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Relationship between reported childhood and adult physical activity

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RELATIONSHIP BETWEEN REPORTED CHILDHOOD AND ADULT PHYSICAL ACTIVITY

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RELATIONSHIP BETWEEN REPORTED CHILDHOOD AND ADULT PHYSICAL ACTIVITY

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It was the purpose of this research to examine the relationship between reported childhood and adult physical activity (PA), with special regards to the types of activities that correlate with habitual activity. Subjects were 249 male and female students age 19 to 30 years (M = 21.9 years) enrolled at the University of Nebraska at Omaha. Subjects were surveyed from all departments on campus. Subjects were asked to complete a survey instrument that assessed past and present PA. The results of the current study reported that there is a significant positive correlation ($r = 0.284$, $p \leq 0.05$) between the total score of past childhood PA and present adult PA. When past PA was divided into preteen and adolescent periods, there were also significant relationships ($p \leq 0.05$) with all of the four indices of present PA (work, sport, leisure and total). Regression analysis explained 17.6 % of the variance in exercise when predicting adult PA from the total score of past PA. The prediction equation is as follows: $Y' = 27.761 + 0.775\ (X_1) + 0.276\ (X_2) + 0.945\ (X_3) + 1.787\ (X_4) - 1.254\ (X_5)$; where X_1 = number of varsity athletic letters received as an adolescent, X_2 = informal activities as a preteen, X_3 = level of athletic ability or coordination in favorite sport as an adolescent, X_4 = P.E. classes as an adolescent, and X_5 = activity level compared to peers as a preteen. It was concluded that

there was a significant positive correlation ($p \leq 0.05$) between the total score of past PA and each of the four indices of present PA.

Table of Contents

Table of Tables

CHAPTER I

Introduction

The amount of childhood and adolescent physical activity (PA) has been linked to the overall health and PA of adults in recent literature (Pate, Baranowski, Dowda, & Trost, 1996; Sallis, Simons-Morton, Stone, Corbin, Epstein, Faucette, Iannotti, Killen, Klesges, Petray, Rowland, & Taylor, 1992; Taylor, Blair, Cummings, Wun, & Malina, 1999; Trudeau, Laurencelle, Tremblay, Rajic, & Shephard, 1999). However, the relationship between the two has not been strong (Malina, 1996; Pate et al., 1996; Taylor et al., 1999). Nevertheless, it has been shown that children tend to track certain risky behaviors from adolescence into adulthood. These risk factors include physical inactivity (Pate et al., 1996). PA is a special concern for today's population due to the fact that coronary heart disease, diabetes mellitus, colon cancer, and hypertension are becoming more prevalent (U. S. Department of Health and Human Services, 1996), and these are all disease states that have a known relationship to physical inactivity.

There is a debate in the literature of whether PA is tracked from childhood to adulthood. Several studies have shown that relationships do exist; however, the correlations are small in magnitude. Correlations in one study showed a significant relationship of $r = 0.16$ for sport participation of children prior to teen years and $r = 0.17$ for teen skill in activity ($p \leq 0.05$) thus showing a limited relationship between childhood PA and adulthood PA (Taylor et al., 1999). Pate et al. (1996) reported higher correlations for early childhood PA ($r = 0.53$ for one year and $r = 0.63$ for three years; $p \leq 0.05$). They suggested that early childhood PA could possibly lead to continued PA in later

childhood, thus suggesting that the behavior could be continued later in life. Several others have found significant but small relationships (Malina, 1996; Raitakari, Porkka, Taimela, Telama, Rasanen, & Viikari, 1994; Sallis, Berry, Broyles, McKenzie, & Nader, 1995).

Trudeau et al. (1999) refuted the idea of childhood PA leading to adult PA. They found that there was no significant relationship ($p > 0.05$; $\chi^2 = 5.56$; $N = 546$) in the amount of PA reported by adults when asked to self-report PA of childhood as compared to adulthood. This study is important because of the large sample size and high return rate of questionnaires (83.7%), which lessened the likelihood of selection bias (Trudeau et al., 1999). Evidence regarding the tracking of childhood PA into adulthood is lacking. Others have also supported the notion that childhood PA may not lead to adult PA (Brill, Burkhalter, Kohl, & Blair, 1989).

Furthermore, a problem presented in the literature concerning this area of research is how PA has been measured. An estimated level of PA (i.e., hours/week, an activity score, or total energy expenditure) quantified by recall has been the main form of measurement (Malina, 1996). These forms of data collection are less accurate due to the need for memory recall. Further investigation is needed to determine if childhood PA is related to adult PA. If a meaningful relationship were found, numerous implications for childhood intervention would exist, such as teaching techniques and PA guidelines.

Therefore, it is the purpose of this research to examine the relationship between reported childhood and adult PA, with special regards to the types of activities that correlate with habitual activity.

CHAPTER II

The Problem

Problem: It was the purpose of this research to examine the relationship between reported childhood and adult PA, with special regards to the types of activities that correlate with habitual activity.

Hypotheses:

1. There will be a significant positive correlation between the total score of past PA and the adult work index as measured in the modified Baecke questionnaire.
2. There will be a significant positive correlation between the total score of past PA and the adult sport index as measured in the modified Baecke questionnaire.
3. There will be a significant positive correlation between the total score of past PA and the adult leisure index as measured in the modified Baecke questionnaire.
4. There will be a significant positive correlation between the total score of past PA and the adult total index as measured in the modified Baecke questionnaire.

Delimitations: The subjects of this study were male and female students from the University of Nebraska at Omaha. There was an N size of 249 subjects in this study. Current PA was assessed by a comprehensive questionnaire, in that it included components dealing with work, sport,

leisure and total indices. Past PA was assessed using a questionnaire that provided information about preteen and adolescent PA.

Limitations: The following variables may have affected the outcome of the study:

1. The memory recall of PA by subjects and the bias of overestimating the amount of PA performed.
2. Accuracy of the questionnaire to measure current and past PA. Any particular survey is unable to assess all variables.
3. Time constraint to accurately fill out survey.

Definitions: PA ------- physical activity in this study was defined as any body movement that results in an increase in the resting energy expenditure (Malina, 1996).

Significance Physical activity is a special concern for today's population due to the fact that coronary heart disease, diabetes mellitus, colon cancer, and hypertension are becoming more prevalent (U. S. Department of Health and Human Services, 1996). Therefore, because a positive significant relationship was found between reported childhood and adult PA, this would support the importance of influencing children to live a more active lifestyle.

CHAPTER III

Review of Literature

The review of literature consisted of the following sections: measurement of physical activity and determinants of physical activity.

Measurement of PA

In the discipline of health, physical education and recreation, the accurate and reliable measurement of PA is a challenging and difficult, yet important task. The measurement of PA can be further sub-divided into subjective and objective means of measurement. In this section, each sub-area will be further researched to display the most common methods of assessment for each. The reliability and validity of each instrument will also be reported. The pros and cons for each instrument will be examined. It should be noted that no one technique is suitable for all purposes (Sallis et al., 1993).

Subjective Measurement. The literature shows that there are numerous means of subjectively measuring PA (Baecke, Burema, & Frijters, 1982; Haskell, Taylor, Wood, Schrott, & Heiss, 1980; Kriska, Knowler, LaPorte, Drash, Wing, Blair, Bennett, & Kuller, 1990; Sallis, Haskell, Wood, Fortmann, Rogers, Blair, & Paffenbarger, 1985; Taylor, Jacobs, Schucker, Knudsen, Leon, & Debacker, 1978; Taylor et al., 1999). Some of the most common ways include self-reports, interviewer-administered questionnaires, PA recalls, diaries, and journals. All of these have their advantages and disadvantages. The basis of subjective measurement is to estimate the amount of PA that an individual is currently doing or has done in the past. Many questionnaires are based on different activity areas of the individual's life, such as occupation, transportation, housework, and

leisure time (Roeykens, Rogers, Meeusen, Magnus, Borms, & Meirleir, 1998). Various measures of estimating the energy expenditure (EE) of PA exist including hours/week, MET/min/d (metabolic units per minute per day; 1 MET = EE at rest), MET/hr/wk, and various scoring systems based on time the individual was active at different intensities.

The questionnaires most often used in the research have similarities that should be noted. Several of the recalls use the same units of measurement to quantify PA. For example, the Minnesota Leisure Time Physical Activity (MLTPA), Baecke (sports score), and Seven Day Physical Activity Recall (PAR) (total, occupational, and nonoccupational) all use MET/min/d as a way to measure the amount of PA an individual is currently participating in or has participated in the past (Taylor et al., 1978; Baecke et al., 1982; Sallis et al., 1985). A similar way of quantifying PA was used by Kriska et al. (1990) in which PA was measured in MET/hr/wk. However, others use a scoring system to account for the amount of PA. The Baecke questionnaire uses a 5-point Likert scoring system (Baecke et al., 1982), whereas the Lipid Research Clinics (LRC) questionnaire uses a 4-point score of very low, low, moderate, and high active (Haskell et al., 1980).

The timing of recall is another area to consider when using PA questionnaires. Recall in the literature ranges from seven days to many years in the past. Sallis et al. (1985) developed the Seven-Day PAR to assess PA within the preceding week, and Baecke et al. (1982) designed their questionnaire to measure the current PA of the subject. The LRC questionnaire was developed to measure the current PA of the individual without specifying the time period (Haskell et al., 1980). The majority of the questionnaires, however, used a 12-month period for measuring the individual's PA. The

MLTPA and Specific Activity Questionnaire used this approach (Kriska et al., 1990; Taylor et al., 1978). The only study that the author could locate reporting childhood PA by adults was by Taylor et al. (1999).

