A DESCRIPTIVE STUDY OF PHYSICAL ACTIVITY AND BODY MASS INDEX
IN PALAUAN ADOLESCENTS

A THESIS SUBMITTED TO THE GRADUATE DIVISION OF THE
UNIVERSITY OF HAWAI‘I IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

IN

KINESIOLOGY AND LEISURE SCIENCE

DECEMBER 2006

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We certify that we have read this thesis and that, in our opinion, it is satisfactory in scope and quality as a thesis for the degree of Master of Science in Kinesiology and Leisure Science.

THESIS COMMITTEE

Chairperson

Nathan McNamara

Rebecca Cheen
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ACKNOWLEDGEMENTS

It is with great pleasure to thank the many people who made this thesis possible. To god, for his blessings and giving me the strength to be where I am today. I am indebted to my advisor, Dr. Charles Morgan for his guidance, enthusiasm and great efforts on helping me with my thesis write up. I would like to also express my appreciation to Dr. Nathan Murata and Dr. Julienne Maeda for their knowledge and support throughout my academic work here at the university.

I would like to thank Palau Ministry of Education for their continued support, most especially Chiefs Sinton Soalablai and Raynold Mechol for their tremendous help and understanding. I would like to also thank Alex Kaluu, PHS Physical Education Department and all the other teachers that helped me out with my data collection. Also to Dr. Steve Kuartei for his help and resources. To Susan, Ngeru, Kos and Rei-Rei, thank you so much for being there.

My appreciation extends to my thesis committee, Dr. Charles Morgan, Dr. Nathan Murata and Dr. Rebecca Cheema for their time, knowledge and support. Most importantly, my utmost appreciation goes out to the students of Maris Stella and Seventh-Day Adventist schools for participating in this study, their principals and teachers for their flexibility and understanding.

Lastly, I want to thank my family on whose constant encouragement and love have kept me going. To my late father, Ngirchoime Lemong for always believing in me. And to my husband, you are my true inspiration; I love you. It is to them, I dedicate this work.
ABSTRACT

Background: The purpose of the study was to examine physical activity and body mass index in Palauan adolescents using pedometers and BMI measurements. Methods: A total of 131 (63 females, 68 males; ages 10-14) middle school aged children from two accredited private schools participated in the study. The ethnicity group sample was 112 Palauans (85.5%), 11 Filipinos (8.4%), 7 Asians (5.3%) and 1 other (.8%). Participant’s steps/day (eight days of monitoring) and height and weight measurements were obtained to determine Body Mass Index. Results: Boys (10800 ± 3167) accumulated approximately 2,800 (14%) more steps/day than girls (8000 ± 2967) (p<.01). No significant differences were found for the grade main effect and sex by grade interaction. There were no significant differences found in BMI between sexes, grades, and sex by grade interaction. Although there were no significant sex differences in BMI, approximately 29% of the boys were classified as overweight compared to 22% of the girls. It is evident that overweight disparities exist between Palauan boys and girls. Girls in the lean/healthy group acquired approximately 940 more steps/day (13%) than girls in the at-risk/overweight group. However, boys in the lean/healthy group accumulated 1400 steps/day (11%) lesser than boys in the at-risk group. Conclusions: Palauan adolescents mean steps/day was 1900 (17%) lower when compared to national youth. We found a large disparity in overweight between boys and girls. In this study, 26% of the participants were overweight, which was 42% higher than the national average (15%).
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INTRODUCTION

The promotion of physical activity and the prevention of overweight in youth are important national health goals because physical inactivity, and overweight are two of the most prevalent risk factors for chronic diseases [1]. Promoting physical activity and preventing overweight in certain ethnic groups is a high priority because disparities exist in physical activity and overweight. Eliminating these disparities has been deemed one of the two most important and overreaching health goals for the nation [2].

In the United States overweight rates have increased for all age groups and ethnic backgrounds over the past thirty years [3]. Certain ethnic groups have a higher prevalence of overweight than American adolescents across gender and ages [4]. For instance, Mexican-American adolescents have a higher prevalence of being overweight (23%) than black (21%) or white (16%) counterparts. Overweight disparities subsist in communities with low socioeconomic status. Families that have lower income have higher body composition and are physically inactive [5]. This widening disparity in overweight that disadvantages adolescents in poor families has emerged in recent years [6].

Disparities in physical activity levels also exist among population groups. Insufficient physical activity exists among minority children and adolescents compared to White youth [7]. Mexican American and Non-Hispanic Black adolescents were less likely to participate in vigorous physical activity than Whites [8]. However, other minority populations have not been closely examined.

To our knowledge, only one study has investigated physical activity and overweight in Palauan adolescents. A report released by Balling et al (2003) using Youth Risk Behavior Surveillance data reported that approximately 15.5% middle school
students were overweight. This was consistent with white adolescents (15%) from the same pool of data [9]. The authors also reported that Palauan adolescents reported 25% less moderate physical activity and 18% less vigorous physical activity than US adolescents [10].

Limited data on physical activity and overweight prevalence are available on adolescents in other island nations. A study examining physical activity and overweight in Guamanian adolescents found that approximately 27% of middle and high school students were overweight. The authors also found Guamanian adolescents were 30% less likely to participate in moderate PA and 31% less vigorous physical activity than U.S. adolescents [11]. Chai et al (2003) conducted a study using anthropometric measurements and found that overweight problem existed among Native Hawaiian youth. The authors compared their results to the National Health and Nutrition Examination Survey III and found that Native Hawaiian youth obesity rates doubled in boys and girls [12].

