

AN ABSTRACT FOR THE THESIS OF
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Title: Indoor cycling Wear: A Needs Assessment

Abstract approved: _____

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As designer it is important to understand the needs and wants of the consumer. In sportswear design it is particularly important to know what consumers think they want and what are the physical movements needs which the apparel must meet. This study was developed to provide the researcher with a foundation in designing sportswear for particular sports. Indoor cycling was selected because of the popularity of the activity and the lack of specific apparel. Though indoor cycling is viewed as substitute for road cycling, the conditions and participants are not the same. This study uses a design process which asks the consumer about their aesthetic needs of the clothing as well as the functional needs.

The purpose of this study is to identify needs related to indoor cycling wear design and to examine commitment differences in clothing attributes selection. Data was gathered as to the preferences of indoor cyclists for garment characteristics of ideal indoor cycling wear. A questionnaire was developed as the instrument that would be used to gather the indoor cyclists' preferences. The goal is to establish design criteria of indoor cycling wear that meets the needs of

highly committed and casual indoor cyclists. Each questionnaire was made up of three major parts: (1) Demographics (2) Personal value statements and (3) Indoor cycling wear design preferences. The 137 questionnaires were analyzed to test the hypotheses and investigate the clothing needs of indoor cyclists who were involved with indoor cycling class. The respondents for this study were a sample of 135 (85 females and 50 males) participants. Demographic data analysis showed that most of the respondents were between 46 to 60 years. The majority of the participants reported the length of participation in indoor cycling class was above 3 years and amount of time spent for indoor cycling class was 2 to 3 times a week. Over 75% of the respondents were not only attending indoor cycling class but also enjoyed in outdoor cycling for exercise.

In this study, frequencies were used to identify the design criteria for males and females indoor cycling design. The indoor cycling clothing design criteria were combined and composite drawings of indoor cycling wear preferences were developed. It was not an objective of this research to develop prototypes from the design criteria. However, the reported design criteria could be used as guidelines for the development of future indoor cycling clothing. Though it is not an original objective of the study, this research also indicates that an older consumer may have different athletic clothing needs and should be a topic for future research.

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Indoor Cycling Wear: A Needs Assessment

by

Yi-Ling Ho

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degree of

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APPROVED:

Major Professor representing Design and Human Environment

Chair of the Department of Design and Human Environment

Dean of the Graduate School

I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

Yi-Ling Ho, Author

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Indoor cycling Wear: A Needs Assessment

CHAPTER I

INTRODUCTION

As designer it is important to understand the needs and wants of the consumer. In sportswear design it is particularly important to know what consumers think they want and what are the physical movements needs which the apparel must meet. This study was developed to provide the researcher with a foundation in designing sportswear for particular sports. Indoor cycling was selected because of the popularity of the activity and the lack of specific apparel. Though indoor cycling is viewed as substitute for road cycling, the conditions and participants are not the same. This study uses a design process which asks the consumer about the aesthetic needs of the clothing as well as the functional needs.

Indoor cycling is a cardiovascular exercise which is a group exercise class done on specially designed stationary bikes. It is also known by one popular trademark name: Spinning®. The International Health, Racquet & Sports club Association (IHRSA) reported that in the United States, the number of indoor cycling participation had hit 1.6 million by 2007. (IHRSA reported) There is an extensive market providing cycling wear for outdoor cyclist, however, there is no specific clothing for indoor cyclist. For the outdoor cyclists, a cycling jersey and

shorts would be the most proper suit for them while cycling. However, does existing cycling wear meet the needs of indoor cyclist too?

An interesting topic from *Indoor Cycle Instructor.com* was “Do you wear cycling clothing when you teach spinning?” (Deep Breath In, LLC 2010) To be a professional instructor and coach, they would like to project an image of professionalism.

Regarding the appearance part, one instructor mentioned, “... I show up to my classes in the exact same types of clothes I bike in. A cross country bike jersey, bike shorts and bike shoes. When I walk into class looking like this, people know they are dealing with a real biker and are going to get an awesome class. “

On the contrary, another instructor assessed wearing a bike jersey by, “...walking in wearing a full Discovery or Astana kit would be laughed out of the room...”

Regarding the needs for indoor cycling wear, one instructor mentioned, “My attire indoor and out are different because my needs are different! “

Above comments are from indoor cycling instructors for the indoor cycling wear.

The answer to this question would be valuable for sport clothing manufactures for those who are interested in research on emerging sports in

order to expand their target market and to meet the needs of their consumers. Therefore, the purpose of this study is to develop possible designs for indoor cyclists based on the identified perceived needs of highly committed and casual indoor cyclists.

PURPOSE OF THE STUDY

The purpose of this study was to identify the needs and preferences of indoor cyclists related to indoor cycling wear design. Data were gathered as to the preferences of indoor cyclists for garment characteristics of ideal indoor cycling wear. A questionnaire was developed as the instrument that would be used to gather the indoor cyclists' preferences. The overall goal was to establish design criteria of indoor cycling wear that meets the needs of highly committed and casual indoor cyclists.

OBJECTIVES OF THE STUDY

The objectives of this study are:

1. To identify the level of cycling commitment and indoor cycling clothing of indoor cyclists.
2. To assess the importance of indoor cycling wear attributes.
3. To identify needs of indoor cyclists' perceived indoor cycling clothing.
4. To develop design criteria for indoor cyclists based on the identified

perceived needs and indoor cycling wear attributes of indoor cyclists.

HYPOTHESES OF THE STUDY

Based upon Objective 1 of the study the following hypotheses were developed. The general hypothesis that there is a significant relationship between the indoor cycling commitment and the clothing interests among indoor cyclists was use.

Hypothesis 1

Indoor cyclist who is on “addiction” commitment is significantly related to their clothing interests.

- H1a: Indoor cyclist who is on “Addiction” commitment is significantly related to *Appearance/Fashion Awareness* clothing interests.
- H1b: Indoor cyclist who is on “Addiction” commitment is significantly related to *Selection Expectation* clothing interests.
- H1c: Indoor cyclist who is on “Addiction” commitment is significantly related to *Performance Enhancement* clothing interests.

Hypothesis 2

Indoor cyclist who is on “Relax and Happiness” commitment is significantly related to their clothing interests.

- H2a: Indoor cyclist who is on “Relax and Happiness” commitment is significantly related to *Appearance/Fashion Awareness* clothing interests.
- H2b: Indoor cyclist who is on “Relax and Happiness” commitment is significantly related to *Selection Expectation* clothing interests.
- H2c: Indoor cyclist who is on “Relax and Happiness” commitment is significantly related to *Performance Enhancement* clothing interests.

Hypothesis 3

Indoor cyclist who is on “Self-Improvement” commitment is significantly related to their clothing interests.

- H3a: Indoor cyclist who is on “Self-Improvement” commitment is significantly related to *Appearance/Fashion Awareness* clothing interests.
- H3b: Indoor cyclist who is on “Self-Improvement” commitment is significantly related to *Selection Expectation* clothing interests.
- H3c: Indoor cyclist who is on “Self-Improvement” commitment is significantly related to *Performance Enhancement* clothing interests.

ASSUMPTIONS OF THE STUDY

1. Indoor cyclists with more years of activity will have more experience with garment characteristics which best meet their specific clothing needs.
2. Indoor cyclists have basic knowledge regarding the clothing used in indoor cycling.

3. Indoor cycling wear means garments (top or shirt & shorts or pants) worn during indoor cycling class but not for other workout programs.

DEFINITION OF TERMS

Indoor Cycling (SPINNING®)-is one of the most popular group fitness classes at gyms and clubs. It's a stationary bike with a weighted flywheel that simulates an outdoor cycle ride.

Perceived Need- a need or want that a user believes or thinks is necessary.

Needs Assessment- the wearers' functional or aesthetics needs, preferences and ease of movement would be collected from the users in interviews and previous literatures

Problem- an action which is determined by observation, interviews and experience of an activity which does not satisfy the perceived needs.

Task- it is considered of easing movement or performance enhancement.
(Mitchka, Black, Heitmeyer & Cloud, 2009)

Appearance- it is considered of attractive, expressing competence or unique.
(Mitchka, Black, Heitmeyer & Cloud, 2009)

Indoor Cycling Commitment- describe addiction, relaxation, self-improvement and happiness indoor cycling brings to participants.

Indoor Cycling Clothing Interests- clothing interests refers to the aspects of appearance, status, image, selection expectation or performance enhancement relating to cycling clothing.

CHAPTER II

REVIEW OF LITERATURE

A background knowledge of needs assessment related to indoor cycling wear was necessary to establish a basis for this study. Needs assessment design is a technique that involves users in the design process. The purpose of needs assessment is to provide insight into some of issues and needs for active people and indicate a gap between indoor cycling wear needs and cycling wear currently available.

In order to determine the wear needs of indoor cyclists, the review of literature will consist of the history and development of indoor cycling as an activity; the relationship between commitment and clothing expectations, attributes and satisfaction related to indoor cycling; and what cycling wear are currently on the market for indoor cycling.

The objective of the literature review was to explore studies related to indoor cycling wear selection and performance perceptions of indoor cyclists. The research revealed a number of studies related to other types of active-wear and outdoor clothing but no studies related to any aspect of the indoor cycling wear. A study of the indoor cycling clothing preferences and attributes of cyclists requires a review of literature related to (1) needs assessment (2) the history and development of indoor cycling (3) sports clothing expectations, attributes and satisfaction (4) indoor exercise environment (5) traditional cycling wear.

NEEDS ASSESSMENT

An FEA model (Functional, Expressive, and Aesthetic considerations) defined as the “consumers needs model” (Lamb and Kallal, 1992). The functional, expressive and aesthetic needs which are outlined in this model are related to the needs of one specific individual. For a larger target market, the needs of many consumers should be used related to the development of specific market goods.

Cowie (2001) looked at the relationship between male cyclists’ clothing and their commitment to cycling, and though this was not a study which was directly related to a needs assessment of the cyclists, the study did collect data which was related to the psychological clothing needs of the cyclists. This study found that cycling clothing that enhances performance is the most important clothing interest of male cyclists. Therefore a cyclist would want to have clothing that enhances their physical needs because they believe that it enhances their overall performance. According to Mullet (1984) needs can be social, psychological or physical. Furthermore, Yoo (1996) indicated that clothing plays an important role of physical, psychological and social needs.

Other researchers have understood the importance of looking at both the physical and psychological needs of the wearer. The methods used to collect the data are varied. In order to collect psychological needs, researchers (Uriyo, 2000; Casselman-Dickson & Damhorst, 1993) used a simple questionnaire which

collected data related to what the wearer thinks they need. A focus group another technique which Harr (1998) used by observing children with sensory impairments to develop a therapy garment for three four-year-old boys with sensory integrative dysfunction who participated in occupational therapy using sensory integrative methods . Mullet used a questionnaire which had kayakers rank design characteristics that they thought were important. (Mullet, 1984) Also, through the questionnaire Chae (2002) identified women's perceived tennis clothing needs.

THE HISTORY AND DEVELOPMENT OF INDOOR CYCLING

According to the figures from the International Health, Racquet and Sportsclub Association (IHRSA), more than half of Canadian sports clubs offer group cycling classes. In 1998, the first year that IHRSA tracked participation, 1.1 million people took an indoor cycling class. By 2007, the number had hit 1.6 million.

Group indoor cycling dates back to 1987, when South African-born cyclist Jonathan Goldberg, was training for cross-country bike race. He didn't want to be away for a long period during his wife's pregnancy. He installed a stationary bike in his garage and arranged a training program to simulate outdoor terrain then called his cycling friends to join him. (Johnny G. Spinning Instructor Manual, 1999) A trademark program Spinning® was introduced by Madd Dog

Athletics, Inc. later in 1992. Spinning is a type of indoor cycling program designed to help train professional cyclists and is specially aimed at improving cardiovascular fitness, muscle tone and exercise endurance (Johnny, 1996) It is a type of indoor aerobic classes performed on stationary bikes by participants who pedal together to the rhythm of music and during indoor cycling class the instructor simulates a ride. Participants can control their own speed and resistance to simulate traveling on flat roads, climb hills, sprint and race.

Originally, indoor cycling started as a form of cycling that would allow cyclist to complete training regardless of the weather. Therefore, indoor cycling classes were designed with outdoor challenges to provide a results-oriented program. A stationary bike has a weighted flywheel to simulate a similar outdoor cycling environment, and the indoor cycling class is designed to simulate terrain and situations similar to riding a bike outdoors. Participants bike through imaginary terrain, across flats and up hills, standing up and sitting down on cue. (Johnny G. Spinning Instructor Manual, 1999)

Two types of outdoor cycling concepts are incorporated into indoor program: mountain biking and road riding. The primary differences between these two outdoor riding styles are terrain and bicycle design. The principles of mountain biking and road cycling are adapted for strength training and used for endurance riding. Outdoor cycling terminology became part of the language used to present skill-specific drills replicated in spinning program.

EXPECTATIONS, ATTRIBUTES AND SATISFACTION OF SPORTS CLOTHING

Sport clothing serves a variety of purposes for athletes. (Dickson & Pollack, 2000) The success of designer will likely not only get the idea of the physical needs, but also better to identify what wearers' psychological needs in a variety of sports. There are various expectation, attributes and satisfaction of sport clothing based on the different types of sport. Those are related to task or appearance. In terms of task, it is considered of easing movement or performance enhancement. In terms of appearance, it is considered of attractive, expressing competence or unique. (Mitchka, Black, Heitmeyer & Cloud, 2009)

Many studies showed that expectations vary by the type of sport or activity. Cowie (2001) found that male cyclists use clothing to carry out their identity, symbolically show their membership to the cycling community and enhance their skill level in efforts to define their role as a cyclist. As for female bicyclists, Dickson and Damhorst (1993) found that bicyclists are concerned with their appearance and like to wear cycling wear that is neat. Modesty and attractiveness emerged related to task-specific clothing enhanced their performance. Besides, Dickson and Pollack (2000) found that female in-line skaters preferred to have a unique and feminine identity appearance that meets their performance needs and believed that clearly identifies them as participants in in-line skate. For dancers of different commitment levels, Mitchka, Black, Heitmeyer and Cloud (2009) reported that dancers with highly committed express stronger expectations related to appearance issues.

