

Constraints: An Integrated Viewpoint

Tara Sue Patterson

The theory of constraints has been researched in both leisure studies and motor behavior within kinesiology. Constraints are limitations or barriers imposed on the individual that may lead to decreased or non-participation in an activity. Findings have led to the formulation of several frameworks in order to direct the research surrounding constraints. The purpose of this paper is to outline the frameworks as designed by Crawford and colleagues (Crawford & Godbey, 1987; Crawford, Jackson, & Godbey, 1991) and Newell (1986), and to provide inference for integrating the two frameworks to direct further research. By extending the model proposed by Crawford and associates (1991), future research may benefit from a more inclusive model drawing from the strengths of allied fields.

KEY WORDS: Constraints, motor behavior, leisure

The field of health and human performance has significantly contributed to our understanding of factors that affect the human body in all domains: physical, affective, cognitive, spiritual, and social. Human beings are complex systems. The human body is similar to that of a computer whereby information is taken in from the environment, processed by the brain, and displayed by actions as output. The goal of this output is known as goal directed behavior. The academic field of motor behavior focuses on how goal directed movements originates, how the movement patterns change, and how they persist throughout the life span. Researchers in other related fields, such as recreation and leisure studies, have focused research on such topics including: recreation participation, motives, preferences, and satisfaction. Researchers and practitioners in both disciplines strive to attain a common goal: increased quality of life for an individual.

What are the factors that contribute or impede on an individual's attainment of quality of life? An area of research that has gained considerable attention among researchers across disciplines is constraints. On a general level, constraints are those factors that may limit participation and enjoyment in a given activity (Jackson, 1991).

Researchers within the field of motor behavior have posed an interest in studying constraints. Movement is essentially the way in which one interacts with the environment, and by understanding movement; individuals within therapeutic and educational settings may begin to better understand such things as skillfulness (Clark, 1995). A major theme in the field of motor development is the development of skill, and how certain factors interact in order to produce a specific movement. Research in this area has also focused on the barriers that limit individuals from achieving their goal, and the factors that may prevent a person from becoming skillful. In leisure studies, much research has focused on recreation participation, and the underlying reasons why individuals do not participate in a given activity, or why participation may be limited. Therapeutic recreation research has examined limitations placed on individuals with disabilities that may lead to modified or non-participation (Buchanan & Allen, 1985;

Smith, 1987; Williams & Bird, 1992; Henderson, Bedini, Hecht, & Schuler, 1995; Henderson & Bedini, 1997).

Understanding constraints has contributed to our understanding of leisure behavior in general (Jackson & Burton, 1999). Researchers interested in motor behavior (a field within the kinesiology discipline) have also been confronted with the constraint issue in understanding skill acquisition and the factors that may prevent coordination and control. These researchers have attempted to justify skill acquisition by analyzing movement through the relationships of constraints imposed on an individual. Two schools of thought have directed the research examining movement and coordination: the traditional approach and the dynamical systems theory (Clark, 1995; Newell, 1984). However, there is a lack of a universal theory that concretely explains the phenomenon of skill acquisition (Clark, 1995). Consequently, the presence of constraint research across varied disciplines has led to the formulation of several frameworks that have been developed in order to more successfully understand the factors that prevent individuals from participating in various recreational activities.

Several researchers have expressed the need to incorporate other aspects and disciplines in order to facilitate connections and communications among researchers of varied disciplinary backgrounds (Henderson, 1997; Jackson & Burton, 1999). Examining factors that have been identified in other disciplines, such as motor behavior, may help us to better understand some of the key issues within leisure studies. Fundamentally, it is crucial to extend research to other allied disciplines. Therapeutic recreation is one such allied field that would benefit from the incorporation of additional frameworks to extend the research on constraints. It is important to break the barriers that exist between researchers and work together to bridge the gaps and provide answers surrounding recreation and human movement studies. By incorporating ideas from allied disciplines, researchers may gain a greater understanding regarding the role of constraints in the lives of individuals.