There is little evidence on the prevalence of physical activity and overweight in Palauan adolescents. Therefore, given the limited information on physical activity and overweight in Palauan adolescents, and the known fact that disparities on overweight issues persists, the primary purposes of this study was to provide descriptive information on pedometer-determined physical activity and body mass index on Palauan adolescents. A secondary purpose was to determine the relationship between physical activity and overweight status. The information resulting in this study may be used by administrators and interventionists to increase physical activity and decrease overweight in Palauan adolescent.
METHODS

Participants

Approximately 190 adolescents in grades 6-8 were solicited to volunteer for the study. Students were from two private accredited middle schools on the island of Palau in the Micronesia. Of the 190 targeted students, 134 (71%) returned both parent consent and student assent forms. Three participants were forced to withdraw from the study due to excessive absenteeism resulting in a final sample size of 131 (68 males, 63 females). Ethnic distribution consisted of 112 Palauans (85.5%), 11 Filipinos (8.4%), 7 Asians (5.3%) and 1 other (.8%). Participation was voluntary and participants were allowed to stop at anytime without consequence or question. Appropriate approval from the University’s Institutional Review Board (IRB), Palau Ministry of Education (Research and Evaluation Division), and the school principals was granted.

Instruments

Pedometers have been found to be a valid instrument to measure adolescent physical activity [13]. They also have been found to be very accurate in measuring the number of steps taken and have very good intra-instrument reliability [14-16]. The Walk4Life LS 2525 (Plainfield, IL) pedometer has been examined and validated in children (ages 5-11) for accuracy in step count [17]. Consistent with published guidelines, each Life Stepper 2525 pedometer was checked for accuracy by conducting a shake test (100 shakes) in a manufacturers shipping box [18]. Two-hundred twenty five pedometers were tested and eighteen (9%) were either defected or surpassed instrumental error of ± 3% and were excluded from the study.
Procedures

The procedures used in this study were similar to other published studies that have measured pedometer-determined physical activity in youth [19, 20]. A week prior to the study the students were introduced to the pedometers and were allowed to use and examine the pedometer during their homeroom period. Participants were then issued pedometers on the first day of monitoring (Monday) during their homeroom period. Participants wore the pedometer for eight consecutive weekdays for two weeks. Eight to nine days of monitoring for adolescents is necessary to achieve high reliability [21]. Participants were instructed to wear the pedometer from the time they are dressed for school until time to go to bed. They were told to take it off when showering, swimming and sleeping. Students with loose clothing were provided waistline belts or were instructed to wear their pedometers on their hipline. Participant’s were also reminded daily of the proper protocols and procedures of wearing the pedometer. In addition, participants were instructed to maintain their normal daily activities without regard to the pedometer.

Daily monitoring procedures included collecting pedometers, cutting zip-ties, recorded data, resetting and resealing devices, and returning them to the participants after receiving the daily questionnaire. Pedometers were sealed with a zip-tie to assure they were not accidentally reset and avoid tampering. If the participant(s) forgot their pedometer, data were not recorded for that day. They were then instructed to wear it again for the next 24 hour period after the pedometer has been reset and resealed.

Body Mass Index (BMI) was used to assess body composition. BMI does not measure body fat directly, but research has shown that BMI is positively related to direct
measures of body fat. BMI has recently been used to determine international cut points for overweight and obese children [22]. Participant’s height was measured to the nearest centimeter using a portable stadiometer (Model Seca 214, Hamburg, Germany). Weight was measured to the nearest tenth of a kilogram using a digital scale (Model Seca 884, Hamburg, Germany). To avoid embarrassment and ensure confidentiality, participants were measured outside of class in a private classroom with one female and one male assistant present. The participants were asked to remove their shoes before height and weight measurement was recorded.

A daily “pedometer questionnaire” was distributed to participants for each day they wore the pedometer. This questionnaire was to help account the types of activity they were involved in the previous day. Questions included information about means of transportation to and from school (walk, car, bus, ride), if they were involved in any organized sports, participated in physical education class, performed activities after school, and if they wore the pedometer the entire time. To ensure the students were following the pedometer protocol, parental reminders were distributed midway through the study.

Statistical Analysis

Data were analyzed using SPSS, version 13.0 (Statistical Package for the Social Sciences, 2003) and a $p$ value $\leq .05$ was used to indicate statistical significance. Mean steps/day were calculated on 131 participants with 8 days of pedometer data. BMI was calculated by dividing the participants' weight in kilograms by height in meters squared ($\text{kg/m}^2$). Participants were classified as lean, healthy, at-risk for overweight, ($85^{th}$ and $95^{th}$ percentile), and overweight ($\geq 95^{th}$ percentile) based on the Center of Disease Control
(CDC) BMI-for-age growth charts to obtain a percentile ranking. Analysis of variance (ANOVA) procedures were conducted to determine group differences on mean steps/day and body mass index and the between subjects factors included sex and grade (6, 7, 8).

RESULTS

Significant differences were found on mean steps/day for the sex main effect $F(1, 125) = 28.85, p < .001$, partial $\eta^2 = .19$. Boys accumulated approximately 2,800 (14%) more steps/day than girls. No significant differences were found for the grade main effect $F(2, 125) = 2.23, p = .11$ and sex by grade interaction $F(2, 125) = .587, p = .56$. Means (Standard Deviation) steps/day by sex and grade are presented in Table 1.