The various questionnaires also have unique qualities. One questionnaire that has been developed to evaluate leisure time activity is the MLTPA questionnaire (Taylor et al., 1978). The questionnaire was initially formed to classify people based on their chances of developing coronary heart disease; however, it can also be used to estimate EE in other North American populations (Taylor et al., 1978). The MLTPA is a widely used questionnaire that classifies activities based on an intensity scale. EE is expressed in terms of an Activity Metabolic Index (AMI) measured in MET/min/d. Total AMI is calculated through the following equation:

$$\text{Total AMI} = \Sigma(I \times M \times F \times T)$$

where I is the intensity code given to the activity, M is the specific number of months in which the activity is performed, F is the average number of times in each month, and T is the average duration of the activity. Light AMI, moderate AMI, heavy AMI, and household AMI are all calculated using a variation of the above equation.

Blair et al. (1991) reported reliability coefficients for the MLTPA that ranged from 0.20 to 0.50 ($p < 0.05$), with the higher intensity activities, such as competitive basketball and handball, producing higher correlations. Subjects were 451 employees of a worksite health study ($M \pm SD$ age = 41.3 ± 10.2 years). They were first measured at baseline, then 11 years later using the MLTPA questionnaire. The long span of time between measurements may explain the low to moderate correlations. This is evident in

the reliability coefficients of other shorter studies. When the time between measurements was 2 weeks, 5 weeks, or 12 months, reliability coefficients were significantly higher. Folsom et al. (1986) reported correlations of 0.69 to 0.88 for two weeks and five weeks, respectively. Also, Jacobs et al. (1993) reported correlation ranges of 0.73 to 0.95 and 0.32 to 0.71 for 1 month and 12 months, respectively. The MLTPA was validated against several validation measures, including a CALTRAC accelerometer, lung function, four-week PA history, graded treadmill test, and percent body fat (Jacobs et al., 1993). The four-week history produced the highest validation coefficients ($r = 0.74$ to 0.86).

A commonly used survey instrument is the Baecke questionnaire (Baecke et al., 1982). A similar version of the original is the modified Baecke questionnaire, which is identical to the original with the addition of three questions (Pols et al., 1995). It is often used to assess PA within the last year. The test-retest reliability for the modified Baecke has been reported at 0.82 for males and 0.79 for females (Pols et al.). Correlation coefficients for internal consistency between questions was good, ranging from 0.65 to 0.89 (Pols et al.). Pols et al. also reported validity coefficients of 0.56 for males and 0.44 for females when compared to diaries. The Baecke questionnaire consists of four different indices: work, sport, leisure, and total. The indices are scored based on a Likert scale of 1 to 5. Questions 1 through 8 relate to the work index, questions 9 through 12 relate to the sport index, and questions 13 through 19 relate to the leisure index. The total score combines the work, sport, and leisure indices into one score.

A questionnaire widely used in research is the Seven-Day PAR (Sallis et al., 1985). This method of collecting data on the activity of individuals is used for

quantifying the PA habits of individuals within communities and large-scale health surveys. The PAR is administered by an interviewer and consists of three separate parts: a two-hour survey based on the health, knowledge, attitudes, behavior and medical status of the subject; measurement of various physiological variables, such as anthropometric measures, blood, urine, and expired air; and three question-answer assessments based on intensity and EE of PA. Sallis et al. initially administered the PAR to 1,120 females (M age 41.0) and 1,006 men (M age 39.2) from the Stanford Five-City Project. The baseline survey was conducted between 1979 and 1980 on four of the five cities in central California. The survey was developed to measure moderate and vigorous activities, as well as total EE from the previous seven days. Moderate activities were defined as activities that required an EE of 3-5 METs, and vigorous activities were defined as an EE of ≥ 6 METs. Total EE was calculated by summing the hours of sleep, and light, moderate, hard, and very hard activities. Sallis et al. also assessed test-retest reliability of this questionnaire two weeks later with 64 of the original subjects. Reliability coefficients for the number of moderate and vigorous activities reported were 0.83 and 0.75, respectively ($p \leq 0.0001$).

In another study, Sallis et al. (1993) conducted test-retest reliability one week apart on the PAR in which they found $r = 0.77$ ($p \leq 0.001$). He assessed 36 fifth-graders, 36 eighth-graders, and 30 eleventh-graders with the latter group producing the highest correlations that were most similar to adults, thus concluding that reliability increased with age. Also, Sallis et al. reported that males provided higher reliability coefficients than females. In this same study, the authors reported validity coefficients that ranged

from 0.29 to 0.33 ($p \leq 0.05$) for fifth-graders, 0.36 to 0.45 ($p \leq 0.05$) for eighth-graders, and 0.57 to 0.72 ($p \leq 0.001$) for eleventh-graders using heart rate as the validation measure.

The LRC questionnaire has been used to assess the PA of trained versus untrained subjects. The LRC is a self-administered survey that reveals typical PA patterns. Ainsworth et al. (1993) examined the test-retest reliability and validity of the LRC. The subjects of this study were 28 males and 50 females ($M \pm SD$ age $= 39.8 \pm 9.1$). The test-retest reliability coefficient was $r = 0.85$, thus showing that the LRC is a reliable indicator of PA over a one month time. The LRC was validated against cardiorespiratory fitness, body composition, EE from four-week history, and a Caltrac accelerometer. The partial r^2 ranged from 0.17 to 0.29.

A questionnaire that has been recently developed is the Childhood and Adolescent Physical Activity Patterns Questionnaire (Taylor et al., 1999). The subjects in this study were 105 middle-aged males. They were first asked to recall their weekly exercise habits for the prior three months. They were then asked to fill out a questionnaire that estimated PA during childhood (6 to 12 years) and adolescence (13 to 18 years). Cues were given to help remember the setting in which PA took place to increase the accuracy of recall. Frequency of participation in physical education (PE) classes, youth sports, specific sport lessons, and informal activities were recorded. PA for team and individual participation was also noted. The survey also inquired about psychosocial factors similar to that of Bandura's Social Cognitive Theory. Taylor et al. used estimated daily EE during the prior three months as the dependent variable in this study. The independent variables

included frequency of PA in childhood and adolescence, individual or team sports participation, enjoyment of PA, and forced participation in exercise. No validity data on this instrument has been developed as of yet.

By looking at the various types of PA questionnaires, a better knowledge has been gained about the strengths and weaknesses of these types of measurement. First, there is clearly more than one way to reliably and accurately report PA by means of subjective measurement, thus suggesting that there is no "gold standard" in the measurement of PA. Also, the literature shows that questionnaires can be used with many different age groups as young as fifth-graders to report typical PA patterns of up to 10 years in the past. Questionnaires are easily administered, cost is minimal, and there is little burden on the subjects. A negative aspect of using recalls is the loss of accuracy due to poor memory recall.

Objective Measurement. A technique that is considered to be a more valid and reliable way of measuring PA is by objective means. Examples are heart rate (HR) monitors, activity counters, accelerometers, doubly-labeled water technique, and direct observation (Bailey, Olson, Pepper, Porszasz, Barstow, & Cooper, 1995; Gayle, Montoye, & Phipot, 1977; Klesges, Klesges, Swenson, & Pheley, 1985; Montoye, Washburn, Servais, Ertl, Webster, & Nagle, 1983; Saris, 1986; Schoeller, 1983; Westerterp, De Boer, Saris, Schoffelen, & Ten Hoor, 1984). These types of measurement, no matter how reliable and accurate they may be, still have their limitations. Due to the nature of direct data collection, high cost and large time constraints seem to be the major deterrents of these methods (Saris, 1986).

HR recording has been utilized in this area of research for many years. However, in recent years it has become a much easier way to collect data. Many years ago the nature of technology required subjects to be measured with a major encumbrance (Saris, 1986). The technological advances have allowed HRs to be detected and stored reliably over long periods of time, all while using small equipment. This is why HR recording has become one of the more popular methods of collecting PA data. The idea of using a physiological mechanism, such as HR, to measure PA is based on the linear relationship between oxygen uptake (VO_2) and HR (Saris). This relationship implies that as the HR increases due to a certain workload, so does the oxygen required to perform that specific task. This is true for HRs above 110 beats per minute (bpm). Heart rates below this can be influenced by emotional factors and muscle contraction that may not cause an increase in VO_2 (Saris). Environmental temperature, food intake, body position, and continuity of exercises also affect HR (McArdle, Katch, & Katch, 1996). McArdle et al. noted that even though using HR to estimate EE is practical, it has not been validated for activities other than running and cycling. Therefore, it could be inaccurate for estimating EE of individuals in daily activities, team-sports, and activities not yet validated.

The validity and reliability of the HR method are known. Leger and Thivierge (1988) compared 13 HR monitors that were currently on the market to electrocardiography (ECG) readings at various HRs and to various ergometric devices (e.g., bicycle ergometer, treadmill, and step test). They found that 4 of the 13 HR monitors had validity coefficients >.90 ($p \leq 0.05$) when compared to ECG readings. These four were believed to be more accurate due to their use of conventional chest

electrodes, rather than finger or wrist devices (i.e., pulse oximeters). In another study, test-retest reliabilities were performed on 131 subjects age 5-7 years old (Durant et al., 1993). Reliabilities were performed on a 12-hour segment over one day of recorded data. Durant and colleagues reported correlations of 0.92 for HRs that were 25 percent above the resting HR and 0.88 for HRs that were 50 percent above the resting HR.

