To the Graduate Council:

I am submitting herewith a thesis written by Amelia Susan Potter entitled "Some Selected Factors Influencing Child Fatigue in a Day Care Center." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Child Development and Family Relationships.

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SOME SELECTED FACTORS INFLUENCING CHILD FATIGUE IN A DAY CARE CENTER

A Thesis

Presented for the

Master of Science

Degree

The University of Tennessee

Amelia Susan Potter

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1265306

DEDICATED TO

MY PARENTS

who have been my best teachers of human

development with their wisdom,

love and understanding

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ABSTRACT

One purpose of the study was to determine whether there was any association between nap behaviors and fatigue behaviors in a day care center. The association between fatigue behaviors and free play activities was also examined. A third purpose of the study was to formulate operational definitions of fatigue behaviors in preschool children.

The subjects were eight children, ranging in age from 47 to 69 months, enrolled at The University of Tennessee Child Day Care Center. Fifteen fatigue behaviors used in the data collection were obtained from a modified Q sort technique based on the description of Kerlinger (1973). A time sampling technique was used to record fatigue behaviors observed in the subjects while participating in free play activities during the afternoon program at the day care center. An interobserver reliability coefficient of 96 was obtained from a total of four hours of observations at two week intervals.

To assess the significant difference between the sample means of resters and nonresters and the number of fatigue behaviors observed, a t test was used. Lambdas were used to determine the degree of association between different free play activities and the number of fatigue behaviors observed. Fatigue behaviors percentages were determined for each free play activity by dividing total fatigue behaviors observed, by the total of the signs of fatigue and signs of no fatigue.

The results showed that there was no significant difference between the mean number of fatigue behaviors of resters and nonresters and the number of fatigue behaviors observed. No association was found between the free play activities and the number of fatigue behaviors observed in each activity. However, a ranking of the number of fatigue behaviors in each free play category indicated that the higher number of fatigue behaviors were associated with the more structured activities, while the more unstructured activities were associated with fewer fatigue behaviors.

A discussion of the value and limitations of the operational definition of fatigue, and factors influencing the results of the study were presented. Implications of the present study, as well as suggestions for future research related to fatigue were provided.

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CHAPTER I

INTRODUCTION

Over the past few years much discussion and attention has been centered around the need for group care of young children. One reason for the attention can be attributed to the recent emphasis on the formative years as an especially important period for learning (e.g., Bloom, 1964; Hunt, 1961). The number of young children now within the age span designated as a critical learning period reflects the need for quality child care programs. The fact that in 1973 there were 640,000 children enrolled in licensed day care facilities and an estimated two to four and a half million more needing day care accentuates the demand for additional day care services (Fein and Clarke-Stewart, 1973). The necessity of day care has increased as the roles of women change, as more women are being employed and as they are seeking time outside the home. In addition mothers receiving assistance for dependent children are increasingly required to participate in some type of training or educational program. Children of these women must be provided adequate and continuous care. The current trend of industries to provide day care centers for the children of their employees represents further interest in day care. Many communities are forming parent cooperatives to meet their needs for child care. Congress realizing the increase and significance of these concerns, has initiated moves to meet the needs through Title XX and the proposed 1975 Child and Family Services Bill.

A continuation of current trends to meet the needs for day care indicates that there will be an increase in day care facilities. It is critical that problems facing day care programs are solved before this increase occurs and more children become involved and possibly suffer from the problems. It is essential that the problems are solved as quickly as possible to assure quality programs for the children participating.

One of the problems confronting day care pertains to the length of time many children must spend at centers. Because of their parents' work hours, it is necessary for many children to spend 10 to 12 hours each day at a center. Partially as a result of the length of day, fatigue is a usual occurrence. Relatively little research exists which pertains to the fatigue effects of the long day at day care centers. Furthermore, there appears to be a scarcity of information dealing with factors which contribute to and alleviate fatigue among day care children.

I. STATEMENT OF PURPOSE

One purpose of the study was to determine whether there was any association between nap behaviors and fatigue behaviors in a day care center. The association between type of free play activity and fatigue behaviors was also examined. An additional purpose of this exploratory study was to formulate operational definitions of fatigue behaviors in preschool children.

II. OPERATIONAL DEFINITIONS

Nap behaviors. Degree and amount of restfulness in a 1 1/2 hour period.

Rester. Slept or lay quietly on cot with minimal movement and noise.

Nonrester. Sat, stood, or lay on cot with excessive movement such as kicking and jumping and excessive noise such as singing, clapping, talking, whining.