No significant differences were found on steps/day for the BMI for age main effect, $F(2, 125) = 2.31, p = .10$ and sex by BMI for age, $F(2, 125) = 1.3, p = .28$. Means (Standard Deviations) are displayed in Table 2. Although, there were no significant differences found on steps/day and BMI for age, girls in the lean/healthy group acquired approximately 8442 (12%) more steps/day than girls in the at-risk/overweight group (7402). However, boys in the lean/healthy group accumulated 10560 (11%) steps/day lesser than boys in the at-risk group but consistent with the overweight category. For the overall participants, 3.1% categorized as lean, 50.4% as healthy, 20.6% as at-risk for overweight, and 25.9% as overweight. Approximately 2% of the boys were categorized as lean, 52% as healthy, 18% as at-risk for overweight, and 29% as overweight. In contrast, 5% of the girls were lean, 49% were healthy, 24% were at-risk for overweight and 22% were overweight. Although there were no significant differences between sexes, Palauan boys have 48% higher BMI values than National average.
DISCUSSION

This was the first study to provide data on objectively measured physical activity in Palauan adolescents. Boys (10,800) accumulated approximately 2,800 (14%) more steps/day than girls (8,000) which is consistent with national and international pedometer-determined physical activity studies [23, 24]. Le Masurier et al. [25] reported that boys accumulated approximately 1,800 (12%) more steps/day than girls. A New Zealand (N=1115) study with a large number of Polynesians (n=334) found that boys accumulated approximately 2,000 (12%) more steps/day than girls [24]. Another study found that Australian boys accumulated approximately 2,600 (12%) more steps/day than girls [23]. All grades accumulated similar steps/day which is consistent with other US pedometer studies of adolescents in middle schools [23, 26]. Other descriptive studies of youth physical activity consistently reported that male subjects are more active than female subjects and that physical activity declines with age[27, 28].

This study allowed us to compare pedometer-determined physical activity of Palauan adolescents with national data for the first time. Figures 1 and 2 compare boys and girls in the current study with a large U.S. sample of adolescents by grade. U.S. boys accumulated approximately 12,200 (12%) more steps/day than Palau boys (10,700). U.S. girls accumulated approximately 10,400 (24%) more steps/day than Palau girls (7,900). There appears to be a large disparity between both Palauan boys and US boys, and Palauan girls and US girls.

The prevalence of at-risk for overweight and overweight in this sample was overwhelming. Approximately 21% of the participants were classified as at-risk for overweight and 26% were overweight. Overweight disparities exist between Palauan
boys and girls. The boys (29%) had a higher prevalence of overweight than the girls (22%). Although there was no significant differences in the BMI for age groups, girls in the lean/healthy group acquired approximately 1040 more steps/day (12%) than girls in the at-risk/overweight group. However, boys in the lean/healthy group accumulated 1400 steps/day (11%) lesser than boys in the at-risk group, but consistent with the overweight category. Correlation analysis found no relationship between step counts and BMI groups, $F (2,125) =2.31, p<0.10$. The lean/healthy group had mean step/day of 9500, about (10%) lower than the at-risk group and (11%) higher than the overweight group.

Other studies used body mass index (BMI) as the criterion for developing pedometer-determined activity recommendation in children[29]. Daily step counts targets of 15,000 (boys) and 12,000 (girls) were proposed as the optimal cut-off points for predicting normal and overweight BMI categories.

Another key factor in this study was to determine the relationship between physical activity and BMI groups. Girls in the lean/healthy group accumulated approximately 100 (1%) steps/day more than the at-risk group and 1900 (13%) steps/day for the overweight group. In contrast, boys in the at-risk group accumulated approximately 1400 (11%) steps/day more than the lean/healthy group and the overweight group.

Several limitations should be noted regarding this study. Mainly, this study examined data using a cross-sectional design, which restricts the results of our study. Second, the study was conducted in a private school setting, in which limit samples from other schools and communities. Third, environmental factors may have been the contributing factor to the low physical activity levels signified by Palauan adolescents.
Generally, the playgrounds available for Palau schools are small and with little recreation ground for students to play on after school. Palau does not provide sidewalks designated for running, biking and walking. Recreational and community facilities have limited spacing and poor lighting. Considering these constraints, the activity level of Palau children may be expected to be lower than American schoolchildren. Lastly, our study used BMI as the only anthropometric measurement. Although BMI can be used as an indicator of overweight and obesity, it doesn’t account for variations in %BF among adolescents [23, 30].

CONCLUSION

The major findings of the study confirmed disparities in levels of physical activity and the prevalence of overweight in Palauan adolescents. Palauan adolescents mean steps/day was 1900 (17%) lower when compared to national youth. In this study, 26% of the participants were overweight. The prevalence of overweight was 29% for boys and 22% for girls respectively. We also found a large disparity in overweight especially for the boys. Palauan boys had 42% higher BMI values than the National average. This study focused on adolescent body composition and physical activity levels. Environmental, physiological, or biological factors that determine overweight and physical activity disparities of Palauan adolescents’ needs to be further investigated in order to increase physical activity behaviors and eliminate these severe health disparities.
Table 1: Mean (Standard Deviation) Steps/Day by Sex and Grade.