When consumers purchase apparel products, product attributes stand an important factor influence their purchasing decisions. According to Fowler's (1999) study, participants completed an attribute importance ranking exercise to rank eight characteristics in terms of how important or influential the attributes were to the purchase decision for sports apparel. The eight characteristics listed were fit, comfort, style, color, brand, durability, ease of care and good value. The result showed that comfort, fit and style were rated as most important, and brand name and ease of care were least important.

Respondents in Cowie (2001) study, cyclists who scored high in behavioral commitment more frequently reported that fit was the most important quality attribute. On the contrary, cyclists low in behavioral commitment mentioned price, fabric and brand name as important attributes. Comfort and fit were the most important attributes when purchasing tennis clothing were investigated by Chae (2006). Wheat & Dickson (1999) examined female golfers and found that size, price and construction quality were more important than other attributes.

Several academic studies on sport clothing showed that comfort, fit and physical performance enhancing characteristics are important factors to influence satisfaction or dissatisfaction with clothing. (Zhang, 2004 ; Cowie, 2001; Dickson & Damhorst, 1993; Feather, Ford & Herr, 1996) Zhang (2004) examined older women who exercise regularly and found dissatisfaction occurred due to a pool of body measurement for ready-to-wear garment lead to limited size, fit and style selection. By the face-to-face interviews poor fit of clothing is a frequent

dissatisfaction of mature women. Also, fit satisfaction for female collegiate basketball players in the Feather, Ford & Herr (1996) study were mentioned as the most important clothing needs.

Based on prior studies of expectation, attributes and satisfaction with sport clothing, it appears that the proper sport clothing design will be likely be dependent on the ability to identify what wearers' physical and psychological needs. Thus, the purpose of this study was to identify the needs and preferences of indoor cyclist of clothing.

INDOOR EXERCISE ENVIRONMENT

The advantage of indoor exercise is that there is never a problem if the weather is too hot, cold, rainy or otherwise. Indoor exercise provides a stable environment facilitates a regular exercise routine. However, exercise indoor decreases the body's ability to cool itself down through convection, such as air flowing over the body. (Johnny G. Spinning Instructor Manual, 1999) That means the wearers will sweat more and if the sweat stays on the skin or clothing will cause discomfort feeling and lower performance.

In order to deal with heat and humidity or with more freedom of movement during exercise, there is wide variety of hi-tech materials developed to offer the functional fabrics for different needs. For example, LYCRA® fiber, Du Pont Co.'s registered trademark for the spandex fiber, adds comfort, fit,

shape retention, durability and freedom of movement. (LYCRA® fiber is a trademark of INVISTA.) And COOLMAX® can rapidly move moisture away from the body to the outer layer of the fabric, where it evaporates. It makes the wearer to feel cooler and more comfortable. (COOLMAX® fabric and freshFX® fabric are trademarks of INVISTA.)

TRADITIONAL CYCLING WEAR

Traditional cycling wear included cycling jersey and shorts. Cycling jersey is a specific jersey for cycling. The jersey is cut long in the back in order to accommodate the bent-over position used and rear pockets are placed on the back panel to hold water bottle or towel. Long zipper sets are located on the front of jersey for cyclist to maintain temperature. To reduce air resistance cycling jersey are usually worn with a tight fit. The traditional cycling jersey is printed with the logos and with special colors of a cycling team's sponsors.

As for cycling shorts, bike shorts usually have panels to allow the garment to be contoured to fit the human body in the cycling position. In the past due to lack of stretch fabrics, it would need more panels to allow the short more curvature. Today stretch fabrics help to improve this issue. However, in general, higher end bike shorts are usually made in 8-panel design. For the next level would be 6-panel and 4-panel. Also, the bike pad plays an important role while cycling. The purpose of padded bike shorts is to wick moisture and to prevent chafing.

People gain information about others through one's dress and behavior and use that information to define a situation. (Goffman, 1959) Every sport has its particular clothing, designed to be functional and to make that sport easier and more comfortable.

CHAPTER III

METHODS

DESIGN PROCESS FRAMEWORK

According to Koberg & Bagnall (1988) they defined design as a process of creative problem-solving. In the field of textile and clothing many scholars (Dejonge, 1984; Lamb & Kallal, 1992; Watkins, 1984, 1995; Labat & Sokolowski, 1999) have developed or modified design process frameworks to meet the needs of apparel design. To achieve the goal of developing possible design for indoor cycling wear, a design process framework was generated by modifying existing design process framework which was developed by J.F. Boles (Alexander, 1998). The four essential stages of Boles design process framework are (a) problem development (b) needs assessment (c) prototype development d) evaluation. (Figure 1)

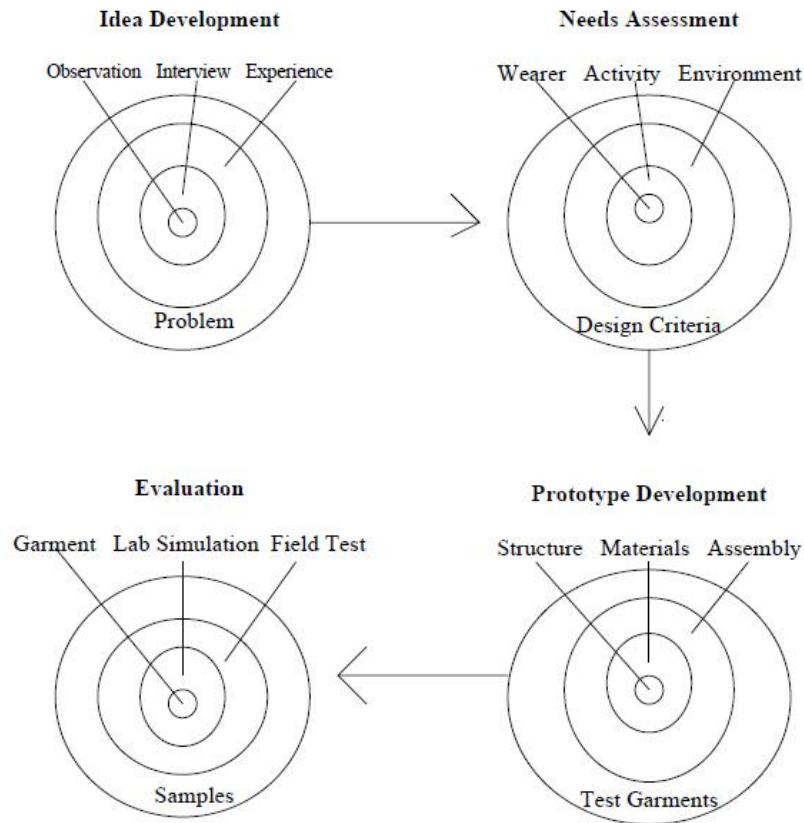


Figure 1: Boles design process framework. (Adapted from Alexander, 1998)

According to information found in the review of literature, the indoor cycling class is designed to simulate terrain and situations similar to riding a bike outdoors. However, the conditions and participants are not the same. And the most obvious difference between outdoor and indoor cycling is the environment condition.

The problem of indoor exercise environment is that indoor air humidity without airflow. Outdoor activities such as running and cycling incorporate a significant airflow. The airflow would increase convective heat dissipation and

promote evaporation. For outdoor cycling, depend on the weather condition people usually have to dress in layers so that they can remove them in increments while sweating and then put back on as needed.

However, when it comes to aerobic exercise in a hot, stuffy indoor environment such as gym, a good rule is to keep cool by wearing as little clothing as one is comfortable with because one exercises more vigorously when one is not overheated. Therefore, I draw the environment condition to be the constant in the model or the over-arching factor. (See Figure 2)

The first step of design framework is to identify the problem. This is made with a view to discuss through interview and observation to consider all possible problems in terms of practicality and requirements of indoor cyclists.

The next step of the framework is to perform a needs assessment. The wearers' functional or aesthetics needs, preferences and ease of movement would be collected from the users in interviews and previous literatures. The needs assessment makes designing to more close and responsive to wearer needs. The needs and preferences are generated, analyzed and translated into design criteria and clothing specifications.

In the third step, the design ideas collected from step 1 and clothing specifications developed from step 2 guide the development of the prototype garment structure. Using proper garment structure and materials which are

assembled based on environment condition, the designer construct a prototype apparel product for testing.

The last step, evaluation, is done to determine if the design meets the assessed needs. If not, it would return to the needs assessment and garment sample tests in the field and lab. Though the design process framework is described as steps, the process is not actually independent but coordinated in different ways and a continuous network model. The continuous network model is connected by the open-ended arrows.

This study utilized two of the four steps in this design process framework of indoor cycling: these are idea development and needs assessment.

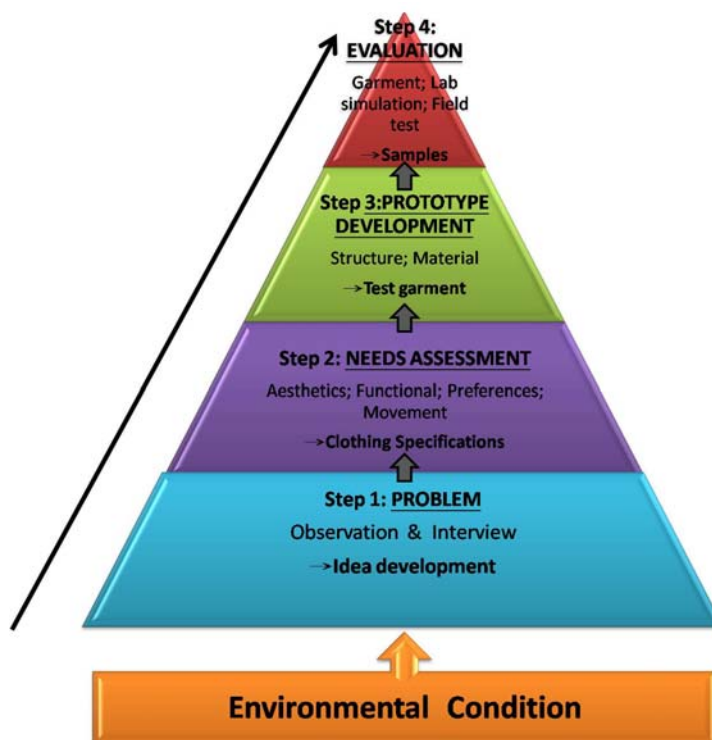


Figure 2. Design process framework of indoor cycling wear

SAMPLE AND DATA COLLECTION

The sample consisted of adults who enrolled and attended group indoor cycling class at fitness centers. Two formats were used for the survey: a Paper Survey and a Web Survey.

For the Paper Survey, the researcher requested permission to attend the indoor cycling classes which at the Fitness Center at the Dixon Recreation Center and Timberhill Athletic Club. (See Appendix A). The researcher will ask Instructors of these classes help to announce the need for participants and then handout the questionnaires to interested volunteers after class. The participants were asked to return their questionnaires to a survey box left at the classroom door.

For the Web Survey, the survey link was distributed through the newsletter of "Indoor Cycle Instructor.Com". The supervisor of Indoor Cycle Instructor.Com sent out the survey link and announcement to their readers. The readers of Indoor Cycle.Com include indoor cycling instructors and students from all over the country.

The project was approved by Oregon State University's Institutional Review Board (IRB) (See Appendix B), and the questionnaire is presented in Appendix C. The questionnaire was developed to investigate the proposed objectives one to four. The questionnaire was modified from previous research studies by Cowie(2001) to identify indoor cyclists' clothing needs in indoor

cycling wear. The questionnaire comprised five sections: general information, indoor cycling commitment, cycling clothing interest, cycling clothing needs and your ideal indoor cycling wear. (Appendix C)

DATA ANALYSIS

Data analysis was based on the returned valid questionnaire. An STATA statistical package was used for the analyses of these data. The quantitative and qualitative study used to assess the importance of indoor cycling wear attributes and summarized design preferences.

The questionnaire in this study is comprised of three major portions: (1) Demographics (2) Personal value statements and (3) Indoor cycling wear design preferences. The first portion included questions that obtain general demographic information from participants. The demographic questions related to the respondent's gender, age, and participation and commitment assessed in indoor cycling class. The statistical tests used for this portion consisted of frequencies, means, and standard deviations of the rating of the participants.

The second section respondents were asked to rate on 6-point scales ranging from 1 (strongly disagree) to 6 (strongly agree). The cycling commitment and clothing interest questions were developed by the researchers based on similar questions used by Cowie (2000) to assess male cyclists clothing preferences. The principal components factor analysis showed different types of clothing interests among indoor cyclists. Principal component analysis with

rotation was performed to reduce the number of variables from commitment and clothing interests. Lastly, relationships among the variables and analyses of variance were used utilizing simple linear regressions at a confidence level of $p < 0.05$.

In order to determine whether a significant difference existed between the probability that both attending outdoor and indoor cycling participants chose particular clothing for indoor cycling clothing and the probability that only participating indoor cycling class participants chose the same value. Pearson Chi-square test was performed to determine whether these probabilities were the same or significantly different. An alpha level of 0.05 was used for the test.

In the third section of questionnaire (cycling clothing needs), respondents indicated the attributes and elements of indoor cycling wear design that they are preferred. Through this process to illustrate possible indoor cycling wear criteria. Questions on the needs assessment were developed to determine the length of shorts/pants and sleeves of the top, how tight and loose and with what. Open-ended questions were included in each division of needs assessment .

Chapter IV

RESULTS

The overall goal of this study was to identify the clothing needs of people who participate in indoor cycling class. Since the number of indoor cycling participation is growing, it is necessary to investigate their clothing needs. The study was conducted to identify if indoor cyclists' commitment to cycling is associated with their sport clothing interests. This study also sought to determine the perceived needs and assess the importance of indoor cycling wear attributes. Besides, the study was to determine the needs and preferences of indoor cyclists for indoor cycling clothing. These preferences would be used as criteria to develop possible designs for indoor cyclists based on the identified perceived needs and indoor cycling wear attributes of indoor cyclists.

