen too, that there were no significant differences in flow based on the number of times previously participated in the MudRun, F (1,46) = .749, p > .05.

CHAPTER V

DISCUSSION

The origin of flow research was not in the realm of sport and exercise, but instead was based on psychological experiences during various daily activities (Csikszentmihalyi, 1975). Initially, sport and physical activity (recreational and competitive) were included as activities in which flow could be experienced, but these areas were not a focus of early research in flow. After Csikszentmihalyi established flow as a psychological experience and measure, researchers have identified and observed the effects of flow specifically in a sport setting, focusing primarily on elite athletes (Jackson, 1995). This focus on high-level athletes limits the usage of flow research in the realm of sport and physical activity, because the data only relates back to other elite (or equivalent) athletes. There has been some research on flow in non-elite, even regularly inactive, individuals in physical activity. For example, Elbe (2010) observed flow during physical activity in sedentary adults and made some interesting findings in regards to differences in flow experiences as a function of activity type and gender. Based on the existing body of research, it was the purpose of this research to measure flow in recreationally active individuals. Additionally the study was designed to identify any potential personal predictors of flow, such as gender, age, race, and/or experience level in addition to other measures and factors.

The primary finding showed that participants at the event not only experienced flow, but also experienced a significantly greater level of flow when compared to means of a composite sample of physically active individuals provided by the FSS-2 (Jackson, 2010). This finding demonstrates two things: that individuals participating in a recreational activity can have significant flow experiences even greater than the experiences of individuals from a range of activities including elite athletes and that there may be elements of the MudRun that foster and facilitate flow experiences that include, but are not limited to the teamwork aspect, the uniqueness of the challenges, and support from other participants and event staff. Either way, having participants report flow during a self-selected recreational activity provides support for future researchers to utilize non-elite/recreationally active individuals in flow research.

When looking at predictors impacting the experience of flow, age was not significant. This was not expected, considering both the intensity of the event, and the broad age range (18-61 years). However, this non-significant finding establishes that flow can be observed, in recreationally active adults across a broad age range. Although flow has been observed throughout age ranges and activities, in the realm of physical activity most research has been done on individuals in their 20's-30's. Having individuals with a mean age of almost 31 as well as those in their 50's and 60's reporting flow, further provides support that flow can be experienced in physical activity across the life-span.

It was hypothesized that there would be a difference in flow relative to gender, supported by previous research (Elbe, 2010) which observed differences in flow

experiences by gender in relation to activity type (jogging vs. soccer). For MudRun participants, gender was found to be a significant predictor of experiencing flow with males reporting significantly higher levels of flow. When looking more closely at the relationships between gender and flow, it was observed that although there was a significant difference between the male and female samples, there were not significant differences on all of the 9 dimensions of flow. Male participants had significantly greater levels of global flow, and this resulted from reporting significantly higher levels of flow in five dimensions: Challenge-Skill Balance, Action-Awareness Merging, Clear Goals, Unambiguous Feedback, and Sense of Control. The gender differences could be due to the nature of the event and group dynamics. In the Elbe (2010) study, flow was greatest in the female jogger group, as opposed to the present study in which male participants reported the greatest levels of flow. This difference in findings could be due to a number of factors unique to the MudRun, including (but not limited to) single bout versus 12-week intervention, teamwork aspect, and the combination of running and navigating obstacles.

The goal of the final primary analysis was to evaluate the relationships between the nine dimensions of flow. Initially the goal was to determine if the Challenge-Skill Balance dimension was a significant predictor of the Autotelic Experience dimension. Statistical analysis showed that the two dimensions were significantly correlated. Through further investigation, it was observed that most of the dimensions were significantly correlated with each of the other dimensions. With the exception of time transformation only being significantly correlated to the Autotelic Experience and not

significantly related to any of the other dimensions. This lower report for the time transformation dimension is likely to be a result of the nature of the MudRun. Csikszentmihalyi (1990) acknowledged that, although a dimension of flow, time transformation might not be as universal to the experience of flow, because certain activities may require or support a higher awareness of time. Specifically, the MudRun is a timed event and contains 36 discrete obstacles, many of which are numbered. Thus, it is possible that these specific aspects of the MudRun minimized the ability for participants to experience a time transformation during the event.

One interesting finding derived from the demographic/participant questions was the correlation between previous experience participating in the MudRun and flow. It was thought that those with previous experience would likely be entering the event with a higher level of confidence and knowledge of the course, which would positively influence many of the dimensions of flow. However, the results indicated that previous experience was not significantly related to flow in that there was no difference in flow between first time participants and those with previous MudRun experience, nor could flow be predicted based on amount of previous experience participating in the MudRun. This finding demonstrates that a certain level of expertise is not necessary to experience flow.