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<tr>
<td>Sex</td>
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<tr>
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<td>68</td>
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</tr>
<tr>
<td>Female</td>
<td>63</td>
<td>7977 ± 2967</td>
</tr>
<tr>
<td>Grade</td>
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<tr>
<td>6th</td>
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<tr>
<td>7th</td>
<td>45</td>
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</tr>
<tr>
<td>8th</td>
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Table 2: Mean (Standard Deviation) step counts for sex and BMI for age

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Figure 1: US and Palau boys mean steps-day (sex and grades 6-8)
Figure 2: US and Palau girls mean steps/day (sex and grades 6-8)
REFERENCES


Appendix A

Literature Review
Overweight Disparity: United States childhood overweight is an epidemic in some areas and on the rise in others. An estimated 22 million children under five years of age are estimated to be overweight worldwide. According to the US Surgeon General, in the United States the number of overweight children has doubled and the number of overweight adolescents has tripled since 1980. The prevalence of obese children aged 6-to-11 years has more than doubled since the 1960’s (World Health Organization, 2006). The prevalence of overweight is 13-15 percent in children 6 to 12 years of age and 11-12 percent in those aged 12 to 17 years. Mexican-American boys have a higher prevalence of overweight than black or white boys, and Mexican-American and black girls have a higher prevalence of overweight than white girls[4]. The prevalence of overweight children ages 12 to 19 tripled from 5 percent in 1980 to 15 percent in 2000 [31].

Among European countries, Greek adolescents have one of the highest rates (26.3%) of overweight and obese school-aged children [32]. In Brazil, adolescents, both rich and poor, showed a substantial increase in BMI as well. In northeast Brazil, the prevalence of overweight tripled to 5% and 12% for boys and girls respectively from 1975 to 1997 [33]. In Mexico, an estimated 30.8% of boys and 29.7% of girls are overweight and obese [34]. The prevalence of overweight in Irish school children increased threefold from 1990 to 2004 [35]. Current obesity levels range from below 5% in China, Japan and certain African nations, to over 75% in urban Samoa. But even in relatively low prevalence countries like China, rates are almost 20% in some cities. The problem is global and increasingly extends into the developing world; for example, in Thailand the prevalence of obesity in 5-to-12 year olds children rose from 12.2% to
15.6% in just two years (World Health Organization, 2006). There is no indication that the prevalence of overweight in children and adolescents will decrease either [36].

Adult overweight and obesity has reached epidemic proportions in the United States and the global nation. Overweight and obesity are currently defined by body mass index \[\text{weight in kilograms/height in meters}^2\]. Body mass index (BMI) is a common way to assess overweight and obesity. It is a major contributor to the global burden of chronic disease and disability. Obesity is a complex condition, with serious social and psychological dimensions, affecting virtually all ages and socioeconomic groups. It is estimated that there are over 1 billion overweight adults; 300 million of them are obese. A body mass index of 25 to 29.9 are at risk of becoming overweight, and one over 30 defines obesity. Adult mean BMI levels of 22-23 kg/m2 are found in Africa and Asia, while levels of 25-27 kg/m2 are prevalent across North America, Europe, and in some Latin American, North African and Pacific Island countries (WHO, 2006). Current estimates from NHANES III for U.S. adults aged 20 to 74 years identify 60 percent of men and 50 percent of women as being overweight, with 20 percent of men and 25 percent of women being obese. About 31 percent of individuals between 6 and 19 years of age were at risk of becoming overweight and 16 percent were obese [36]. These findings are becoming a public health issue when the number of overweight and obese individuals continue to rise enormously.

**Physical Activity:** The prevalence of physical inactivity increases with age [4]. Children and adolescents are less physically active than recommended. In 2003, the Youth Risk Behavior Surveillance System reported that 33.4% of adolescents did not
participate in sufficient physical activity [37]. In addition, about 14% of youth reported no recent physical activity [7].

Nearly half of Americans between the ages of twelve and twenty-one are not vigorously active on a regular basis [38]. Participation in physical activity declines dramatically as age or grade in school increases. Habitual physical inactivity is more common in girls (14%) than boys (7%) and in African American girls (21%) than white girls (12%). Overall, white students (31%) were less likely to watch television three or more hours per school day than Hispanic (48%), or African-American students (69%).

There are several factors can contribute to the likelihood of someone’s becoming overweight and physical inactivity. This includes personal characteristics of the individual, the individual’s environment, cultural attitudes, financial situation, genetics and behavior (CDC, 2001). In rural areas, sedentary past times such as watching television, is a common reason for inactivity. In urban areas, crowding, poverty, crime, traffic, pollution, and a lack of parks and recreation facilities, and sidewalks make physical activity difficult (WHO, 2006).

Environmental factors are suggested to play a major role in physical activity (PA) and other obesity-related behaviors. Geographic and social distribution of recreational facilities was assessed to investigate how disparity in access to recreational facilities might underlie population-level physical activity and overweight patterns [39]. It showed that higher socioeconomic groups had 1 or more facilities in their area. Whereas, low socioeconomic and minority groups were less likely to have facilities. The authors concluded that inequality in availability of physical activity facilities may contribute to ethnic and socioeconomic disparities in physical activity and overweight patterns [40].
Current objective measures on pedometry, accelerometry, body composition, and heart rate (HR) telemetry have been consistently utilized to examine and investigate physical activity levels of children, adolescents, and adults in all ages and countries. These objective measures provide data on what needs to be addressed to eliminate physical activity and overweight disparities.