Constraints and Leisure Studies

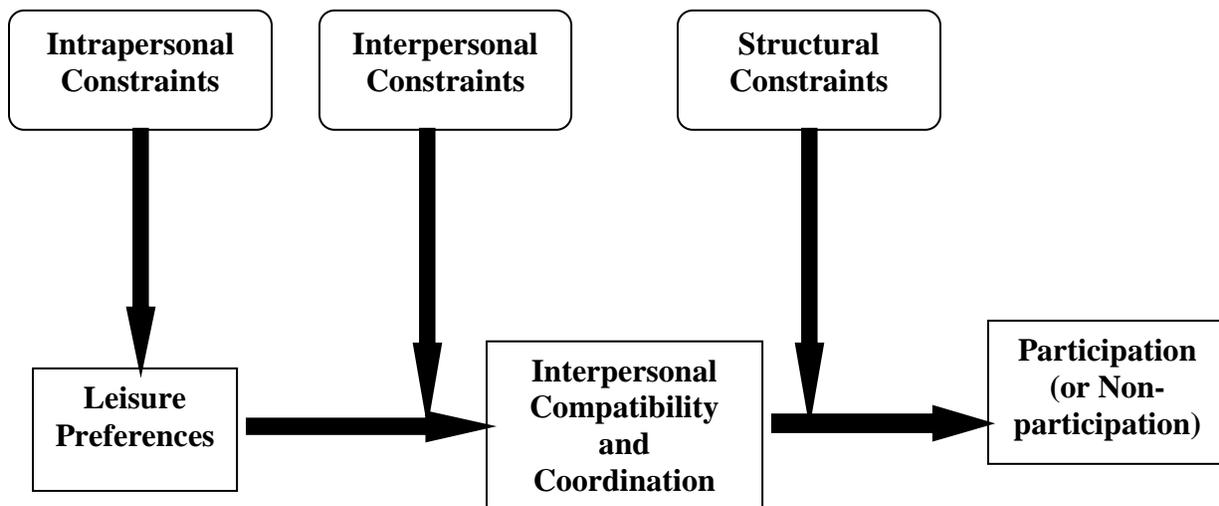
In leisure studies, research has focused on constraints for several decades, with some studies in outdoor recreation dating back to the mid 1900's (Jackson & Burton, 1999). Theories and frameworks have emerged with aspirations of defining constraints and the effect on leisure behavior. For example, based on a study of individuals with mental retardation Wade and Hoover (1985) categorized constraints as: internal and external. Internal constraints include variables such as physical fitness level, cognitive skills, and motor skill deficits. External constraints typically include such factors as societal attitudes that may affect recreation opportunities, and institutionalization that may negatively affect individuals' leisure exposure due to poor training and lack of available activities (Wade & Hoover, 1985). The researchers also note the presence of an "internal-external" dichotomy, which is an interaction of these two types of constraints. However, the interaction is not represented as a distinct classification of its own.

Another framework of understanding constraints was proposed by Smith (1987) who noted that tourists with disabilities may encounter constraints that may be defined as intrinsic barriers (health related problems, lack of knowledge), environmental barriers (attitudes of others, ecologic and architectural barriers), and interactive barriers (international travel). These barriers will ultimately influence and restrict the options of a disabled tourist (Smith, 1987).

Finally, Crawford and Godbey (1987) proposed the presence of three distinct classifications of constraints: structural, intrapersonal, and interpersonal. The first classification of constraints is structural, which includes such factors as family life cycle stage, season, and opportunity. Structural constraints typically represent those factors that intervene between leisure preference and leisure participation. Intrapersonal constraints are those factors that interact with leisure preferences and are characterized by the individual's psychological attributes and states, such as depression, anxiety, and stress. Finally, interpersonal constraints are factors that result from the interaction between individuals, such as marital relationship (Crawford & Godbey 1987; Crawford, Jackson, & Godbey, 1991).

The classification of constraints was then later expanded upon to include constraints as a hierarchy model, in which intrapersonal constraints must first be negotiated before progression through interpersonal and finally, structural constraints (Crawford et al., 1991). In the model, constraints were conceptualized as factors that must be negotiated through resulting in modified leisure participation, as opposed to obstacles to leisure participation (Jackson, Crawford, & Godbey, 1993).