SAMPLE DESCRIPTION

The final sample used in this study consisted of 137 participants, 36 from Timberhill Athletic Club, 14 from Dixson Recreation center in Corvallis, Oregon, and 87 from all over country via *Indoor Cycle Instructor.Com.* The data were collected within a three-week period (from April 11 to April 30, 2010). Participants included students and instructors. One hundred and thirty-seven indoor cyclists returned completed questionnaires. Fourteen questionnaires were unusable due to the numerous sections of missing data.

SECTION ONE: DEMOGRAPHICS CHARACTERISTICS

Age and Gender

Table 1 reports the age groupings and gender of the participants. The 137 participants in this study ranged from 18 to above 60 years old. There are 85 females and 50 males. There are two missing value on gender. Of the 85 females surveyed, the age group that made up the largest set were the 46-60 years old (41%), the second largest percentage of female were ages 31-45 years old (33%).

There were 50 participants in the male group of the survey. Forty-four percent of these men were 46-60 years old and only 4% were 18-21 years of age.

Table 1: *Age & Gender of Respondents*

Age	<i>Female</i>		<i>Male</i>		Total number
	Number of respondents	Percentage	Number of respondents	Percentage	
18-21	5	6%	2	4%	7
22-30	12	14%	8	16%	20
31-45	28	33%	14	28%	42
46-60	35	41%	22	44%	57
above 60	5	6%	4	8%	9
Total	85	100%	50	100%	135

Note: Value missing 2

Length of Participation In indoor Cycling Class

The length of participation in indoor cycling class among the respondents ranged from less than one month to above 3 years (Table 2). The largest percentage of participants indicated participating in indoor cycling class for more than 3 years (58.4%). The second largest percentage of participants indicated participating in indoor cycling class from one to two years (17.5%). Combining the responses for participants who had been indoor cycling for less than one year equaled (16.8%) and approximately 7.3% of the respondents had been learning for two to three years.

Table 2: *Length of Participation in Indoor cycling class*

Length of participation	Number of Respondents	Percentage
Above 3 years	80	58.4%
2-3 years	10	7.3%
1-2 years	24	17.5%
6 months-1 year	9	6.6%
1- 6 months	8	5.8%
Less than 1 month	6	4.4%
Total	137	100%

Weekly Participation in Indoor Cycling Class

Indoor cycling class participation ranged from one to five per week. In Table 3, the largest group of respondents participated two to three times per week (56.20%). The second largest group of the respondents attended four to five times per week (22.63%). Approximately 11.68% of the respondents reported once a week of indoor cycling class participation.

Table 3: *Weekly Participation in Indoor cycling class*

Weekly participation	Number of Respondents	Percentage
more than 5 times	13	9.49%
4-5 times a week	31	22.63%
2-3 times a week	77	56.20%
Once a week	16	11.68%
Total	137	100%

Outdoor Cycling

The majority participants in this study were not only attending indoor cycling class but also participated in outdoor cycling for exercise. The data showed 75.91% of the participants in this study enjoyed outdoor cycling for exercise (Table 4).

Table 4: *Outdoor cycling participation*

Outdoor Cycling	Number of Participants	Percentage
No	33	24.09%
Yes	104	75.91%
Total	137	100%

SECTION TWO: PERSONAL VALUE STATEMENTS

Indoor Cycling Commitment and Clothing Interest

A modified version of the instrument developed by Cowie (2001) was used in this study to identify indoor cyclists' level of commitment and clothing interests and new items were added relating to indoor cyclists. To address object 1 (To identify the level of cycling commitment and indoor cycling clothing of indoor cyclists.) of this study, factor analysis is carried out to reduce the commitment and clothing interests variables to a smaller number of basic dimensions, and therefore more compact information can be achieved in the following analysis and comparison. Also, to ensure the variables in the commitment and clothing interest are assumed to be measuring the same thing. Thus, principal component analysis with rotation was performed to reduce the number of variables.

Commitment

The 14-item commitment to indoor cycling measure was reduced to three factors (Table 5). The three factors included a total of 12 items that loaded over 0.50, six items in the first factor, three items in the second factors and the other three items in the third factor. Two items were deleted from factors to increase the alpha reliability.

The first factor in the commitment to indoor cycling section included six items with a Cronbach's alpha reliability of 0.79 (Table 5). The eigenvalue for this factor was 4.69 and the factor accounted for 39.2% of variance. The first factor was labeled *Addiction*, as the items related to indoor cyclists' commitment to ride certain number of hours regardless of busy schedule.

The second factor was comprised of three items and had a Cronbach's alpha reliability of 0.71 (Table 5). The eigenvalue was 1.44 and percent of variance explained was 11.98. The second factor was named *Relax and Happiness* because the items described the happiness and relaxation cycling brings to participants.

The third factor in the indoor cycling commitment measure included three items, which had a Cronbach's alpha reliability of 0.59 (Table 5). The eigenvalue was 1.05 and the variance explained by the factor was 8.79%. The three items in

this factor pertained to increase work productivity and was named *Self-Improvement*.

Table 5: Factor Loading for Indoor Cycling Commitment Items

Factors	Factor Loading
Addiction	
(eigenvalue= 4.69 ; Cronbach's α = .79; variance explained= 39.2%)	
I spend considerable time and effort to be a more competent indoor cyclist.	0.74
Missing an indoor cycling class upsets me greatly.	0.53
I ride even when I am very busy.	0.66
I ride indoor cycling frequently.	0.75
I try to ride a certain number of hours each week.	0.66
I give indoor cycling higher priority than other activities.	0.62
Relax and Happiness	
(eigenvalue=1.44 ; Cronbach's α = .71; variance explained= 11.98%)	
Indoor cycling helps people relax.	0.60
Indoor cycling increases happiness.	0.84
Indoor cycling is the high point of my day.	0.76
Self-Improvement	
(eigenvalue=1.05 ; Cronbach's α = .59; variance explained=8.79%)	
I would change or arrange my schedule so that I can ride.	0.65
Indoor cycling increase work productivity.	0.80
Indoor cycling can be a means of self-improvement.	0.52

Note: Items were rated on a scale of 1 (Strongly Disagree) to 6 (Strongly Agree). Most items in the scale were modified from Cowie (2001). Overall Cronbach's α = .85.

Clothing Interest

Upon creating the three factors that shortly described indoor cyclists' commitment to cycling class, principal components factor analysis with rotation

was guided for the indoor cycling clothing interest measure. The 16-item indoor cycling clothing interest measure was reduced to three factors including 14 items, eight items in the first factor, four items in the second factors and 2 items in the third factor (Table 6). Two items was eliminated from factor consideration to raise the alpha reliability.

The first factor was named *Appearance /Fashion Awareness* and contained eight items with a Cronbach's alpha reliability of .85 (Table 6). The eigenvalue was 4.67 and explained 33.35 percent of variance. These items in this factor related to the appearance, status and image of indoor cycling clothing.

The second factor in the indoor cycling clothing interest measure included four items, which had a Cronbach's alpha reliability of .93 (table 6). The eigenvalue was 3.19 and the variance explained by this factor was 22.77%. The factor was labeled *Selection expectation*, as the items described people are able to find indoor cycling wear followed their expectation and preference.

The third factor included 2 items with a Cronbach's alpha reliability of .82 (Table 6). The eigenvalue for this factor was 1.17 and explained 8.38% of variance. The items in this factor pertained to enhancing performance with cycling clothing regardless whether others like it or not and was named *Performance Enhancement*.

Table 6: *Factor Loading for Indoor Cycling Clothing Interest Items*

Factors	Factor Loading
Appearance/Fashion Awareness	
(eigenvalue= 4.67 ; Cronbach's α = .85; variance explained= 33.35%)	
I am very aware of what other cyclists are wearing.	0.61
I like to wear cycling clothing that is different from cycling clothes that other riders wear.	0.57
The kind of clothes a cyclist wears tells a lot about his/her level of competence as an indoor cyclist.	0.73
I care about what I wear for a ride more than other cyclists do.	0.82
I like to be considered a well dressed cyclist by others who ride.	0.81
I only wear cycling clothing that is specifically made for riding (jerseys verse t-shirts).	0.65
I wear cycling clothing that enhances my physical appearance.	0.68
I think peoples' opinions of my ability as an indoor cyclist are based on the clothing I wear for cycling.	0.63
Selection expectation	
(eigenvalue=3.19 ; Cronbach's α = .93; variance explained= 22.77%)	
I am able to find quality cycling wear.	0.91
I am able to find cycling wear in my size.	0.9
I am able to find cycling wear in the colors I prefer.	0.91
I am able to find cycling wear in the fabrics I prefer.	0.91
Performance Enhancement	
(eigenvalue=1.17 ; Cronbach's α = .82; variance explained=8.38%)	
I wear cycling clothing that I like whether others like it or not.	0.89
I prefer to wear cycling clothing that will help me ride better.	0.74

Note: Items were rated on a scale of 1 (Strongly Disagree) to 6 (Strongly Agree). Most items in the scale were modified from Cowie (2001). Overall Cronbach's α = .83.

Summary of Indoor Cyclists' Commitment and Clothing Interest

Table 7 displays the means and standard deviation for indoor cycling commitment and clothing interest. In general, indoor cyclists indicated strong commitment to indoor cycling class. The mean for the variable Addiction was 4.60 (SD= .87), the mean for the variable Relax and Happiness was 4.94 (SD=.74) and the mean for the variable Self-Improvement was 5.12 (SD=.61).

Overall, indoor cyclists had fairly neutral involved in their cycling clothing with a mean for the variable Appearance/Fashion Awareness of 3.27 (SD=1.03) and the mean for the variable Selection expectation was 4.33 (SD=1.19). In general, indoor cyclists believed that cycling clothing will help them ride better with a mean for the variable Performance Enhancement of 4.77 (SD=1.05).

Table 7: Means for Indoor Cycling commitment and clothing interest

	Variable	Mean	Standard Deviation
Commitment	Addiction	4.6	0.87
	Relax and Happiness	4.94	0.74
	Self-Improvement	5.12	0.61
Clothing Interests	Appearance/Fashion Awareness	3.27	1.03
	Selection expectation	4.33	1.19
	Performance Enhancement	4.77	1.05

SECTION THREE: INDOOR CYCLING WEAR DESIGN PREFERENCES

Indoor Cycling Clothing Attributes

Regarding clothing attributes, participants' response to questions regarding the importance of cycling shirt/top and pants/shorts attributes (Question 7 of Section IV-Part A and question 6 of Section IV-Part B, see Appendix C). The respondents ranked the level of importance with 16 clothing attributes including ease of dressing, weight of fabric, fabric performance, fit and durability. The items were measured on a six point scale ranging from 1- Not Important to 6- Very Important. In order to determine what kind of clothing attribute was important for indoor cyclists, top five attributes which ranked at very important of shirt/top and pants/shorts were highlighted.

Shirt/Top

Table 8 shows that 55% of the respondents thought it was very important for the shirt/top to have thermal comfort. 51% of the respondents thought it was very important with fabric performance. 54% of the respondents thought it was very important fit well. And 50% of the respondents thought it was very important to have durability and friction against the body with 49%.

Table 8: *The Evaluation of Importance of Shirt/Top Attributes*

		Not Important				Very Important	
		1	2	3	4	5	6
1)	Ease of dressing	5%	6%	12%	19%	31%	27%
2)	Thermal comfort	3%	4%	4%	7%	28%	55%
3)	Weight of fabric	1%	4%	5%	11%	39%	39%
4)	Fabric performance	0%	2%	6%	6%	35%	51%
5)	Ease of care & maintenance	0%	1%	4%	14%	36%	45%
6)	Modesty	5%	10%	15%	28%	27%	14%
7)	Fit	0%	1%	1%	10%	35%	54%
8)	Fashion/Stylish	5%	8%	22%	25%	24%	16%
9)	Covers imperfections	6%	12%	12%	26%	29%	15%
10)	Pressure on the body	7%	8%	18%	27%	28%	13%
11)	Appearance & body image	5%	7%	10%	28%	32%	18%
12)	Age appropriateness	10%	13%	10%	25%	29%	13%
13)	Calls attention	32%	22%	24%	12%	7%	3%
14)	Keep me dry	1%	2%	4%	14%	33%	46%
15)	Friction against the body	3%	4%	3%	14%	27%	49%
16)	Durability	1%	2%	1%	10%	36%	50%

Pants/Shorts

For the pants/shorts there are five attributes that the respondents ranked as very important: fabric performance (53%), fit (55%), keep me dry with 53%, friction against the body with 54% and durability with 60%. (See Table 9)

Table 9: *The Evaluation of Importance of Pants/Shorts Attributes*

	Not Important				Very Important	
	1	2	3	4	5	6
1) Ease of dressing	2%	4%	10%	20%	38%	25%
2) Thermal comfort	3%	2%	7%	11%	33%	43%
3) Weight of fabric	1%	1%	9%	16%	43%	28%
4) Fabric performance	0%	1%	4%	10%	33%	53%
5) Ease of care & maintenance	1%	1%	3%	12%	40%	44%
6) Modesty	6%	11%	10%	26%	29%	18%
7) Fit	0%	0%	1%	4%	39%	55%
8) Fashion/Stylish	8%	13%	19%	29%	20%	10%
9) Covers imperfections	11%	11%	15%	28%	19%	16%
10) Pressure on the body	4%	6%	6%	28%	31%	24%
11) Appearance & body image	6%	7%	13%	26%	33%	24%
12) Age appropriateness	14%	13%	13%	23%	23%	13%
13) Calls attention	33%	23%	20%	15%	5%	4%
14) Keep me dry	4%	3%	2%	11%	27%	53%
15) Friction against the body	5%	3%	4%	12%	21%	54%
16) Durability	1%	1%	0%	11%	27%	60%

Male and Female Preferences for Indoor Cycling Wear Design

In this study, there were 85 females and 50 males. Male and female respondents were asked to determine the elements needed for the indoor cycling clothing based on their cycling wear experience. The results of the indoor cycling design preferences are divided into two parts: (A) Upper body garment- shirt/top (B) Lower body garment-pants/shorts.