Other factors might have influenced activity differences are physical education and middle school organized sports. A total of fifty minutes of planned physical education is provided twice per week. Participants who average higher steps/day than others are involved in school basketball and volleyball teams. Studies have also demonstrated that students who participate in organized sports programs and after-school activity programs accumulate significantly more physical activity than those who do not [41, 42].

**Body Mass Index:** Subsequent evidence suggests that step counts are strongly associated with percentage body fat (%BF) than with BMI in children [24]. New step count targets are being developed as the optimal cut-off points for predicting normal and overweight BMI. Current recommendations for pedometer-determined physical activity in children (boys, 15,000 steps/day; girls, 12,000 steps/day) were based on the association between step counts and body mass index [24]. Recommendations states that step count targets for reducing the risk of excess body fat in children are 1,000 steps/day higher than existing BMI-referenced guidelines to 16,000 steps/day for boys and 13,000 steps/day for girls. Tudor-Locke et al. (2004) suggests that 1000 steps is a worthwhile increase in daily activity with respect to improving health outcomes.
In 2003, Palau Ministry of Health conducted obesity intervention on Palauan adults (N=260) and reported that 70.5% of participants were found to be either overweight (30%) or obese (41%). Body mass index was used to classify overweight (BMI 25.0-29.9) and obesity (BMI greater than or equal to 30.0) 44% of participants had body fat between 30% and 40%. 27.7% of participants had body fat percentage over 40%. Of the participant’s physical activity, 60.8% responded that their “work” involved mostly sitting or standing, with walking for no more than 10 minutes at a time. On the other hand, 25.8% responded that their work involved vigorous activity, like heavy lifting, digging, or construction work for at least 10 minutes at a time. Of those respondents doing vigorous work activities, 40.1% reported they performed them 5-6 days per week. 53% of respondents reported walking or riding a bicycle at least ten minutes per day. 79.8% responded that their “leisure time” involve mostly sitting, resting, or standing with no physical activity lasting more than 10 minutes at a time. 25.9% of respondents participate in vigorous activities like running, strenuous sports, or weight lifting. Those who do vigorous activities 61.5% do them 3 times or less per week. Other studies found that increased prevalence of overweight and obesity in adulthood was associated with low levels of leisure-time physical activities in adolescence [43].
Appendix B

IRB Certification Form and Memorandum
Protection of Human Subjects
Assurance Identification/IRB Certification/Declaration of Exemption
(Common Rule)

Policy: Research activities involving human subjects may not be conducted or supported by the
Departments and Agencies adopting the Common Rule (BFR2003, June 30, 1981) unless the
activities are exempt from or approved in accordance with the Common Rule. Section 101(b)
of the Common Rule for exemptions. Institutions submitting applications or proposals for support
must submit certification of appropriate Institutional Review Board (IRB) review and approved to
the Department or Agency in accordance with the Common Rule.

1. Request Type
[X] ORIGINAL
[ ] CONTINUATION
[ ] EXEMPTION

2. Type of Mechanism
[ ] GRANT
[ ] CONTRACT
[ ] FELLOWSHIP
[ ] COOPERATIVE AGREEMENT
[ ] OTHER:

3. Name of Federal Department or Agency and, if known, Application or Proposal Identification No.

4. Title of Application or Activity
"A Descriptive Study of Physical Activity, Body Composition, and Physical Self-Perception of Palauan Adolescents"

5. Name of Principal Investigator, Program Director, Fellow, or Other
Stephanie B. Ngircholecule

6. Assurance Status of this Project (Respond to one of the following)
[X] This Assurance, on file with Department of Health and Human Services, covers this activity:
Assurance Identification No. E-3528, the expiration date September 23, 2008 IRB Registration No. [ORG0000169

[ ] This Assurance, on file with (agency/ dept)_________________________, the expiration date_________________________, covers this activity.
Assurance No._________________________, IRB Registration/Identification No._________________________, (if applicable)

[ ] No assurance has been filed for this institution. This institution declares that it will provide an Assurance and Certification of IRB review and approval upon request.

[ ] Exemption Status: Human subjects are involved, but this activity qualifies for exemption under Section 101(b), paragraph___________.

7. Certification of IRB Review (Respond to one of the following if you have an Assurance on file)
[X] This activity has been reviewed and approved by the IRB in accordance with the Common Rule and any other governing regulations.
by: [ ] Full IRB Review on (date of IRB meeting)_________________________ or [X] Expedited Review on May 23, 2006
[ ] If less than one year approval, provide expiration date_________________________

[ ] This activity contains multiple projects, some of which have not been reviewed. The IRB has granted approval on condition that all projects covered by the Common Rule will be reviewed and approved before they are initiated and that appropriate further certification will be submitted.

8. Comments

CHS #14494

9. The official signing below certifies that the information provided above is correct and that, as required, future reviews will be performed until study closure and certification will be provided.

