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EXPLORING THE USEFULNESS OF THE DISPOSITIONAL FLOW SCALE FOR OUTDOOR RECREATION ACTIVITIES

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Abstract

The Dispositional Flow Scale (DFS), developed by Jackson et al. (1998), measures an individual's dispositional tendency to experience flow, a psychological state of optimal experience originally conceptualized by Csikszentmihalyi in 1975. The DFS, developed in the realm of sports psychology, has primarily been used with participants of urban sports settings, such as: football, running, or tennis. This study explores the validity and reliability of applying the DFS to outdoor recreation activities. A stratified sample of 406 visitors to the Bob Marshall Wilderness Complex in Montana was contacted during the summer of 2004. A survey response rate of 74 percent was achieved with on-site contact, mail back questionnaires, follow-up reminder postcards, and replacement mailing. The primary activities reported were hiking, horseback riding, and fishing. Results from confirmatory factor analysis, a special application of structural equation modeling, confirm that the DFS displays a satisfactory level of validity and reliability when applied to these activities.

1.0 Introduction

Since most public land management agencies are mandated to provide outdoor recreation opportunities, it is necessary for their employees to understand the variety of experiences that occur in these natural settings. Natural resource managers and planners also need to understand the quality of those experiences, especially the meaningful, special, or out of the ordinary experiences that are sought in outdoor recreation activities. This focus on the quality of recreation experiences has been investigated in a number of ways. For example, Borrie and Birzell's 2001 review discusses the nature of quality wilderness experiences. Walker et al.'s 1998 work examined the prevalence of optimal experiences among visitors to an Appalachian outdoor recreation area. One such optimal experience construct is flow.

Flow was originally conceptualized by Csikszentmihalyi (1975) as "…holistic sensation(s) that people feel when they act with total involvement" (p. 36) and later described it as "the state in which people are so involved in an activity that nothing else seems to matter; the experience itself is so enjoyable that people will do it even at great cost, for the sheer sake of doing it." (1990, p. 4). Flow is a psychological state that is characterized by nine dimensions; a balance of challenge and skill, a merging of action and awareness, clear perceived goals, unambiguous feedback, total concentration on the task at hand, a sense of control, a loss of consciousness of self, a speeding up or slowing down of time, and autotelic experience, which refers to intrinsically rewarding experiences (Csikszentmihalyi 1990). A state of flow, or flow state, is theorized to occur when these nine dimensions co-occur at high levels.

Most research on flow has examined the presence or occurrence of the flow state in specific situations. This has typically been done by using the Experience Sampling Method (subjects wear beepers that randomly alert the subject to fill out a very brief questionnaire about what they were experiencing when the beeper went off.) These efforts have been helpful to establish that the flow state does occur in a variety of settings, including outdoor recreation settings (e.g., Jones et al. 2000).

For most people, achieving flow is a rare occurrence and is an elusive phenomenon. Csikszentmihalyi (1988) suggested that there are individual differences in the ability to experience flow and that certain people may have psychological traits that allow them to more easily experience flow, regardless of the situation. With this in mind, Susan Jackson and colleagues developed the dispositional flow scale (DFS). The DFS measures an individual's propensity to experience flow. The DFS accomplishes this by measuring the frequency at which an individual experiences flow. The premise is that flow is an optimal, but elusive and difficult to achieve, state of experience. Therefore, "… people who report more frequent occurrence of flow characteristics (must) possess a greater predisposition towards experiencing flow" (Jackson and Eklund 2004).

Development of the DFS began with a qualitative approach to explore the perceptions that elite performers held of flow and how they attained this state during their athletic performances (Jackson 1992, 1995, 1996). The DFS was initially published in 1998 (Jackson et al. 1998). Confirmatory factor analysis, an application of structural equation modeling, provided a satisfactory fit of the DFS to both the nine factor model and a single higher order model (flow), suggesting good reliability and validity of the scale (Jackson et al. 1998). Slight changes to the scale were made over the course of several studies to improve internal consistency of the scale, eventually settling on a 36-item self-report instrument that is not tied to a particular event, but measures more generally the frequency that a person experiences flow in a chosen activity. The DFS has primarily been used to measure participants of urban sports settings such as football, running, and tennis. In the latest version of DFS, question items were modified in an attempt to make the scale applicable to all activities, not just traditional sport activities. The purpose of this study was to test the reliability and validity of DFS when it is limited to outdoor recreation activities.