Fatigue behaviors. Those behaviors which represent a state of tiredness agreed upon by professionals working with young children and parents of young children (see Appendix D).

Free play. That time when children are given a selection of activities from which to choose (see Appendix A).

III. ORGANIZATION OF PAPER

A review of literature related to fatigue and factors influencing fatigue is discussed in the next chapter. Chapter III presents specific procedures and methodology of the study. The results of the research are described in Chapter IV, and a discussion of these results in addition to suggestions for future research are included in the fifth chapter. The final chapter contains a brief discussion of the summary and conclusions.

CHAPTER II

REVIEW OF LITERATURE

The literature in the area of day care reflects concern and emphasis on solving problems related to the program of the day. However, definitive studies and solutions, especially those pertaining to fatigue, are limited. The literature on fatigue does contain information and knowledge about such variables as length of day, attempts to describe fatigue behaviors, difficulties in analyzing child fatigue, and factors influencing fatigue in preschool children.

I. LENGTH OF DAY

Hosley (1965) cited the length of day as one of the most serious handicaps of day care. The author further stated that the long day presents problems for the teacher, the administrator, and the child. The primary argument was that the long day is undesirable in terms of the child's mental and emotional well being.

Also referring to the effects of the long day, Pizzo (1972) discussed the increased anxiety observed in children required to spend a considerable amount of time at a center. Although she cited no specific research which supported her thinking, Pizzo attributed the increased amount of childrens' agression to the length of day. Moreover, Pizzo suggested that the last two hours of the day was a time when children have to be constantly admonished and controlled.

II. DESCRIPTIONS OF FATIGUE

There have been relatively few attempts to formulate operational definitions of fatigue. Only two studies formulated operational definitions as part of their research. Dawe and Foster (1935) used broad classifications of fatigue which included: (1) physical (e.g., weary expression, drooping attitude, eyes lack lustre, flushed face, dark circles under eyes, yawns, etc.), (2) motor signs (e.g., sudden movements, persistent movements, fidgeting, restlessness, grimaces, stumbles easily, etc.), (3) mental signs (e.g., inattentive, miscalls words, forgetful, hearing less acute, loses interest easily, etc.), (4) emotional signs (e.g., laughs easily, cries easily, loses sense of humor, feelings easily hurt, etc.), (5) changes in the voice (e.g., pitch higher or lower than usual, tends to stutter), (6) report of the child (e.g., feet cold, headache). Touchton (1967) used the following categories of behavior in measuring child fatigue: (1) whining (e.g., complaining sound, low cry without tears), (2) yawning, (3) listlessness (e.g., tired expression, drooping attitude, disinterest in surroundings and activities), (4) restlessness (e.g., fidgeting, wandering around room, rubbing eyes), (5) irritability (e.g., cross, resists change or suggestions, pushes other away in cross manner).

Fatigue was discussed extensively by Bartley and Chute (1947), who provided various views on fatigue and related factors. Child fatigue was not dealt with specifically, but the following excerpt exemplifies the difficulty in dealing with fatigue in general:

> What fatigue is no one knows; the word is of the nature of such terms as intelligence, emotion, and instinct: a name that is glibly used to cover a multitude of states, for some of which there may be objective correlates, while for others there is no conceivable relation between the subjective experience and the objective expression. In fact, so much confusion has resulted from the use of the term that some suggest that it should be banished from precise scientific discussion. In common usage, "fatigue" is confused with nearly every other related or similar condition. The one with which it is identified most frequently is boredom; some of the objective results of the two states are the same: decreased output, increased inaccuracies, and general lack of expression of either interest or enthusiasm. In both cases, the subjective reports of feelings and experiences are the same; and yet, any casual observed can distinguish between the type of decreased production that results from decreased capacity and the type that results from a lack of desire to do the work or from an aversion to it. (Bartley and Chute, 1947, p. 19)

Bartley and Chute (1947) also provided information concerning experimentation related to fatigue, including the following:

> 1. Definitions are required as a basis for fruitful experimentation. This caution is particularly pertinent in the field of fatigue, owing partly to the experimental nature of fatigue, and partly to the customary tendency of investigators to make conceptual formulations, if they make them at all, only after prolonged random experimentation.
>
> 2. In studies in human activity the individual must be taken as a reference. In dealing with fatigue, it is the organization of the individual that is under study. Fatigue, frustration, monotony, boredom, and other concepts in this field are meaningless except when the individual is taken as the point of reference. (Bartley and Chute, 1947, p. 403-404)

In her discussion surrounding problems of fatigue definition, Seham (1926) commented that it was difficult to present a precise description of fatigue because the signs differ in each child. Seham related some of the difficulties to age, sex, race, health, time of day, food intake, and type of activity.

