

POSSIBLE MECHANISMS OF THE BENEFIT OF ONE-DAY CHALLENGE ROPES COURSES

Chung-Chi WU *, Chih-Mou HSIEH ** & Wei-Ching WANG ***

**Department of Recreational Sport and Health Promotion, National Pingtung University
of Science & Technology, Pingtung, Taiwan*

***Department of Civil Education and Leadership, National Taiwan Normal University,
Taipei, Taiwan*

****Department of Tourism, I-Shou University, Kaohsiung, Taiwan*

ABSTRACT

To identify possible mechanisms of benefit of one-day ropes courses, a hypothetical structural equation model based on previous research was proposed. To test the hypotheses, a survey was conducted. Utilising purposeful sampling, 279 high school students participating in a one-day ropes course programme at the National Taiwan Sports University participated. The original hypothesized model was rejected and replaced with an alternative, in which three important mechanisms (preparation for learning, processing of activities and characteristics of experiences) were identified as benefiting participants in ropes course programs. These concepts were viewed as antecedent and mediating variables in the revised model. Further hypotheses regarding (adventure-related) experiential learning were discussed. It was suggested that three mechanisms benefiting participants be applied by experiential educators: (1) having participants prepare for learning in advance and implementing sequenced processing in course design; (2) presenting a comprehensive programme starting with warm-up activities and ending with debriefing and reflection; and (3) optimising every participant's experience, as several learning opportunities are possible within a single activity.

Key words: Adventure-based recreation; Ropes courses; Mechanisms benefit; Outdoor adventure education.

INTRODUCTION

Benefit of ropes courses

Outdoor adventure education can take on many forms, such as backpacking, rafting, orienteering, hang-gliding and ropes courses (Ewert, 1989). Ropes courses can be described as “any program that utilizes belayed, spotted or non-spotted elements/activities designed or installed as part of an (adventure-related) experiential learning curriculum” (Association for Challenge Course Technology, 1998:23). Ropes courses are an effective training modality to instil intra- and interpersonal skills growth in young participants and have become popular (Rohnke, 1986; Rogers, 2000), in many countries because of their associated beneficial and significant outcomes. Compared with other outdoor activities, which can be less accessible and involve travelling, ropes courses are relatively more accessible.

Participation in a program that includes ropes course experiences has been found to yield intra- and interpersonal benefits to various target groups. These include improved self-efficacy in high school students (Constantine, 1993), enhanced self-concept in male and female undergraduate students (Finkenburg *et al.*, 1994), benefits to children with cerebral palsy (Carlson & Evans, 2001), and improved resilience in 25 minority adolescents of low-income status (Green *et al.*, 2000). Robitschek (1996) examined 98 at-risk youth and reported improvement in feelings of hope after a one-day program that included ropes course activities. Eagle (2000) found an improvement in self-concept and life skills for an experimental group consisting of 74 students participating in challenge ropes courses. Sibthorp (2000) argues that outdoor adventure education benefits physical fitness and increases outdoor-related specific knowledge and skills. Hatch and McCarthy (2005) published research reporting the significant skill improvements of a group of 76 college students who participated in a half-day program that included ropes course activities. The possible benefits they identified were physical fitness, specific skills, social skills and life skills.

Possible mechanisms of benefit derived from ropes courses

Though the above studies indicate several positive outcomes of ropes courses, behavioural scientists suggest that the causes behind these benefits remain vague (McKenzie, 2000; Baldwin *et al.*, 2004). Thus, a fuller understanding of why ropes courses can be beneficial calls for further scientific enquiry.

Researchers have tried to ascertain the reasons behind the observed benefits of ropes courses to participants. In this study, these reasons are referred to as: 'mechanisms of benefit'. Their scope is all positive changes resulting from participation in a one-day programme that includes participation in a ropes course, among other activities. Suggested indicators (Ewert, 1988; Marsh & Richards, 1989; Sibthorp & Arthur-Banning, 2004), include participants' intentions and expectations with regard to outdoor adventure programs, as well as their willingness to be challenged to change before participation. These may constitute key antecedent variables that help with the identification of benefits.