11. Phone No. (with area code) (808) 696-5007

12. Fax No. (with area code) (808) 539-3554

13. Email: dendle@hawaii.edu

14. Name of Official
William H. Dendle

15. Title
Compliance Officer

16. Signature

17. Date
May 24, 2006

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Appendix C

Palau Ministry of Education Collaboration Letter
MEMORANDUM

May 24, 2006

TO: Stephanie B. Ngorchoimeyi
   Principal Investigator
   Kinesiology & Leisure Science

FROM: William H. Dendle
      Executive Secretary

SUBJECT: CHS #14494- "A Descriptive Study of Physical Activity, Body Composition, and Physical Self-Perception of Palauan Adolescents"

Your project identified above was reviewed by the Chair of the Committee on Human Studies through Expedited Review procedures. The project qualifies for expedited review by CFR 46.110 and 21 CFR 56.110, Category (4) of the DHHS list of expedited review categories.

This project was approved on May 23, 2006 for one year. If in the active development of your project you intend to change the involvement of humans from plans indicated in the materials presented for review, prior approval must be received from the CHS before proceeding. If unanticipated problems arise involving the risks to subjects or others, report must be made promptly to the CHS, either to its Chairperson or to this office. This is required in order that (1) updating of protective measures for humans involved may be accomplished, and (2) prompt report to DHHS and FDA may be made by the University if required.

In accordance with the University policy, you are expected to maintain, as an essential part of your project records, all records pertaining to the involvement of humans in this project, including any summaries of information conveyed, data, complaints, correspondence, and any executed forms. These records must be retained for at least three years from the expiration/termination date of this study.

The CHS approval period for this project will expire on May 23, 2007. If your project continues beyond this date, you must submit a continuation application to the CHS at least four weeks prior to the expiration of this study.

We wish you success in this endeavor and are ready to assist you and your project personnel at any time.

Enclosed is your certification for this project.

Enclosure
August 14, 2006

University of Hawaii-Manoa
Human Subjects Institutional Review Board

Subject: Collaboration letter for research

Palau Public/Private Schools is collaborating with University of Hawaii-Manoa in a study involving sixth through eighth grade students. The schools that will be participating in the study include Maris Stella and Palau Seventh-Day Adventist schools. The purpose of the study is to assess daily step counts (physical activity), physical self-perceptions, and body mass index measurements.

Pedometers will assess daily physical activity patterns. Pedometers are small electronic devices (matchbox size) that measure steps and simply attach to the waistband. The Physical Self-Perception Profile for Children (PSPP-C) will be used to assess physical self-perceptions. Height and weight measurements will be assessed to determine body mass index. The students who volunteer to participate must sign an informed assent form and obtain written permission from their parents (consent form). All students will be made aware that participation is voluntary and they may stop at any time.

Sincerely,

Raynold Mecho
Chief, Research and Evaluation
Palau Public Schools

"Out students will be successful in the Palauan society and the world."
Appendix D

Maris Stella & Seventh-Day Adventist School Letter of Support
August 14, 2006

Maris Stella School
Koror, Palau

Subject: Letter of Support

Maris Stella School would like to acknowledge their support with the University of Hawaii-Manoa in a study involving sixth through eighth grade students. We would like to thank you for your interest in conducting your research at our school. The purpose of the study is to assess daily step counts (physical activity), physical self-perceptions, and body mass index measurements.

Pedometers will assess daily physical activity patterns. Pedometers are small electronic devices (matchbox size) that measure steps and simply attach to the waistband. The Physical Self-Perception Profile for Children (PSPP-C) will be used to assess physical self-perceptions. Height and weight measurements will be assessed to determine body mass index. The students who volunteer to participate must sign an informed assent form and obtain written permission from their parents (consent form). All students will be made aware that participation is voluntary and they may stop at any time.

Once again, thank you for your interest in our school. We are hopeful that this will provide us information as to where we can improve and provide necessary modifications in our physical education curriculum.

Sincerely,

Felix Okabe
Principal, Maris Stella School
August 14, 2006

Subject: Letter of Support

The Palau SDA Elementary School would like to acknowledge their support with the University of Hawaii-Manoa in a study involving sixth through eighth grade students. We would like to thank you for your interest in conducting your research at our school. The purpose of the study is to assess daily step counts (physical activity), physical self-perceptions, and body mass index measurements.

Pedometers will assess daily physical activity patterns. Pedometers are small electronic devices (matchbox size) that measure steps and simply attach to the waistband. The Physical Self-Perception Profile for Children (PSPP-C) will be used to assess physical self-perceptions. Height and weight measurements will be assessed to determine body mass index. The students who volunteer to participate must sign an informed assent form and obtain written permission from their parents (consent form). All students will be made aware that participation is voluntary and they may stop at any time.

Once again, thank you for your interest in our school. We are hopeful that will provide us information as to where we can improve and provide necessary modifications in our physical education curriculum.

Sincerely,

Nelson Sisior
Vice Principal, Palau SDA Schools
Appendix E

Parent Consent Form (English & Palauan version)
Consent To Be a Research Participant

Dear Parent/Guardian,

I am a graduate student under the direction of Dr. Charles Morgan in the Department of Kinesiology and Leisure Science at the University of Hawaii at Manoa. The study involves determining the relationships between activity levels, body composition and self-esteem in children. I am now conducting a study on 6, 7, & 8 graders of Airai and Koror schools children/adolescents to determine how their physical activity, body composition, and self-esteem change over time.

Students will wear a pedometer for eight weekdays (four weekdays one week and four weekdays a second week). A pedometer is small (matchbox size) device that attaches on the waistband of your child’s pants or shorts and measures step counts. Your child’s participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty, it will not affect your child’s grade or standing at school in any way.