III. FACTORS INFLUENCING FATIGUE

In order to investigate the specific features of children's motor activity and their emotional behavior in early developmental stages, Missuro (1963) tested the capacity for longer rhythmical work on a Mosso-type finger ergograph in 58 children ranging in age from 3 to 15 years. The results showed the children ages three to four stop working at the first signs of fatigue. The experiment showed that the three and four year old child tires easily at the tasks measured by the finger ergograph. Missuro attributed this to the higher exhaustibility of the cortical neurons, short attention span, and short interest in the same activity. The results also indicated that from the ages of six to eight and older, the child's resistance of fatigue increases as the child is able to adjust better to the conditions of the ergographic test. The resistance of fatigue appeared to Missuro to be related to the emotional expression produced by the integrative function of the central nervous system and the development of the child's attitude toward the exploration of his/her world and environment. Related to the present study in consideration of extraneous variables, was the finding of an increase inthe capacity to perform a given motor task in older children when another peer was present. Missuro's conclusion was that work capacity and greater resistance to fatigue appeared only from the age of five and six and older.

A pertinent study in relation to the present research was that of Touchton (1967). The investigator systematically varied the extent of

teacher-child interaction while observing the fatigue effects during the morning and afternoon sessions with preschool day care children. The results showed that teacher participation and time of day were not significantly related to the amount of fatigue, but greater incidence of fatigue occurred in the afternoon for all subgroups except younger boys.

The work of Dawe and Foster (1935) was perhaps most relevant to the present study. Evidence of fatigue as a function of the program and the time of day were observed in 483 children attending half day public kindergarten programs. The results revealed that fatigue increased as restrictions on movement and demands for self-control increased. A possible implication of the results was that the type of activity rather than the time of day has the greatest effect on fatigue seen in preschool children.

Several studies have examined childrens' reactions to free play activities and participation influences on these activities. Prescott (1967) investigated the role that activities play in evoking different responses from children. The results showed that activity settings, time of day, and age of children were predictive of differences in children's responses. Children's responses were rated on a continuum during 20 minute observation periods. The ratings from lowest to highest were:

a. disinterested, bored, restless, lethargic
b. somewhat disinterested
c. moderately interested and involved
d. definitely interested and involved
e. exceptionally interested and involved. (Prescott, 1967, p. 338)

The findings revealed that most activities were eliciting the full range of responses. Free play appeared to hold less interest, but seldom evoked responses in the lowest category. While the results demonstrated a limited relationship of responses to time of day, highly rated responses did occur during the late afternoons and early morning periods.

Shure (1963) investigated the spontaneous behavior of preschool children as it occurred within certain areas of the indoor nursery school setting. She specifically looked at questions concerning

a. population density—as measured by the number of appearances within an area
b. mobility—as determined by the frequency with which children move in and out of an area
c. appropriateness of an activity to a locale
d. the quality of emotions
e. the complexity of social participation
f. amount of constructiveness with play materials
g. sex differences in each of the items above. (Shure, 1963, p. 980)

Seven girls and seven boys were observed for an hour in the morning. The results showed that the block area was most popular for boys and the art area was most popular for girls. For the total sample, the games area had the least amount of child mobility and the doll area demonstrated the greatest proportion of complex social interaction. Across all areas more positive responses were demonstrated in the doll area. However, neutral (indifferences or lack of concern) behaviors consistently occurred most frequently in all areas, and negative (depressed, unpleasant mood, crying, whining) behaviors rarely occurred.

Stodolsky (1974) examined the effects of age, sex, social class, mental ability, and school program on childrens' behavior as they moved

from one activity to another. Narrative records were made of the behavior of 65 children ranging in age from 3 to 6 years. The major findings were those related to age and school programming. It was found that with age children became more effective in moving from one activity to another, spent less time in transition and more time in activity. Activity length and how children start activities were affected by teacher-student ratio and philosophy of the program.

