

Research article

## Instrumentation and motivations for organised cycling: the development of the Cyclist Motivation Instrument (CMI)

Trent D. Brown<sup>1</sup>✉, Justen P. O'Connor<sup>1</sup> and Anastasios N. Barkatsas<sup>2</sup>

<sup>1</sup>Monash University, Peninsula Campus, <sup>2</sup>Gippsland Campus, Australia

### Abstract

'Serious leisure' cycling has developed as a reinterpretation of the traditional form of the sport. This short term, informal, unstructured and unconventional conceptualisation represents a challenge to participant numbers in the mainstream sport. The purpose of this study was twofold: (i) to ascertain the cultural, subcultural and ecological factors of participation in this new conceptualised form enabling clubs, associations and governments to a deeper understanding about participants practices and (ii) as an ongoing validation to previous qualitative work (see O'Connor and Brown, 2005). This study reports on the development and psychometric properties (principal components analysis, confirmatory factor analysis) of the Cyclists' Motivation Instrument. Four hundred and twenty two cyclists (371 males, 51 females) who were registered members of the state competitive cycling body completed a fifty-one item instrument. Five factors were identified: social, embodiment, self-presentation, exploring environments and physical health outcomes and these accounted for 47.2% of the variance. Factor alpha coefficients ranged from .63 to .88, overall scale reliability was .92, suggesting moderate to high reliability for each of the factors and the overall scale.

**Key words:** Bicycling, cyclists, motivation, scale validation, instrument, social ecology.

### Introduction

This study develops and validates a new tool, the Cyclists Motivation Instrument (CMI), and presents the initial psychometric properties (principal components analysis, confirmatory factor analysis). To our knowledge, this is one of the first instruments which incorporate social, cultural, economic and ecological factors associated with the motivation of an understudied sub-group of 'serious-leisure' cyclists. Cycling is the 4<sup>th</sup> most popular physical recreation activity for Australians aged 15 years or over, with a majority of these participants engaging in the activity in a non-organised capacity (90%) (Australian Bureau of Statistics, 2007). Beyond these figures are an increasing number of 'serious leisure' cyclists, including a small proportion of competitive club cyclists, estimated at between 7000-10000 each weekend that travel along Melbourne's most popular cycling venue, Beach Road, whose motivations for participating beyond the individual are not well understood (BurrIDGE, et al., 2003; O'Connor and Brown, 2007). In one study, for example, examining participant reasons for serious-leisure cycling, where qualitative focus groups were employed eight themes emerged highlighting issues such as geographical, norma-

tive and identity spaces, emotional and social investment made by participants, the sense of movement, the freedom and flexibility, and cycling as a journey as reasons for engagement with this activity (O'Connor and Brown, 2005). The complexity and diverse nature of cultural, sub-cultural and ecological factors of participation across a range of intra-, inter-personal, social, and policy levels posits the use of an encompassing theory such as socio-ecological theory (Sallis et al., 2006; Sallis and Owen, 2002). Therefore we developed and began the validation process of the CMI utilising a socio-ecological theory to understand, uncover and explain such themes/factors. Additionally, results may also confirm themes/factors that have emerged in previous qualitative studies with samples of serious-leisure cyclists.

Cycling has been reported to be fun and accessible form of activity (Telfer, 2003) that, as a moderate intensity physical activity, has been shown to decrease risk of mortality (Andersen, et al., 2000), improve cardiovascular performance (Hendriksen et al., 2000), lower cholesterol and risk of heart attack (Australian Department of Environmental Protection and Bike West, 1999) and produce favourable effects on body mass gain and waist circumference (Wagner et al., 2001). Additionally, cycling has been shown to have positive benefits on social interaction (O'Connor and Brown, 2007), mood and self-esteem (Garrard et al., 2007) and levels of depression and stress (Scully et al., 1999). 'Serious leisure' cyclists' are fitness seeking enthusiasts that group together for weekly training rides and competition (O'Connor and Brown, 2007) and may be considered to be an informal, unstructured and to a lesser degree unorganised form of the sport (de Knop et al., 1996, Ravenscroft, 2004). They have been reported to spend an average of 4.2 hours competing as a cyclist during the previous 7 days and on average spend 13.2 hours per week in sport and active leisure activities, nearly four hours per week more than the national average of 9.3 hours per week (Sport and Recreation New Zealand, 2003).

'Serious leisure' according to Stebbins (1992, p. 3) is "the systematic pursuit of an amateur, hobbyist, or volunteer activity that is sufficiently substantial and interesting for the participant to find a career there in the acquisition and expression of its special skills and knowledge". In line with the development of other 'lifestyle' or 'new' sports, such as windsurfing (Wheaton, 2000) or rock-climbing (Rienhart, 2000) that have emerged over the past two decades, 'serious leisure' cyclists' shun the regimented and structured aspects of the sport choosing instead to assimilate with other like-minded individuals

that self organize into bunches and 'compete' on public roads outside of the formal races held by sporting clubs. According to Tomlinson, and colleagues (2005) 'lifestyle'/'serious-leisure' sports possess three central concepts namely they are: (i) 'alternative' (sports are practiced in different ways), (ii) 'lifestyle' oriented (meanings are related beyond interpersonal factors, such as competition) and (iii) 'extreme' (a label relating to differing forms of risk-taking such as performance in different spatial locations, different emotional responses, transgression of the normative social/sporting landscape, differing skill requirements and elements of danger/risk). As a result of the immense complexity in understanding 'lifestyle'/'serious-leisure' cycling, we have drawn on theoretical literature from health behaviour (Sallis and Owen, 2002), in particular socio-ecological theory to understand these motivations in the initial development and validation of the CMI. Owen, et al., (2000) highlighted the importance of researchers and research to use specific ecological models and theories for specific types of behaviours performed in distinct settings. Such research looks beyond intra-personal influence (Markland and Hardy, 1993) such as motivation, beliefs and attitudes. According to Sallis et al., (2006):