The pedometer was one of the first motion sensors developed. It is a device that simply counts the steps an individual takes. Gayle et al. (1977) reported that the pedometer is an instrument used to count steps as a result of the bottom of the foot striking the ground. This motion causes a lever inside the mechanism to move vertically, thus registering a step. The device is very convenient because it is worn at the waist, which allows it to be worn almost at all times. Despite this advantage, Gayle et al. reported that accuracy could vary between individuals even when worn on a certain side of the waist. Pedometers also don't measure PA for activities such as skiing, bicycling, or arm ergometry (Montoye & Taylor, 1984).

Another type of motion sensor devised for the measurement of PA is a small portable device known as an accelerometer (Montoye et al., 1983). This device is worn on the waist and measures the acceleration and deceleration of movements in a vertical direction, with the absolute value of the two recorded. The accelerometer can be used to measure intensity and quantity of exercise better than the pedometer by use of a piezoelectric device (Klesges et al., 1985). Therefore, accelerometers seem to be a more valid estimate of EE than pedometers.

Nevertheless, motion sensors have their limitations. Due to the devices being worn at the waist, EE is not measured during static exercises such as rowing or bicycling (Montoye et al., 1983). Secondly, Montoye et al. found that even though VO_2 increases with increased grade on a treadmill, the accelerometer would not detect the change in incline. Also, neither unit can be used in population studies because they are unable to measure minute-by-minute data. Data must be determined at specified times or as a cumulative figure (Haskell, Yee, Evans, & Irby, 1993).

Klesges et al. (1985) reported validity coefficients on 50 adult male and female subjects. They found a correlation of 0.81 with direct observation of PA. This correlation was similar to the validity coefficient that Montoye et al. (1983) reported ($r = 0.74$). Altogether, direct observation explained 64 percent of the variance of the accelerometer readings in the Klesges et al. study.

Montoye et al. (1983) compared the accelerometer to VO_2 measurements using a treadmill on 21 subjects age 20-60 years old. They performed test-retest reliabilities on 4 of the 21 subjects performing 14 various activities using the accelerometer. The test-retest was carried out two weeks apart. They found a correlation of 0.94 across all 14 activities inferring high reliability. Therefore, the accelerometer, despite some limitations, appears to be a valid and reliable way to measure PA.

Yet another means of objectively measuring PA is the doubly labeled water technique (Saris, 1986; Schoeller, 1983; Westerterp et al., 1984). The method is based on the notion of isotope equilibrium between the expired oxygen (O_2) and carbon dioxide (CO_2) and the O_2 content of body water. A fluid containing a stable radioactive isotope is

given to subjects to drink. The rate of the isotope appearing in the body water is proportional to body metabolism, which is interpreted as the EE. When stable isotopes are introduced into the body, the elimination rates of the products yield CO_2. This CO_2 is then used to determine EE from the VO_2 estimated respiratory quotient (RQ) value (Saris, 1986). The RQ value is determined by dividing the CO_2 produced by the O_2 uptake (McArdle et al., 1996).

Westerterp et al. (1984) performed a study in which 2 subjects spent the first 3 days of the 14-day study in a respiratory chamber. Blood and urine samples were collected throughout the study to determine EE via the doubly labeled water technique. During the three days, each subject performed a specific exercise program on a bicycle ergometer. Subject A exercised on day 2 only with 1 MJ (mega joule) of work spread throughout the day in 4 sessions of 30-45 minute work bouts. Subject B exercised on days 1 and 3 with 1.6 MJ of work distributed throughout the day in 4 bouts of 30-45 minutes. The results of the two-week study showed that there was a difference in total daily EE, which was mainly due to PA. This technique is considered the most accurate method of measuring EE over an extended duration (Schoeller, 1983). In this same study, Schoeller (1983) tested the validity on 17 subjects (8 to 34 years old) and found that the CV of the doubly labeled water technique for the measurement of EE was between 4 and 8 percent.

As with all previous objective measurement instruments, there are limitations to the doubly labeled water technique. The largest is cost. Saris (1986) reported that for one experiment it would cost approximately $3 per isotope dose per kilogram body

weight. Also, this method only provides a cumulative estimation of EE for the entire observation period rather than for an acute exercise session. Therefore, its adaptability is limited. Another possible risk might be the exposure to the radioactive isotope itself.

Finally, another way to estimate PA is direct observation. This method is comprehensive because of its ability to measure intensity, duration, and frequency (Bailey et al., 1995). Bailey et al. proposed to develop a practical observation system, apply the system to a group of children, and then test the reliability of the instrument. Subjects were 15 children age 6-10 years old. Subjects were observed at various settings (e.g., school, home, friend's house) throughout a 12-hour day. They were observed every 3 seconds during 4-hour time blocks from 8 a.m. to 8 p.m. Each 4-hour block was divided into 30-minute blocks. The first 24-minutes were designated to measuring the EE of various postures (e.g., sitting, standing, running). Intensity codes were then recorded every three seconds. Fourteen categories or postures were used to reflect the PA of a free-ranging child. Each posture was issued an intensity level of low, moderate, or intense.

The observer training was very rigorous, and interobserver coefficients were required to exceed 0.90 before anyone was allowed to be an observer (Bailey et al., 1995). Agreement of the observers was 91 percent for this study. The pros and cons of this type of measurement are very pronounced. The greatest advantage is that observations are made every three seconds with a standardized coding system based on postures and intensities. This results in a more accurate depiction of the actual frequency, intensity, and duration of various activities. However, there is a large requirement of

time for training and data collection. Therefore, this type of measurement is not appropriate for large population studies due to the large cost involved. Another limitation using any type of direct observation is subject reactivity (Klesges et al., 1985). Klesges and colleagues suggested that subjects would tend to alter PA when they knew they were being observed.

In summary, there are many subjective and objective ways to measure PA. Each method has its own advantages and disadvantages, and thus, can be applied to different situations. For small groups, objective measurement should be utilized. However, for larger population based studies, subjective measurements should be the instrument of choice. It has been thought that two or more of the methods could be combined, which may lead to a more accurate depiction of PA (Saris, 1986). Nevertheless, one should remember that any one technique only measures a part of the so-called "habitual physical activity pattern" (Saris, 1986).

Determinants of PA and Exercise

Before discussing determinants it is important to distinguish PA and exercise. Exercise is defined as activity that is continuous in nature for at least 20 minutes at 60 to 90 percent of the maximum HR for three or more times per week (Sallis et al., 1992). PA focuses on the amount rather than the intensity of the activity, suggesting that everyone should strive to accumulate 30 minutes of activity throughout the day (U. S. Department of Health and Human Services, 1996). A great deal of research has been performed on the adoption and maintenance of exercise (Dishman, Sallis, & Orenstein, 1985; Sallis, Hovell, Hofstetter, Faucher, Elder, Blanchard, Caspersen, Powell, & Christenson, 1989;

Sallis, Hovell, & Hofstetter, 1992; Sallis, Haskell, Fortmann, Vranizan, Taylor, & Solomon, 1986; Stuck-Ropp & DiLorenzo, 1993). However, less attention has been given to PA. One out of every two people will quit exercising within the first year after starting (Dishman et al., 1985). This is of special concern since approximately 15 percent of the adult population is considered vigorously active on a consistent basis (U. S. Department of Health and Human Services, 1996). Therefore, the interventions that stem from the exercise adherence research may have little impact on the remaining 85 percent of the population that is consistently less than vigorously active.

In many of the studies, a multivariate approach to analyzing the predictors of exercise was used. Also, many of the studies were cross-sectional surveys that determined the most powerful predictors of the adoption and maintenance of exercise. Predictors were divided into several sub-groups that would better describe the behavior of the subjects. Sallis et al. (1992) used 25 environmental, social, cognitive, physiological, and other personal variables as areas of interest to study.

The variables considered for analysis have often been related to behaviors upon which the Social Cognitive Theory is based. Developed by Bandura (1977), the Social Cognitive Theory states that behaviors are influenced by both biological variables (e.g., age, body composition) and psychological variables (e.g., attitudes, beliefs). These variables purportedly affect our beliefs in a way that predicts our future behavior. In other words, being able to confidently perform a given task will undoubtedly increase the ability to actually perform the task, thus increasing self-efficacy.

Many variables mentioned in the literature have been found to predict PA including gender, age, intensity of the activity (vigorous or moderate), and stage of change (adoption or maintenance). Research suggests that females are influenced more by social variables such as family and friend support, while males are more influenced by cognitive variables (perceived benefits), physiological variables (age, body mass index {BMI}), and environmental variables (neighborhood environment) (Sallis et al., 1992). Sallis et al. reported self-efficacy as a strong predictor of PA for both male and female subjects. This finding was similar to other studies (Sallis et al., 1986; Sallis et al., 1989). Sallis et al. (1989) found that self-efficacy accounted for 23 percent of the variance in exercise in both males and females. Other predictors of PA for both genders were PA history (Sallis et al., 1992), barriers to exercise, and diet (Sallis et al., 1989).

In a study of 1,411 adults Sallis et al. (1986) found many significant determinants of PA based on the current behavioral stage of change, intensity of the activity, and gender. A multivariate analysis was performed on numerous variables to determine the most robust predictors. Self-efficacy, age (inverse), and gender (higher probability in men) yielded an R^2 of 0.57 for the adoption of vigorous activity. For the maintenance of vigorous activity, activity attitude produced an R^2 of 0.40. The adoption of moderate activity predicted that the amount of health knowledge accounted for 32 percent of the variance in exercise. Finally, the maintenance of moderate activity was predicted by gender (higher probability in women), self-control, and self-efficacy ($R^2 = 0.32$). The multivariate analysis of variables in this study supported the fact that various determinants of PA are present (Sallis et al., 1986).