Moreover, Outward Bound instructors noted several mechanisms of benefit, such as the power of the group process, problem-solving situations, concrete experiences, structured reflection and the element of adventure via observation during the activities they supervised (Hopkins & Putnam, 1993). Luckner and Nadler (1997), argued that learners may benefit because of new relationships formed, increased kinaesthetic awareness during participation and risk-taking that encourages learning. Based on an Australian study, Neill and Dias (2002) pointed out that social support from instructors and group members can significantly predict program outcomes. This enhances the psychological resilience of the participants to survive and thrive across varied circumstances. Several other studies, mainly conducted by McKenzie (2000) and Sibthorp (2003), have also yielded useful findings.

McKenzie (2000) identified six characteristics of a programme (physical environment, activities, processing, the group, the instructors, and the participants) that result in positive outcomes. In a later study, McKenzie (2003) proposed five factors that affect

programme benefits: physical environment, social environment, activities, instructors and group members. Sibthorp and his colleague (Sibthorp 2000, 2003; Sibthorp & Arthur-Banning, 2004), conducted studies to identify characteristics of the adventure education experience, namely ‘personal empowerment’ and ‘social support’. The characteristic ‘social support’ includes the instructors and group members. Another characteristic identified was ‘learning relevance’, which refers to student generalisations between course content and personal life (Sibthorp & Arthur-Banning, 2004:38). Haras and Bunting (2005) noted that elements of challenge, uncertainty, risk, novelty and fun, variety in activities, self-selected roles for participants and providing a variety of challenging options are specific characteristics provided by ropes courses.

TABLE 1: POSSIBLE MECHANISMS OF BENEFIT FOR ROPES COURSES

Studies and papers	Mechanisms of benefit & Possible factors													
	1. Preparation for learning			2. Processing of activities						3. Characteristics of experiences				
	1-1	1-2	1-3	2-1	2-2	2-3	2-4	2-5	2-6	3-1	3-2	3-3	3-4	3-5
Ewert (1988)			X											
Haras & Bunting (2005)				X	X									X
Hopkins & Putnam (1993)						X	X		X	X		X		
Luckner & Nadler (1997)				X	X	X	X	X	X	X	X	X		
Marsh & Richards (1989)	X													
McKenzie (2000)				X	X	X	X	X	X				X	X
McKenzie (2003)					X	X	X	X					X	
Neill & Dias (2002)													X	
Sibthorp (2000)									X				X	X
Sibthorp (2003)									X				X	X
Sibthorp & Arthur-Banning (2004)		X							X					X

1-1= participant intention

1-2= participant expectation

1-3= willingness to change

2-1= state of disequilibrium

2-2= sense of mission or challenge

2-3= team building through collaboration

2-4= mastery within successful experiences

2-5= role of facilitator

2-6= debriefing and reflection

3-1= kinesthetic imprint

3-2= immediate feedback

3-3= encouraging adventure

3-4= social support

3-5= empowerment

X = Discussion of denoted factor in prior studies and papers

Although several possible mechanisms of benefit have been proposed, some perspectives lacked empirical data and integration thereof. For example, in the study by Neill and Dias

(2002), focus was only given to the possible mechanism of ‘social support’ and the work by Hopkins and Putnam (1993), and Luckner and Nadler (1997), lacked sufficient empirical support. Consequently, integration of the potential factors and the design of an empirical model are still necessary. In order to clarify this, the possible mechanisms of the benefits of ropes courses were categorised according to characteristics identified in the literature review. Fourteen possible mechanisms of benefits of ropes courses drawn from previous studies were grouped into three categories (Table 1):

- *Preparation for learning*: participant intention, participant expectation and willingness to change;
- *Processing (sequencing) of activities*: state of disequilibrium, sense of mission or challenge, team building through collaboration, mastery through successful experiences, role of facilitator, and debriefing and reflection;
- *Characteristics of experiences*: kinaesthetic awareness, immediate feedback, encouraging for adventure, social support and empowerment.