When analyzing potential personal predictors of flow, race/ethnicity and Team type were considered as well as age and gender. Race/ethnicity did not have a significant impact on experiencing flow, which was expected, however race had yet to be examined within the flow research. Although there were not significant differences based on race,

future research could examine if there are cultural differences in flow across different activity types. Team type was not a significant predictor of flow. Even though there were differences in flow by gender throughout all MudRun participants, there were not significant differences in flow between the all-male, all-female, or co-ed teams.

Previous research has observed flow as it relates to performance/outcome variables in sport activity (Aherne et al., 2011, Bakker et al., 2011, Elbe et al., 2010, Jackson, 1995, Kimiecik & Stein, 1992, Young & Payne, 1999). In this sample, there was no significant relationship between flow and performance (time to finish the course). From the sample of participants, the fastest completion time for the course was 52 minutes (fastest team for the whole event) and the team that took the longest to finish took 2 hours and 47 minutes, a difference of 1 hour 55 minutes. This result, demonstrates that previous experience and expertise in this particular activity are not a requirement for experiencing flow with both the fastest and longest times and those with the most and no previous experience reporting similar ratings of global flow.

Future directions and implications

The primary result of this study clearly demonstrates that recreationally active individuals are a viable population in which to observe and measure flow. When considering the potential benefits of experiencing flow, it is important to consider that the flow experience is beneficial in and of itself. Flow is a positive and emotionally fulfilling experience. Research that aims to promote flow in recreationally or regularly inactive individuals could have many benefits beyond that of physical fitness, when considering flow as a valuable outcome to elicit and observe. Future research in flow and physical

activity can start to use more non-elite populations and expect to observe flow, especially at large group obstacle course events. In turn, a wider variety of individuals will have the potential to benefit from the findings in flow research.

To further explore gender differences in team settings, future researchers could control the male/female ratio within teams (i.e., for teams of four members: all-female, 1 male and 3 female, 2 male and 2 female, 3 male and 1 female, or all-male). Perhaps the balance of male and female members could influence flow. Considering that there were differences in flow as a function of gender, future research could look into the relationship(s) between physical activity types/settings to observe which activity types are more conducive for either gender to experience flow. Researchers could use controlled environments to manipulate exercise protocols to further understand the relationship between flow (including the nine dimensions) and gender. Whether through promoting or hindering flow (in general or by specific dimensions) researchers could potentially develop exercise protocols and/or mental skills training to manipulate gender differences in flow.

Because flow has also been related to peak and/or optimal performance in elite athletes, it is likely that recreationally active individuals would have similar performance improvements associated with experiencing flow. Future research could aim to observe whether regularly experiencing flow during an exercise program would have a relationship with physical outcomes (fitness) and sport psychology outcomes. However, this study demonstrates that experience may not be a requirement for experiencing flow, and that even a one-time acute and novel bout of exercise can elicit flow states so if

future research could show that exercise protocols can increase the incidence and level of flow, that alone would be a significant and meaningful result.

Limitations and observations

The primary limitation of the results is that the event itself impacts many elements of the results. The nature of the MudRun is unique and atypical to most sport and exercise experiences. This factor was considered in the design of this study. To record flow during an event in which all participants have a similar experience, it was decided to conduct data collection at a large single-day event in which the participants have chosen to participate. Collecting data at a more typical event, such as a community 5k was considered. However, these were not chosen because they may attract individuals who identify as runners, which would deviate from the intention of observing a recreational population. Additionally, community 5k's which do attract recreational participants, they are self-paced as were determined to be lacking in the ability to elicit a significant challenge which, based on the literature is essential to experiencing flow. So even though the event may have had an impact on the sample, which may not be entirely generalizable, it was determined to be an ideal event to have participants report flow. However, because this particular event is one of the largest of its kind, the sample is likely closer to, but still not entirely generalizable to, the general population participating in regular/recreational physical activity/sport/exercise.