In another cross-sectional study, Stucky-Ropp and DiLorenzo (1993) studied 242 children and their mothers cross-sectionally. They found that self-efficacy was not a predictor of PA in children, which contrasts with the finding of previous studies on adults (Sallis et al., 1992; Sallis et al., 1989; Sallis et al., 1986). This suggests that children are influenced by other variables than those presented in the social cognitive theory, which emphasizes self-efficacy. Several variables were significant predictors ($p \leq 0.05$) for both boys and girls. The enjoyment of PA ($R^2 = 0.09$ for males and $R^2 = 0.06$ for females), mother's perception of barriers to exercise ($R^2 = 0.12$ for males and $R^2 = 0.11$ for females), and mother's report of family social support ($R^2 = 0.13$ for males and $R^2 = 0.10$ for females) were all weak significant predictors of PA in children. However, there were also differences between genders. Boys were more influenced by support of friends and family ($R^2 = 0.11$), where girls were more affected by the amount of exercise-related equipment in the house ($R^2 = 0.08$) and parental modeling of exercise ($R^2 = 0.12$). These results suggest that children may be impacted more by social variables rather than by self-efficacy (Stucky-Ropp & DiLorenzo, 1993).

In considering the determinants of PA and exercise, the relationship of PA between childhood and adulthood is important. Several studies have suggested that there is a relationship between the two time spans in regards to PA (Malina, 1996; Pate et al., 1996; Raitakari et al., 1994; Sallis et al., 1995; Taylor et al., 1999), while other studies have refuted the idea of a relationship (Brill et al., 1989; Trudeau et al., 1999).

Of the articles that support the tracking of PA, most of them reported low inter-age correlations of PA between childhood and adulthood. Also, fewer longitudinal

studies than cross-sectional studies have been performed. In a study by Taylor et al., (1999) the relationship of activity in childhood was compared to that of adulthood in a retrospective study of 105 middle-aged male subjects. Results showed that self-reported skill in PA during adolescence was significantly related to adult PA ($r = 0.17$, $p \leq 0.05$). Participation in team sports during childhood was also significantly related to adulthood PA ($r = 0.16$, $p \leq 0.05$). The authors reported that being forced to exercise in both childhood and adolescence was inversely related to adult PA ($r = -0.20$ and $r = -0.15$, respectively).

In a study by Raitakari et al. (1994), 961 boys were longitudinally studied to determine the amount of tracking of PA for three different age categories (12, 15, and 18 years old) from adolescence to young adulthood. The intensity, approximate duration, and monthly frequency were assessed by questionnaire. PA was assessed at baseline and at 3 and 6-year follow-ups. Results showed that those considered physically active at baseline remained the same or increased at both 3 and 6 years. For example, Spearman's rank order correlation coefficients showed the following relationships for the 3-year follow-up: 0.35, 0.45, and 0.54 for 12, 15, and 18 year old boys, respectively; and 0.33, 0.37, and 0.39 for 12, 15, and 18 year old girls, respectively. The tracking of PA was better as age increased. Correlations were smaller but still significant for the 6-year follow-up. All correlations were significant at the $p \leq 0.05$ level.

A non-significant difference between childhood and adulthood has also been reported. Trudeau et al. (1999) cross-sectionally studied 147 men and women who had participated in five PE classes per week during their grade school years in the early

1970s. This group was the experimental group. The control group consisted of 720 subjects selected from the Quebec Health Survey. The purpose of this study was to see if the subjects who were part of the PE programs, and therefore theoretically exercised five times per week, reported more PA 20 years later than the randomly selected control group. Results showed that the experimental group did not report significantly more PA then the control group. In conclusion, the authors suggested that what the PE programs offered to children may not substantially influence the amount of future adulthood PA. This article opposes the idea that past PA is generally considered one of the best predictors of future PA (Dishman, 1994).

Summary

In summary, the research is not clear about many issues concerning PA. First, there has not been a "gold-standard" established for the measurement of PA. This holds true for both subjective and objective measurement. The main reason for this seems to be that there are many different variables affecting the adoption and maintenance of PA and exercise; and therefore, it seems to be difficult to define one best way to measure and which variables to measure. Second, the literature is not definitive about the predictors or determinants of PA. Many different precursors to PA have been identified, and it has been difficult to determine the best predictors across all populations and demographics. Finally, whether or not PA tracks from childhood to adulthood is controversial. Of the studies that showed a positive association, the correlations were relatively small. It appears that in cross-sectional, retrospective studies, it is difficult to obtain strong,

meaningful relationships. Nevertheless, cross-sectional research works best in this situation to assess present and past PA.

CHAPTER IV

Methods

Subjects

Subjects were 249 male (113) and female (136) age 19 to 30 years students enrolled at the University of Nebraska at Omaha. Students were volunteers from classes of a variety of departments throughout campus. The study was approved by the University of Nebraska at Omaha Institutional Review Board.

Experimental Design

This study utilized a non-experimental recall technique. Subjects were sampled regarding their childhood and adulthood PA.

Procedures

The investigator visited several classes across campus to explain the purpose of the study to possible subjects. Classes visited were an equal number of lower level (100 and 200) and upper level (300, 400, and 800) classes from each of the colleges on campus (Arts and Sciences, Business Administration, Education, Engineering and Technology, Fine Arts, Human Resource and Family Sciences, Information Science and Technology, and Public Administration). The investigator spoke briefly to each class. Volunteers received a packet of information after each class including a questionnaire (Appendices B and C) and a cover letter to explain the questionnaires (Appendix A). Students were asked to complete the survey and return it to the instructor within one week. The investigator then returned one week later to pick up all returned packets from the professor and pay a second visit to each class to remind students that may have forgotten.

The investigator distributed 494 surveys to students and 298 were returned for a return rate of 60.3 %; however, 49 were discarded for a final total of 249 accepted surveys, which changed the return rate to 50.4 %.

The modified Baecke questionnaire was used to assess PA within the last year (Pols et al., 1995). This questionnaire was modified by adding three questions to the original instrument. The test-retest reliability for the modified Baecke has been reported at 0.82 for males and 0.79 for females (Pols et al.). Correlation coefficients for internal consistency between questions was good, ranging from 0.65 to 0.89 (Pols et al.). Pols et al. also reported validity coefficients of 0.56 for males and 0.44 for females when compared to diaries. The Baecke questionnaire consists of four different indices: work, sport, leisure, and total. The indices were scored based on a Likert scale of 1 to 5. Questions 1 through 8 related to the work index, questions 9 through 12 related to the sport index, and questions 13 through 19 related to the leisure index. The total score combines the work, sport, and leisure indices into one score. A copy of the modified Baecke questionnaire is attached in Appendix B.

The Childhood and Adolescent Physical Activity Patterns Questionnaire was used to assess PA between ages 6 and 18 years old. The instrument has been used to assess the types and patterns of PA for children (6-12 years old) and adolescents (13-18 years old) (Taylor et al., 1999). The survey incorporated cues for visualizing the setting of activities to aid in the recall of activity. Frequency of participation is also recorded in PE classes, organized youth sports, specific sport lessons, and informal physical activities. Questions also classify the activities as individual or team based in both childhood and

adolescence. A Likert scale of 1 to 5 assesses subject's PA level compared to peers. Other questions relate to the Social Cognitive Theory, which includes constructs dealing with motivation and self-efficacy (Bandura, 1986). Taylor et al. (1999) reported Cronbach alpha coefficients that were greater than 0.70, thus showing good internal reliability. The questionnaire has not been validated as of yet. A copy of the Taylor questionnaire is located in Appendix C.

The sequence of the two questionnaires in each packet was counter-balanced to minimize possible order effect.

Data Analysis

Descriptive statistics were calculated, including mean (M), standard deviation (±SD), and range for all data. Pearson correlation coefficients were used to examine the relationships between reported childhood and adult PA. Stepwise multiple regression analysis was performed to determine the extent that childhood and adolescent PA explained adult PA. The dependent variable was adult PA. The independent variables were selected variables used to determine the scores of preteen and adolescent PA as measured by the Childhood and Adolescence PA Patterns Questionnaire. Variables selected were those that could be readily quantifiable. Preteen variables included PE classes, school or organized sports, classes or lessons related to PA, informal activities, number of games or sports participated in per year outside of PE classes, activity level compared to peers, and level of athletic ability or coordination. Adolescent variables included PE classes, non-school sponsored sports, classes or lessons related to PA, school sponsored sports, informal activities, number of varsity athletic letters, number of games

or sports participated in outside PE classes, level of athletic ability or coordination, and occurrence of participation in favorite sport during off-season. Nine regression equations were developed: three for males, three for females, and three for all subjects combined. Adult PA was predicted from the total score of past PA. Prediction equations were developed. An alpha level of 0.05 was used.

CHAPTER V

Results

Results from the present study on the relationship of past childhood PA and present adult PA indicated that all four hypotheses proposed in Chapter II were accepted ($p \leq 0.05$) i.e., that each of the relationships would be significant. The hypotheses, as well as the correlation coefficients, are as follows:

1. Total score of past PA and present work index ($r = 0.129$, $p \leq 0.05$).
2. Total score of past PA and present sport index ($r = 0.335$, $p \leq 0.05$).
3. Total score of past PA and present leisure index ($r = 0.195$, $p \leq 0.05$).
4. Total score of past PA activity and present total index ($r = 0.284$, $p \leq 0.05$).