Figure 1: Leisure Constraints Model



Source: Crawford, Jackson, & Godbey (1991)

This framework has been expanded upon and utilized in a variety of activity settings in order to present reasons for decreased or non-participation in given activities. Originally, the assumption was that constraints reported would lead to decreased participation in an activity, however, researchers have identified that this may not necessarily be the case (Jackson et al., 1993; Shaw, Bonen, McCabe, 1991). Jackson and colleagues (1993) noted that constraints may produce modified participation, and Shaw and colleagues (1991) identified that participation in a physical activity did not decrease

as a result of constraints experienced. Other populations that have also been studied include women with disabilities (Henderson, Bedini, Hecht & Schuler, 1995; Henderson & Bedini, 1997) and older adults (Mannell & Zuzanek, 1991). The issue of constraints in leisure studies should continue to be expanded upon by employing different samples possessing varied characteristics within the same hierarchical framework (Raymore, Crawford, Godbey, & von Eye, 1993). Moreover, incorporating additional variables could expand the existing hierarchical framework.

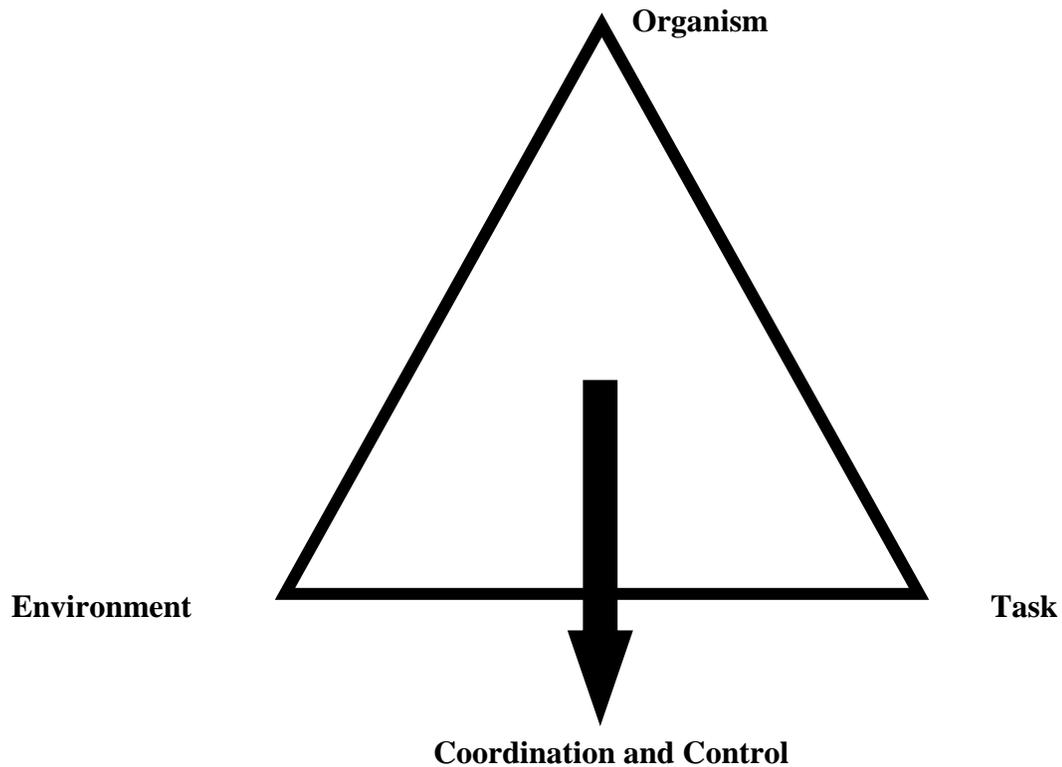
Constraints and Developmental Kinesiology

One of the most interesting constructs of research in the field of human movement studies is the acquisition and development of motor skills (Clark, 1995). Daily tasks stem from motor skills learned throughout one's life span. Movement essentially begins at conception, as noted by the physiological developments a human embryo experiences while maturing in the womb of its mother (Newell, 1984). As individuals mature, they experience many things that may alter or affect our movement and the patterns one exhibits while performing a specific task or skill. Barriers, also referred to as constraints, may hinder the development of such movement patterns or skills. The notion of constraints and its impact on motor skill development has been a source of much interest in motor behavior and kinesiology for decades.