The data represents a small sample and many individuals turned-down the opportunity to participate for various reasons. One factor that may have influenced participation was accessibility. Although researchers were set-up in a high-traffic area,

not everyone who finished the MudRun walked past the booth where the questionnaire was being introduced and distributed. Additionally, many individuals were too tired, sore, or pre-occupied to participate or acknowledge the researcher. Another factor impacting participation may have been the incentive, which was a bar of soap and a washcloth. Many who turned down the chance to volunteer did not want/need the incentive. Lastly, after having the study introduced, a common first response (other than accepting or turning down) was to ask how long the questionnaire would take (5-10 minutes). There were several individuals who stated that they did not have the time or saw the 4-page questionnaire as being too long/not worth it, based on direct feedback body language and tone. Many of the people who declined participation were unexpectedly curt and/or short-tempered. In contrast, most of those who did volunteer to fill-out the questionnaire were happy to participate for three main reasons: first, they wanted the incentive; second, they were available/had free time after completing the event; lastly, many participants had a genuine interest in the research topic (flow) or were glad to support student research. Based on the negative responses from individuals who elected not to participate (before or after having the study described), it is likely that these individuals were having a negative experience including injury, disappointment in performance, feeling physically uncomfortable or generally not having a pleasant experience. All of these factors could have a negative impact on the incidence and level of flow experienced by individuals who elected not to participate in the research study. That being said, based upon team-type, age ranges, race, average time to complete the course, and their reasons for

participating in the MudRun the sample was reflective in terms of general MudRun participants.

Conclusion

The purpose of this study was to determine whether flow would be observed in recreational participants during a group event and to determine potential predictors/differences between participants relating to flow experiences. Of the proposed hypotheses, first, participants experienced flow at levels greater than normative data that included elite athletes. Additionally, performance, age, and other demographic information were determined not to be related to experiencing flow. Some gender differences in flow were observed but the exact nature of gender differences is still uncertain.

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APPENDIX A

ASSESMENT TOOLS

UNIVERSITY OF NORTH CAROLINA AT GREENSBORO

CONSENT TO ACT AS A HUMAN PARTICIPANT: LONG FORM

Project Title: Predictors of Flow In Recreational Participants at a Large Group Event

Project Director: Dr. Jennifer Etnier

Participant's Name: _____

What is the study about?
This is a research project. The researcher hopes to observe experiences of flow (or being in the zone) in individuals who finish the USMC Ultimate Challenge MudRun. Demographic information will be related to flow to identify potential personal predictors for experiencing flow during this event.

Why are you asking me?
You were selected as a possible participant in the study because of your interest to participate and your meeting the requirements of inclusion- being at least 18 years of age or older and finishing the USMC Ultimate Challenge MudRun on October 13th.

What will you ask me to do if I agree to be in the study?
I will ask you to fill out questionnaires that include questions about your experiences during the USMC Ultimate Challenge MudRun. This is expected to take no longer than 10-15 minutes. No physical, psychological, or emotional stress is expected to result from participation in this research.
What are the dangers to me?
The Institutional Review Board at the University of North Carolina at Greensboro has determined that participation in this study poses minimal risk to participants.

If you have any concerns about your rights, how you are being treated or if you have questions, want more information or have suggestions, please contact the Office of Research Compliance at UNCG toll-free at (855)-256-1482.
Questions about this project or benefits or risks associated with being in this study can be answered by David A. Henning who may be contacted at (971) 221-9946 or at dahennin@uncg.edu
Are there any benefits to society as a result of me taking part in this research?
The data collected in this study may inform future research and may help those in your

demographic with their experiences. As well as, provide valuable information to the event director to make improvements/adjustments to the event.

Are there any benefits to *me* for taking part in this research study?
There are no benefits to you as a result of participation in this research study

Will I get paid for being in the study? Will it cost me anything?
There are no costs to you, however you will receive soap and a washcloth for your participation.

How will you keep my information confidential?
Consent forms will kept separately from all other data collected and will be kept in a locked file cabinet, in a locked lab, in the Health and Human Performance Building at UNC Greensboro. Your questionnaire data does not include any identifying information. "All information obtained in this study is strictly confidential unless disclosure is required by law."

What if I want to leave the study?
You have the right to refuse to participate or to withdraw at any time, without penalty. If you do withdraw, it will not affect you in any way. If you choose to withdraw, you may request that any of your data which has been collected be destroyed unless it is in a de-identifiable state.

What about new information/changes in the study?
If significant new information relating to the study becomes available which may relate to your willingness to continue to participate, this information will be provided to you.

Voluntary Consent by Participant:
By signing this consent form you are agreeing that you read, or it has been read to you, and you fully understand the contents of this document and are openly willing consent to take part in this study. All of your questions concerning this study have been answered. By signing this form, you are agreeing that you are 18 years of age or older and are agreeing to participate, or have the individual specified above as a participant participate, in this study described to you by David A Henning.

Signature: _____ Date: _____

MudRun Experience Questionnaire (MREQ)

We'll start by getting to know you.