Part A: Upper body garment- shirt/top

Fit of Shirt

Male and female cyclists were first asked about the fit of ideal indoor cycling top. They were given the options of: very fitted, relax fitted, baggy fitted, loose and others. 58% males identified relax fitted as the fit of their choice and 69% females preferred baggy fitted of the shirt. Only four female selected the option “others” and said that “narrow through hips and waist, larger through shoulders”, “close to the body, but not enough to cause chaffing”, “Very Fitted, but not skin tight” and “Relaxed fitted, but hard to find longer tops in women's models.”. Figure 3 includes the five fit description and their related preference.

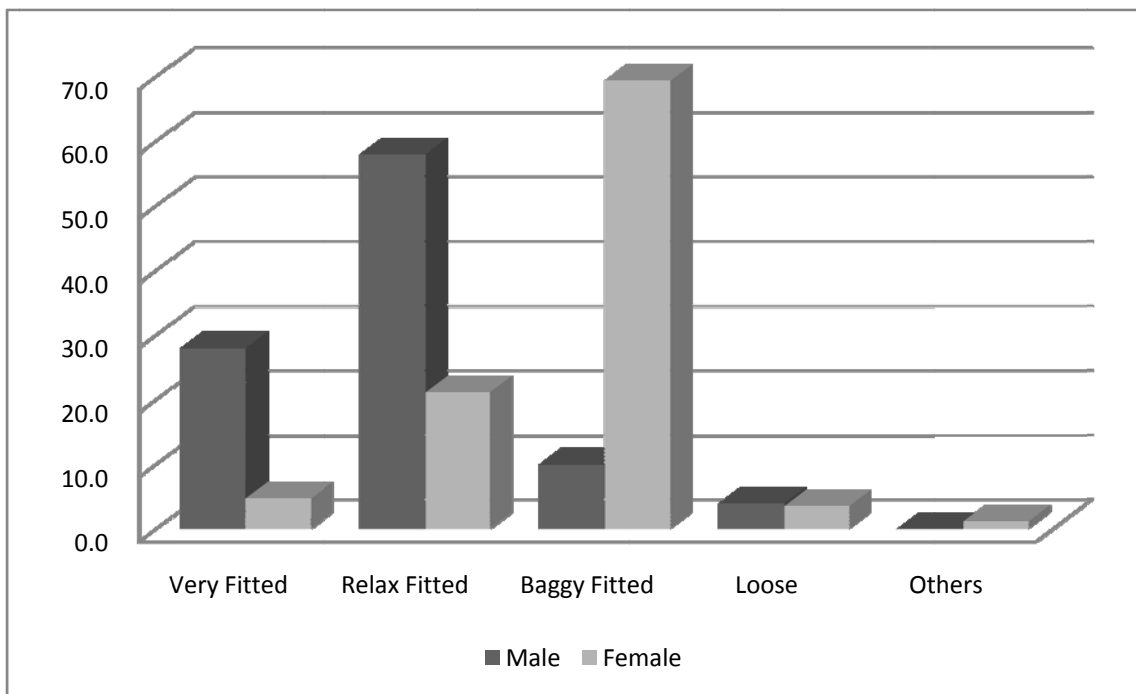


Figure 3: *Fit of Shirt*

Length of Sleeves

Sixty percent of the male respondents preferred short sleeves and 40% of them wanted no sleeves. Racer back, 3/4 length sleeve and long sleeves received no votes from male participants. The type of sleeves that 35% of the female participants wanted on indoor cycling shirt was racer back and 32% of the female participants wanted a shirt that was short sleeves. Figure 4 displays the results of the length of sleeve question.

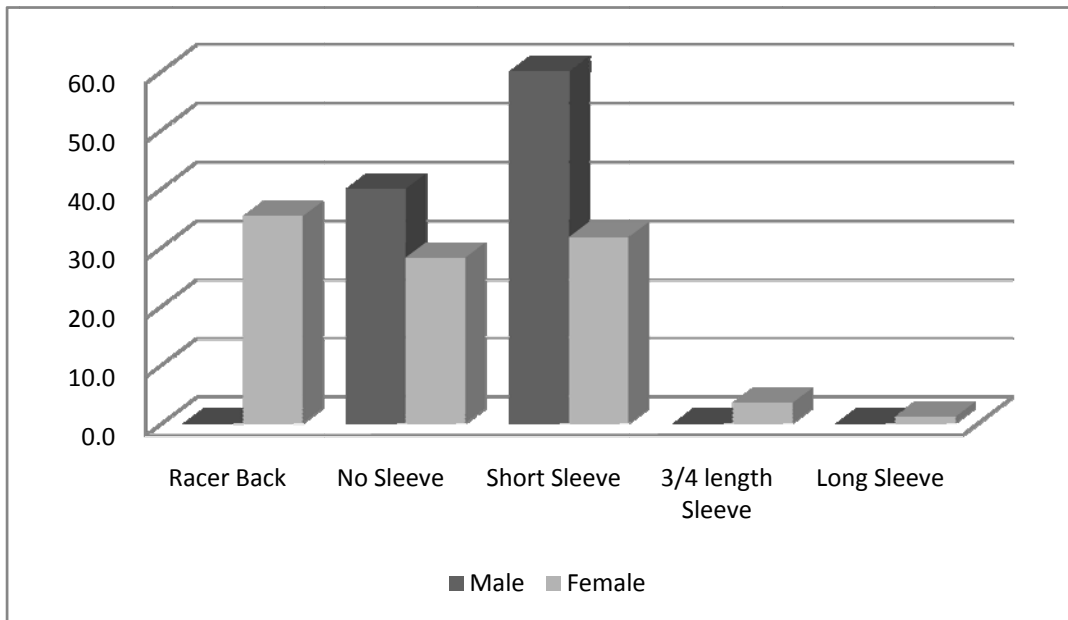


Figure 4: *Length of Sleeves*

Length of Waist

Choices of shirt length were: (1)above the waist, (2)at the waist, (3)below the waist, (4)short in front and longer in back, and (5) others. The male respondents preferred were either at the waist or below the waist. At the waist received 32% and below the waist received 34% from males. 61% of female respondents showed a preference for below the waist. Figure 5 has a display of the results.

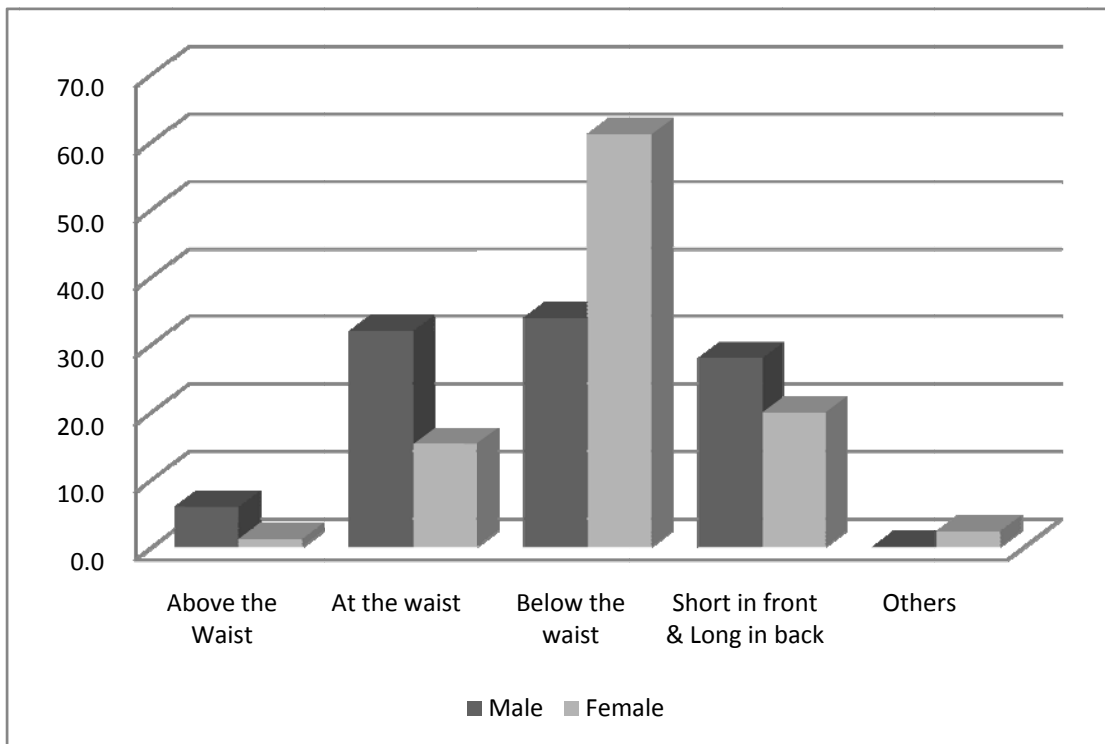


Figure 5: *Length of Waist*

Fabric Pattern of Shirt

Participants were asked to indicate what kind of fabric pattern they prefer. They were given four choices: (1) solid color, (2) prints, (3)logos, and (4)others.

Both male and female participants preferred the solid color. Figure 6 shows the results of fabric pattern preference.

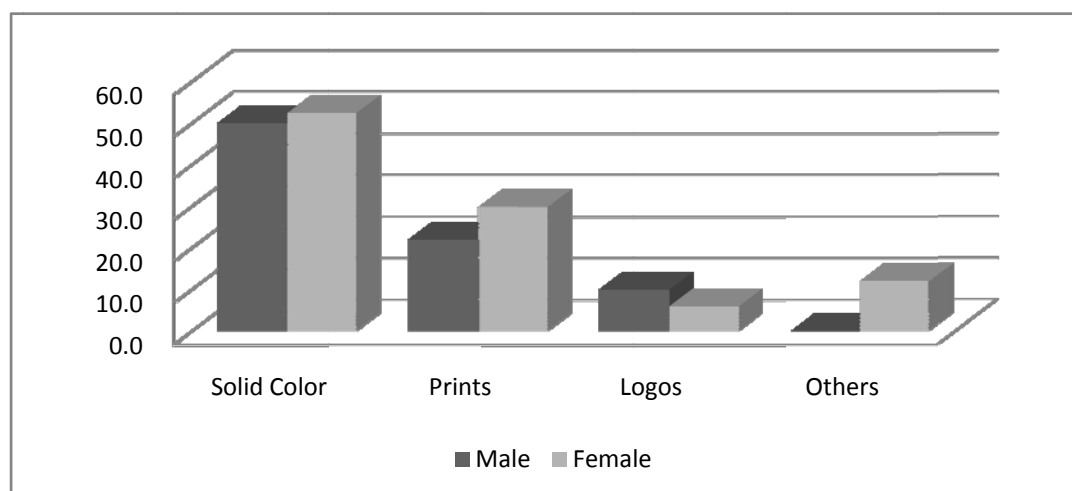


Figure 6: *Fabric Patterns of Shirt/Top*

Built-In Bra

All the female participants were asked to answer question about if they wear cycling short/top which with built-in bra. There are only 27% of the female respondents that wear cycling shirt/top which built-in bra. The rest of female respondents who answered no with several reasons, such as “never find one that is supportive” or “it would be uncomfortable.”

Pocket On the Shirt

Sixty-six percent of female participants preferred do not have pocket on the shirt, in addition, 52% of male participants do not want pocket on indoor cycling

shirt either. Male and female participants who wanted pocket specified the pocket location to be on the middle of the back. In this study included indoor cycling class instructors, therefore, some respondents preferred to have pocket to place the wireless mike transmitter.

Part B: Lower body garment- Pants/Shorts

Length of Pants

The length of pants/shorts was the first component that was considered in the design of indoor cycling pants for both male and female wearers. 88% of male participants selected Bike, while female respondents were split almost evenly between Bike (35%) and Pedal (28%) or perhaps liked both Short(17%) or Capri(17%). (See Figure 7)

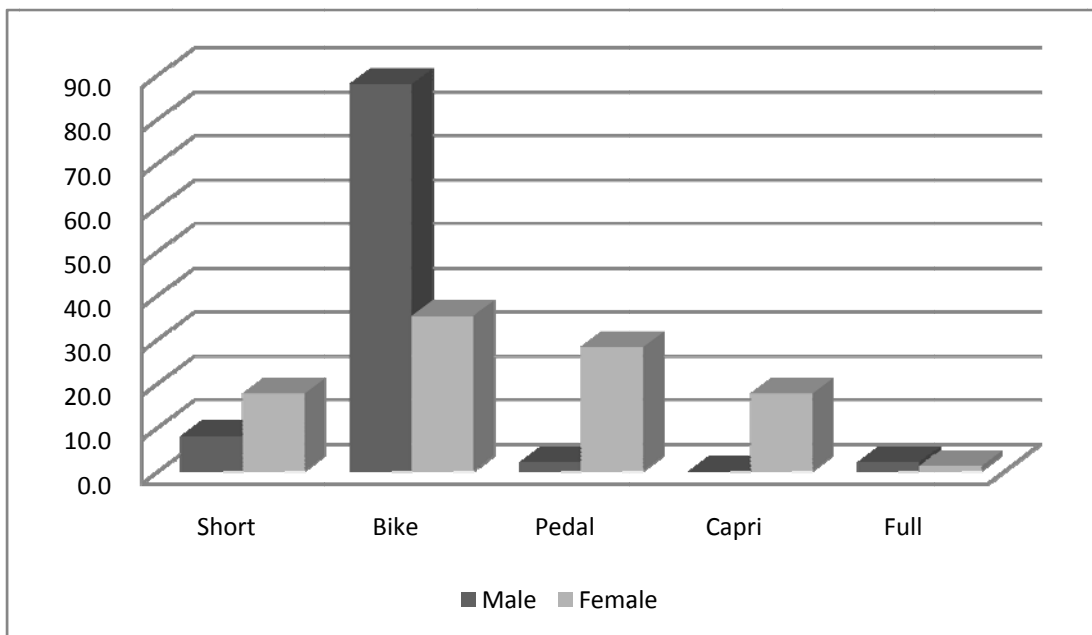


Figure 7: *Length of Pants/Shorts*

Fit of Pants

The fit of pants was the second question posed to male and female participants. Figure 8 showed that both male (70%) and female (62%) participants wanted very fitted for the pants/shorts.