Another position on the association between the influence of motivation, the type of activity and fatigue was that of Bartley and Chute (1947), who considered motivation as a key variable. Citing R. W. Husband, the authors position is revealed by the following:

> Fatigue follows prolonged exertion and requires rest, preferably sleep. Its effect upon motivation is negative; the more tired a person is the less he desires to do anything. But fatigue itself is in turn partially dependent upon motivation. Boring tasks tire one much more quickly than interesting activities. We may play tennis for hours, but a half hour spent in weeding the garden leaves us exhausted. (Bartley and Chute, 1947, p. 18)

The effects of the rest period and sleep on fatigue have been discussed by several researchers. Noting the role of individuality in fatigue study, Seham (1926) stressed that the concept of rest is not appropriately used since it is highly related to individual needs. In her discussion of the length of the rest period, she stated that some children find relief following short periods of rest, while others must have longer rest periods to recoperate from the same amount of work.

Sears and Dowley (1963) report a 1945 study by Bach which suggested that children consider nap an interruption of their play and

activities, while regarding the teacher as the agent of this interference. Using a projective doll play technique to discover the quantity and kinds of fantasies in children, Bach found more fantasy aggression and more aggression towards the teacher in those preschoolers who were involved in longer nap periods. He attributed the aggression to the frustration experienced by the children who had longer nap times.

In an investigation of sleeping habits of children, Chant and Blatz (1928), observed nap time of 13 children in a nursery school. Nap and night sleep of the subjects in the homes were also observed by the subjects' mothers. The data showed that the number of children in the room did not interfere with the sleep of children who had good sleeping habits. Further, the data indicated that fewer children slept on Mondays than any other day. An important finding was that for younger children, nap reinforces night sleep but later interferes with it. The demonstrative need for nap began to disappear after the third year, and did so on an all or none principle. Bartley and Chute (1947) reported that the average amount of sleep was 13 to 14 hours each day. These authors cite R. M. Reynold's findings that in spite of a variation from day to day in the amount of sleep taken by a preschool child there was a fairly consistent average over weeks.

The review of literature suggests the following tentative conclusions concerning fatigue:

1. The long day children experience in day care centers probably does produce fatigue.
2. There have been few attempts to formulate operational definitions of fatigue.

3. There are a variety of factors which may influence fatigue including age, sex, time of day, race, peer interaction, food intake, rest and sleep behaviros, and activities.
4. There are conflicting views related to the role that rest sleep plays in eliminating fatigue.

As this review of literature demonstrates, there are unanswered questions related to fatigue. Many of these questions center around factors which may influence fatigue. The purpose of the present study was to investigate two of these factors, nap behaviors and activities. An additional purpose, to formulate operational definitions of fatigue should also be helpful in facilitating further research dealing with fatigue.

CHAPTER III

METHOD AND PROCEDURE

I. SUBJECTS

The subjects consisted of ten children enrolled at The University of Tennessee Child Day Care Center. Six male and four female children ranging in age from 47 to 69 months were selected (see Appendix B). The subjects represented a broad range of maturity levels among the older aged children at the day care center. The children were selected according to nap behaviors from a three month nap record kept daily by the teachers at the center. Selection also was based on parental cooperation in leaving their children until after the observations were completed each afternoon, and in recording amount and type of sleep the subjects had each night during the observation period.

Two children, one male and one female, left the day care program, and therefore, were dropped from the study. This made a total of eight subjects, five male and three female.

II. PROCEDURE

A time sampling technique was used to record fatigue behaviors observed in the subjects. The fifteen fatigue behaviors used in the observations were obtained from a modified Q sort technique based on a method described by Kerlinger (1973). Parents of day care children, experienced day care teachers, and professionals in the Child and

Family Studies and Early Childhood Education Departments at The University of Tennessee, were asked to list fatigue behaviors of four and five year old children. The instructions they received for listing the behaviors are described in Appendix C. From the listings, a composite list of 50 different behaviors was obtained (see Appendix D). The five members of the professional teaching staff at The University of Tennessee Day Care Center ranked the 50 behaviros as to most, somewhat, slightly, or least indicative of fatigue in children four and five years of age. Each category was assigned a numerical value ranging from 40 for the most indicative category to 10 for the least indicative category. The numerical value for each behavior was found by totaling the five different ratings. The total numerical value for a behavior could range from 200 to 40. The researcher arbitrarily selected fifteen behaviors as the highest number which could be potentially remembered, noted, and coded in a 30 second time interval. Therefore, the fifteen behaviors with the highest number of points were selected as definitions of fatigue behaviors for the study (see Appendix D). Behaviors which had a score of 140 and above were chosen as the behaviors to be given an alphabetical code for use in recording the fatigue behaviors. In addition to the fifteen behaviors, a code of "X" was used to represent those times when no fatigue behaviors were observed.