Team Number _____ Age_____ Gender M F

Start-time ____:____ Finish-time ____:____ Current time ____:____

Race/Ethnicity: (circle one) White/Caucasian Black/African-American
Hispanic/Latino

Asian/Pacific Islander Native American
Other_____

Team type: (circle one) Homeland Heroes Military All Male All Female

Co-ed JROTC Corporate

1. Flow is a mental state in which a person performing an activity is fully immersed in a feeling of energized focus, full involvement, and enjoyment in the activity; flow is completely focused motivation. Using this definition, to what extent did you experience flow during the MudRun? (use the 1-5 scale below)

Low		Moderate		High
1	2	3	4	5

2. How many obstacles did your team have to skip? _____

3. Have you participated in the USMC Ultimate Challenge MudRun event previously? Yes / No
   If **Yes**, how many times (not including today) have you participated in the USMC Ultimate Challenge MudRun? _____

4. Have you participated in other similar events (MudRun/Obstacle course events)?
   Yes / No

5. Have you participated in other large group Running events? Yes / No

   If Yes, what type? (circle all that apply) 3k/5k/10k/half-marathon/marathon

6. In these past events, would you consider yourself competitive or recreational? Competitive / Recreational

7. What State do you live in?____

Please answer the following questions in relation to your experience in the MudRun you just completed. These questions relate to the thoughts and feelings you may have experienced during the MudRun. There are no right or wrong answers. Think about how you felt during the MudRun, then answer the questions using the rating scale below. For each question, circle the number that best matches your experience.
Example questions:

#	MudRun Experience Questionnaire MREQ	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
1	I was challenged, but I believed my skills would allow me to meet the challenge.	1	2	3	4	5
2	I made the correct movements without thinking about trying to do so.	1	2	3	4	5
7	I was not concerned with what others may have been thinking of me.	1	2	3	4	5
8	Time seemed to alter (either slowed down or speeded up).	1	2	3	4	5
9	I really enjoyed the experience.	1	2	3	4	5
53	Competition (with other teams) was an important aspect of the MudRun	1	2	3	4	5
54	I was satisfied with my personal performance during the MudRun	1	2	3	4	5
55	Team cooperation was an important aspect of the MudRun	1	2	3	4	5
56	I was satisfied with my team's overall performance	1	2	3	4	5
57	Personal challenges were an important aspect of the MudRun	1	2	3	4	5
58	I enjoyed the obstacle portions of the MudRun.	1	2	3	4	5
59	I enjoyed the running portions of the MudRun.	1	2	3	4	5

What was your main reason for participating in the MudRun? (Example: personal challenge, support the USMC, to support friends/teammates, fun, etc.)_____

APPENDIX B

COMMUNICATION WITH EVENT DIRECTOR

director@usmcmudrun.org
USMC Ultimate Challenge Mud Run
Dear Mudrun Director,

My name is David Henning, I am a Grad student in the Sport Psychology program at UNC-Greensboro. I have an interest is conducting research on the experience participants have during group events. My focus is on the experience of flow-sates, or being in "the zone" especially in non-elite athletes. As a participant in both the October 2011, and the up-coming April 2012 MudRuns I know that this event draws in a variety of participants.

I'm formally asking to distribute a questionnaire to individuals after they finish the Ultimate MudRun Challenge in the Fall of 2012. The questionnaire would be completed in a short period of time, on-site and would collect some basic demographic information (age, race, etc.), contain a measure of flow experience, and some specific questions regarding their experience during the event. No sensitive, or individual information (name, etc.) will be collected, except team number to get their completion time.

The results of this questionnaire could provide important information as to which personal qualities influence the achievement of flow states, which levels of flow are most common during this type of event, as well as which elements of the MudRun may be more or less contusive to the experience of flow states.

I would be more than happy to share all of my findings with you and even the participants if possible. You put on a fantastic event, but my findings may help to inform changes that may be made to improve how participants experience the most ultimate challenge.

I will be participating in the April 21st MudRun this weekend, it would be nice to get a chance to meet and discuss this further; either in person, over the phone, or e-mail.

I'm excited to discuss the details/possibility of working together.

Thank you so much for your time,
David A. Henning
April 6, 2012
dahennin@uncg.edu (971) 221-9946

Director's Response
David,
I would definitely be interested working on this with you. If you can on Saturday find me and we can at least meet and talk quickly about it. I will be wearing a black shirt with director on the back. I can't promise you where I will be at any specific time but text me when you are here
Thanks,
Bill
William Toomey, Director USMC Ultimate Challenge MudRun