*Ecological models are distinguished by their explicit inclusion of environmental and policy variables that are expected to influence behavior. Rather than positing that behavior is influenced by a narrow range of psychosocial variables, ecological models incorporate a wide range of influences at multiple levels. Levels of variables often included in ecological models of physical activity include intrapersonal (biological, psychological), interpersonal/cultural, organizational, physical environment (built, natural), and policy (laws, rules, regulations, codes). (p. 299)*

A socio-ecological frame encompassing the social environment ("Cycling in club/store clothes allows me to feel part of something"), the physical environment ("I cycle to get to and from places") and policy environment ("I need to be a member of a cycling club to meet my needs") was used in order to look at, and beyond intra-personal determinants of participation (Giles-Corti et al., 2005).

There exists enormous diversity in the meanings and meaning-making qualities associated with how participants experience sport and movement (Brown, 2008; Seippel, 2006). 'Serious-leisure' cyclists attach different meanings to the act of cycling compared with commuter, recreational or family cyclists. As an example, serious-leisure cyclists attach significance and meaning to the social rituals, and identity formation (lycra-wearing, shaved leg, expensive equipment) that surround the pursuit. In contrast commuter cyclists are more likely to derive meaning from improving environmental quality and beating the congestion on their trips to work (Cox, 2005; Garrard et al., 2007). As Cox has highlighted it is necessary that such reasons and meanings are identified and evaluated in the differing sub-groups of cyclists and that results are utilised appropriately by policy makers concerned with programs, infrastructure and support pro-

visions. As previous research has suggested motives for participating in cycling may also differ by the type of activity (for example, 'serious leisure' cycling vs. recreational cycling vs. commuting cycling). LaChausse (2006) examined the motivations of 679 competitive, 428 non-competitive and 110 leisure cyclists using a modified version of the motives of marathoners scale (MOMS). Primary reasons for cycling across the sample were goal achievement and health concerns. Competitive cyclists were more likely than non-competitive cyclists to endorse goal achievement, competition and recognition as reasons for cycling. When all cyclists were aggregated male cyclists endorsed competition more than females, who in turn stated that weight concern, affiliation and self-esteem were important motives for cycling. In another study comparing 58 'serious leisure' cyclists with 65 general fitness exercisers that examined competition and intrinsic motivation, sport competitiveness was significantly higher in bicycle racers. Multiple regression analysis was employed and found that sport competitiveness was correlated with intrinsic motivation, individuals with higher sport competitiveness possessed higher intrinsic motivation, for example the high-sport competitive exercise group was followed by high-sport competitive cyclist group then the low-sport competitive cyclist group and finally low-sport competitive exercise group (Frederick-Recascino and Schuster-Smith, 2003).

Traditional motivations such as health/fitness, wellbeing, weight control may be identified as plausible reasons for engaging in both cycling and marathon running however, the added complexities of equipment, type of event (competitive marathon run vs. local café bunch ride), body shape and size, culture (shaved legs), sociality (Strong, 2005) provide additional constraining factors which warrant cycling specific study. In support, Masters, et al., (1993) wrote that for ongoing development of broader psychological theories it is important that contemporary sport specific instruments designed using select samples of participants will lead to sport specific findings. Additionally, the centrality of cycling as an event in the lives of participants as well as the impact to relationships, both positive and negative, with family/friends/work colleagues is plausibly another reason to examine participant motivations. Understanding these motivations are warranted and needed, as such knowledge can be used to develop and increase adherence to training programs, promote the activity of cycling in formal and informal environments and to improve the health and wellness of participants and valued others.

Given that this subgroup of 'serious leisure' cyclists have a considerable presence on public roads (Medew, 2007; O'Connor and Brown, 2007; Oakes, 2007) and anecdotally invest heavily in the sport both through time and money, developing an appreciation about the underlying motivations/reasons for these cyclists may provide for a deeper understanding in promoting and catering for this form of activity given its many positive benefits. To our knowledge there is currently no instrument that has been developed which has specifically examined a range of influencing factors in this 'serious-leisure' subgroup of cyclists. The purpose of this study was to develop a quantitative instrument capable of iden-

tifying a range of factors that influenced motivation to engage in the 'serious leisure' sport of cycling.

## Methods

### Instrument design

The data for this investigation were collected using a 51 item researchers-designed questionnaire based on socio-ecological theory (Sallis et al., 2006) and underpinned by principles of scale development ( DeVellis, 2003) that is exploratory in nature with a desire to reduce the items for a more manageable scale. Several sources were drawn upon to establish the item pool and content validity including: (a) Previous research findings about motivations and benefits of exercise (Pelletier, et al., 1995; Sechrist, et al., 1987) and (b) literature relating to participation from both 'serious-leisure' (sport) and recreational cycling (transport, active recreation etc), from newspapers, the internet and cycling magazines that were used to frame items in the questionnaire. Of significance to the establishment of item content validity was the use of preliminary and complementary focus group interviews in which 32 'serious leisure' cyclists were recruited via the governing body CycleSport Victoria (CSV). These cyclists were randomly selected from cycling clubs stratified by location (rural, regional, metropolitan) in the state of Victoria, Australia. Selected clubs invited members to attend focus groups within their own venue at a mutually agreed time. Focus group interviews ranged in length from 90 to 120 minutes with exploratory questions focused on 'serious leisure' cyclist' experiences associated with the uptake and ongoing participation in their chosen activity (for further details on focus group methodology, see O'Connor and Brown, 2007). Themes such as competition, health/fitness, challenge and image/identity (personal level), sociality (intra-personal level) and built/natural environments, club/association policy (macro level) were derived from focus group interviews and served to both frame and validate items used in the principal design of the CMI (Morgan, 1998).