In the current study, the specific hypotheses to be tested are as follows:

- H1: ‘Preparation for learning’ correlates positively with ‘processing of activities’;
- H2: ‘Preparation for learning’ correlates positively with ‘benefits of activities’.
- H3: ‘Processing of activities’ correlates positively with ‘benefits of activities’.
- H4: ‘Processing of activities’ correlates positively with ‘characteristics of experiences’.
- H5: ‘Characteristics of experiences’ correlates positively with ‘benefits of activities’.

PURPOSE OF THE STUDY

The purpose of the present research was to construct a model for the mechanisms of benefit of ropes courses. By adopting concepts from multiple disciplines, as well as incorporating suggested mechanisms, a hypothetical model is proposed. In this model, ‘preparation for learning’ was regarded as an antecedent variable for ‘processing (sequencing) of activities’ and ‘benefits of activities’. Another variable, ‘characteristics of experience’, was regarded as a mediating variable between ‘processing (sequencing) of activities’ and ‘benefits of activities’. To clarify the mechanisms, the relationships among all variables were examined and verified based on the two study objectives adopted:

- (a) to examine the relationships among the variables ‘preparation for learning’, ‘processing of activities’, ‘characteristics of experiences’ and ‘benefits of activities’; and
- (b) to provide practical examples of an enhanced design of such programmes.

METHODOLOGY

Participants

Research participants were students from three high schools participating in a one-day programme that included ropes course activities at the National Taiwan Sports University

from March to April 2006. The participants voluntarily took part in the research project and were remunerated for their time. Of the 300 questionnaires distributed, 279 were returned (93% response rate). Among the 279 participants, 124 were males (44.4%) and 155 were females (55.6%), and the average age of participants was 14.3 years (SD=1.20).

Measures

All measures were adopted or transferred from related research material and statements in past studies. Designed items were rated on a 5-point Likert scale as follows: 1=strongly disagree; 2=disagree; 3=neutral; 4=agree; and 5=strongly agree. To enhance the measurement variables, a series of analytic procedures were applied to the responses, including item analysis, exploratory factor analysis (EFA), reliability analysis (Cronbach's alpha) and confirmatory factor analysis (CFA).

Preparation for learning is an 8-item measure constructed from related concepts and statements taken from Sibthorp (2003), and Sibthorp and Arthur-Banning (2004). *Processing/sequencing of activities* is an 18-item measure constructed from related research material and statements (Hopkins & Putnam, 1993; Luckner & Nadler, 1997; McKenzie, 2000; Haras & Bunting, 2005). *Characteristics of experiences* are a 17-item measure consisting of 5 subscales extracted. After the EFA, the dimensions were adapted from related concepts and statements by Hopkins and Putnam (1993), Luckner and Nadler (1997), McKenzie (2000, 2003), Sibthorp (2000, 2003), Neill and Dias (2002), and Haras and Bunting (2005). *Benefits of activities* are a 15-item measure adapted from related concepts and statements by Ewert (1989), Neill (1999) and Sibthorp (2000).

Programme design

Four components, namely socialising games, group initiative activities (warm-up and ice-breaker games), low ropes elements and high ropes elements comprised the day-long programme. The main purpose of socialising games was to allow participants to get to know one another and become acquainted with the facilitator. The aims of group initiative activities were to establish some initial levels of trust and team work. Low ropes elements consisted of a series of problem-solving activities at ground level or 1-3m off the ground, and were designed to afford participants opportunities to experience cooperation, trust and problem-solving through spotting (physical support provided by fellow participants) or belaying the ropes. High ropes elements consisted of a series of individual and group (1-3 participant) challenges at an average height of 15m suspended by 18m poles and a network of cables.