The study will be conducted during the weeks of August 21-31, 2006. On the days your child participates they will be given a pedometer at school and asked to wear it all day until they go to bed. Please remind your child to take the pedometer off if it will get it wet in any way. The morning please remind them to please put it back on when your child gets dressed and have them wear it to school until it is collected. The pedometers will be sealed closed to ensure proper data collection. Please encourage your child not to open it. Height and weight will be measured privately during this study and a self-esteem survey will be administered to children in sixth through eighth grades. We recognize that children are not as responsible as adults and encourage you to help your child remember to return the pedometer each day they participate. If you are concerned that your child might lose the pedometer or not return it you do not have to participate, remember that participation is voluntary. We would like to be able to get as many pedometers returned back as possible because each pedometer costs $30.

The indirect benefit of your child’s participation is a better understanding of youth physical activity levels that will assist physical education teachers in their efforts to promote and measure daily physical activity.

The results of this project may be published in a journal and/or presented at a professional conference. Your child’s name or identity will not be revealed. In order to keep this confidential, only a code number will identify your child in this project. Documents that link your child’s name with this code number will be kept separate and secured from the completed data forms.

If you have any questions concerning the research study or your child’s participation in this study, please call me at 680-587-3452. If you have further questions or concerns about human subject/human rights, please contact committee on Human Studies at this information:

UHM Committee on Human Studies
2540 Malle Way, Room 253
University of Hawaii at Manoa
Honolulu, HI 96822
Phone: (808)956-5007 or (808)539-3955

Sincerely,

Stephanie B. Ngitchoime
Ongit el Melai er a Kengei

Mo Er a Chedam, Chedil me a Oungerachel er a Ngalek,

Ngak a ngalek er a Belau e ngar er a skuul er a Hawaii el ngar er a eungel a Dr. Charles Morgan er a Department er a Kinesiology me a Leisure Science. Tia el omsuub el bo kurul er ngii a mo ousbech er a ongelolem, ongeuid me a ongeai el ngalek er a Airai me a Koror Elementary skuul. Ak mo melai a klemengetir me a berredir el mo medengei el ua se ng chatter er a rekrir. Ng dirrek el soak el mo medengei a telkelel a rol el a klekool el tir a ngar er ngii er a bek el sils.

A ngelekem a mo cheltiut er ngii a pedometer (mesil el meluk er a cherroid me a idisel a blekeklel er a ta el sils). A pedometer a kekerei el klalo el ko er a baks a teletelel el mo cheltiut er a chesnjelel a subelngel me a lechub e ng sailengel a ngelekem el kmal di melemalt er a bkul a ochil.

Tia el omsuub el lebo er ngii a ngelekem, a Isekum me ng chetim e ng di ungil besul. Ng diak a ngarang el bo el temellii er a teng me a lechub e ngomesubel a ngelekem. A Isekum me ng kongei e a uriul e ng mo chetil e ng dirrek el di ungil besul. Ng kmal diak a ngarang el bo el temellii er a omesubel.

Ak mo meruul er tia el omsuub el omuchel er a lluich me a tang el mo imuut er a okedei me a tang el kebesengil chelechal el Ongeai el buil (August 21 – 31). Se el ki momuchel e a ki mo msang a ngelekem tia el pedometer e ng cheltuit er a subelngel me a lechub e ng sailengel er a tutau el mo kebesengei el mo imuut er a borrei. Tia el klalo a diak el kirel el mo dekims me a Isekum e ng mo melechong me a lechub e ng mo mengedub a ngelekem e ng kirel el ngubetii. Se el bo el merek e ng lemuut el chitutii el di mereko bo el bad e ng ngubetii el mecherei. Se le bekiis er a tutau e ng lemuut el chitutii el di mereko lluut el me er a skuul.

Ke dirrek lomeklak er a ngelekem me ng diak lomok er tia el klalo. A kmal lolengit me dekaingeseu kau me a ngelekem el kauklatk me ng diak lebo dekims me a lechub e ng diak loridii tia el pedometer e ng kmal meringel a cheral.

A uriul er tia el omesubek e ak mo meluches er a bablingek el kirel, e diak kobekikl e le ng diak el bo el medung a ngkkel a ngelekem me a rokui el Kingsilai el kirel a ngelekem. Ke kmal mesulang kau me a ngelekem el ojingeseu er ngak er tia el ta er a dauch er a omesubek er a skuul. A le ngar er ngii a ngodech el kerim e mo mkedong er ngak er a (587-3452). A Isekum me ng ngar er ngii a kuk di kerim el kirel a human rights e mo mkedong er a Committee er a Human Studies er a:

UHM Committee on Human Studies
2540 Malle Way, Room 253
University of Hawaii at Moana
Honolulu, HI 96822
Phone: (808) 956-5007 or (808) 539-3955

Sincerely,

Stephanie Ngirchoimei
Please sign and complete the information on the Child’s First & Last Name (Please print clearly)

Teacher’s name (Classroom)________________________________________

Please answer the following questions:

Child’s birthday: _______ / _______ / _______  Child’s age: _______ years old

Child’s Gender: (Circle)  Male  Female

Child’s Ethnicity:

___ Belauan
___ Filipino
___ American
___ Asian
___ Federated States of Micronesia (Yapese, Kosraean, Pohnpeian, Chuukese)
___ Other: ________________________________

Does your child participate in any after school programs or sports? (Circle)  YES  NO

If yes, which ones?