2.0 Methods

The DFS was included in the 2004 Bob Marshall Wilderness Complex visitor study (Whitmore & Borrie 2005). The Bob Marshall Wilderness Complex (BMWC) is a large tract of wilderness in northwest Montana comprised of three wilderness areas: Bob Marshall, Scapegoat, and Great Bear. In total, these areas cover over a million acres of land just south of Glacier National Park. Visitors were contacted on-site at the 15 busiest trailheads during summer and fall. There were 115 sample days spread out over a 5-month period. After the in initial onsite contact, participants were mailed a questionnaire. With a reminder post card and replacement mailing, a 76 percent response rate was achieved, yielding 291 usable questionnaires. The primary activities reported by BMWC visitors were hiking, horseback riding, and fishing.

Respondents were asked to choose the outdoor recreation activity in which they most participate, referring to their recreation experiences as a whole not just based on their visit to the Bob Marshall Wilderness Complex. They were then asked to think about how often they experienced each characteristic of flow, ranging from never, rarely, sometimes, frequently, to always.

To assess the reliability and validity of the DFS for this sample population, confirmatory factor analysis, a special application of structural equation modeling (SEM) was used. Within confirmatory factor analysis, researchers can specify which observed variables are affected by specific common factors (based on a-priori theory). The advantage of this procedure is that it can deal with latent variables. A latent variable is a variable that is not directly measurable. For example, flow is a complicated construct that cannot be measured directly by any single variable. It is in fact a single construct, but is made up of many observable variables. In structural equation modeling, not only can observed variables be explained by latent variables but latent variables can also be used to explain other latent variables. Confirmatory factor analysis is very helpful in assessing the reliability and validity of multidimensional constructs such as flow.

The software package EQS version 6.1 was used for SEM analysis. This software package was used because at the time of the study, it was the best available for dealing with categorical variables and non-normal data. In all cases, the maximum likelihood method of estimation with robust correction was employed, and a correlation matrix of indicators was used for model identification. Maximum likelihood methods assume normally distributed and continuous data, and violations to these assumptions lead to an increase in type one error (Kline 1998). This study employs many Likert type scale items which are not continuous and rarely approximate a normal distribution. In previous studies (e.g. Jackson & Eklund 2002, 2004), these categorical variables were treated as continuous variables and fit indices were reported using the standard maximum likelihood method of estimation. Due to the violation of assumptions of maximum likelihood, it is likely that many of the results reported suffered from a Type 1 error. Version 6.1 of EQS offers a new way to deal with these violations through a "robust" option within the maximum likelihood method, employing the Sattora-Bentler scaled chi-square statistic (Bentler 2004). All SEM results in this study are reported as the maximum likelihood results with the robust correction.

3.0 Analysis and Results

Recall that flow is theorized to consist of nine dimensions. The first step in establishing the reliability of the DFS was to assess the composite reliability (coefficient alpha) for each dimension indicating the consistency of the indicators in measuring their respective latent variable (dimension). Shown in Table 1, the coefficient alphas for each dimension ranged between .74 and .89 with a mean alpha of .84. Alphas above .60 indicate sufficient internal consistency reliability (Churchill 1979), thus these nine dimensions are found to have very good reliability.

Table 1.—Coefficient alphas for the Dispositional Flow Scale dimensions

Dimension	Coefficient alpha
Challenge – skill balance	.74
Merging of action and awareness	.83
Clear goals	.88
Unambiguous feedback	.87
Concentration on the task at hand	.87
Sense of control	.84
Loss of self consciousness	.89
Transformation of time	.85
Autotelic experience	.78

n = 291, each factor was comprised of four question items. Data was analyzed with SPSS version 10.0.

The validity of the DFS in this study was then assessed by two models in confirmatory factor analysis. The first model, the first order factor model (Fig. 1), tests that the question items load satisfactorily into their intended dimensions and that the dimensions are independent and homogeneous. The second model, the higher order factor model (Fig. 2), tests that the dimensions contribute to a higher order factor, flow. In both models, rectangular boxes represent observed variables. Labels inside the boxes, such as "DFS 1", indicate the item number. Ovals represent latent variables or factors. Labels inside the ovals, such as "F1", identify the factors.