The CMI assesses the factors perceived by cyclists that influence motivation to participate in the activity of cycling (for example, "I consider cycling to be a social activity," "Cycling gives me a strong sense of accomplishment"). Reported scores reflect subject agreement on a seven point Likert scale where: A score of one, does not correspond at all to the subjects feelings about cycling; a score of four corresponds moderately and a score of seven corresponds exactly (Preston and Colman, 2000). Respondents were asked to indicate how important each statement was in relation to their own participation in cycling. Participants were presented with standard instructions on how to complete the CMI prior to its administration. The project was approved by the Monash Standing Committee on Ethics for Research in Humans (SCERH).

### Participants/setting

The study piloting the instrument was conducted in the state of Victoria, Australia. Two thousand registered cyclists representing 80% of the competitive cycling association, CSV, were posted the scale for completion. The

sample was heavily biased towards males (88% of sample) in accordance with actual participation rates (CycleSport Victoria, 2006). Garrard (2003) has highlighted that the likely cause for such discrepancy is related to concerns of safety (safe places to cycle, interaction with traffic). Four hundred and twenty two 'serious leisure' cyclists (371 males, 51 females) returned the scale using a reply-paid envelope. Given the gender, level of cyclist and the number of surveys returned we suggest is representative of the sample population and that the number of items and exploratory nature of the instrument is considered to be acceptable for such a study. Participants ranged in age from 18 to 84 years ( $M = 42.11$ ,  $SD = 12.30$ ). Nearly 50% of participants were engaged in the sport of cycling for greater than 10 years, with the next most common grouping between 2 and 5 years (Table 1).

**Table 1. Demographic details of the participants.**

| Socio-demographic variable                              | Mean      | SD      |
|---|-----------|---------|
| Age (yrs)   | 42.11     | 12.3    |
| Body Mass Index (BMI)                                   | 24.41     | 3.27    |
|   | Frequency | Percent |
| <b>Gender</b>   |           |         |
| Male  | 365       | 86.5    |
| Female  | 49        | 11.6    |
| <b>Marital status</b> <sup>a, b</sup>                   |           |         |
| Single  | 92        | 21.8    |
| Married/defacto   | 318       | 75.4    |
| <b>Employment status</b> <sup>a, b</sup>                |           |         |
| Employed  | 360       | 85.3    |
| Unemployed  | 17        | 4.0     |
| Homemaker   | 6         | 1.4     |
| Retired   | 34        | 8.1     |
| <b>Level of cyclist</b> <sup>a, b</sup>                 |           |         |
| A-grade   | 65        | 15.4    |
| B-grade   | 105       | 24.9    |
| C-grade   | 101       | 23.9    |
| D-grade   | 56        | 13.3    |
| E-grade   | 9         | 2.1     |
| Recreational  | 86        | 20.4    |
| <b>Regular speed of training (km/h)</b> <sup>a, b</sup> |           |         |
| 21-25   | 43        | 10.2    |
| 26-30   | 174       | 41.2    |
| 31-35   | 164       | 38.9    |
| 36-40   | 26        | 6.2     |
| 41+   | 8         | 1.9     |

<sup>a</sup> Some values may not equal 100% due to non-completion of demographic information in the survey.

<sup>b</sup> These variables have been self-nominated by the individual.

## Data analysis

### Principal component analysis

Data from the 51 item CMI were analysed using the Statistical Package for Social Sciences version 15 (2006). A Principal Component Analysis (PCA) with a Varimax rotation was used to examine the items. The significance level was set at .05, while a cut-off criterion for component loadings of at least .40 was used in interpreting the solution. According to Coakes and Steed (2001), if the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy is greater than 0.6 ( $KMO = 0.886$ ) and the Bartlett's Test of Sphericity (BTS) is significant ( $BTS = <0.001$ ) then factorability of the correlation matrix is assumed. A matrix that is factorable should include several sizable correlations. For this reason it is helpful to

examine matrices for partial correlations where pairwise correlations are adjusted for effects of all other variables.

The analysis yielded 12 components with eigenvalues greater than 1. Given the exploratory nature of this study and guided by the interpretability of the components, and scree plot, a five factor orthogonal solution was extracted. The 5 components factors were named social, embodiment, self-presentation, exploring environments and physical health outcomes. A combination of criteria for the decision on the final factors was utilised. The latent roots or eigenvalues criterion, the percentage of variance criterion and the Scree Test criterion, in order to come up with the final five factor solution. The solution accounted for 47.2% of the variance with the social activity factor explaining the greatest amount of variance in this sample of serious-leisure cyclists (> 25.64% of the variance).

Variables loading on more than one factor or that possessed poor communalities were eliminated. Twelve items were removed resulting in a 39 item scale. Cronbach's alpha coefficient of internal consistency were used to ensure that the items comprising the resulting factors produced a reliable scale. Coefficients ranged from 0.63 to 0.88, overall scale reliability high,  $\alpha = 0.92$ . The lowest alpha value was 0.63 (physical health outcomes subscale). According to Wiersma & Jurs (2009): "The size of the reliability coefficient is affected by the variable being measured. Achievement tests in academic and skills areas, for example, tend to have higher reliability than interest and attitude inventories" (p. 356). Hair et al. (2006) argued that "the generally agreed upon lower limit for Cronbach's alpha is 0.70, although it may decrease to 0.60 in exploratory research" (p.137).