Figure 8: *Fit of Pants/Shorts*

Fabric Pattern of Pants

Figure 9 showed that almost all female participants (93%) and 76% of the male participants wanted the fabric pattern of indoor cycling pants/shorts to be a

solid color. Both male and female participants went on to show a clear preference for solid color for the pants and shorts.

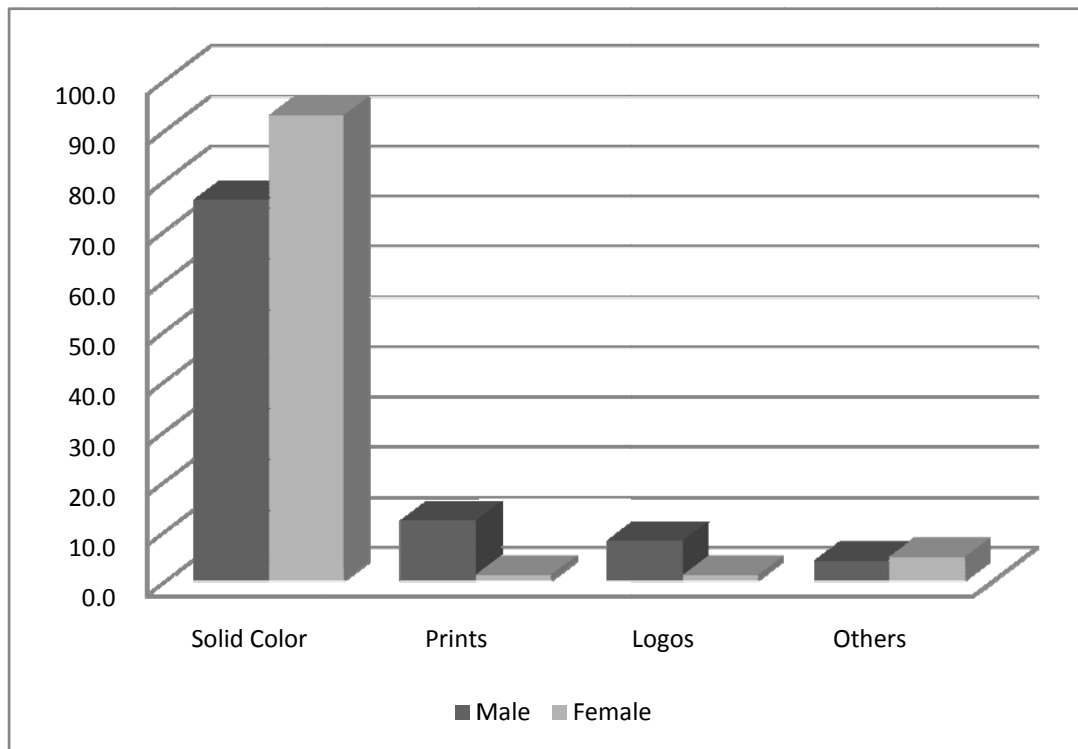


Figure 9: *Fabric Pattern Preferences of Pants/Shorts*

A Seat-Pad

The participants were asked whether a seat pad should be a part of the design criteria for the tight fitting pants and shorts. Males (82%) agreed that a seat-pad should be incorporated into indoor cycling pants or shorts. However, there is only 49% of females preferred with a seat-pad into cycling pants or shorts.

Particular Clothing for Indoor Cycling Class

At the end of the questionnaire, participants were asked to indicate whether or not particular clothing is necessary for indoor cycling class. They were given the options of : (1) Yes, please describe what you think the ideal indoor cycling outfit should look like? ,and(2)No, Why?. Most of the participants (63%) selected yes, it is necessary to have particular clothing for indoor cycling class. Sixty percent of the males and sixty-four percent of the females wanted the particular clothing for the class. Figure 10 displays the result.

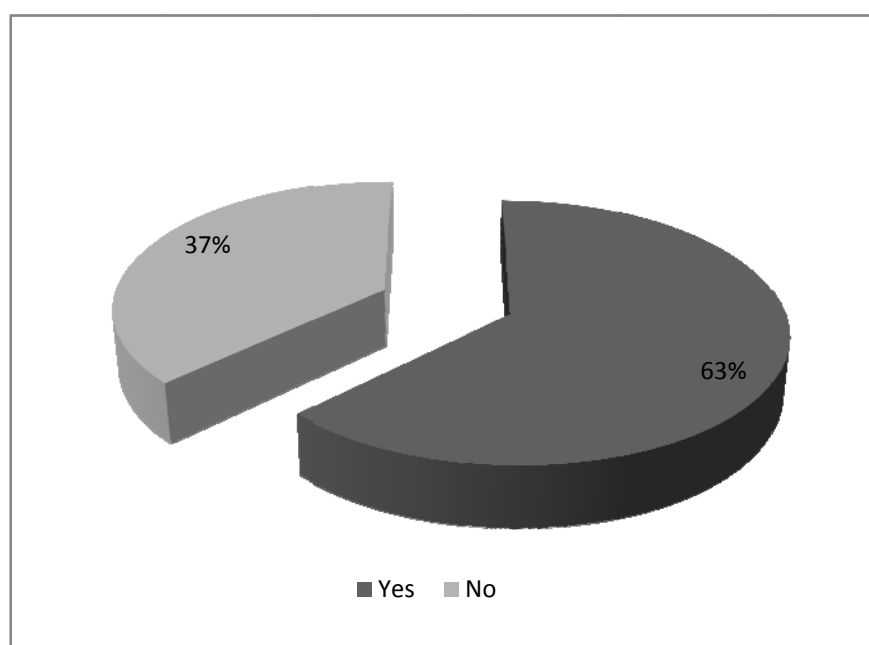


Figure 10: *Is it necessary to have particular clothing for indoor cycling class?*

Most participants commented the ideal cycling outfit presented as follows,
“...would love a performance T-shirt type product instead of a jersey...”

“... most riders would benefit from riding with padded shorts and a moisture wicking shirt.”

“...similar to cycle clothes but cooler as there is no wind in the class..”

“...Jerseys should be long enough so as not to show your back when ridding. The material should also not show sweat spots. “

“... neat, flattering, and polished plus wicking and non chaffing are key.”

One participant discussed how ease of care and maintenance related to ideal indoor cycling outfit by,

“My biggest issue is with order. I do everything possible to launder my spin stuff and still have to toss it after a month or two as it gets that dri-fit smell... cat urine comes to mind. I never dry stuff and use arm and hammer super strength detergent. It's the biggest problem with workout clothing.”

Regarding proper clothing for an indoor cycling instructor, one participant noted,

“Instructors need to model proper clothing for their students. "Proper" means clothing that helps wick moisture and keeps you drier, and has padding for comfort and ability to stay seated for longer periods. Shorts and a wicking top are the most important (and cycling shoes) - it doesn't have to be a cycling jersey, but t-shirts are inappropriate as they hold in moisture to the body. Padded shorts

can mean the difference to a student enjoying the workout and being more likely to come back, otherwise they may not get past the sore bum!”

One participant discussed how outdoor and indoor riding environment relates to cycling wear,

“Indoor riding is different from outside, possibly things could be done to enhance the inside ride. Sweating can be a huge issue if your ride for more than 3 hrs.”

Another participant also noted,

“Breathable function is important for me since riding indoor is much less ventilated than outdoor.”

From our previous results showed that the most participants in this study were not only attending indoor cycling class but also participated in outdoor cycling for exercise. The data showed 75.91% of the participants in this study enjoyed outdoor cycling for exercise too (See Table 4).

On the other hand, people who commented “No need particular clothing for indoor cycling class” given the reason as below,

“It is not necessary for people to have certain clothing, just something that they are comfortable in that will allow them full range of movement while also being comfortable.”

“No, I think people need to exercise in what they feel most comfortable wearing.”

“... as long as you comfortable it shouldn't matter...”

Table 4 (p. 28) showed that most participants in this study were not only participating in indoor cycling class but also attending outdoor cycling for exercise. Combined the data about whether or not particular clothing is necessary for indoor cycling class, crosstab results shown in table 10, 67 respondents who participate both indoor and outdoor cycling reported the highest number of needs on specific clothing for indoor cycling.

Table 10: *Distribution of respondents by Specific Clothing Needs on Clothing*

Group	Specific Clothing for Indoor Cycling Class		Total
	Yes	No	
Both Indoor & Outdoor Cycling	67	37	104
Only Indoor Cycling	19	14	33
Total	86	51	137

In order to determine whether a significant difference existed between the probability that both attending outdoor and indoor cycling participants chose particular clothing for indoor cycling clothing and the probability that only participating indoor cycling class participants chose the same value. Pearson

Chi-square test was performed to determine whether these probabilities were the same or significantly different. An alpha level of .05 was used for the test.

The Chi-square results presented in Table 11 shown p-values that was higher than the 0.05 alpha level. Results indicated that there was no significant differences between the probability that both attending outdoor and indoor cycling participants chose particular clothing for indoor cycling clothing and the probability that only participating indoor cycling class participants chose the same value. ($X^2 = .503$, $df = 1$, $p = .478$).

Table 11: Participants by selection of Specific Clothing for Indoor Cycling Class

Variable	Both Indoor & Outdoor Cycling (n= 104)		Only Indoor Cycling (n= 33)		Statistic	DF	X^2	p-value
	Y	N	Y	N				
Specific Clothing for Indoor Cycling Class	67	37	19	14	X^2	1	0.503	0.478

Note: Y= Number of participants that need specific clothing for indoor cycling class. N= Number of participants that no need specific clothing for indoor cycling class.

RESULTS OF HYPOTHESES TESTS

The hypothesis in this study was developed based on the first objective of the study and tested using simple linear regression, to determine whether there were significant relationships between indoor cycling commitments and the

clothing interests. The principal components factor analysis showed three types of indoor cycling commitment; *Addiction, Relax and Happiness* and *Self-Improvement*, also found three types of clothing interests; *Appearance/Fashion Awareness, Selection Expectation* and *Performance Enhancement*. In order to test each indoor cycling commitment and clothing interests variable separately, the hypothesis was split into three main hypotheses.

Hypothesis 1

Indoor cyclist who is on “Addiction” commitment is significantly related to their clothing interests.

Hypothesis 2

Indoor cyclist who is on “Relax and Happiness” commitment is significantly related to their clothing interests.

Hypothesis 3

Indoor cyclist who is on “Self-Improvement” commitment is significantly related to their clothing interests.

Also, the principal components factor analysis found three types of clothing interests; *Appearance/Fashion Awareness, Selection Expectation* and *Performance Enhancement*. Therefore, in order to test each clothing interest variables separately, the main hypotheses containing the clothing interest variables were split into three hypotheses. For example, hypothesis 1 includes

the clothing interest variable, thus, the variable *Appearance/Fashion Awareness* will be reported under the heading hypothesis 1a, *Selection Expectation* will be reported under the heading hypothesis 1b and *Performance Enhanced* will be reported under the heading hypothesis 1c. As three variables of clothing interests (*Appearance/Fashion Awareness*, *Selection Expectation* and *Performance Enhancement*) were used to test hypothesis 2 and 3, the hypotheses were also separated into Hypothesis 2a, 2b, 2c and 3a, 3b and 3c.

Hypothesis 1

Simple linear regression was run to determine the relationship between the level of *addiction* commitment and clothing interests. The independent variable in the regression was *addiction* and *Appearance/Fashion Awareness*, *Selection Expectation* and *Performance Enhancement* Clothing Interests were the dependent variable.

Hypothesis 1a: Indoor cyclist who is on “addiction” commitment is significantly related to *Appearance/Fashion Awareness* clothing interests.

A significant positive relationship was found between the level of *addiction* commitment and *Appearance/Fashion Awareness* clothing interests. $F(1, 135) = 13.57$, $P < 0.01$. In this model, 9% of the variance in *Appearance/Fashion Awareness* clothing interests can be explained by the level of *addiction* commitment. Indoor Cycling *addiction* Commitment was significantly related to *Appearance/Fashion Awareness* clothing interests. (See Table 12) with a standardized coefficient of .30 ($t = 3.68$).

The presence of a positive b-value suggests that the more involved an indoor cyclist is with commitment, the more interested indoor cyclists tend to be in *Appearance/Fashion Awareness* cycling clothing interests. An increase in indoor cycling commitment, interests in *Appearance/Fashion Awareness* cycling clothing also increases. Therefore, Hypothesis 1a was supported.

Hypothesis 1b: Indoor cyclist who is on “addiction” commitment is significantly related to *Selection Expectation* clothing interests.

There was no significant relationship between the variables *addiction* commitment and *Selection Expectation* clothing interests ($F = 0.31$; $df = 1, 134$; $p = .577$) (See Table 12). An indoor cyclist is not able to find indoor cycling wear followed their expectation and preference with maintaining an addiction level commitment. As simple linear regression demonstrated a non-significant relationship between the variables *Addiction* and *Selection Expectation* may be caused by no specific indoor cycling clothing in the current market. A large portion of the respondents (63%) chose that particular indoor cycling clothing is necessary for indoor cycling class. However, people who are on high addiction level of commitment might not be able to find cycling wear they prefer in sportswear market. As *Selection Expectation* clothing interests were not significantly related to the level of addiction commitment. Hypothesis 1b was rejected.

Hypothesis 1c: Indoor cyclist who is on “addiction” commitment is significantly related to *Performance Enhancement* clothing interests.

A significant positive relationship shown between *addiction* commitment and *Performance Enhancement* clothing interests ($F=13.19$; $df=1, 135$; $p<0.01$). (See Table 12) Addiction commitment was significantly related to the factor *Performance Enhancement* clothing interests with a standardized regression coefficient of .30 ($t= 3.63$). The positive beta suggests that the more indoor cyclists' commitment on addiction level, the more interested they tend to be in the *Performance Enhancement* clothing interests. As a result of linear regression analysis, Hypothesis 1c was supported. *Addiction* commitment was found to have a significant positive relationship with the variable *Performance Enhancement*.