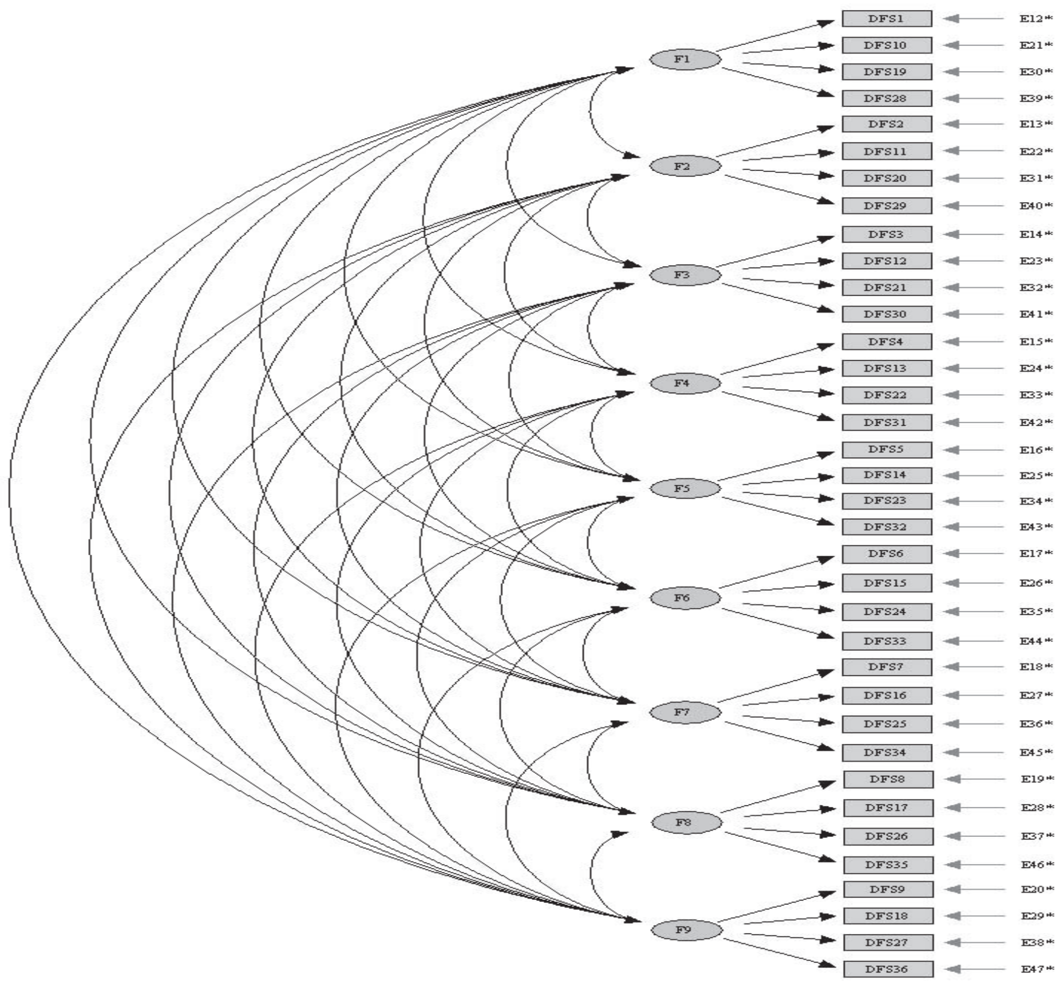
In the case of the first-order factor model, straight arrows point from the latent variables to the observed variables. The direction of the arrows indicate that the observed variables can be explained by the latent variables. The values for each strait arrow can be interpreted as a factor loading, or the variance within the factor explained by the observed variable. These values are listed in Table 2. The variance that is not explained by that relationship (error) is represented by the letter "E", and appears on the right most column of the model. Curved, double ended arrows represent correlations. In this case, all possible combinations of correlations between the factors are represented.

In the higher order factor model, the symbols are the same. Notice the addition of the second, higher order factor, flow [F10]. Straight arrows from flow to each of the nine first-order factors represent the relevance of the overall concept of flow to the nine first-order factors. The values of these arrows can be interpreted as a structure loading, or the variance in the overall factor explained by the first order factors. The structure loadings are listed in Table 3.

With regard to the first order factor model, evidence suggests that all items load well on the factors they are intended to define. Factor loadings are represented on the model as the straight arrows from the latent variables to the observed variables. Loadings were between .65 and .91 with an average factor loading of .77 (see Table 2). The independence of the nine dimensions was evaluated via examination of the correlations among the dimensions (curved double ended arrows). These intercorrelations ranged from .138 to .847 with an average of .495 (see Table 4). The magnitude of these relationships indicates that most factors share a common variance. This should be expected given that all factors were developed to measure aspects of a more global flow disposition. Overall, the common variance between

Label Key:
F1= Balance
F2= Merging
F3= Goals
F4= Feedback
F5= Concentration
F6= Control
F7= Consciousness
F8= Time
F9= Autotelic

DFS 1-36 = Question item numbers
E = Error terms for each item



Symbol Key:
Rectangles = observed variables
Ovals = latent variables (factors)
Curved arrows = correlations between factors
Straight arrows from ovals to rectangles = factor loadings
Straight arrows from error terms to observed variables = amount of variance in the question item not explained by the factor.