A summary of the relationships between childhood and adolescent PA and present adult PA can be seen in Table I.

Table I. Summary of Relationship between Childhood/Adolescent Physical Activity and Adult Physical Activity for All Subjects (N=249).

Past PA	Present PA			
	Work	Sport	Leisure	Total
Preteen	0.130*	0.241*	0.199*	0.249*
Adolescent	0.108	0.352*	0.162*	0.266*
Total	0.129*	0.335*	0.195*	0.284*

* $p \leq 0.05$

The table shows that the highest relationship was between the adolescent score of past PA and the sport index of present PA ($r = 0.352$). This correlation was slightly larger than the total score of past PA and sport index of present PA ($r = 0.352$). The next largest relationship statistically was between the total score of past PA and the total index of present PA ($r = 0.284$). All correlations were statistically significant at the $p \leq 0.05$ level except the relationship between the adolescent score of past PA and the work index of present PA.

Descriptive data of preteen and adolescent PA is presented in Table II. The units of measure represent arbitrary units of PA. This score signifies the sum of points based on the subject's PA. The highest possible preteen score was 95 and the highest possible adolescent score was 127 for a total of 222 possible points for past PA. The last column in Table II represents the percentage that each mean score was of the total possible for the age group. In other words, 69.5 % for the preteen age group implies that the mean score of 52.16 was 69.5 % of the possible 95 points. The percentage of possible points was greatest for the preteen age group, followed by the total score (48.2 %) and the adolescent score (43.3 %). Therefore, most of the PA scored by the questionnaire on past PA came from the preteen age group.

Table II. Description of Preteen and Adolescent Physical Activity Scores (Arbitrary Units of PA).

Variable	N	M	SD	Range	% of possible total
Preteen	249	52.2	18.47	16 - 94	69.5 %
Adolescent	249	54.9	24.01	3 - 124	43.3 %
Total	249	107.1	39.19	40 - 214	48.2 %

Descriptive data of adult PA is presented in Table III. The units of measure are again arbitrary units of PA identical to that used in Table II. The score signifies the sum of points based on the subject's PA for all of the three single indices: work, sport and leisure. The possible scores for each index are as follows: work = 40, sport = 20, leisure = 20, and total = 80. The last column in Table III represents the percentage that each mean score was of the total possible for each respective index. The sport index was the only index that did not reach more than 50 percent of the possible total (47.7 %). The other three indices, however, did have percentages greater than 50 percent, thus showing that the work (53.3 %), leisure (52.0 %), and total (51.7 %) indices all contributed greater to the total PA than did the sport index.

Table III. Description of Adult Physical Activity Scores (Arbitrary Units of PA).

Variable	N	M	SD	Range	% of possible total
Work	249	21.3	7.72	0 - 39	53.3 %
Sport	249	9.5	3.83	3 - 19	47.7 %
Leisure	249	10.4	2.91	4 - 17	52.0 %
Total	249	41.4	10.88	14 - 66	51.7 %

Tables IV through XII are summaries of stepwise multiple regression analyses. Total adult PA is the dependent variable in all the analyses and therefore is what is being predicted. Table IV summarizes the regression analysis predicting total adult PA from the preteen activity score for all subjects. Three variables entered into the prediction equation with an R = 0.328, SEE = 8.79, thus explaining 10.7 percent of the variance.

Table IV. Summary of Stepwise Regression Analysis for Predicting Total Adult PA from Preteen Activity Score for All Subjects (N=249).

Step	Variable	R	R^2 x 100	SEE
1	Informal activities as a preteen	0.255	6.5	8.96
2	Number of games/sports participated in outside PE classes as a preteen	0.305	9.3	8.85
3	PE classes as a preteen	0.328	10.7	8.79

$$Y' = 28.676 + 0.232\ (X_1) + 1.035\ (X_2) + 1.471\ (X_3)$$

Table V summarizes the regression analysis predicting total adult PA from the adolescent PA score for all subjects. Three variables entered into the prediction equation with an R = 0.358, SEE = 8.69, thus explaining 12.8 percent of the variance.

Table V. Summary of Stepwise Regression Analysis for Predicting Total Adult PA from Adolescent Activity Score for All Subjects (N=249).

Step	Variable	R	R^2 x 100	SEE
1	Number of varsity athletic letters received as an adolescent	0.287	8.2	8.88
2	Level of athletic ability or coordination in favorite sport as an adolescent	0.333	11.1	8.76
3	PE classes as an adolescent	0.358	12.8	8.69

$$Y' = 27.808 + 0.748\ (X_1) + 0.870\ (X_2) + 1.727\ (X_3)$$

Table VI summarizes the regression analysis predicting total adult PA from the total past PA (preteen and adolescent activity score combined) for all subjects. Five variables entered into the prediction equation with an R = 0.420, SEE = 8.48, thus explaining 17.6 percent of the variance.

Table VI. Summary of Stepwise Regression Analysis for Total Adult PA from Total Past PA for All Subjects (N=249).

Step	Variable	R	R^2 x 100	SEE
1	Number of varsity athletic letters received as an adolescent	0.287	8.2	8.88
2	Informal activities as a preteen	0.354	12.5	8.69
3	Level of athletic ability or coordination in favorite sport as an adolescent	0.383	14.7	8.60
4	PE classes as an adolescent	0.401	16.1	8.54
5	Activity level compared to peers as a preteen	0.420	17.6	8.48

$$Y' = 27.761 + 0.775\ (X_1) + 0.276\ (X_2) + 0.945\ (X_3) + 1.787\ (X_4) - 1.254\ (X_5)$$

Table VII summarizes the regression analysis predicting total adult PA from the preteen activity score for all female subjects. One variable entered into the equation with an R = 0.205, SEE = 8.09, thus explaining 4.2 percent of the variance.

Table VII. Summary of Stepwise Regression Analysis for Total Adult PA from Preteen Activity Score for Female Subjects (N=136).

Step	Variable	R	R^2 x 100	SEE
1	Informal activities as a preteen	0.205	4.2	8.09

$$Y' = 38.144 + 0.225\ (X_1)$$

Table VIII summarizes the regression analysis predicting total adult PA from the adolescent activity score for all female subjects. One variable entered into the equation with an R = 0.369, SEE = 7.68, thus explaining 13.6 percent of the variance.

Table VIII. Summary of Stepwise Regression Analysis for Total Adult PA from Adolescent Activity Score for Female Subjects (N=136).

Step	Variable	R	R^2 x 100	SEE
1	Level of athletic ability or coordination in favorite sport as an adolescent	0.369	13.6	7.68

$$Y' = 32.057 + 1.724\ (X_1)$$

Table IX summarizes the regression analysis predicting total adult PA from the total past PA score for all female subjects. One variable entered into the prediction equation with an R = 0.369, SEE = 7.68, thus explaining 13.6 percent of the variance.

Table IX. Summary of Stepwise Regression Analysis for Total Adult PA from Total Past PA for Female Subjects (N=136).

Step	Variable	R	R^2 x 100	SEE
1	Level of athletic ability or coordination in favorite sport as an adolescent	0.369	13.6	7.68

$$Y' = 32.057 + 1.724\ (X_1)$$

Table X summarizes the regression analysis predicting total adult PA from the preteen activity score for all male subjects. Two variables entered into the prediction equation with an R = 0.360, SEE = 9.57, thus explaining 13.0 percent of the variance.

Table X. Summary of Stepwise Regression Analysis for Total Adult PA from Preteen Activity Score for Male Subjects (N=113).

Step	Variable	R	R^2 x 100	SEE
1	Number of games/sports participated in outside PE classes as a preteen	0.307	9.4	9.71
2	PE classes as a preteen	0.360	13.0	9.57

$$Y' = 27.001 + 1.703\ (X_1) + 2.341\ (X_2)$$

Table XI summarizes the regression analysis predicting total adult PA from the adolescent activity score for all male subjects. Three variables entered into the prediction equation with an R = 0.438, SEE = 9.26, thus explaining 19.2 percent of the variance.

Table XI. Summary of Stepwise Regression Analysis for Total Adult PA from Adolescent Activity Score for Male Subjects (N=113).

Step	Variable	R	R^2 x 100	SEE
1	PE classes as an adolescent	0.299	9.0	9.74
2	Non-school organized sports as an adolescent	0.396	15.7	9.42
3	Number of varsity athletic letters received as an adolescent	0.438	19.2	9.26

$$Y' = 25.899 + 2.837\ (X_1) + 0.333\ (X_2) + 0.756\ (X_3)$$

Table XII summarizes the regression analysis predicting the total score of adult PA from the total score of past PA for all male subjects. Three variables entered into the prediction equation with an R = 0.418, SEE = 9.36, thus explaining 17.5 percent of the variance. When a fourth variable was entered into equation, the first variable was then removed. The unreported regression was R = 0.438, SEE = 9.26, which explains 19.2 percent of the variance.

Table XII. Summary of Stepwise Regression Analysis for Total Adult PA from Total Past PA for Male Subjects (N=113).

Step	Variable	R	R^2 x 100	SEE
1	Number of games/sports participated in outside PE classes as a preteen	0.307	9.4	9.71
2	PE classes as an adolescent	0.373	13.9	9.51
3	Non-school sponsored sports as an adolescent	0.418	17.5	9.36

$$Y' = 24.571 + 0.959\ (X_1) + 2.919\ (X_2) + 0.291\ (X_3)$$

The relationship of age and adult PA was found to be non-significant for all of the following: work ($r = -0.055$, $p > 0.05$), sport ($r = -0.06$, $p > 0.05$), leisure ($r = -0.027$, $p > 0.05$), and total ($r = -0.074$, $p > 0.05$).