## Results

The screening process found that data did not deviate significantly from normality (Tabachnick and Fidell, 2007). The extraction method used was Principal Component Analysis and the rotation method was a Varimax with Kaiser Normalization. The rotation converged in 7 iterations.

Eleven items loaded on component 1, eleven items loaded on component 2, eight items on component 3, four items on component 4 and five items loaded on component 5 (Table 2). The naming of the components was guided by the nature of the items associated with each component. The five factors were named social, embodiment, self-presentation, exploring environments and physical health outcomes.

The resulting model was tested using Confirmatory Factor Analysis. The total sample ( $N = 422$ ) was randomly split into two equal samples of 211 participants and we reestimated the factor models to test for comparability. The two VARIMAX rotations were quite comparable in terms of both loadings and communalities for all five factors. The only notable occurrence is the presence of a slight cross-loading for item twenty seven (factors of embodiment and physical health outcomes) in subsample 1, although the difference in loadings (0.418 versus 0.539) makes assignment of item twenty seven only to factor of physical health outcomes appropriate.

## Discussion

Cox (2005) has highlighted the need for research and for researchers to examine the varied sub-cultures of cycling and cyclists beyond an oversimplistic "one size fits all" interpretation. To add to the research evidence this study addressed the cultural, sub-cultural and ecological factors of an understudied sub-group, known as 'serious leisure' cyclists. In providing initial evaluation of the psychometric properties (principal components analysis, confirmatory factor analysis) of the CMI, this paper has taken steps to extend examinations of motives beyond the intrapersonal to socio-ecological frames providing greater power to consider organisational, environmental and policy influences. A range of social, economic and ecological factors into assessing participant motivations with a focus on the sporting cycling form were established.

The key items that form the social factor included cycling as a social activity, spending time with other cyclists with similar interests, wearing clothing that signifies being part of a collective and it being a sport that is a team activity. These findings support previous qualitative research that cycling is a social activity (O'Connor and Brown, 2007). As LaChausse (2006) has also discussed 'serious leisure' cycling is an individual and team sport. 'Pulling' turns (drafting), pointing out dangers on the road, branded clothing a motivating force driven by sociality.

The factor that we have labelled as embodiment is a diverse set of items which includes concepts and items representing kinaesthetic feeling, accomplishment and learning/education. In an anthropological study with aging cyclists, support for this factor is recognised through qualitative interviews with Italian cyclists where terms *stare bene* (an overall sense of wellbeing) and *sfo-garsi* (meaning embodied release or catharsis, which can be both physiological and psychological) better represent this factor as an embodied connection of spirit to the body (Whitaker, 2005).

The third factor, self-presentation supports qualitative investigations with 'serious leisure' cyclists (O'Connor and Brown, 2007). Self-presentation according to Leary (1992) is the presentation and omission of aspects of the self in order to optimise a favourable social impression and where undesirable impressions will be avoided. This factor has items comprising: being competitive and competition, use of technology and positively enjoying the notion of others thinking of themselves as cyclists. This final item is further highlighted by Smith's (2000) study with non elite road runners. Many runners enjoyed the perception of an enhanced status compared with non-runners because of their training/racing distances. This "quiet admiration" and respect was most evident in social situations which fostered this self-presentation amongst these runners (Thornton and Scott, 1995). Items related to travel and environmental benefits were found in the exploring environments, factor four. This motivating factor is worth highlighting as it provides departure from those studies that have used the environment as a dependent variable (eg laboratory versus natural environment) rather than a motivational factor for participating (Bodin and Hartig, 2003). There exists strong

**Table 2. Principal components loadings for the CMI with Varimax rotation and factor explained variance, eigenvalues and number of items.**