Table 12: Summary of regression analyses using the level of *Addiction* Commitment as an Independent variable.

Variable	b	SE	t	p	β	F(df)	R ²
Appearance/Fashion Awareness	0.25	0.07	3.68	0.000**	0.30	13.54 (1, 135)	0.09
Selection Expectation	0.04	0.06	0.56	0.577	0.05	0.31(1, 134)	0.00
Performance Enhancement	0.25	0.07	3.63	0.000**	0.30	13.19(1, 135)	0.09

** $p<0.01$; * $p<0.05$

Hypothesis 2

Regression analysis was utilized to determine the relationship between the level of *Relax and Happiness* commitment and clothing interests. The factor *Relax and Happiness* commitment was the independent variable and *Appearance/Fashion*

Awareness, Selection Expectation and Performance Enhancement Clothing Interests were the dependent variable.

Hypothesis 2a: Indoor cyclist who is on “Relax and Happiness” commitment is significantly related to *Appearance/Fashion Awareness* clothing interests.

A significant relationship was not found between the level of *Relax and Happiness* commitment and *Appearance/Fashion Awareness* clothing interests ($F=3.56$; $df=1, 135$; $p=0.061$) (See Table 13). The non-significant relationship found between *Relax and Happiness* commitment and *Appearance/Fashion Awareness* clothing interests and thus, Hypothesis 2a was rejected.

Hypothesis 2b: Indoor cyclist who is on “Relax and Happiness” commitment is significantly related to *Selection Expectation* clothing interests.

After run simple linear regression analysis, the variable *Relax and Happiness* commitment and the variable *Selection Expectation* clothing interests did not exhibit a significant relationship ($F=1.71$; $df=1, 134$; $p=0.193$) (See Table 13). As *Selection Expectation* clothing interests was not significantly related to the level of *Relax and Happiness* commitment. Hypothesis 2b was rejected.

Hypothesis 2c: Indoor cyclist who is on “Relax and Happiness” commitment is significantly related to *Performance Enhancement* clothing interests.

A significant positive relationship was demonstrated between the variables *Relax and Happiness* commitment and *Performance Enhancement* clothing interests ($F=4.27$; $df=1, 135$; $p<0.05$) (See Table 13). *Relax and Happiness* commitment was

found to be significantly related to the variable *Performance Enhancement* clothing interests with a standardized regression coefficient of .17 ($t= 2.07$). Indoor cyclists that are more in *Relax and Happiness* commitment also more concern about *Performance Enhancement* clothing interests. Simple linear regression demonstrated a positive relationship between the variables *Relax and Happiness* commitment and *Performance Enhancement* clothing interests and therefore, Hypothesis 2c was supported.

Table 13: Summary of regression analyses using the level of *Relax and Happiness* Commitment as an Independent variable.

Variable	b	SE	t	p	β	F(df)	R ²
Appearance/Fashion Awareness	0.11	0.06	1.89	0.061	0.16	3.56 (1, 135)	0.02
Selection Expectation	-0.07	0.05	-1.31	0.193	-0.11	1.71(1, 134)	0.01
Performance Enhancement	0.12	0.06	2.07	0.041*	0.17	4.27(1, 135)	0.03

**p<0.01; *p<0.05

Hypothesis 3

Simple linear regression was utilized to analyze the relationship between indoor cyclists' *Self-Improvement* commitment on clothing interests variables. The independent variable in the regression analysis was *Self-Improvement* commitment and the dependent variables were *Appearance/Fashion Awareness*, *Selection Expectation* and *Performance Enhancement* Clothing Interests.

Hypothesis 3a: Indoor cyclist who is on “Self-Improvement” commitment is significantly related to *Appearance/Fashion Awareness* clothing interests.

According to overall results , *Self-Improvement* commitment was not related to *Appearance/Fashion Awareness* clothing interests since relationship between the two variables was at 0.959 level of significance ($F= 0.00$; $DF= 1, 135$, $p= 0.959$) (See Table 14). Therefore, Hypothesis 3a was rejected.

Hypothesis 3b: Indoor cyclist who is on “Self-Improvement” commitment is significantly related to *Selection Expectation* clothing interests.

Results indicated that *Self-Improvement* commitment was not related to *Appearance/Fashion Awareness* clothing interests ($F= 0.39$; $df= 1, 134$; $p= 0.532$). (See Table 14) There was a non-significant relationship between *Self-Improvement* commitment and *Appearance/Fashion Awareness* clothing interests. Therefore, Hypothesis 3b was rejected.

Hypothesis 3c: Indoor cyclist who is on “Self-Improvement” commitment is significantly related to *Performance Enhancement* clothing interests.

As predicted, there was a significant relationship between the independent variable *Self-Improvement* commitment and the dependent variable *Performance Enhancement* clothing interests ($F=7.20$; $df= 1, 135$; $p<0.019$) (See Table 14). Indoor cyclists who are on the level of *Self-Improvement* commitment impact their clothing interests on *Performance Enhancement*. It means that indoor cyclists at the level of *Self-Improvement* commitment prefer to wear cycling clothing that will

help them ride better. Likewise, they think cycling clothing is important on their performance enhancement. As *Self-Improvement* commitment was significant relationship with *Performance Enhancement* clothing interests, Hypothesis 3c was supported.

Table 14: *Summary of regression analyses using the level of Self-Improvement Commitment as an Independent variable.*

Variable	b	SE	t	p	ß	F(df)	R ²
Appearance/Fashion Awareness	0.00	0.05	0.05	0.959	0.00	0.00 (1, 135)	0.00
Selection Expectation	0.27	0.44	0.63	0.532	0.05	0.39(1, 134)	0.00
Performance Enhancement	0.13	0.49	2.68	0.008**	0.23	7.20(1, 135)	0.05

**p<0.01; *p<0.05

CHAPTER V

SUMMARY, CONCLUSIONS AND COMMENDATIONS

This study was undertaken to determine indoor cyclists' preferences for indoor cycling clothing and garment characteristics. Four objectives were developed to accomplish the task.

The objectives of this research were as follows:

1. To identify the level of cycling commitment and indoor cycling clothing of indoor cyclists.
2. To assess the importance of indoor cycling wear attributes.
3. To identify needs of indoor cyclists' perceived indoor cycling clothing.
4. To develop design criteria for indoor cyclists based on the identified perceived needs and indoor cycling wear attributes of indoor cyclists.

The completion of the above objectives provided design criteria that could be used to recommend the preferences for the ideal indoor cycling clothing.

In this chapter the investigation was summarized, and recommendations for future research. This chapter was presented as follows: 1) summary of findings, 2) Design criteria/garment characteristics, 3) discussion and conclusion, 4) recommendations for apparel manufacturers & retailers, and 5) recommendations for further research.

SUMMARY OF FINDINGS

The purpose of this study was to identify the needs of indoor cycling consumers in an emerging sports and to explore the indoor cycling clothing design preferences of indoor cyclists and to examine the relationship between indoor cyclists' sport clothing interests and commitment to cycling. This research also attempted to determine whether there were significant differences between people who taking indoor & outdoor cycling have different needs on clothing based on environmental conditions. The indoor cycling wear design preferences would reflect the design criteria for indoor cycling clothing design.

Previous research had studied the relationship between male cyclists' sport clothing involvement, sport clothing interests, and commitment to cycling (Cowie, 2001). Also, Casselman-Dickson and Damhorst's study(1993s; 1993b) showed that female cyclists at two levels of involvement in the sport found that athletes were careful to wear correct clothing that accurately identified their level of competence in the sport. And the standards for appropriate clothing for a specific sport are drawn from sport traditions and the accustomed "uniform" for the sport. However, indoor cycling exercise has no a clearly identifiable look or "uniform" for indoor cyclists nor the environment condition is different from outdoor cycling. On what criteria do indoor cyclists consumers base their choice of clothing for indoor cycling exercise?

Previous studies of sport clothing had primarily focused on traditional outdoor male and female cyclists. This study provided insight into the design criteria of indoor cyclists of clothing. Furthermore, this study described the importance of indoor cycling clothing. Lastly, this study clarified the relationship between environment and different clothing needs.

The literature reviewed in this study related to needs assessment, the history and development of indoor cycling, sports clothing expectations, attributes and satisfaction, indoor exercise environment and traditional cycling wear. Environment condition was the constant and the over-arching factor of the conceptual framework for this study. And idea development and needs assessment are two main design processes of the framework.

A questionnaire was developed as the instrument to be used to gather needs and preferences for indoor cycling clothing design criteria from indoor cyclists. Each questionnaire was made up of three major parts: (1) Demographics (2) Personal value statements and (3) Indoor cycling wear design preferences. The 137 questionnaires were analyzed to test the hypotheses and investigate the clothing needs of indoor cyclists who were involved with indoor cycling class. The respondents for this study were a sample of 135 (85 females and 50 males) participants. Demographic data analysis showed that most of the respondents were between 46 to 60 years. The majority of the participants reported the length of participation in indoor cycling class was above 3 years and amount of time spent for indoor cycling class was 2 to 3 times a week. Over 75% of the

respondents were not only attending indoor cycling class but also enjoyed in outdoor cycling for exercise.

For this study, one general hypothesis was formulated to investigate whether there is a relationship between sport clothing interests and commitment.

Objective 1: To identify the level of indoor cycling commitment and indoor cycling clothing interests;

Hypothesis 1a and 1c supported a positive relationship between the level of addiction commitment and appearance/fashion awareness & performance enhancement clothing interest was identified. Indoor cyclists who were more in the level of addiction indoor cycling commitment tend to have more appearance/fashion awareness & performance enhancement clothing interest on clothing. Hypotheses H1b was rejected. There is no significant relationship between the level of addiction commitment and selection expectation clothing interests.

H2c was supported. It showed that indoor cyclists who were in relax and happiness level of commitment were more likely interested in performance enhancement clothing interests. H2a and H2b were rejected. Indoor cyclists who were in relax and happiness level of commitment did not exhibit a significant relationship with Appearance/Fashion Awareness & Selection Expectation clothing interests.

H3c supported that there was a significant relationship between indoor cyclists who were in self-improvement level of commitment and Performance Enhancement clothing interests. Performance enhancement clothing interest is important to indoor cyclists who were in self-improvement commitment. H3a & H3b were rejected. A non-significant relationship were shown between self-improvement commitment and Appearance/Fashion Awareness & Selection Expectation clothing interests.

The results of all hypotheses tests are summarized in Table 15.

Table 15: *Summary of hypotheses tests*

Hypothesis	Outcome
H1a: Indoor cyclist who is on "Addiction" commitment is significantly related to <i>Appearance/Fashion Awareness</i> clothing interests.	Supported
H1b: Indoor cyclist who is on "Addiction" commitment is significantly related to <i>Selection Expectation</i> clothing interests.	Rejected
H1c: Indoor cyclist who is on "Addiction" commitment is significantly related to <i>Performance Enhancement</i> clothing interests.	Supported
H2a: Indoor cyclist who is on "Relax and Happiness" commitment is significantly related to <i>Appearance/Fashion Awareness</i> clothing interests.	Rejected
H2b: Indoor cyclist who is on "Relax and Happiness" commitment is significantly related to <i>Selection Expectation</i> clothing interests.	Rejected
H2c: Indoor cyclist who is on "Relax and Happiness" commitment is significantly related to <i>Performance Enhancement</i> clothing interests.	Supported

H3a:	Indoor cyclist who is on “Self-Improvement” commitment is significantly related to <i>Appearance/Fashion Awareness</i> clothing interests.	Rejected
H3b:	Indoor cyclist who is on “Self-Improvement” commitment is significantly related to <i>Selection Expectation</i> clothing interests.	Rejected
H3c:	Indoor cyclist who is on “Self-Improvement” commitment is significantly related to <i>Performance Enhancement</i> clothing interests.	Supported

Performance Enhancement was supported for *Relax and Happiness* and *Self-Improvement* indicates that the indoor cyclists are using the exercise to improve themselves and therefore the clothing may be secondary to the overall goal of indoor cycling exercise. The hypotheses that dealt with *Appearance and Fashion* were rejected and therefore supported the notion that indoor cyclists are interested in *Performance Enhancement* before Fashion of their apparel.