Upon arrival, participants were introduced to the facilitators, who then reviewed the activities that would comprise the 1-day ropes course. The participants were exposed to 2 socialising games followed by 2 problem-solving activities. The 2 socialising games ('name dance' and 'moon ball'), and the 2 group initiative activities ('key punch' and 'wind in the willows'), followed by completing 1 low ropes activity ('the wall') and 2 high ropes activities ('cat walk' and 'pamper pole'), comprised the activities of the programme. During the 1-day adventure-related experiential learning programme that including ropes courses experiences, facilitators provided safety guidelines, as well as debriefing experiences to enhance reflection and learning.

Procedures

In order to investigate the mechanisms of benefit of 1-day ropes courses, questionnaires were distributed to participants after they had completed the whole course. One of the authors distributed the questionnaires and was present to assist participants when guidance was required. The questionnaire took approximately 10 minutes to complete in a quiet setting. Participant confidentiality and anonymity were assured.

Analysis

LISREL 8.54 software was employed to identify positive outcomes (constructs) of this adventure-related experiential learning programme. Statistical indices for goodness-of-fit (Hair *et al.*, 1998), were used to assess the model's adequacy for both the CFA and Structural Equation Modelling (SEM), including: (1) chi-square statistics; (2) standardised root mean square residual (SRMR); (3) goodness-of-fit index (GFI); (4) non-normed fit index (NNFI); and (5) adjusted goodness-of-fit index (AGFI). Values greater than 0.90 for indices (3) to (5) were taken to indicate adequate fit of the model.

RESULTS

Model identification and modification

To test the proposed hypotheses, a path analysis was conducted to evaluate the core relationships among the measures for 'preparation for learning', 'processing of activities', 'characteristics of experiences' and 'benefits of activities'.

Preparation for learning

Through the EFA (exploratory factor analysis), 3 factors were extracted, namely participant intention', 'participant expectation' and 'willingness to change' - and explained with 71.5% variance. Cronbach's alpha value for the 3 subscales ranged from 0.72 to 0.87.

Processing/sequencing of activities

Six factors, namely 'state of disequilibrium', 'sense of mission or challenge', 'team building through collaboration', 'mastery through successful experience', 'role of facilitator' and 'debriefing and reflection' were extracted by the EFA and explained with 65.6% variance. Cronbach's alpha value for their 6 corresponding subscales ranged from 0.65 to 0.88.

Characteristics of experiences

The total scale yielded an explained variance of 69.3%, while Cronbach's alpha for the 5 subscales ranged from 0.72 to 0.83.

Benefits of activities

The EFA yielded 4 factors, which were 'physical fitness', 'social skills', 'specific skills' and 'life effectiveness'. The total scale returned an explained variance of 63.5% and Cronbach's alpha ranged from 0.75 to 0.85 for the 4 subscales.

Construct common to the factors

The results of the CFA (Confirmatory Factor Analysis) indicated the dimensions of the model matched the distribution of observation data from the current study.