| Item   | Component 1<br>Social | Component 2<br>Embodiment | Component 3<br>Self-presentation | Component 4<br>Exploring<br>environments | Component 5<br>Physical health<br>outcomes |
|--|-----------------------|---------------------------|----------------------------------|--|--|
| I consider cycling to be a social activity (Q23)                         | .702                  |                           |                                  |  |  |
| Cycling allows me to spend time with others who have similar goals (Q33) | .693                  |                           |                                  |  |  |
| I enjoy socialising after/during ride at a café or similar venue (Q50)   | .641                  |                           |                                  |  |  |
| Cycling allows me to feel part of a group (Q1)                           | .636                  |                           |                                  |  |  |
| Cycling in club/store clothes allows me to feel part of something (Q46)  | .616                  |                           |                                  |  |  |
| I cycle because it is a team sport activity (Q47)                        | .606                  |                           |                                  |  |  |
| Cycling allows me to meet new people (45)                                | .584                  |                           |                                  |  |  |
| The presence of others motivates me to ride (Q25)                        | .559                  |                           |                                  |  |  |
| I cycle because I like receiving encouragement from peers (35)           | .518                  |                           |                                  |  |  |
| My fellow cyclists share the same interests as me (Q42)                  | .493                  |                           |                                  |  |  |
| I can learn new techniques to help improve my cycling (Q36)              | .423                  |                           |                                  |  |  |
| Cycling allows me to feel refreshed & invigorated (Q18)                  |                       | .691                      |                                  |  |  |
| I enjoy the feeling of exhilaration after I have ridden my bike (Q7)     |                       | .626                      |                                  |  |  |
| I enjoy the sensation of moving fast whilst cycling (Q9)                 |                       | .539                      |                                  |  |  |
| I enjoy the simplicity of cycling (Q31)                                  |                       | .537                      |                                  |  |  |
| Cycling gives me a strong sense of accomplishment (Q29)                  |                       | .521                      |                                  |  |  |
| Cycling allows me to learn new things (Q10)                              |                       | .516                      |                                  |  |  |
| Cycling allows me to set new goals related to my health and fitness (Q6) |                       | .489                      |                                  |  |  |
| Because cycling removes me physically from stressful environments (Q22)  |                       | .471                      |                                  |  |  |
| I am confident any goal I set myself in cycling I could achieve (Q19)    |                       | .463                      |                                  |  |  |
| Cycling is an activity than you can do at any age (Q30)                  |                       | .438                      |                                  |  |  |
| My area is a great place to cycle (Q2)                                   |                       | .418                      |                                  |  |  |
| I get satisfaction from beating someone up a hill (Q17)                  |                       |                           | .665                             |  |  |
| Cycling allows me to test myself in competition (Q4)                     |                       |                           | .649                             |  |  |
| I am a competitive person (Q12)  |                       |                           | .643                             |  |  |
| I like others to think of me as being athletic (Q8)                      |                       |                           | .619                             |  |  |
| I like using the technologically advanced equipment of cycling (Q20)     |                       |                           | .554                             |  |  |
| I like others to think of me as a cyclist (Q38)                          |                       |                           | .529                             |  |  |
| I need to be a member of a cycling club to meet my needs (Q26)           |                       |                           | .521                             |  |  |
| Cycling allows me the opportunity to own nice gear (Q28)                 |                       |                           | .413                             |  |  |
| I cycle to get to and from places (Q24)                                  |                       |                           |                                  | .863                                     |  |
| I cycle because it is an efficient form of transport (Q14)               |                       |                           |                                  | .846                                     |  |
| Cycling allows me to exercise and get to places at the same time (Q37)   |                       |                           |                                  | .802                                     |  |
| Cycling allows me to be environmentally friendly (Q3)                    |                       |                           |                                  | .691                                     |  |
| I cycle so that I can eat whatever I like (Q11)                          |                       |                           |                                  |  | .651                                       |
| I cycle because it is less stressful on the body (Q34)                   |                       |                           |                                  |  | .573                                       |
| Cycling allows me to stay free from 'lifestyle' diseases (Q27)           |                       |                           |                                  |  | .536                                       |
| I use cycling to control my weight (Q51)                                 |                       |                           |                                  |  | .522                                       |
| Cycling prevents me from developing injuries (Q5)                        |                       |                           |                                  |  | .509                                       |
| <b>Cronbach's alpha</b>  | .88                   | .80                       | .80                              | .87                                      | .63  |
| <b>Variance explained (%)</b>  | 25.64                 | 6.78                      | 5.56                             | 4.91                                     | 4.28                                       |
| <b>Eigenvalues</b>   | 10.00                 | 2.64                      | 2.17                             | 1.91                                     | 1.70                                       |
| <b>Number of items</b>   | 11                    | 11                        | 8                                | 4  | 5  |

support from research with women cyclists (Garrard, 2003) and student commuting populations (Titze, et

al.,2007) that outdoor environments and mobility are factors associated with cycling participation. Moreover

activity forms pursued for adventure or sport such as rock climbing, distance running, windsurfing, sea-kayaking, mountain bike riding in the outdoors provide further foundation that exploring environments is a reason for participation (Csikszentmihalyi, 1975; Hall and Weiler, 1992; Hollenhorst, et al., 1995).

The final factor of the CMI is that of physical health outcomes. Items included: weight control and eating, staying free from disease and preventing certain types of injuries. This factor corroborates studies with cyclists and runners (Frederick-Recascino and Schuster-Smith, 2003; LaChausse, 2006; Thornton and Scott, 1995) and general fitness exercisers (Biddle and Mutrie, 2002).

### Strengths

There are several strengths that can be drawn from this study. Firstly, scale reliability of  $\alpha = .92$  with four out of five subscales demonstrating moderate to high reliability should be seen as a strength of this research study. Beyond such statistics, the need “to understand lifestyle sports... to start with the participants and their understandings, rather than to select a group of activities that are associated with (increasingly commodified by) certain types of lifestyle (Tomlinson et al., 2005, p. 38)” provides further evidence and that our research design and methodology was appropriate. This is evidence via the use of preliminary, complementary qualitative focus groups interviews with 32 ‘serious leisure’ cyclists recruited via the governing body CycleSport Victoria (CSV), as a form of grounded theory, to establish item content validity and general themes providing assurance to the worth of items prior to the quantitative confirmatory factor analysis. The use of nascent socio-ecological theory to ascertain cultural, subcultural and ecological factors of participation in this new conceptualised form in an understudied subgroup such of ‘serious-leisure’ cyclists should be seen as another strength of this study. The emergence of factors/themes such as embodiment and self-presentation, beyond those intra-personal themes demonstrate the complexity of research with participants in traditional or ‘lifestyles’ sports.