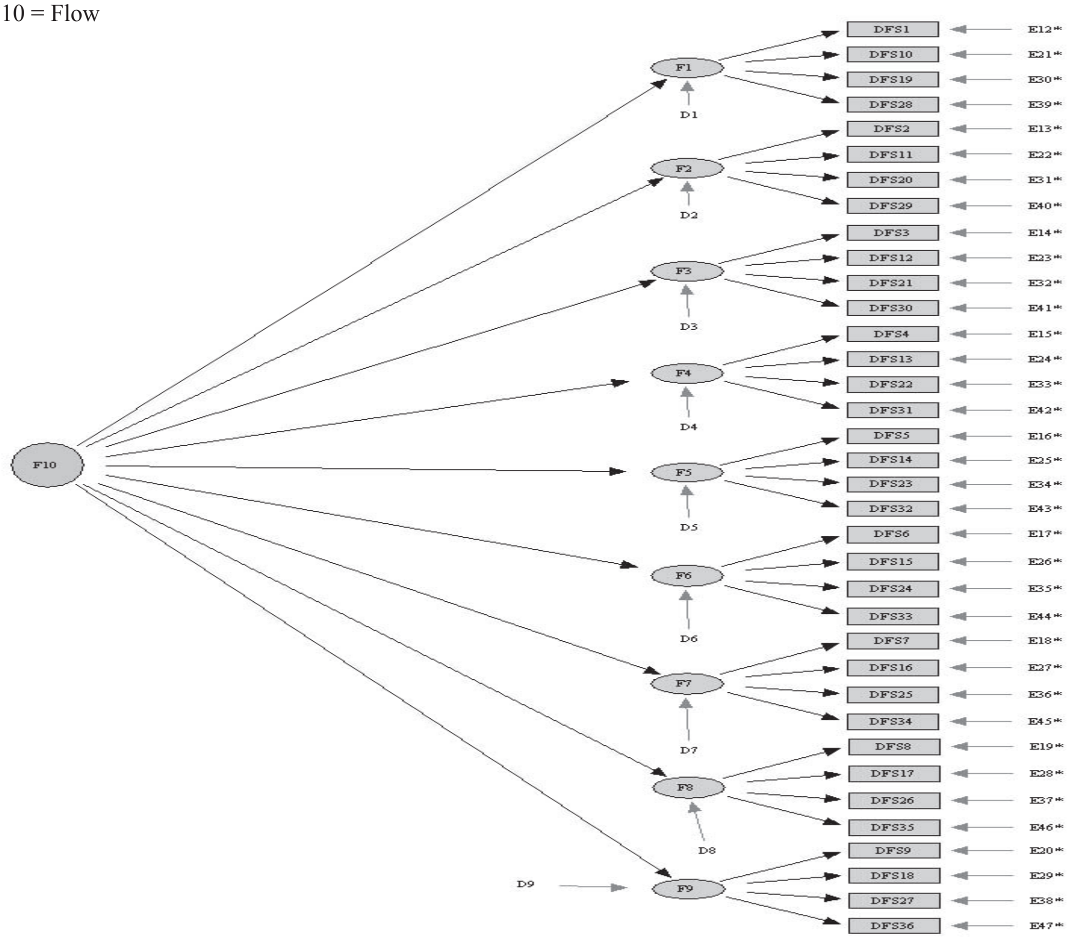
Figure 1.—First-order factor model, Dispositional Flow Scale.

subscales tends to be less than 50 percent so it seems reasonable to believe that the flow subscales tap into reasonably unique aspects of the flow experience. Overall, the goodness of fit indices (Table 5) point to good fit of the first order model to the data (ratio of chi-square to df of 1.04, CFI of .996, NNFI of .995, and RMSEA of .01). This reinforces that each item does load well into its intended factor and that the factors measure relatively independent aspects of flow.