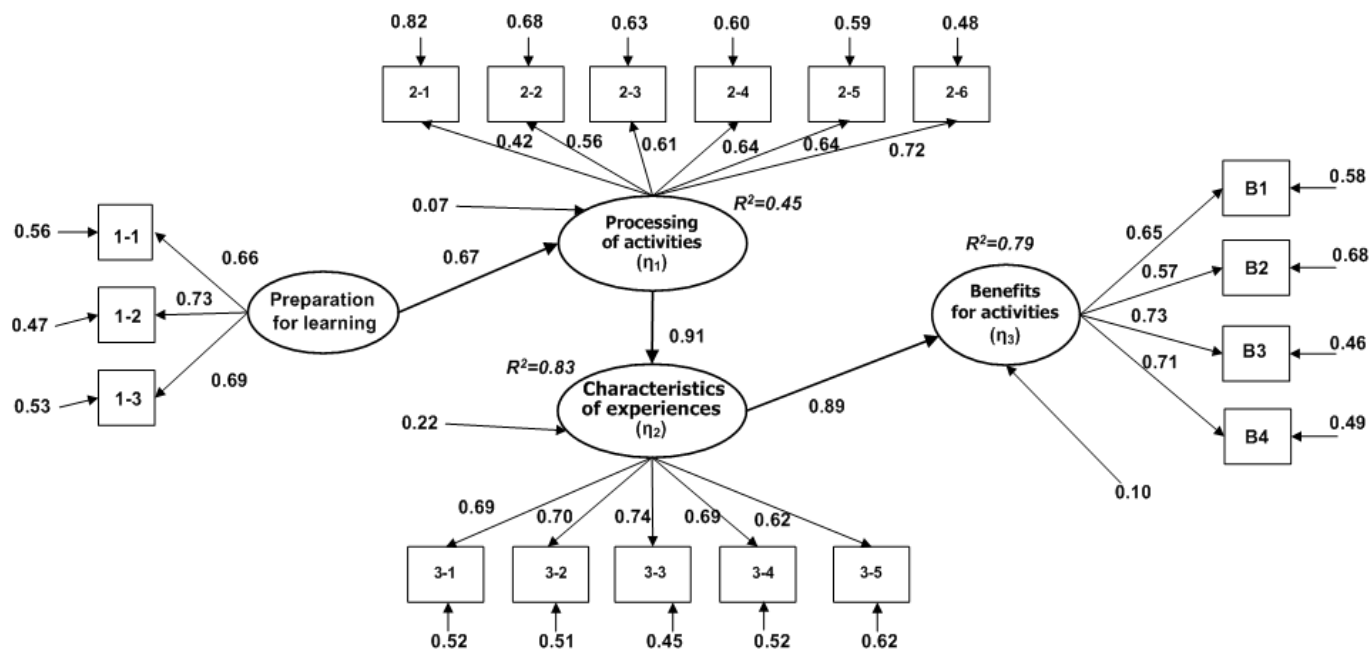


FIGURE 1: ALTERNATIVE MODEL AFTER MODIFICATIONS

KEY: Standardised coefficients are reported. Significant= p < 0.05; (ns) = Non-significant

Possible factors for mechanisms of benefit:

- | | | |
|------------------------------|--|----------------------------|
| 1-1= participant intention | 2-1= state of disequilibrium | 3-1= kinesthetic imprint |
| 1-2= participant expectation | 2-2= sense of mission or challenge | 3-2= immediate feedback |
| 1-3= willingness to change | 2-3= team building through collaboration | 3-3= encouraging adventure |
| | 2-4= mastery within successful experiences | 3-4= social support |
| | 2-5= role of facilitator | 3-5= empowerment |
| | 2-6= debriefing and reflection | |

B1= physical fitness B2= specific skills B3= social skills B4= life effectiveness

In the hypothesised model, the relationships between ‘preparation for learning’ and ‘benefits of activities’ and between ‘processing of activities’ and ‘benefits of activities’ were not significant at the 0.05 level ($\beta = 0.04$ and -0.01 , respectively). Figure 1 depicts the adapted model after subsequent modification. Overall, the goodness-of-fit indices supported the adapted structural model, showing it to fit the data reasonably well ($\chi^2 = 242.75$, $df = 132$, $p < .05$; GFI = 0.91; AGFI = 0.89; SRMR = 0.04; NNFI = 0.98; and Normed $\chi^2 = 1.84$). In the modified model, 2 paths were dropped, including ‘preparation for learning’ to ‘benefits of activities’ and ‘processing of activities’ to ‘benefits of activities’.

According to the literature reviewed, both measures of ‘preparation for learning’ and of ‘processing of activities’ could be antecedent characteristics of benefits. However, it should be noted that in the studies reviewed, those factors were usually considered separately when testing their influences on benefits. In contrast, this study had all variables considered together in the model. Therefore, some variables could have influenced one another.