Constraints limit the coordinated and controlled pattern of action that is displayed. The optimal movement pattern is demonstrated by coordination, which in itself is the reflection of the interplay of forces (Newell, 1986). As humans grow and develop, many changes occur that affect the ability to display particular movement patterns. Control parameters, or factors that assist in changing the movement pattern, affect coordination. Control is exhibited by fine-tuning these patterns (Newell, 1986). For example, a treadmill is used for running, and coordination is affected by the speed selection on the treadmill.

Newell (1984) proposed the importance of examining physical constraints that may impede skill development and later described three variables that are the key source of constraint input: organism, task, and environment (Newell, 1986). The three classifications of constraints interact (organism and environment, organism and task, and environment and task interactions) and from this interaction emerges the optimal pattern of movement for a particular situation. A representation is noted below.

Figure 2: Newell's Triangle



Source: Newell (1986)

The organism constraint refers to those properties that are embodied in the person, and consist of functional and structural organism constraints such as weight, height, and body shape as well as cognitive and emotional attributes (Newell, 1986; Clark 1995). Environmental constraints are those factors that are external to the individual and these may be general or task specific. Variables that are included are gravity, temperature, and cultural factors. Finally, task constraints include the goal of the action, the rules embedded in the action prescription, and the machines involved in the performance (Newell, 1986).

In order to more concretely understand the idea of constraints as proposed by Newell (1986), it is important to examine the idea within the realm of development. For example, studies on infants have demonstrated that a newborn will exhibit a swimming reflex within the first nine months of life; the newborn will be able to swim when immersed in water. This reflex is similar to walking, although the child at nine months cannot walk. It will become prevalent when the child learns to walk. The environmental constraint (gravity) interacts with other constraints and determines the action that is portrayed: when placed in water the infant will swim, but on land, the infant will not be able to walk.

The frameworks presented within the two disciplines, leisure studies and motor behavior have outlined three categories of constraints that have directed research focused

on examining the factors that impede upon an individual's involvement in an activity. By developing an inclusive model drawing from the strengths of both disciplines, research in allied fields may benefit from the increase in knowledge and understanding of motor behavioral constraints and its affect on persons with disabilities as well as leisure preferences and participation levels.

Integration of Disciplines

The constraint theories as demonstrated by Crawford and associates (1991) and Newell (1986) are important contributors to the field of health and human performance. Although presented in different connotations, both theories incorporate similar notions that address leisure characteristics and movement. Within the field of recreation and leisure, Crawford and associates model (1991) fails to address some of the finer points that are accounted for in Newell's model. Newell's model (1986) may also benefit from more extensive inclusion of the factors presented by Crawford et al. (1991). For example, by examining level of participation or involvement an individual may have in an activity, researchers may begin to better understand the coordination and control exhibited by an individual. A baseball player may not exhibit "coordination and control" if he does not possess the intrinsic desire of becoming skilled, and being involved.

Examination of limitations of movement due to a disability or disease identifies additional constraints that need to be considered when examining constraints to people with disabilities. By adding Newell's constraints model (1986) to Crawford and colleagues model (1991), additional factors that are "physical" or organismic in structure may provide further understanding for why individuals with disabilities may not participate in recreation, primarily due to "physical" constraints. Crawford and colleagues (1991) neglect to address the adherent "organismic" constraints that may first be of influence to one's level of participation in a given activity.

Recreation and leisure studies may benefit by examining organism constraints because some characteristics of an individual are quite often a constraint themselves. An example would be a gymnast who may be taller than desired. This constraint may limit her performance, and prevent her from performing the movements at an advanced or "skilled" level. Therefore, she may choose to discontinue participating. In the case of a person with a disability, if the individual were to have a degenerative disease, such as multiple sclerosis, then this individual might demonstrate different movement patterns that may limit her further from becoming skilled or from performing at all. Therefore, this person may have reduced participation due to an internal constraining factor.

So what does this mean for future researchers? By not incorporating physical constraints, researchers may overlook important indicators to non-or limited participation. Physical constraints may be a precursor to decreased or non-participation for any population, whether it be able bodied or an individual with a disability. These physical (organismic) constraints may provide first indications to why a person may be hesitant or not included in recreation activities, and leisure researchers may overlook this issue because of the lack of inclusion in Crawford et al.'s model (1991).