### Limitations

While there are many positives as a result of this study, we acknowledge that limitations exist. The return rate from females sampled was approximately 12%, which may be considered low for survey research, yet is in line with female participatory trends in competitive cycling in Victoria. According to national surveys of participation in physical activity for exercise, recreation and sport for Australians aged 15 years or over 13.2% of males and 7.2% of females participated in cycling during the previous 12 months (Australian Bureau of Statistics, 2007). In explaining the relatively low participation rates for females compared to males Garrard (2003) highlighted those issues such as safety concerns, including safe cycleways and road safety were deterrents for cycling. Added to this research Albert (1999) has stated that risk and potential injury are inseparable from ‘serious-leisure’ cycling which perpetuates the ideology of hegemonic masculinity which reaffirms the exclusion of women from

the sport (Messner and Sabo, 1990). While it is likely that risk and safety may explain the low participation of females in either recreational or ‘serious-leisure’ cycling, there are other factors such as fitness level, type of equipment and etiquette which may also contribute to low participation. Against this gendered view the creation of education programs, where information on safety, road, fitness and etiquette related issues are provided, such as that of ‘Pink Inc.’ a ladies only cycling group in Melbourne, Australia (see <http://www.kennedycyclefit.com/Text/1117605206550-5234/Pink-Inc-Ladies-Cycling>) provides an example of community development which directly addresses those reasons for non-participation, while at the same time developing shared geographical, normative and identity spaces common to male ‘serious-leisure’ cyclists (O’Connor and Brown, 2007). Furthermore, anecdotal demographic data suggests that the sample comprised of predominantly white Anglo-Saxon, Anglo-Celtic participants which makes it difficult to draw generalisations to other samples outside of Australia. A limitation within the structure of the CMI related to the final factor of physical health outcomes is the low internal consistency level,  $\alpha = 0.63$ . Reliability may be affected by the sample characteristics, homogeneity of item content, number of items and the response format. Factors with fewer items, such as the physical health outcomes factor with only 5 items, tend to have lower alpha values, but this is likely due to its low inter-item correlation (Gable and Wolf, 1994). However in this current study, all subscales are acceptable as Loewenthal (2001) has stated that even when subscales possess less than 10 items an acceptable reliability coefficient is .60 as long as there is evidence of validity. The low internal consistency measure of the physical health outcomes subscale may be in part to cyclists’ feeling that this has been measured as part of other subscales.

### Conclusion

The analyses conducted on the 39-item five components version of the CMI demonstrated a workable component structure. Ongoing work will still be required on the revision and further validation of the instrument is required in order to extend understandings of why people choose to participate or not participate in the activity of ‘serious-leisure’ cycling. Pertinent information including social, economic and ecological factors of participant motivations within the changing ‘forms’ of the activity of cycling can be gathered from the use of this instrument by educators, health promotion workers, town/recreational planners, policy makers and volunteer members of sporting/recreational associations, enabling for deeper understanding about this sub cultural group within the total cycling population.

Donnelly and Young (1988) have stated that contextualisation of sub-cultural research needs to occur else it remains “...an interesting appendage to mainstream consideration of changing patterns of social development” (p. 237). As such generalising these reasons to other typologies/subcultures of cycling samples should be seen as problematic due to (i) the different needs, goals and types and cultures of individuals that classify themselves

as cyclists, and (ii) the dearth of literature on sporting cyclists' motives for participation. It is recommended that further psychometric analyses should be conducted with other groups of cyclists such as non-club recreational members to harmonize the competing needs of subgroups and focus policy and support for this life affirming pursuit. The psychometric evaluation of the current version of CMI provides an acceptable way of assessing sporting-recreational cyclists' motivations to cycling.

### Acknowledgements

This research was funded in full by Sport and Recreation Victoria and completed in partnership with Cycle Sport Victoria. The authors also wish to acknowledge Bicycle Victoria for their support in completing the research.