DESIGN CRITERIA

In this study, frequencies were used to identify the design criteria for males and females indoor cycling design. The indoor cycling clothing design criteria were combined and composite drawings of indoor cycling wear preferences follow. (See Figure 11 & 12)

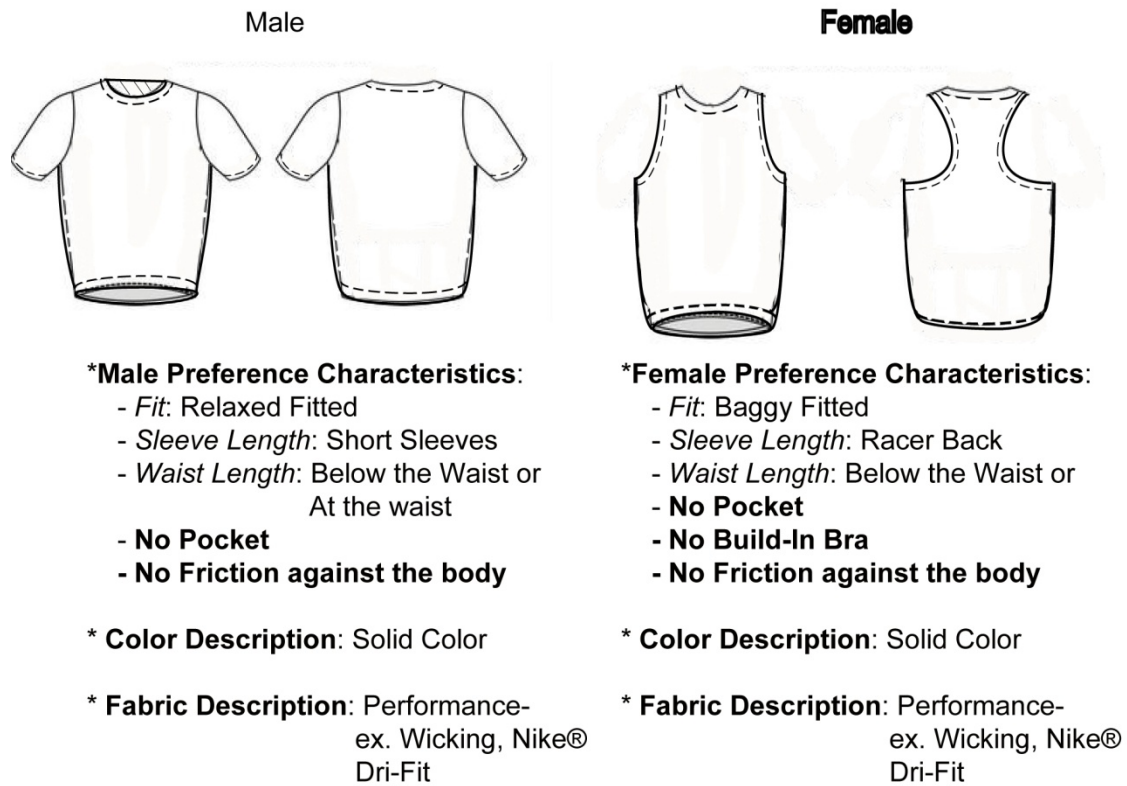


Figure 11: *Design Criteria for Male & Female Indoor Cycling Shirt/Top*

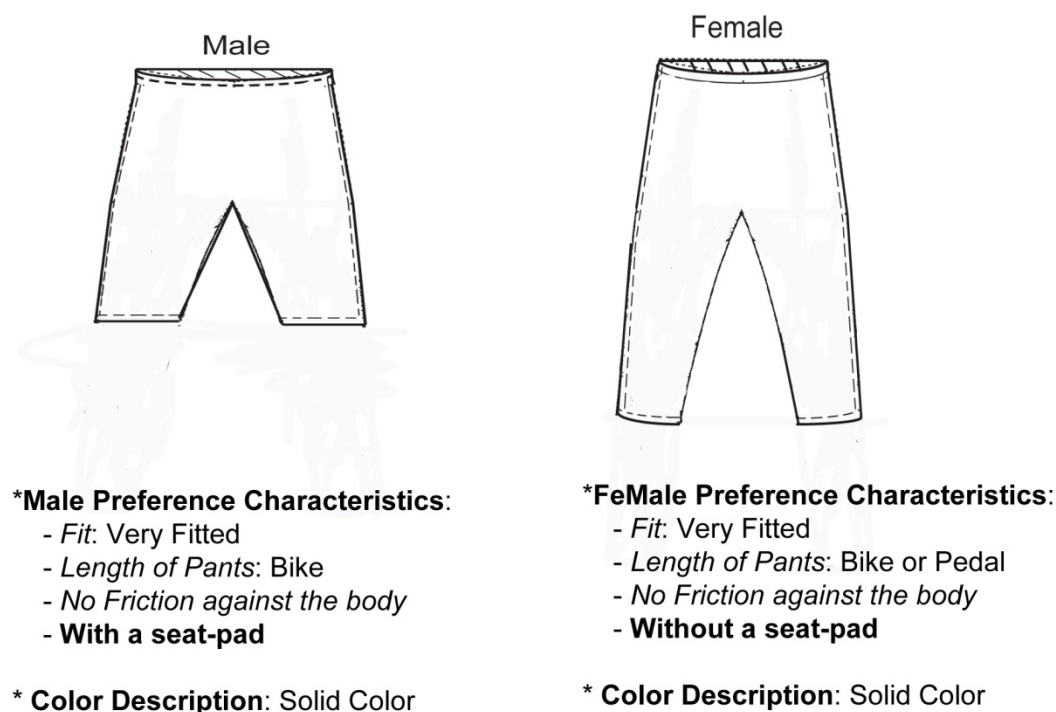


Figure 12: *Design Criteria for Male & Female Indoor Cycling Shorts/Pants*

It was not an objective of this research to develop prototypes from the design criteria. However, the reported design criteria could be used as guidelines for the development of future indoor cycling clothing. Some significant relationships were indicated by the analysis of data.

Shirt/Top of Indoor Cycling Wear

The highest level of significance was indicated by the 46 to 60 age group. A greater percentage of those 46-60 participants, 58% of males preferred relax fitted and 69% of females preferred baggy fitted. 60% of those 46 to 60 males preferred

short sleeve and 35% of females preferred racer back. Additionally, males (34%) preferred at the waist or below the waist and most female (61%) participants preferred below the waist length shirt. Also, a greater percentage of males and females preferred solid color. Both male and female participants did not preferred pocket on the shirt, except some instructors would like to have pocket to place the wireless mike transmitter. As for built-in bra, most females did not prefer this clothing characteristic.

Pants/Short of Indoor Cycling Wear

Eighty-eight percent of males preferred bike length of shorts, while females preferred bike (35%) or pedal (28%) length. Both male and female participants wanted very fitted shorts. Also, a greater percentage of participants (93%-male; 76%-female) preferred solid color. Regarding a seat pad, males (82%) agreed that a seat-pad is necessary for indoor cycling pants, however, females (51%) did not agree with that.

The findings of this research revealed that the indoor cyclists' preferences of indoor cycling clothing were shown as above information. Like Dickson & Pollack (2000), a better understanding of what criteria athletes in emerging sports use for evaluating and choosing sport clothing would guide manufacturers and retailers interested in serving the needs of these athletes.

DISCUSSION AND CONCLUSION

A questionnaire was developed and utilized to address the objective and purpose of the study. The 137 questionnaires were analyzed to test the hypotheses and explored the clothing needs of indoor cyclists who were involved in indoor cycling class. A positive relationship between the level of Addiction commitment and Appearance/Fashion Awareness & Performance Enhancement clothing interests were identified. A significant relationship between Relax and Happiness commitment and Performance Enhancement clothing interests was found. Also, indoor cyclists who were in Self-Improvement commitment tended to more concern Performance Enhancement clothing interests. The results shown that no matter what level of indoor cyclist commitment (Addiction, Relax & Happiness and Self-Improvement) were all focused on Performance Enhancement clothing interests. Moreover, indoor cyclists who were in addiction commitment were more likely interested in Appearance/Fashion awareness clothing interests.

The sample can be characterized as dedicated participants of the sport of indoor cycling. The “average” respondent to the questionnaire would have been a female whose average age is 46-60years. She exercises 2 to 3 times a week and has been doing so for more than 3 years. This respondent would also enjoy outdoor cycling. According to Zhang (2004), active sportswear for older women is expected to represent durable market because of older women engaging in

regular physical activity. Age was not related to an increase in the number of clothing problems (Black, 1988). However, fitting problems was positively correlated with age (Moore, 1982). Therefore, comparing younger indoor cyclists, it would be important to recognize the fitting problem of mature indoor cyclists on clothing.

The other important conclusion of this study is the relationship between fabric performance and product name is better understood. Functional fabric is an absolute requirement for indoor cycling clothing. Cyclists realize that indoor cycling environment cause them sweat more than outdoor. From open-ended questionnaire most participants mentioned Nike® Dri-Fit was their preferred short for keeping them feel dry while indoor cycling. The product name as an influencing factor in sport clothing evaluation across a variety of sports cannot be ignored. Related to comfort, the well-known product names are critical to athletes when selecting sport clothing. The close association was found in Dickson & Pollack's (2000) study indicated that the close association of brand name and quality and performance-enhancing characteristics were important information provided to manufacturers and retailers.

LIMITATIONS

Limitations to the study included:

1. Since respondents had defined interest in clothing and more willing to

answer questionnaire.

2. Sample included only people who subscribe to attended indoor cycling class.
3. Since the questionnaire was posted or distributed during three week period in April, 2010, not all indoor cyclists might have been able to participate in the study.
4. Sample age is estimated to be only a very small percentage of overall participants of the subject.

RECOMMENDATIONS

Based on the results of this study, the following suggestions are for apparel manufacturers and retailers and future research:

For Apparel Manufacturers & Retailers:

1. The most important information provided to retailers and manufacturers of sport clothing from this study is that well & easily -known style names are critical to cyclists when selecting sport clothing. There is strong association of consumers' selection and the name of performance-enhancing characteristics of clothing.
2. The indoor cyclists in this study expressed greater likelihood of buying top/shirt if it had wicking function characteristics.
3. This study indicated that clothing for indoor cycling is different than clothing for conventional outdoor cycling, thus providing designers with new design criteria and market possibilities.

4. A manufacturer may be approached to produce a set of garments for wear testing, or a textile company may be interested in developing new end uses.

For Future Research:

1. To investigate the clothing problems of older people participating in various other sports.
2. The prototype of the design could be made and evaluated.

BIBLIOGRAPHY

- Alexander, L. (1998). *Design criteria for female flight attendant uniforms: Wearer preference needs assessment*. Unpublished master's thesis, Virginia Polytechnic Institute and State University
- Black, C. (1988). *An intergenerational investigation of women's clothing problems*. Unpublished master's Thesis, University of Alberta.
- Casselman_Dickson, M.A., & Damhorst, M.L. (1993a). Female bicyclists and interest in dress: Validation with multiple measures. *Clothing and Textiles Research Journal*, 11(4), 7-17.
- Casselman-Dickson, M.A., & Damhorst, M.L. (1993b). Use of symbols for defining a role: Do clothes make the athlete? *Sociology of Sport Journal*, 10, 413-431.
- Chae, M. (2002). *An assessment of women's tennis wear*. Unpublished master's thesis, Florida State University.
- COOLMAX® fabric is a trademark of INVISTA (2009). *Why COOLMAX® fabric*. Retrieved December 22, 2009, from http://www.coolmax.invista.com/g_en/webpage.aspx?id=15
- Cowie, L.S. (2001). *Relationship between male cyclists' sport clothing involvement, sport clothing interests, and commitment to cycling*. The Ohio State University.
- Deep Breath In, LLC. (2010). *Do You Wear Cycling Clothing When You Teach Spinning?* Retrieved January 05, 2010, from <http://www.indoorcycleinstructor.com/indoor-cycling-20/instructor-tips-and-tricks/do-you-wear-cycling-clothing-when-you-teach-spinning-2/>

- DeJong, J. O. (1984). Forward: The design process. In S.M. Watkins (Ed.), *Clothing: The portable environment* (pp. vii-xi). Ames: Iowa State University Press.
- Dickson, M. A., & Pollack, A. (2000). Clothing and identity among female in-line skaters. *Clothing and Textiles Research Journal*, 18 (2), 65-72.
- Feather, B. L., Ford, S., & Herr, D. G. (1996). Female collegiate basketball players' perceptions about their bodies, garment fit, and uniform design preferences. *Clothing and Textiles Research Journal*, 14 (1), 22-29.
- Fowler, D. (1999). The attributes sought in sports apparel: A ranking. *Journal of Marketing Theory and Practice*, 7, 81-88.
- Goffman, E. (1959). *The presentation of self in everyday life*. Garden City, NY: Doubleday & Company, Inc.
- Haar, S. J. (1998). *The design of a Therapy Garment for Preschool Children with Sensory Integration Dysfunction*. Doctoral dissertation, Virginia Polytechnic Institute and State University.
- Johnny G. *Spinning Instructor Manual*. (1999). Johnny G. Publications.
- Koberg, D., & Bagnall, J. (1974). The design process is a problem-solving journey. In *The All New Universal Traveler: A Soft-Systems Guide to Creativity, Problem-Solving, and the Process of Reaching Goals* (pp. 16-17). Los Altos, CA: William Kaufmann Inc.
- LaBat, K.L., & Sokolowski, S.L. (1999). A Three-Stage Design Process Applied to an Industry-University Textile Product Design Project. *Clothing and Textiles Research Journal*, 17(1), 11-20.

- Lamb, J.M., & Kallal, M. J. (1992). A conceptual framework for apparel design. *Clothing and Textiles Research Journal*, 10 (2), 42-47.
- LYCRA® fiber is a trademark of INVISTA. (2009). *ABOUT LYCRA® FIBER*. Retrieved December 22, 2009, from http://www.lycra.com/g_en/webpage.aspx?id=142
- Mad Dogg Athletics. (2009). *Spinning: The Ultimate ride for body and mind*. Retrieved December 15, 2009, from <http://www.spinning.com>
- Mitchka, J., Black, C., Heitmeyer, J., Cloud, M. R. (2009). Problem structure perceived-Dance practicewear needs of adult female dance students. *Clothing & Textile Research Journal*, 27(1), 31-44.
- Mullet, K.K. (1984). *Kayaker's paddling jacket: A needs assessment*. Unpublished Master's Thesis. The Virginia Polytechnic Institute and State University.
- Uriyo, A. (2000). School unifrom design preferences of uniform wearers and terminal values attributed to them. The Virginia Polytechnic Institute and State University.
- Watkins, S.M. (1995). *Clothing The Portable Environment (2nd ed.)*. Ames, IA: Iowa State University Press.
- Wheat, K.L., & Dickson, M. A. (1999). Uniforms for Collegiate Female Golfers: Cause for Dissatisfaction and Role Conflict? *Clothing and Textile Research Journal*, 17(1), 1-10.
- Yoo, S. (1996). *Investigation of petite and tall sized women's clothing needs: Fashion involvement versus pre-purchase clothing satisfaction*. Unpublished Master's Thesis. The Texas Tech University.

Zhang, H. (2004). *Activewear for older women who exercise regularly: a Product development approach*. University of Manitoba, Winnipeg, Manitoba, Canada.

APPENDICES

APPENDIX A

Survey Permit


Questionnaire title: Indoor Cycling Wear: A needs assessment

PERMISSION IS HEREBY GIVEN FOR YI-LING HO (MAVIS) TO HAND OUT QUESTIONNAIRES TO INTERESTED VOLUNTEERS WHO ATTEND SPINNING (INDOOR CYCLING) CLASS AT THE DIXSON RECREATION CENTER.