Examination of physical constraints may help to understand other constraints (interpersonal, intrapersonal, and structural) and may also help the individual recognize limitations placed on themselves by their disability in a physical connotation. If a person does not have the motor skills to perform a task, then he may not have the initiative to try. By examining each discipline, it can be noted that the category of constraints are quite

similar. The environmental constraint is similar to the structural constraint, the task constraint is similar to structural and interpersonal constraint, and the intrapersonal constraint includes the psychological and emotional facet of the organism constraint. However, the major limitation to the model proposed by Crawford et al. (1991) is the failure to include crucial organism components. Newell's model (1986) encompasses many important facets that may be extended to recreation and leisure, however the model fails to include levels of participation and outcomes of that involvement. It seems that the most dominant constraint is the individual, something that should first be examined in the hierarchy of constraints, especially when working with populations with disabilities.

There have been many advances in technology with the development of adaptive devices that can be made available to an individual with a disability so that they may be included in recreational type activities. For example, adults diagnosed with multiple sclerosis may not be considered prime candidates for horseback riding due to their decreased balance and coordination through disease progression (an organismic constraint), however, through therapeutic riding, saddles are adapted for the person as well as the use of sidewalkers to help with balance. This person may also be faced with structural, interpersonal, and intrapersonal constraints, which may be negotiated once these physical constraints have been examined (Patterson, 2000). The physical constraints may impose the greatest limitation on recreation participation for individuals with disabilities. This factor may have been overlooked in past recreation and leisure studies research. It would be particularly interesting to examine the effects of varied constraints, whether it is structural (task) or environmental, on the level of participation and attainment of skill, as well as levels of satisfaction and feelings of increased quality of life.

Conclusions

Majority of the research in leisure studies has primarily focused on individuals' constraints to participation in various activities. However, by defining a constraint as anything that inhibits participation is limiting, and that constraints need to be considered in varying aspects (Henderson, 1997). Also, due to the paucity in research there is a crucial need to perpetuate the examination of the role of constraints in the area of therapeutic recreation. The existing studies in therapeutic recreation have been limited to viewing constraints as barriers that yield non-participation or minimal participation.

Academic discipline such as therapeutic recreation would benefit by incorporating and extending Crawford et al.'s model (1991) to include the motor behaviorists perspective. For example, therapeutic recreation specialists work with individuals with disabilities in order to educate and implement leisure into to individual's life. The therapeutic recreation specialist should implement activities with specific goals outlined, such as increasing leisure awareness and increasing walking balance. By drawing from the constraint concepts presented in recreation and leisure and motor behaviors, the specialist may gain a better perspective as to which activities may be better suited for that individual. A person with mental retardation may enjoy therapeutic horseback riding because they are able to overcome the structural, interpersonal, and intrapersonal constraints, and by overcoming the task constraints of riding (throwing a ball into a basket while riding) and the environmental constraints (riding with and without reins) they may begin to exhibit more coordination and control as an effect of the horseback riding strengthening lower extremity muscles. However, the therapeutic recreation

specialist must take into account that individuals desire to participate, a crucial component of Crawford and colleagues model (1991).

Researchers in leisure studies may also benefit from an inclusive model by examining the role of organismic constraints, which are not included in Crawford et al.'s hierarchical model. The inclusive model would then expand to include four points for organism, task (structural), environment (structural and interpersonal), and intrapersonal constraints.

Henderson (1997) suggests that in order to understand leisure, it is necessary to step outside of one's perspective and examine other paradigms. Researchers are all striving for a common goal of increased quality of life, and the inclusion of an integrated model may help to direct research that may more concretely provide evidence of activities that may assist in producing such increased feelings of satisfaction and happiness.

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Ms. Tara Patterson is currently a Ph.D. student in Rehabilitation Science at the University of Florida. She received her Bachelor's degree in Psychology from the Pennsylvania State University. She also has a Master's degree in Developmental Kinesiology with a specialization in Motor Learning and Control from Bowling Green State University.

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