Hypotheses tested

Figure 1 indicates the standardised coefficient for each path in the model. First, the data supported Hypotheses 1, 3 and 4 as formulated earlier. The ‘preparation for learning’ variable significantly predicted ‘processing of activities’ (pathway coefficient $\beta=0.67$); ‘processing of activities’ significantly predicted ‘characteristics of experiences’ ($\beta=0.91$); and there was a significant correlation between ‘characteristics of experiences’ and ‘benefits of activities’ that was found to be $\beta=0.89$. Standardised path coefficients, which can be interpreted as regression weight (β) or correlation coefficients (R) can be seen in Figure 1.

Based on the coefficients between latent variables displayed, 3 paths for mechanisms of benefit were revealed:

1. ‘Preparation for learning’ \rightarrow ‘processing of activities’ \rightarrow ‘characteristics of experiences’ \rightarrow ‘benefits of activities.’ This path showed indirect effects as well as a standardised coefficient of 0.54 ($= 0.67 \times 0.91 \times 0.89$).
2. ‘Processing of activities’ \rightarrow ‘characteristics of experiences’ \rightarrow ‘benefits of activities.’ This path also showed indirect effects as well as a standardised coefficient of 0.81 ($= 0.91 \times 0.89$).
3. ‘Characteristics of experiences’ \rightarrow ‘benefits of activities.’ This path showed direct effects with a standardised coefficient of 0.89.

DISCUSSION

This study contributes to the development of theory that explains the possible mechanisms of benefit behind adventure-related experiential learning as determined by a literature review. Furthermore, an integrative model was proposed by incorporating mechanisms suggested in past research. The current study tested an integrative model to examine the relationships between ‘preparation for learning’, ‘processing of activities’, ‘characteristics of experiences’ and ‘benefits of activities’. The model was empirically tested using survey data from 279 participants of a one-day adventure-related experiential learning programme that included ropes course activities.

The study results indicated that 'preparation for learning' had no direct effect on 'benefits of activities', but indirectly influenced it through the 'processing of activities' and 'characteristics of experiences' variables. This result was somewhat different from what was expected. Previous studies (Ewert, 1988; Sibthorp & Arthur-Banning, 2004), regarded participants' intentions and expectations and willingness to change as antecedent variables for benefits. However, after considering these variables and comparing them with two others, 'processing of activities' and 'characteristics of experiences', the effect seemed to be mediated by the other two variables. Thus, the effect of 'preparation for learning' on 'benefits of activities' appear to be mediated by first 'processing of activities' and then 'characteristics of experiences', which both act as antecedent variables of 'benefit of activities'. In the same way, the elements of 'processing of activities' were also regarded in previous research as factors that could lead participants to achieve goals of personal growth (Sibthorp & Arthur-Banning, 2004; Haras & Bunting, 2005). However, in this study, the influence of 'processing of activities' on 'benefit of activities' seemed also to be mediated by 'characteristics of experiences'.

Based on these results, it can be concluded that the two variables 'processing of activities' and 'characteristics of experiences' seemed to play a mediating role in the model. There were also some specific factors at work in the sequence of the adventure-related experiential learning programme. For example, the design of a programme that includes ropes course activities provides a particular state of disequilibrium. Through a series of sequenced activities, such as warm-ups, socialising, as well as low and high ropes elements and skilled facilitation, participants were expected to achieve a certain level of teamwork. Moreover, the programme is designed to conclude each activity with a debriefing that includes in-depth reflection, which can help create a meaningful experience easily transferable to real-life settings (Fleming & Martin, 2007; Johns & Henwood, 2009).

Other benefits of the inclusion of ropes courses in adventure-related experiential programmes are the unique 'characteristics of experiences'. Such characteristics include: (a) 'kinaesthetic imprint', meaning participants can learn through experience; (b) 'immediate feedback' and 'social support' from group members and facilitators as well as 'encouraging adventure' to help participants take on challenges; and (c) 'individual or group empowerment' to allow participants take responsibility for decisions. These findings are similar to those of former studies (Sibthorp, 2000, 2003; Neill & Dias, 2002). The unique characteristics help participants work together and support one another. On the other hand, participants can also obtain immediate feedback and support from other participants. Encouragement by fellow team members has an empowering effect and participants end up doing challenging activities they never thought possible.