### References

- Albert, E. (1999) Dealing with danger: the normalisations of risk in cycling. *International Review for the Sociology of Sport* **34**, 157-171.
- Andersen, L. B., Schnohr, P., Schroll, M., and Hein, H. O. (2000). All-cause mortality associated with physical activity during leisure time, work, sports, and cycling to work. *Archives of Internal Medicine* **160**(11), 1621-1628.
- Australian Bureau of Statistics. (2007). *Participation in sports and physical recreation 2005-2006*. ABS, Canberra, ACT.
- Australian Department of Environmental Protection, and Bike West. (1999) *Cycling 100 trial: a 12-month experiment*. Australian Department of Environmental Protection and Bike West, Perth, Western Australia.
- Biddle, S.J.H. and Mutrie, N. (2002) Motivation for physical activity. In: *Psychology of physical activity - determinants, well-being and interventions*. Eds: Biddle, S.J.H. and Mutrie, N. London: Routledge. 27-48.
- Bodin, M. and Hartig, T. (2003) Does the outdoor environment matter for psychological restoration gained through running? *Psychology of Sport and Exercise* **4**, 141-153.
- Brown, T.D. (2008) Movement and meaning-making in physical education, *ACHPER Healthy Lifestyles Journal* **55**, 5-9.
- Burridge, T., Lema, M. and Lajbcygier, P. (2003) *Draft response to: Bayside City Council 'Bicycle Strategy'*. David Lock and Associates/PBAI Australia, Melbourne.
- Coakes, S.J. and Steed, L.G. (2001) *SPSS - analysis without anguish*. John Wiley and Sons Australia, Brisbane, Australia.
- Corbin, C.B., Welk, G.J., Corbin, W.R. and Welk, K.A. (2008) *Concepts of fitness and wellness*. 9th edition. McGraw-Hill Publishing Company, Boston.
- Cox, P. (2005) 'Conflicting agendas in selling cycling' paper presented to Velo-City conference, Dublin, 31 May to 3 June, published in DVD form as *Velo-City 2005 Dublin: Delivering The Vision* Dublin: Department of Transport, Dublin, European Cyclists Federation and National Development Plan.
- Csikszentmihalyi, M. (1975) Play and intrinsic rewards. *Journal of Humanistic Psychology* **15**(3), 41-63.
- CycleSport Victoria (2006) *Membership figures comparison 2000-2005*. CycleSport Victoria, Melbourne, Australia.
- de Knop, P., van Meerbeek, R., Vanreusel, B., Laporte, W., Theebom, M., Wittcock, H., and de Martelaer, K. (1996) Sports Clubs in Crisis? The Flemish Situation. *European Journal of Sport Management* **2**, 36-52.
- DeVellis, R.F. (2003) *Scale development - theory and applications*. Sage Publications, Newbury Park, CA.
- Donnelly, P. and Young, K. (1988) The construction and confirmation of identity in sport subcultures. *Sociology of Sport Journal* **5**, 223-240.
- Frederick-Recascino, C.M., and Schuster-Smith, H. (2003) Competition and intrinsic motivation in physical activity: a comparison of two groups. *Journal of Sport Behavior* **26**(3), 240-254.
- Gable, R.K. and Wolf, M.B. (1994) *Instrument Development in the Affective Domain*. 2<sup>nd</sup> Edition. Kluwer Academic Publishers, Boston, MA.
- Garrard, J. (2003) Healthy revolutions: promoting cycling among women. *Health Promotion Journal of Australia* **14**(3), 208-212.
- Garrard, J., Rose, G. and Lo, S. K. (2007) Promoting transportation cycling for women: the role of bicycle infrastructure. *Preventive Medicine* **46**(1), 55-59.
- Giles-Corti, B., Timperio, A. and Pikora, T. (2005) Understanding physical activity environmental correlates: increased specificity for ecological models. *Exercise and Sport Science Reviews* **33**(4), 175-181.
- Hall, C.M. and Weiler, B. (1992) What's special about special interest tourism? In: *Special interest tourism*. Eds.: Weiler, B. and Hall C. M. London: Belhaven Press, 1-14.
- Hair, J.F. Anderson, R.E., Tatham, R.L. and Black, W.C. (2006) *Multivariate data analysis* 6<sup>th</sup> edition. Prentice Hall, Upper saddle river, NJ.
- Hendriksen, I.J., Zuiderveld, B., Kemper, H.C. and Bezemer, P.D. (2000) Effect of commuter cycling on physical performance of male and female employees. *Medicine and Science in Sports and Exercise* **32**(2), 504-510.
- Hollenhorst, S., Schuett, M.A., Olson, D. and Chavez, D. (1995) An examination of the characteristics, preferences, and attitudes of mountain bike users of the national forests. *Journal of Park and Recreation Administration* **13**(3), 41-51.
- LaChausse, R.G. (2006) Motives of competitive and non-competitive cyclists. *Journal of Sport Behavior* **29**(4), 304-314.
- Leary, M.R. (1992) Self-presentation processes in exercise and sport. *Journal of Sport and Exercise Psychology* **14**, 339-351.
- Loewenthal, K.M. (2001) *An introduction to psychological tests and scales*. 2nd edition. UCL Press Limited, London.
- Markland, D. and Hardy, L. (1993) The Exercise Motivations Inventory: preliminary development and validity of a measure of individuals' reasons for participation in regular physical exercise. *Personality and Individual Differences* **15**, 289-296.
- Masters, K.S., Ogles, B.M. and Jolton, J.A. (1993) The development of an instrument to measure motivation for marathon running: the Motivations of Marathoners Scales (MOMS). *Research Quarterly for Exercise and Sport* **64**(2), 134-143.
- Medew, J. (2007) Coroner slams aggressive Hell Riders. *The Age*, 27 July, 2007, viewed 21 December, 2007. Available from URL: <http://www.theage.com.au>
- Messner, M. and Sabo, D. (1990) Introduction: towards a critical appraisal of sport, men and the gender order. In: *Sport, men and the gender order*. Eds: Messner, M. and Sabo, D., Champaign, IL, Human Kinetics. 1-15.
- Morgan, D. (1998) Practical strategies for combining qualitative and quantitative methods: applications to health research. *Qualitative Health Research* **8**, 362-376.
- O'Connor, J.P. and Brown, T.D. (2005) *Opportunities and constraints: An investigation into competitive cycling within the state of Victoria*. Draft Report. Melbourne, Victoria.
- O'Connor, J.P. and Brown, T.D. (2007) Real cyclists' don't race: informal affiliations of the weekend warrior. *International Review for the Sociology of Sport* **42**(1), 83-97.
- Oakes, D. (2007) Hell Riders to feel police presence in the heavens. *The Age*, 11 July, 2007, viewed 21 December, 2007. Available from URL: <http://www.theage.com.au>
- Owen, N., Leslie, E., Salmon, J. and Fotheringham, M. (2000) Environmental determinants of physical activity and sedentary behavior. *Exercise and Sports Science Reviews* **28**, 153-158.
- Pelletier, L.G., Fortier, M.S., Tuson, K.M., Briere, N.M. and Blais, M.R. (1995) Toward a new measure of intrinsic motivation, extrinsic motivation and amotivation in sports; the sport motivation scale (SMS). *Journal of Sport and Exercise Psychology* **17**, 35-53.
- Preston, C.C. and Colman, A.M. (2000) Optimal number of response categories in rating scales: reliability, validity, discriminating power, and respondent preferences. *Acta Psychologica* **104**, 1-15.
- Ravenscroft, N. (2004) Sport and Local Delivery. In *Driving Up Participation: The Challenge for Sport* Ed.: Sport England, London: Sport England. 123-134.
- Rienhart, R.E. (2000) Emerging Arriving Sport: Alternatives to Formal Sports, In: *The Handbook of Sports Studies*. Eds: Coakley, J. and Dunning, E. London: Routledge. 504-519
- Sallis, J.F., Cervero, R.B., Ascher, W., Henderson, K.A., Kraft, M.K. and Kerr, J. (2006) An ecological approach to creating active living communities. *Annual Reviews of Public Health* **27**, 297-322.