CHAPTER VI

Discussion

Summary of Results

The present study tested the hypothesis that PA during adulthood is related to the patterns of PA during childhood and adolescence. The current study reported that there is a significant positive correlation ($p \leq 0.05$) between past childhood PA and present adult PA. This association is also apparent when further examined within the different areas of both past and present. When past PA was divided into preteen and adolescent periods, there were also significant relationships ($p < 0.05$) with all of the four indices of present PA (work, sport, leisure and total).

The main objective of this study was to determine the variance in adult PA explained by the activity scores of preteen, adolescent, and total past PA. Several stepwise multiple regression analyses were performed to determine how much variance could be explained. Regression analyses were carried out on both genders together as well as each gender singularly.

First, both genders (N=249) were combined for the analysis of predicting adult PA from past PA. Some 10.7 percent of the variance in adult PA was explained by three variables that assessed preteen PA: informal activities as a preteen, the number of games or sports participated in outside PE classes as a preteen, and PE classes as a preteen. In comparison, 12.8 percent of the variance in adult PA was explained by three variables describing adolescent PA: the number of varsity athletic letters received, the level of athletic ability or coordination in favorite sport, and PE classes as an adolescent. When

these two periods were combined for all subjects, 17.6 percent of the variance was explained. Five variables entered into the prediction equation for predicting adult PA from total past PA: the number of varsity athletic letters received as an adolescent, informal activities as a preteen, the level of athletic ability or coordination in favorite sport as an adolescent, PE classes as an adolescent, and activity level compared to peers as a preteen.

Regression analysis was also performed by gender. For female subjects (N = 136), informal activities as a preteen only explained 4.2 percent of the variance when predicting adult PA from the preteen activity score. Regression analysis on the adolescent activity score resulted in 13.6 percent of the variance explained by one variable, that being the level of athletic ability or coordination in the favorite sport. This variable also entered the prediction equation when the preteen activity score was combined with the adolescent activity score for analysis. This variable explained 13.6 percent of the variance again.

Regression analysis on the male subjects (N = 113) resulted in more pronounced results than for the female subjects. When predicting total adult PA from the preteen activity score, two variables (number of games or sports participated in outside PE classes, and PE classes as a preteen) entered into the prediction equation to explain 13.0 percent of the variance. The adolescent activity score resulted in three variables entering into the equation (PE classes as an adolescent, non-school sponsored sports participated in as an adolescent, and number of varsity athletic letters received as an adolescent) to explain 19.2 percent of the variance. Upon combining both preteen and adolescent

activity scores for male subjects, three variables entered into the prediction equation for predicting adult PA from past PA: number of games or sports participated in outside PE classes as a preteen, PE classes as an adolescent, and non-school sponsored sports as an adolescent). These variables explained 17.5 percent of the variance. When a fourth variable (the number of varsity athletic letters received as an adolescent) entered the equation, the first variable was then removed. The unreported regression equation explained 19.2 percent of the variance.

Comparison of Findings to the Literature

The findings of the current study are both unique and similar in comparison to past studies on physical activity patterns. Many previous studies have focused on the adoption and maintenance of exercise over a period of time while specifically investigating possible predictors or determinants of PA in adults (Sallis et al., 1989; Sallis et al., 1992; Sallis et al., 1986; Stucky-Ropp and DiLorenzo, 1993; Taylor et al., 1999). So too did the current study try to determine possible predictors of PA patterns. The following section will detail similarities and differences between the results and methods of the current study and previous studies.

Two of the most powerful past predictors of future PA in the current study were self-efficacy and past PA history. Two questions of the 16 possible questions for past PA related to self-efficacy (self-rated level of athletic ability or coordination in favorite sport as a preteen and adolescent), and 14 of the 16 questions related to past PA history. In the present study, it was concluded that in all subjects (males and females combined) 17.6 percent of the variance in PA was explained by four variables relating to past PA history

and one variable related to self-efficacy. Past PA history variables were as follows: number of varsity athletic letters received as an adolescent, informal activities as a preteen, PE classes as an adolescent, and activity level compared to peers as a preteen. The self-efficacy variable was the self-rated level of athletic ability or coordination in favorite sport as an adolescent. A study performed by Sallis et al. (1992) showed similar, but weaker relationships. In their study of 1,719 adults that examined predictors of adoption and maintenance of vigorous activity, they found that self-efficacy and past PA history were significantly related ($p \leq 0.05$) with $R = 0.14$ and $R^2 \times 100 = 2.0$ percent for females and $R = 0.25$ and $R^2 \times 100 = 6.3$ percent for males.

In the same study, Sallis et al. (1992) also concluded that there are different determinants for both males and females. The strongest predictor for males was self-efficacy ($R = 0.25$), whereas for females it was past education ($R = 0.17$). The current study also found different predictors for each gender. For females, self-efficacy resulted in $R = 0.37$ (13.6 percent common variance), and in males, the largest predictors were number of games or sports participated outside PE classes as a preteen, PE classes as an adolescent, and non-school sponsored sports as an adolescent. These variables explained 17.5 percent of the variance ($R = 0.42$).

Another study also reported similar findings in regards to self-efficacy, coordination and past history (Sallis et al., 1989). In this study, 2,053 adults were studied to examine the determinants of vigorous activity. The investigators used 24 variables including self-efficacy, social support, age, gender, exercise history, and coordination to predict PA. Their model of variables explained 27 percent of the variance in exercise.

The strongest correlates were self-efficacy, perceived barriers to exercise, modeling, dietary habits, support from friends, and age. Self-efficacy was found to account for the majority of the variance in exercise in both males and females (23 %).

In yet another study by Sallis et al. (1986), 1,411 adults were surveyed to investigate predictors of adoption and maintenance of PA. Self-efficacy, age (inverse), and gender (higher probability in men) yielded 57 percent variance explained for the adoption of vigorous activity. The maintenance of vigorous activity was predicted by activity attitude, which explained 40 percent of the variance. For the adoption of moderate activity, health knowledge accounted for 32 percent of the variance, whereas for the maintenance of moderate activity, gender (higher probability in women), self-control, and self-efficacy also accounted for 32 percent of the variance.

Of the previous three studies described, the latter two reported larger explained variance than the present study. This may be due to the methodology of the research. In both of the above-mentioned studies, subjects were adults and were studied longitudinally over 1-2 years. The mean age in the first study was 47.0 years (Sallis et al., 1989), and the range of the second study was 20 to 74 years of age (Sallis et al., 1986). On the contrary the mean of subjects in the current study was 21.9 years and ranged from 19 to 30. The one study that explained less variance than the current study was cross-sectional and therefore more similar to the present study. Furthermore, subjects were surveyed once like the current study instead of on two separate occasions.

A study that refuted what previous studies and the current study mentioned concerning self-efficacy as a predictor was conducted by Stucky-Ropp and DiLorenzo

(1993). They reported that self-efficacy was not a predictor of PA. They studied 242 children and their mothers cross-sectionally. Variables that explained the most variance were enjoyment of PA (9 % for males and 6 % for females), mother's perception of barriers to exercise (12 % for males and 11 % for females), and mother's report of family social support (13 % for males and 10 % for females). The results of this study suggest that children may be influenced more by social variables than by self-efficacy and PA history like the current study supports.

The present study was most closely related to research performed by Taylor et al. (1999). The survey instrument used for the present study was very similar to the instrument used by Taylor and colleagues. The procedure of scoring PA was different, however. Taylor et al. studied 105 males aged 32-60, which was a smaller N size, homogeneous gender group, and older age group than the present study (N = 249, age 19-30). Results of the Taylor et al. study were similar in one important aspect: significance of self-rated skill in PA during adolescence being related to adult PA ($r = 0.17$, $p \leq 0.05$). The present study also showed the importance of this variable being related to adult PA in adolescence ($R = 0.33$, $R^2 = 11.1$ %), as well as in the total past PA score ($R = 0.38$, $R^2 = 14.7$ %). A difference between the results of Taylor et al. and the current one may exist in the methodology. Using older subjects by Taylor et al. may have increased the likelihood of subject error due to memory limitations.

Interpretation of Findings

The results of the present study are very interesting regarding PA adoption and maintenance. The findings lend support to the notion that PA as a child and adolescent is

important in determining adult PA level. In this study, there was a weak, but significant relationship between past and present PA ($r = 0.28$, $p \leq 0.05$). Total past activity included P.E. classes, school and non-school sponsored activities, private classes or lessons, and informal activities. These four areas of possible activity for a child and adolescent are clearly substantiated as being important in developing future activity patterns, and thus a healthier lifestyle.

There are several national organizations that support the notion of increased levels of PA for children. Among these is the American College of Sports Medicine (ACSM). According to the ACSM (Roberts, 1997), children should obtain a minimum of 20-30 minutes of vigorous exercise every day. The President's Council on Physical Fitness and Sports (Pate, 1998), however, suggests that elementary school aged children accumulate at least 30 to 60 minutes of age appropriate PA on all or most days of the week. A similar stand has been taken by the National Association for Sport and Physical Education (NASPE). NASPE also recommends that children receive at least 60 minutes, and up to several hours of PA per day (Shoemaker, 1998).