● **PURPOSE OF THE STUDY:**

To know what people need for indoor cycling wear. The objectives of this study included identifying indoor cycling wear expectation, assessing the importance of indoor cycling wear attributes and assess satisfaction with selection, fit, comfort, and style of garment for indoor cyclists at different levels of indoor cycling commitment.

PERMISSION REQUEST BY:



DATE

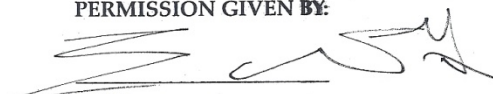
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Department of Design and Human Environment

Oregon State University, 224 Milam Hall, Corvallis, Oregon 97331-5101

T 541-737-3796 | F 541-737-0993 | <http://www.hhs.oregonstate.edu/dhe>

PERMISSION GIVEN BY:



DATE

4/8/10

Survey Permit

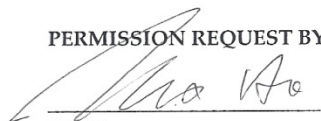
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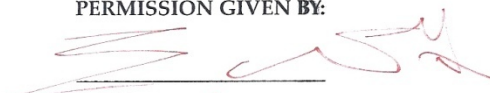
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APPENDIX B



Institutional Review Board • Office of Research Integrity
8308 Kerr Administration Building, Corvallis, Oregon 97331-2140
Tel 541-737-8008 | Fax 541-737-3093 | IRB@oregonstate.edu
<http://oregonstate.edu/research/ori/humansubjects.htm>

NOTIFICATION OF EXEMPTION

June 4, 2010

Principal Investigator:	Kathy Mullet	Department:	Design and Human Environment
Study Team Members:	N/A		
Student Researcher:	Yi-Ling (Mavis) Ho		
Study Number:	4560		
Study Title:	Indoor Cycling Wear: A Needs Assessment		
Funding Source:	None		
Submission Type:	Initial Application received 02/16/10		
Review Category:	Exempt	Category Number:	2

The above referenced study was reviewed by the OSU Institutional Review Board (IRB) and has determined that it is exempt from full board review. You may proceed with the research described in the protocol.

Expiration Date: 04/11/11

Annual continuing review applications are due at least 30 days prior to expiration date

Documents included in this review:

- | | | |
|--|--|--|
| <input checked="" type="checkbox"/> Protocol | <input checked="" type="checkbox"/> Recruiting tools | <input type="checkbox"/> External IRB approvals |
| <input type="checkbox"/> Consent forms | <input checked="" type="checkbox"/> Test instruments | <input type="checkbox"/> Translated documents |
| <input type="checkbox"/> Assent forms | <input type="checkbox"/> Attachment A: Radiation | <input type="checkbox"/> Attachment B: Human materials |
| <input type="checkbox"/> Grant/contract | <input type="checkbox"/> Letters of support | <input type="checkbox"/> Other: |

☐ Project revisions:

Principal Investigator responsibilities:

- Amendments to this study that impact the requirements for review must be reviewed prior to initiating the change. Please contact the IRB Office if you have questions about planned amendments.
- To ensure that changes to this research project have not altered the review category¹, the Principal Investigator must complete a brief renewal application on an annual basis. Submit a continuing review application or final report to the IRB for review at least four weeks prior to the expiration date. Failure to submit a continuing review application prior to the expiration date will result in termination of the research, discontinuation of enrolled participants, and the submission of a new application to the IRB.
- All study team members should be kept informed of the status of the research.
- Reports of unanticipated problems involving risks to participants or others must be submitted to the IRB within three calendar days.

If you have any questions, please contact the IRB Office at IRB@oregonstate.edu or by phone at (541) 737-8008.

¹ Review categories include exempt, expedited, and full board.

APPENDIX C



Department of Design and Human Environment

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INDOOR CYCLING WEAR QUESTIONNAIRE

Explanation of Research:

My name is Yi-Ling Ho and I am a Master's student in the Department of Design and Human Environment. You are being asked to fill-out this questionnaire related to your indoor cycling apparel needs. The significance of this study is to know what people need for indoor cycling wear. The objectives of this study included identifying indoor cycling wear expectation, assessing the importance of indoor cycling wear attributes and assess satisfaction with selection, fit, comfort, and style of garment for indoor cyclists at different levels of indoor cycling commitment.

Your participation in this study is voluntary. There are no foreseeable risk or benefits to you for your participation in this study. The information you give is anonymous. You will not lose any benefits or rights you normally have if you choose not to participate. The questionnaire will take about 10 minutes to complete. You are free to skip any question or stop at any time.

If you have any questions about this research project, please contact: Dr. Kathy Mullet, at (541) 737-3818 or the Oregon State University Institutional Review Board (IRB) office, at (541) 737-8008 or by email at IRB@oregonstate.edu

Section I: General information

Please circle or check the answer.

1. Your gender? ☐ Male ☐ Female
2. Your age? ☐ 18-21 ☐ 22-30 ☐ 31-45 ☐ 46-60 ☐ above 60
3. How long have you been in the indoor cycling class?
☐ Less than 1 month ☐ 1- 6 months ☐ 6 months-1 year ☐ 1-2 years ☐ Above 3 years
4. On average, how many times per week do you attend indoor cycling class?
☐ Once a week ☐ 2-3 times a week ☐ 4-5 times a week ☐ More than 5 times
5. Do you ride a bicycle outside for exercise? ☐ yes ☐ no

Section II: Indoor cycling commitment

Read each statement and give the responses which seem to describe how you **generally** **feel** about **indoor bicycling** most of the time. Please place a circle mark on the scale to indicate your response.

		Strongly		Strongly		
		Disagree		Agree		
1	I would change or arrange my schedule so that I can ride.	1	2	3	4	5 6
2	Indoor cycling increase work productivity.	1	2	3	4	5 6
3	I spend considerable time and effort to be a more competent indoor cyclist.	1	2	3	4	5 6
4	I have to force myself to ride.	1	2	3	4	5 6
5	Missing an indoor cycling class upsets me greatly.	1	2	3	4	5 6
6	I ride even when I am very busy.	1	2	3	4	5 6
7	Indoor cycling can be a means of self-improvement.	1	2	3	4	5 6

8	I ride indoor cycling frequently.	1	2	3	4	5	6
9	I try to ride a certain number of hours each week.	1	2	3	4	5	6
10	Indoor cycling helps people relax.	1	2	3	4	5	6
11	I give indoor cycling higher priority than other activities.	1	2	3	4	5	6
12	Indoor cycling increases happiness.	1	2	3	4	5	6
13	Indoor cycling is the high point of my day.	1	2	3	4	5	6
14	I would attend indoor cycling class more if I could afford the time away from other obligations.	1	2	3	4	5	6

Section III: Cycling Clothing Interest

We are interested in knowing what you think of indoor cycling clothing. For this study, **Indoor cycling clothing** is defined as the clothing (tops, shorts, skin suits, etc.) **worn during indoor cycling**. Please place a circle mark on the scale to indicate your response.

		Strongly Disagree				Strongly Agree	
1	I wear cycling clothing that I like whether others like it or not.	1	2	3	4	5	6
2	I am very aware of what other cyclists are wearing.	1	2	3	4	5	6
3	It is more important how my cycling clothing looks than that it keeps my body a comfortable temperature.	1	2	3	4	5	6
4	I prefer to wear cycling clothing that will help me ride better.	1	2	3	4	5	6

5	I like to wear cycling clothing that is different from cycling clothes that other riders wear.	1	2	3	4	5	6
6	The kind of clothes a cyclist wears tells a lot about his/her level of competence as an indoor cyclist.	1	2	3	4	5	6
7	I care about what I wear for a ride more than other cyclists do.	1	2	3	4	5	6
8	I like to be considered a well dressed cyclist by others who ride.	1	2	3	4	5	6
9	I only wear cycling clothing that is specifically made for riding (jerseys verse t-shirts).	1	2	3	4	5	6
10	I wear cycling clothing that enhances my physical appearance.	1	2	3	4	5	6
11	I don't care how my cycling clothing looks as long as it is comfortable.	1	2	3	4	5	6
12	I think peoples' opinions of my ability as an indoor cyclist are based on the clothing I wear for cycling.	1	2	3	4	5	6
13	I am able to find quality cycling wear.	1	2	3	4	5	6
14	I am able to find cycling wear in my size.	1	2	3	4	5	6
15	I am able to find cycling wear in the colors I prefer.	1	2	3	4	5	6
16	I am able to find cycling wear in the fabrics I prefer.	1	2	3	4	5	6

Section IV: Cycling Clothing Needs

In this section, please answer the following questions to help the researcher determine the elements needed for the indoor cycling wear. And there will have two portions: **A. Shirts/Top** **B. Pants/Shorts**:

Part A: Shirts/Top

1. How would you describe the fit of the ideal indoor cycling top?

☐ Very fitted ☐ Relax fitted ☐ Baggy fitted ☐ Loose ☐ Others _____

2. What type or length of sleeve to you prefer on an indoor cycling top?

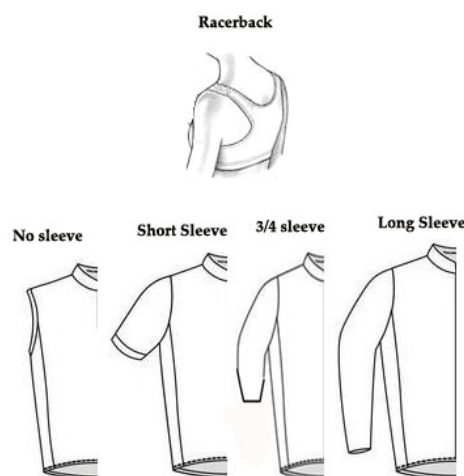
☐ Racer back

☐ No sleeve

☐ Short Sleeve

☐ 3/4 length sleeve

☐ Long sleeve



3. What length of shirt/Top do you prefer for indoor cycling?

☐ Above the waist ☐ At the waist ☐ Below the waist ☐ Short in front and longer in back ☐ Other _____

4. What kind of fabric pattern do you prefer for indoor cycling shirts/top?

☐ Solid color ☐ Prints ☐ Logos ☐ Others _____

5. If you are **female**, please answer this question. If not, you can ignore this question.

Do you wear cycle **shirt/Top** which with built-in bra?

If Yes— what's the brand? _____

6. Do you prefer to have pocket on the indoor cycling shirts/top?

☐ Yes, which pocket location you

prefer? _____

☐ No

7. Please rank the importance of each of these indoor cycling **shirt/top** attributes.

Not

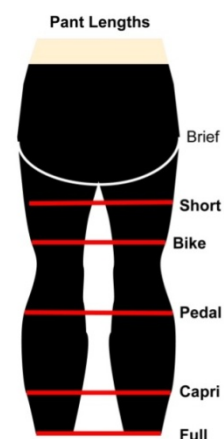
Very

	Important			Important		
1) Ease of dressing	1	2	3	4	5	6
2) Thermal comfort	1	2	3	4	5	6
3) Weight of fabric	1	2	3	4	5	6
4) Fabric performance	1	2	3	4	5	6
5) Ease of care & maintenance	1	2	3	4	5	6
6) Modesty	1	2	3	4	5	6
7) Fit	1	2	3	4	5	6
8) Fashion/Stylish	1	2	3	4	5	6
9) Covers imperfections	1	2	3	4	5	6
10) Pressure on the body	1	2	3	4	5	6
11) Appearance & body image	1	2	3	4	5	6
12) Age appropriateness	1	2	3	4	5	6
13) Calls attention	1	2	3	4	5	6
14) Keep me dry	1	2	3	4	5	6
15) Friction against the body	1	2	3	4	5	6
16) Durability	1	2	3	4	5	6

PART B: Pants/Shorts

1. What length of **pant/shorts** do you like to wear for indoor cycling? (Please refer to the Illustration on the leg)

- ☐ Short
☐ Bike
☐ Pedal
☐ Capri
☐ Full



2. How would you describe the fit of the ideal indoor cycling pants/ shorts?

- ☐ Very fitted ☐ Relax fitted ☐ Baggy fitted ☐ Loose
☐ Other _____

3. What kind of fabric pattern do you prefer for indoor cycling pants/shorts?

- ☐ Solid color ☐ Prints ☐ Logos ☐ Other-

5. Do you wear cycle pants/shorts which are tight fitting and have **a seat pad**?

YES- What brand? _____

NO- Which type of pants/shorts do you wear? _____

6. Please rank the importance of each of these indoor cycling **pants/shorts** attributes.

	Not			Very		
	Important			Important		
1) Ease of dressing	1	2	3	4	5	6
2) Thermal comfort	1	2	3	4	5	6
3) Weight of fabric	1	2	3	4	5	6
4) Fabric performance	1	2	3	4	5	6
5) Ease of care & maintenance	1	2	3	4	5	6

6) Modesty	1	2	3	4	5	6
7) Fit	1	2	3	4	5	6
8) Fashion/Stylish	1	2	3	4	5	6
9) Covers imperfections	1	2	3	4	5	6
10) Pressure on the body	1	2	3	4	5	6
11) Appearance & body image	1	2	3	4	5	6
12) Age appropriateness	1	2	3	4	5	6
13) Calls attention	1	2	3	4	5	6
14) Keep me dry	1	2	3	4	5	6
15) Friction against the body	1	2	3	4	5	6
16) Durability	1	2	3	4	5	6

Section V: Your Ideal Indoor Cycling Wear

1. Please describe what you usually wear for indoor cycling class?

2. Do you think that is it necessary to have particular clothing for indoor cycling class?

☐ YES, please describe what you think the ideal indoor cycling outfit should look like?
Please be specific.

☐ NO, why?

Thank you very much for your contribution! We appreciate your time and sharing!

If you have any questions about this research project/ survey or you want to provide some information, please contact:

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Kathy.Mullet@oregonstate.edu or
- Yi-Ling (Mavis) Ho at 541-908-2923, or by email at : hoy@onid.orst.edu

Or if you have questions about your rights as a research participant in this study, please contact the Oregon State University Institutional Review Board (IRB) office, at (541) 737-8008 or by email at IRB@oregonstate.edu