- Sallis, J.F. and Owen, N. (2002) Ecological models of health behavior, In: *Health behavior and health education - Theory, research and practice*. 3<sup>rd</sup> edition. Eds: Glanz, K., Rimer, B. and Lewis, F., San Francisco, CA: Jossey-Bass. 462-484.
- Scully, D., Kremer, J., Meade, M.M., Graham, R. and Dudgeon, K. (1999) Physical exercise and psychological wellbeing. In: *Benefits and hazards of exercise*. Ed: MacAuley, D. London: BMJ Books.
- Sechrist, K.R., Walker, S.N. and Pender, N.J. (1987) Development and psychometric evaluation of the exercise benefits/barriers scale. *Research in Nursing and Health* **10**, 357-365.
- Seippel, O. (2006) The meanings of sport: fun, health, beauty or community. *Sport in Society* **9**, 51-70.
- Smith, S.L. (2000) British nonelite road running and masculinity - a case of "running repairs"? *Men and Masculinities* **3**(2), 187-208.
- Sport and Recreation New Zealand. (2003) SPARC facts - competitive cycling, Sport and Recreation, New Zealand, viewed 20 July, 2004. Available from URL: <http://sparc.org.nz/filedownload?id=e06e166d-0286-48c8-ad99-1b4f4251e580>
- Statistical Package for Social Sciences. (2006) *SPSS version 15.0 for Windows*. SPSS Inc., Chicago, IL.
- Stebbins, R.A. (1992) *Amateurs, professionals, and serious leisure*, McGill-Queen's University Press, Montreal, Quebec.
- Strong, G. (2005) 'The new golf' *The Age*, 15 October, viewed 21 December, 2007. Available from URL: <http://www.theage.com.au/news/general/the-new-golf/2005/10/14/1128796710464.html?oneclick=true>
- Tabachnick, B.G. and Fidell, L.S. (2007) *Using multivariate statistics*. 5th edition. Allyn-Bacon, Boston, MA.
- Telfer, B. (2003) Increase in cycling to work in Sydney: analysis of journey-to-work census data from 1996 and 2001. *Health Promotion Journal of Australia* **14**(3), 222-224.
- Thornton, E.W. and Scott, S.E. (1995) Motivation in the committed runner: correlations between self-report scales and behaviour. *Health Promotion International* **10**(3), 177-184.
- Titze, S., Stronegger, W. J., Janschitz, S. and Oja, P. (2007) Environmental, social, and personal correlates of cycling for transportation in a student population. *Journal of Physical Activity and Health* **4**, 66-79.
- Tomlinson, A., Ravenscroft, N., Wheaton, B. and Gilchrist, B. (2005) *Lifestyle sports and national sports policy: an agenda for research*. Sport England, London, UK.
- Wagner, A., Simon, C., Ducimetiere, P., Montaye, M., Bongard, V., Yarnell, J., Bingham, A., Hedelin, G., Amouyel, P., Ferrieres, J., Evans, A., and Arveiler, D. (2001) Leisure-time physical activity and regular walking or cycling to work are associated with adiposity and 5 y weight gain in middle-aged men: the PRIME Study. *International Journal of Obesity and Related Metabolic Disorders* **25**(7), 940-948.
- Whitaker, E.D. (2005) The bicycle makes the eyes smile: exercise, aging, and psychophysical well-being in older Italian cyclists. *Medical Anthropology* **24**, 1-43.
- Wheaton, B. (2000) Masculinities and the "New Sport" Participant. *Men and Masculinities* **2**, 424-456.
- Wiersma, W. and Jurs, S.G. (2009) *Research methods in education* 9th ed. Allyn-Bacon: Boston, MA.

## Key points

- Serious leisure' cyclists' are fitness seeking enthusiasts that attach different meanings to the act of cycling and participate in different physical, social and natural environments in comparison to other cyclists.
- This study develops and validates a new tool, the Cyclists Motivation Instrument (CMI), and presents the initial psychometric properties (principal components analysis, confirmatory factor analysis).
- Five factors were identified: social, embodiment, self-presentation, exploring environments and physical health outcomes.
- The scale demonstrates adequate reliability (total scale,  $\alpha = 0.92$ ) and validity.

## AUTHORS BIOGRAPHY

### Trent D. BROWN

#### Employment

Movement, Environment and Community research group in Sport and Outdoor Recreation at Monash University, Victoria, Australia.

#### Degree

PhD

#### Research interest

Participation in conventional and non-conventional sporting forms, socio-ecological drivers of participation and childhood engagement with physical activity.

**E-mail:** [trent.brown@education.monash.edu.au](mailto:trent.brown@education.monash.edu.au)

### Justen P. O'CONNOR

#### Employment

Movement, Environment and Community research group in Sport and Outdoor Recreation at Monash University, Victoria, Australia.

#### Degree

PhD

#### Research interest

Participation in conventional and non-conventional sporting forms, socio-ecological drivers of participation and childhood engagement with physical activity.

**E-mail:** [justen.oconnor@education.monash.edu.au](mailto:justen.oconnor@education.monash.edu.au)

### Anastasios (Tasos) BARKATSAS

#### Employment

Centre for Science, Mathematics and Technology Education, Faculty of Education, Monash University, Australia.

#### Degree

PhD

#### Research interest

Scale development and the use of multivariate statistics in educational research.

**E-mail:** [tasos.barkatsas@education.monash.edu.au](mailto:tasos.barkatsas@education.monash.edu.au)

### ✉ Trent D. Brown

Faculty of Education, PO Box 527, McMahon's Road, Frankston, Victoria, Australia 3199