___ volleyball  ___ baseball/softball
___ basketball  ___ dance
___ music lessons or performance  ___ talent search program
___ Other, please explain ________________________________

By signing below, you are giving consent for your child to participate in the above study.

________________________  __________________________  __________
Appendix F

Child Assent Form (English & Palauan version)
CHILD ASSENT FORM

I have been told that my parents (mom or dad) or guardian/s have given permission (said it's okay) for me to take part in a project about wearing pedometers and height / weight measurement.

I will be asked to fill out a form about how I feel about activity.

I am taking part because I want to. I know that I can stop at any time I want to and it will be okay if I want to stop.

Sign Your Name Here                                    Print Your Name Here

MELAI ER A KENGEI ER A NGALEK

A demak, delak me a oungerachel er ngak a mla kongei er ngak me ak mo ngar er tia el omesuub. Te dirrek el kilngei a omolai er a klengetek me a berredak e dirrek el mo cheltiut er ngak tia el pedometer.

Ng ngar er ngii a babier el kbo fill er ngii el kirel a uldesuek er a rolel a klool.

Ak mo meruul er tia e le ng soak. Ak dirrek el medengei el ua se a bo el chetik e ng sebechek el stob er a ngii el di el taem.

Saing Er a Ngklem                                    Mlechesii A Ngklem
Appendix G

Parent/Guardian Reminder Letter
Reminder to Parents:

This note is a reminder to parents regarding the Pedometer study your child is participating in. Your child begins participation today and will continue wearing the pedometer for the next four days. Below are important points to remember regarding participation in this study:

1. Encourage your child to wear the pedometer all day until they go to bed. The next morning they should put the pedometer back on and wear it until they get to school.

2. If for any reason the pedometer might get wet (swimming, taking a bath, etc.), please take the pedometer off and put it on again after that activity.

3. The pedometer should be worn on the right side of the waist with the pedometer positioned in line with the right knee and attached to the waistband of pants or shorts.

4. The pedometer will be sealed, please encourage your child to keep it sealed and to just go about their normal activities.

If you have any questions regarding participation in this study please feel free to call Stephanie Ngirchoimei at 680-587-3452. Thank you for your support and participation in this study.

Omsubel tial Pedometer

Ulelatk er mora Edam ma Edil:

Tia ulelatk lekor kemi el kirel omesubel tial pedometer el bor ngii a ngelkem el mo omuchel er elchal sils e melemolem leua el klebesei. Aikakid a ulelatk el beldukl el riou:

1. Mo meklatk ra ngelekem meng di cheltiut er ngii ngii tial pedometer el di merko bol bad.

2. Alii tial kloalou a diak el kirel mo dekims. Alsekum meng ngarngii a boloruu el ngii el lecha mo dekims eng ngubeti e sel bol merek eng lemuut el chitutii.

3. Tial pedometer a kirel cheltiut ra right el osngelei a subelngel ma lechub eng sailengel a ngelekem el mal di melemalt ra bkul ochil.

4. Tial kloalou a mo llecht ra kumi meng diak el kirel a ngelekem lomok er ngii.

Kekmal mesulang ra ngelseuim eal borngii a kerim e momkedong ra Stephanie Ngirchoimei ra dengua: (587-3452).
Appendix H

Daily Questionnaire
Pedometer Questionnaire

1. How did you get to school yesterday? (Circle One)
   - Bus
   - Car
   - Walk
   - Bike
   - Skateboard
   - Other

2. How did you get home yesterday? (Circle One)
   - Bus
   - Car
   - Walk
   - Bike
   - Skateboard
   - Other

3. Did you participate in physical education yesterday? (Circle)
   - Yes
   - No

4. Did you participate in organized sports yesterday? (A sport that had a coach) (Circle)
   - Yes
   - No

5. Did you do any of the following activities yesterday: (Check all activities you did yesterday)
   - [ ] play an after school sport
   - [ ] ride your bike
   - [ ] roller blade
   - [ ] swimming
   - [ ] other physical activities — Name the activities

6. Did you take your pedometer off before going to bed last night? Yes
   - No

7. Did you put your pedometer on when you got dressed this morning? Yes
   - No

8. Did you wear the pedometer the entire time? Yes
   - No

9. Was there any time you took the pedometer off yesterday? Yes
   - No
   If yes, how long did you have it off?
Appendix I

Protocol Procedure Questionnaire: Research Assistants
Protocol Procedure Questionnaire: Research Assistants

True / False 1. Students will wear pedometers in all physical activities (i.e. swimming, running, biking, etc.) performed.

True / False 2. Students will log their personal Daily Step Counts (DSC) and activity time.

True / False 3. For ease of administration, students can wear their pedometers anywhere on their waistline or clothing.

True / False 4. Students will fill out daily questionnaires and receive their pedometers after assistants annotate DSC and activity time.

True / False 5. Students will take pedometers off prior to sleeping and wear them before going to school.

True / False 6. Students may cut straps to view their DSC and activity time.

True / False 7. Straps will be used if students have loose clothing that may affect DSC and activity time.

True / False 8. Students are encouraged to follow all protocols (i.e.- care for devices, time worn, daily questionnaires, location of pedometers, and etc.) throughout the duration of the study.

True / False 9. Students are required to turn in all documents (i.e.- parent consent form and assent form) prior to participating in the study.

True / False 10. Students may stop participating in the study at any time.