With all of these national organizations' suggestions on the amount of PA for children, it is clearly an important issue to address when looking at the current levels of PA in children. The Surgeon General's Report stated that daily enrollment in P.E. classes had decreased from 42 to 25 percent since 1991 (Corbin & Dale, 1999). This is alarming considering the findings from the current study. If it is suggested that PE classes may help educate children to lead a healthier and more active lifestyle, then it is obvious that PE classes must be a mainstay in school curriculums. Combine this with the fact that PA

reduces premature mortality and the risk of many diseases, including heart disease, type 2 diabetes, some types of cancer, and hypertension (Corbin & Dale, 1999), it is evident that PE classes and PA must be recognized as being important as reading, arithmetic, and writing.

In the present study, PE classes were shown to be very important factor in the future activity levels of children. Six of the nine regression equations reported PE classes as a variable that would predict higher future PA patterns. Therefore, it is important that public schools reinstate PE classes so that children may benefit from what they have to offer. The Center for Disease Control (CDC) formulated a list concerning youth and activity, and one of the first items listed was that PE classes be required as part of the educational backbone for children (Corbin & Dale, 1999). Also, there is a need for allotted time during the day for unstructured activity other than PE classes. Other CDC guidelines listed were as follows: develop student knowledge and positive attitudes toward PA, develop mastery of skills and confidence in PA, and require that PA instruction meet the needs and interests of all children involved (Corbin & Dale, 1999).

Limitations

Whenever non-experimental research is performed, some inherent characteristics exist that unquestionably affect the outcome of the study. Within the current study, there were certain limitations that were apparent due to the nature of cross-sectional research.

First, the most evident limitation to the study was the ability of subjects to accurately recall past PA. Anytime subjects are asked to remember their patterns of behavior, i.e. PA, they are going to undoubtedly forget exactly what they were involved

in, or they may have the bias of overestimating the actual amount of PA performed. However, in comparing the subjects of the current study to the subjects of Taylor et al. (1999), the current subjects were much younger than the subjects in Taylor's study (M = 21.9 years, range 19-30 vs. M = 45.0 years, range 32-60 years). This, therefore, would lead one to believe that recall of the subjects in the current study was better due to the smaller amount of time between their childhood and the present time.

The next limitation of the present study involved the accuracy of the questionnaire. In other words, did the survey instrument used actually measure what it was intended to measure? The basic objective of this research was to look at the relationship between past and present PA, and more specifically, to see what factors contributed to predicting future adult PA. The survey instruments that were used measured numerous bits of data concerning past and present PA. However, the main concern of the study was to determine the predictors of future PA based on activities that children were involved in during their preteen and adolescent years. In regards to assessing all variables that may influence the dependent variable of the study, the instrument most likely did not do that. Nevertheless, the purpose of this study was not to look at all variables, but the variables that were thought to be influential.

Another possible limitation that exists within the current study deals with the notion of self-selection of subjects. The convenience of sampling subjects on a college campus may lead to a biased sample. In the present study, using subjects that are answering questions related to their behaviors may influence their answers. In other words, people who are very physically active may underestimate their PA, while those

that are extremely sedentary may overestimate their PA, thus skewing the results. Therefore, the subjects of this study may be a biased sample.

The final limitation of the current study was the time constraint it took for subjects to accurately fill out the survey. Many subjects asked the investigator upon receiving the instrument how long it would take to complete the survey. Upon hearing an estimated 15 to 20 minutes, many subjects became disinterested. Others who completed the survey may have skewed their answers based on the fact that they wanted to get done instead of taking their time to read and accurately answer all questions.

CHAPTER VII

Summary, Recommendations and Conclusions

Summary

It was the purpose of this research to examine the relationship between reported childhood and adult physical activity (PA), with special regards to the types of activities that correlate with habitual activity. Subjects were 249 male and female students age 19 to 30 years (M = 21.9 years) enrolled at the University of Nebraska at Omaha. Subjects were surveyed from all departments on campus. Subjects were asked to complete a survey instrument that assessed past and present PA. The results of the current study reported that there is a significant positive correlation ($r = 0.284$, $p \leq 0.05$) between the total score of past childhood PA and present adult PA. When past PA was divided into preteen and adolescent periods, there were also significant relationships ($p \leq 0.05$) with all of the four indices of present PA (work, sport, leisure and total). Regression analysis explained 17.6 % of the variance in exercise when predicting adult PA from the total score of past PA. The prediction equation is as follows: $Y' = 27.761 + 0.775\ (X_1) + 0.276\ (X_2) + 0.945\ (X_3) + 1.787\ (X_4) - 1.254\ (X_5)$; where X_1 = number of varsity athletic letters received as an adolescent, X_2 = informal activities as a preteen, X_3 = level of athletic ability or coordination in favorite sport as an adolescent, X_4 = P.E. classes as an adolescent, and X_5 = activity level compared to peers as a preteen. It was concluded that there was a significant positive correlation ($p \leq 0.05$) between the total score of past PA and each of the four indices of present PA.

Recommendations

Future researchers might consider including all variables measured by the Taylor instrument into multiple regression analysis to possibly determine other significant predictors of present PA from past PA. This may aid in showing other significant variables that help explain why people exercise. Another idea to consider is using objective measures to assess current PA, e.g., heart rate monitors, so that a definite comparison of present PA patterns may be compared to activity recalls. Also, performing more experimental, longitudinal studies that assess PA objectively with children and adolescents, then correlating them with the PA as adults. This would obviously be a time-consuming task, but it would lend more concrete backing to the notion of how PA patterns as a child relate to PA patterns as an adult. A last recommendation for future research is investigating other possible variables that may explain PA patterns other than those mentioned in this study. For example, the PA patterns of parents and siblings, the notion of individual versus group PA, or whether or not moderate or intense PA as a child effects future PA.

Conclusions

Based on the results of this study, the following conclusions are made:

1. There was a significant positive correlation between the total score of past PA and the adult work index ($r = 0.129$, $p \leq 0.05$).
2. There was a significant positive correlation between the total score of past PA and the adult sport index ($r = 0.335$, $p \leq 0.05$).
3. There was a significant positive correlation between the total score of past PA and the adult leisure index ($r = 0.195$, $p \leq 0.05$).
4. There was a significant positive correlation between the total score of past PA and the adult total index ($r = 0.284$, $p \leq 0.05$).

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APPENDIX A

University of Nebraska at Omaha

School of Health, Physical Education and Recreation
Omaha, Nebraska 68182-0216
(402) 554-2670
FAX (402) 554-3693

IRB#: 417-99-EX

Dear Student,

I am surveying students at the University of Nebraska at Omaha to assess present and past physical activity patterns, as well as present and past participation in sports activities. The goal of this survey is to determine the predictors of adult physical activity from those patterns of physical activity in childhood and adolescence. Section One pertains to present physical activity, and Section Two refers to physical activity during childhood and adolescence. It would help tremendously if you could please spend approximately 20 minutes completing the attached survey.

Your time and assistance is greatly appreciated. Please complete the survey and return it to the same class one week after receiving it. I will be there to pick completed survey's up at that time. Thank you in advance.

Sincerely,

Kipp R. Kissinger
Graduate Student
School of HPER
554-3221

APPENDIX B

IRB#: 417-99-EX

Age _____
Gender_____
Name of Class _____

SECTION I

Modified Baecke Questionnaire

1. **What is your main occupation?** _____

2. **At work I sit...**
   a. never b. seldom c. sometimes
   d. often e. always

3. **At work I stand...**
   a. never b. seldom c. sometimes
   d. often e. always

4. **At work I walk...**
   a. never b. seldom c. sometimes
   d. often e. always

5. **At work I lift heavy loads...**
   a. never b. seldom c. sometimes
   d. often e. always

6. **After work I am tired...**
   a. never b. seldom c. sometimes
   d. often e. always

7. **At work I sweat...**
   a. never b. seldom c. sometimes
   d. often e. always

8. **In comparison with others of my own age I think my work is physically...**
   a. much lighter b. lighter c. as heavy
   d. heavier e. much heavier

9. **Do you play sport (organized, intramural, competitive, etc.) ? yes / no**
   If yes:
   - which sport do you play most frequently? _____
   - how many hours a week? a. <1 b. 1-2 c. 2-3 d. 3-4 e. >4
   - how many months a year? a. <1 b. 1-3 c. 4-6 d. 7-9 e. >9

   If you play a second sport:
   - which sport is it? _____
   - how many hours a week? a. <1 b. 1-2 c. 2-3 d. 3-4 e. >4
   - how many months a year? a. <1 b. 1-3 c. 4-6 d. 7-9 e. >9

IRB#: 417-99-EX

10. In comparison with others of my own age I think my physical activity during leisure time is...

a. much less b. less c. the same
d. more e. much more

11. During leisure time I sweat...

a. never b. seldom c. sometimes
d. often e. always

12. During leisure time I play sport...

a. never b. seldom c. sometimes
d. often e. always

13. During leisure time I watch television...

a. never b. seldom c. sometimes
d. often e. always

14. During leisure time I walk...

a. never b. seldom c. sometimes
d. often e. always

15. During leisure time I cycle...

a. never b. seldom c. sometimes
d. often e. always

16. How many minutes per day do you walk and/or cycle to and from work, school and shopping?

a. <5 b. 5-15 c. 15-30
d. 30-45 e. >45

17. During leisure time I do do-it yourself activities...

a. never b. seldom c. sometimes
d. often e. always

18. During leisure time I work in the garden...

a. never b. seldom c. sometimes
d. often e. always

19. How many hours per day do you sleep on average?

a. ≤5 b. 6 c. 7 d. 8 e. ≥9

APPENDIX C

IRB#: 417-99-EX

SECTION II

Childhood and Adolescence Physical Activity Patterns Questionnaire

This questionnaire requests information about your physical activity habits during childhood and adolescence. The items in this questionnaire are grouped into two time periods: preteen years (ages 6 to 12) and high school and teen years (ages 13 to 18). You are asked to summarize your physical activity during each time period. If your physical activity habits changed during a time period, please report your typical habits during that period or think about what your average activity level was.