The above illustrates an interesting point for future research. It could be argued according to this model that the positive benefits derived from adventure-related experiential learning programmes occur more directly because of the unique characteristics of the programme design and content, like kinaesthetic imprint, immediate feedback and encouragement to participate in challenging activities and empowerment and social support from fellow participants. The results of this study indicate that these characteristics actually play a significant role in the generation of benefits and preparing participants for learning. In other words, to enhance the benefits of adventure-related experiential learning programmes, not

only the variables 'preparation for learning' (in advance) and thorough 'processing of activities' are needed, but the item 'specific characteristics' is indispensable to adventure-related experiential learning and helps to distinguish it from other learning methodologies.

IMPLICATIONS

This research offers some insight into the benefits of ropes courses that are integrated with adventure-related experiential learning programmes; however, certain limitations should be noted. The first limitation was the sample of school children. All of the participants in this study were students at a school for outdoor adventure education. Generalisation and application of these research findings to business environments or adventure therapy requires further scientific inquiry. The 5-point Likert scale can be regarded as the second limitation of this research. This tool only provides two options for measuring a positive experience and the same experience is used to generate other data. This may threaten the validity of the data through the common methods variance introduced. A variety of measuring tools or approaches, such as an extended range of the point scale or qualitative approaches like in-depth interviews and participant observation, could be used in research methodologies to obtain more accurate information from the respondents. Moreover, because of time constraints, the research team chose to administer all questionnaire items immediately after the experience. In future research, the distribution of the questionnaires could be staggered according to the different phases of the experience. In addition, future research could employ a larger variety of research models to identify a superior fit.

Considering the conclusions of this research, practitioners should be reminded to include as many factors as possible when developing an adventure-related experiential learning programme. Managing participants' learning expectations in advance and implementing an orderly sequence of activities to create an atmosphere conducive to proper adventure experiences can ensure positive benefits. For example, sharing a former case of success or providing an explanation of the course beforehand might help to enhance the participants' intentions, expectations and willingness to change. Moreover, to ensure that the participants decide to participate in a given programme, an inquiry of their inclinations is also necessary.

The completeness of the programme process, starting with warm-up activities and ending with debriefing and reflection, is important. Participants are encouraged to accomplish their mission based on the confidence and trust built through preceding activities. In the process, a facilitator plays an important role in instruction and guided reflection. By listening, observing and raising questions, a facilitator could assist participants to overcome their fears and share their true feelings with one another. Therefore, it would be better for a small group (7-15 persons) to be allotted one or two facilitators. Moreover, the results of this study showed that a state of disequilibrium is a factor that enhances the beneficial effects of ropes courses. To generate a state of disequilibrium in participants, increasing the degree of difficulty of the activity would be a significant approach to take during course design.

The five 'characteristics of experiences' (kinaesthetic imprint, immediate feedback, encouraging adventure, social support and empowerment) are key factors that determine the value of ropes course experiences. In the courses, participants should be empowered and

encouraged to overcome physical and emotional challenges, both by themselves and when cooperating with other group members. Once the challenge is overcome, the facilitator should give immediate feedback to the participants. It is particularly noteworthy that several activities are usually designed within a programme, but due to time limitations not every participant has the opportunity to experience all activities. In this situation, participants might lose the chance to experience some course benefits. Therefore, the final suggestion is to ensure that every participant is exposed to all benefits of all activities. There should thus be no hesitation to allow participants to experience all of the unique processes available in challenge ropes courses.

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Prof. Wei-Ching WANG: Department of Tourism, I-Shou University, Kaohsiung, 4F., No 235, Jhongjheng 4th Road, Kaohsiung City, Taiwan 80147. Tel.:+886-7-2234017, E-mail:piano@kcg.gov.tw

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