The higher order factor model tests that the dimensions of flow contribute to a more global construct, flow disposition. The goodness of fit indices (Table 5) point to a good fit between the higher order factor model and

Label Key:
F1= Balance
F2= Merging
F3= Goals
F4= Feedback
F5= Concentration
F6= Control
F7= Consciousness
F8= Time
F9= Autotelic
F10 = Flow

DFS 1-36 = Question item numbers
E = Error terms for each item
D = Disturbance or Error terms for each factor



Symbol Key:
Rectangles = observed variables
Ovals = latent variables (factors)
Curved arrows = correlations between factors
Straight arrows from ovals to rectangles = factor loadings
Straight arrows from error terms to observed variables = amount of variance in the question item not explained by the factor.
Straight arrows from disturbance terms to factors = amount of variance in the factor not explained by the overall factor (flow)

Figure 2.—Higher Order Factor Model, Dispositional Flow Scale

the data (ratio of chi-square to df of 1.61, CFI of .930, NNFI of .923, and RMSEA of .05). This suggests that an overall flow construct does exist and that each flow dimension contributes to it. The structural loadings of each dimension to the higher flow factor ranged between .26 and .92 with an average of .71 (Table 3). These loadings represent the strength of the contribution of each dimension to the overall flow construct.

4.0 Conclusion

Taken together, these results indicate that the DFS is valid and reliable for this sample population of outdoor

Table 2.—Factor loadings for the Dispositional Flow Scale

Item	Factor	Factor loading
01	F1 – Balance	.73
10	F1 – Balance	.74
19	F1 – Balance	.72
28	F1 – Balance	.74
02	F2 – Merging	.65
11	F2 – Merging	.66
20	F2 – Merging	.85
29	F2 – Merging	.78
03	F3 – Goals	.75
12	F3 – Goals	.85
21	F3 – Goals	.79
30	F3 – Goals	.83
04	F4 – Feedback	.77
13	F4 – Feedback	.81
22	F4 – Feedback	.83
31	F4 – Feedback	.77
05	F5 – Concentration	.79
14	F5 – Concentration	.68
23	F5 – Concentration	.88
32	F5 – Concentration	.88
06	F6 – Control	.77
15	F6 – Control	.79
24	F6 – Control	.81
33	F6 – Control	.76
07	F7 – Consciousness	.75
16	F7 – Consciousness	.83
25	F7 – Consciousness	.83
34	F7 – Consciousness	.91
08	F8 – Time	.78
17	F8 – Time	.89
26	F8 – Time	.54
35	F8 – Time	.77
09	F9 – Autotelic	.66
18	F9 – Autotelic	.65
27	F9 – Autotelic	.80
36	F9 – Autotelic	.80

Factor loadings were calculated using EQS version 6.1. These values are represented in the first order factor model (Fig. 1) by straight arrows from the factors to each observed variable.

recreation activities. The fit indices for both models demonstrate good fit, indicating that the scale is a valid way of measuring the flow construct. The scale elicited internally consistent responses and hence has desirable reliability properties. Suggestions for future research are to: (1) apply the DFS to other populations that participate in a more diverse range of outdoor recreation activities to ensure that the DFS is valid and reliable for multiple activities; and (2) begin to explore the usefulness of the DFS as an independent variable to help predict such things as visitor behavior, preferences, and/or attitudes.

5.0 Acknowledgments

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Table 3.—Structural loadings for the Dispositional Flow Scale

1st Order Factor	Higher Order Factor	Loading
F1- Balance	F10 – Flow	.85
F2- Merging	F10 – Flow	.70
F3- Goals	F10 – Flow	.90
F4- Feedback	F10 – Flow	.89
F5- Concentration	F10 – Flow	.78
F6- Control	F10 – Flow	.92
F7- Consciousness	F10 – Flow	.54
F8- Time	F10 – Flow	.26
F9- Autotelic	F10 – Flow	.57

Structure loadings were calculated using EQS version 6.1. These values are represented in the higher order factor model (Fig. 2) by the straight arrows from the overall flow factor to each of the first order factors.

Table 4.—Correlations among factors, Dispositional Flow Scale.

Factor	F1	F2	F3	F4	F5	F6	F7	F8	F9
F1	1.000								
F2	.728	1.000							
F3	.740	.533	1.000						
F4	.740	.626	.847	1.000					
F5	.592	.481	.760	.671	1.000				
F6	.767	.647	.834	.797	.776	1.000			
F7	.276	.545	.257	.350	.159	.353	1.000		
F8	.289	.373	.138	.197	.214	.153	.381	1.000	
F9	.644	.403	.490	.447	.442	.494	.221	.493	1.000

Correlations were calculated using EQS version 6.1. These values are represented in the first-order factor model (Fig. 4) by the curved arrows between factors.

Table 5.—Goodness of fit indices for the Dispositional Flow Scale

Model	n	X^2	*df*	X^2/df	CFI	NNFI	RMSEA
First order factor model	291	568.6	549	1.04	.996	.995	.01
Higher order factor model	291	926.0	575	1.61	.930	.923	.05

Results were calculated using EQS version 6.1, maximum likelihood method with robust corrections. The chi–square reported is the Sattora-Bentler scaled chi-square statistic.

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