Research suggests that accurate recall of past events is best when important cues are provided. As you remember each time period think of such things as where you lived, the neighborhood, your family and friends, the schools you attended and the general environment. By visualizing the setting for that time period, your recall will be more accurate.

Thank you in advance for your cooperation in completing this instrument.

PRETEEN YEARS (Ages 6 – 12)

Think about where you were and what you were doing when you were 6-12. What was your neighborhood, school, family, etc., like? ***Please check appropriate responses***

1. **PE Classes during Preteen Years.**
   - Were they offered in your school? No__1 Yes__2
   - If yes, did you participate regularly? No__1 Yes, infrequently__2 Yes, regularly__3
   - If yes, did you enjoy them? No__1 Yes__2

2. **School or Organized Sports during Preteen Years.**
   - Were they offered in your community? No__1 Yes__2
   - If yes, did you participate? No__1 Yes, infrequently__2 Yes, regularly__3
   - If yes, how many months out of a year? Months/Year__(1 to 12)
   - If yes, how many days of the week? Days/Week__(1 to 7)
   - If yes, did you enjoy them? No__1 Yes__2

3. **Classes and Lessons related to physical activity (gymnastics, dance, ballet, tennis, etc.) during Preteen Years.**
   - Were they available and could your family afford them? No__1 Yes__2
   - If yes, did you participate? No__1 Yes, infrequently__2 Yes, regularly__3
   - If yes, how many months out of a year? Months/Year__(1 to 12)
   - If yes, how many days of the week? Days/Week__(1 to 7)
   - If yes, did you enjoy them? No__1 Yes__2

IRB#: 417-99-EX

4. **Informal activities (backyard football, pick-up basketball, badminton, etc.) during Preteen Years.**

Were they available in your neighborhood?	No__1 Yes__2
If yes, did you participate?	No__1 Yes, infrequently__2 Yes, regularly__3
If yes, how many months out of a year?	Months/Year__(1 to 12)
If yes, how many days of the week?	Days/Week__(1 to 7)
If yes, did you enjoy them?	No__1 Yes__2

5. **During your Preteen Years, how many different games, physical activities, or sports did you participate in per year outside of PE classes (including organized & informal activities)?**
   Zero__0 One__1 Two__2 Three__3 Four__4 Five__5 Six or more__6

6. **During your Preteen Years, compared to others your age, you were:**
   Much less active__1 Somewhat less active__2 About as active__3
   Somewhat more active__4 Much more active__5 Uncertain__6

7. **During your Preteen years, did you primarily participate in Team Sports (football, basketball, soccer, baseball, hockey) or Individual Sports (swimming, running, tennis, bowling, hiking, skiing, dancing, skating, weightlifting)?**
   Primarily team sports__1 Primarily individual sports__2 Participated equally__3
   Both team & individual__4 Did not participate__5

8. **During your Preteen Years, was your *favorite* sport to participate in Team Sports (football, basketball, soccer, baseball, hockey) or Individual Sports (swimming, running, bowling, skiing)?**
   Team sport__1 Individual sport__2 Did not have favorite__3 Did not participate__4

9. **During your Preteen Years, your *overall* athletic ability or level of coordination was:**

1	2	3	4	5	6	7
Limited			Average			One of the best

10. **During your Preteen Years, your athletic ability or level of coordination in your *favorite* sport or physical activity to participate in was:**

1	2	3	4	5	6	7	8
Limited			Average			Best	Did not have a favorite sport

11. **During your Preteen Years, how often were you forced to exercise, to be physically active, or play sports?**
    Never__1 Rarely__2 Sometimes__3 Often__4 Very Often__5

IRB#: 417-99-EX

12. During your Preteen Years, of the choices given, please choose the TWO primary reasons why you participated in sports, physical activities, or exercise. Rank in order of choice.

To please my family, friends, teachers or coaches	__1
To socialize with family or friends	__2
To gain recognition	__3
To compete with others	__4
To achieve self-satisfaction/increase self-esteem	__5
To be accepted by my peers	__6
To have fun or to exercise	__7
Did not participate in sports	__8

13. During your Preteen Years, how often did your family, friends, teachers or coaches encourage you to exercise, to be physically active or play sports?

Never__1 Rarely__2 Sometimes__3 Often__4 Very Often__5

14. Please rate your attitude in general toward sports/physical activities during this time period.

1	2	3	4	5	6	7
Very Favorable			Neither Favorable or Unfavorable			Very Favorable

---

HIGH SCHOOL AND TEEN YEARS (Ages 13 – 18)

Think about where you were and what you were doing when you were 13-18. What was your neighborhood, school, family, etc., like? ***Please check appropriate responses***

15. PE Classes during Teen Years.

Were they offered in your school?	No__1 Yes__2
If yes, did you participate regularly?	No__1 Yes, infrequently__2 Yes, regularly__3
If yes, did you enjoy them?	No__1 Yes__2

16. Non-School sponsored Organized Sports through recreational clubs or community agencies such as the YMCA or YWCA during your Teen Years?

Were they offered in your community?	No__1 Yes__2
If yes, did you participate?	No__1 Yes, infrequently__2 Yes, regularly__3
If yes, how many months out of a year?	Months/Year__(1 to 12)
If yes, how many days of the week?	Days/Week__(1 to 7)
If yes, did you enjoy them?	No__1 Yes__2

IRB#: 417-99-EX

17. Classes and Lessons related to physical activity (gymnastics, dance, ballet, tennis, etc.) during your Teen Years.

Were they available and could your family afford them?	No__1 Yes__2
If yes, did you participate?	No__1 Yes, infrequently__2 Yes, regularly__3
If yes, how many months out of a year?	Months/Year__(1 to 12)
If yes, how many days of the week?	Days/Week__(1 to 7)
If yes, did you enjoy them?	No__1 Yes__2

18. School sponsored Organized sports such as intramurals, sport clubs or school teams (including cheerleading) during your Teen Years.

Were they offered?	No__1 Yes__2
If yes, did you participate?	No__1 Yes, infrequently__2 Yes, regularly__3
If yes, how many months out of a year?	Months/Year__(1 to 12)
If yes, how many days of the week?	Days/Week__(1 to 7)
If yes, did you enjoy them?	No__1 Yes__2

19. Informal activities, such as backyard football, pick-up basketball games, badminton, etc., during your Teen Years.

Were they offered?	No__1 Yes__2
If yes, did you participate?	No__1 Yes, infrequently__2 Yes, regularly__3
If yes, how many months out of a year?	Months/Year__(1 to 12)
If yes, how many days of the week?	Days/Week__(1 to 7)
If yes, did you enjoy them?	No__1 Yes__2

20. During High School how many varsity athletic letters did you receive?

0__ 1__ 2__ 3__ 4__ 5__ 6__ 7 or more__

21. During your Teen Years, how many different games, physical activities, or sports did you participate in per year outside PE classes (including organized and informal activities)?

Zero__0 One__1 Two__2 Three__3 Four__4 Five__5 Six or more__6

22. During your Teen Years, did you primarily participate in Team Sports (football, basketball, soccer, baseball, hockey) or Individual Sports (swimming, running, bowling, skiing)?

Primarily team sports__1 Primarily individual sports__2 Participated equally__3
Both team & individual__4 Did not participate__5

23. During your Teen Years, was your *favorite* sport to participate in a Team Sport (football, basketball, soccer, baseball, volleyball) or an Individual Sport (swimming, running, bowling, skiing)?

Team sport__1 Individual sport__2 Did not have favorite__3 Did not participate in sports__4

IRB#: 417-99-EX

24. During your Teen Years, your *overall* athletic ability or level of coordination was:

1 2 3 4 5 6 7
Limited Average One of the best

25. During your Teen Years, your athletic ability or level of coordination in your *favorite* sport to participate was:

1 2 3 4 5 6 7 8
Limited Average Best Did not have a favorite sport

26. During your Teen Years, how often were you forced to exercise, to be physically active or play sports?

Never__1 Rarely__2 Sometimes__3 Often__4 Very Often__5

27. During your Teen Years, of the choices given, please choose the TWO primary reasons why you participated in sports, physical activities or exercise. Rank in order of choice.

To please my family, friends, teachers or coaches __1
To socialize with family or friends __2
To gain recognition __3
To compete with others __4
To achieve self-satisfaction/increase self-esteem __5
To be accepted by my peers __6
To have fun or to exercise __7
Did not participate in sports __8

28. During your Teen Years, how often did your family, friends, teachers or coaches encourage you to exercise, to be physically active, or play sports?

Never__1 Rarely__2 Sometimes__3 Often__4 Very Often__5

29. During your Teen Years, how often did you participate in your favorite sport during the off-season?

Never__1 Rarely__2 Sometimes__3 Often__4 Very Often__5 No off-season for my favorite sport__6 I have no favorite sport__7

30. How many students were in your High School graduating class?

20 or less __1 21-50 __2 51-100 __3
101-300 __4 301-500 __5 501 or more __6

31. Please rate your attitude in general toward participation in sports/physical activities during this time period.

1 2 3 4 5 6 7
Very Favorable Neither Favorable or Unfavorable Very Favorable