The data coding sheet contained the categories of free play activities open to the subjects during the afternoon program at the day care center. A transition category was also included to account

for those times when the children were going from one activity to another, were wandering, or were not participating in an activity (see Appendix E). Fifteen 1 minute samplings were selected for each individual observation period, using a 30 second period of observation and a 30 second period to record behaviors. The 30 second time intervals were selected after the researcher tried several different time systems. Five children were observed each Tuesday through Friday for eight weeks during the Spring of 1975. Each child was assigned a number, and the numbers were rotated by day and by time to assure a variety of observations. Mondays were eliminated, since previous research indicated differing behaviors on Mondays as compared with the remainder of the week (Chant and Blatz, 1928). Each subject was observed twice weekly, making a total of 240 minutes of observation on each subject.

Every two weeks throughout the eight-week observation period, a second observer, a senior in Child and Family Studies who was also a student teacher at the same day care center, was used to check the reliability of the behaviors recorded during the hour data collecting period. An interobserver reliability coefficient of 96 was obtained by dividing the total number of behaviors in agreement by the sum of the total agreements plus disagreements. Agreement was defined as recording the same code for fatigue behavior in the same minute interval under the same free play category.

III. STATISTICAL ANALYSIS

The statistical analysis for the present study included Student's "t" test, a powerful measure for ascertaining the significance of difference between two samples. This test is particularly useful in the present investigation inasmuch as it is suitable for small N's and is readily interpretable for a variety of probabilities where degrees of freedom are equal to $(N_1 - 1) + (N_2 - 1)$. The derivation of t values is shown below:

$$t = \frac{\bar{X}_R - \bar{X}_{NR}}{s_{\bar{x}_R - \bar{x}_{NR}}}$$

where $\bar{X}_R$ = the mean number of fatigue behaviors observed for resters (R);

$\bar{X}_{NR}$ = the mean number of fatigue behaviors observed for nonresters (NR);

and $s_{\bar{x}_R - \bar{x}_{NR}}$ = the standard error of the difference between the means of the resters and nonresters.

The derivation of the standard error term was computed as follows:

$$s_{\bar{x}_R - \bar{x}_{NR}} = \frac{s_N^2}{N_N} + \frac{s_{NR}^2}{N_{NR}}$$

In order to determine the degree of association potentially existing between resters and nonresters and the number of fatigue

behaviors observed, a series of 2 × 2 contingency tables were constructed. For each table, a Lambda coefficient was computed in order to measure the magnitude of association, if any, which might be obtained between the above-stated variables. Guttman's coefficient of predictability, Lambda, λ, was selected because of its flexibility and utility relative to contingency tables of virtually any size. Also, Lambda is perhaps the best nominal level measure of association because of fewer restrictive assumptions associated with it which underlie its legitimate application to situations approximating those found in the present study. Technically, Lambda is a proportional-reduction-in-error (P-R-E) measure in that it provides us with a value indicative of the mutual predictability between any pair of variables. For the purposes of the study, however, Lambda was employed as a simple, but useful, measure of association between variables which have been classified or dichotomized according to nominal scales of measurement. Inasmuch as Lambda values can reflect symmetrical as well as asymmetrical association, the asymmetrical formula (i.e., a directional application of the measure) was employed here. The formula is as follows:

$$\lambda = \frac{\Sigma f_i - F_d}{N - F_d}$$

where f_1 = the largest frequency occurring within each subclass of the independent variable (resters and nonresters);

f_d = the largest frequency found within the dependent variable totals (fatigue and nonfatigue behaviors for each of ten free play activities); and

N = the total number of observations (N = 8).

A more comprehensive discussion of the relative advantages and disadvantages of Lambda may be found in Champion, 1970, pp. 210-214.

Finally, percentages of fatigue behaviors for each of k activities were computed and arranged in order of magnitude in direct proportion to the total number of fatigue and nonfatigue behaviors observed. The precise steps involved in this process will be outlined in a latter section of the research.

A primary decision rule guiding the present analysis is the level of significance at which all hypotheses concerning free play activities, rest, and fatigue behaviors were tested. This has been set at .05. All significance of difference tests as well as measures of association will be regarded as statistically significant, provided the observed values are equal to or greater than the respective critical values required by the tests and measures utilized. It should be noted that the selection of the .05 significance level was influenced in part by professional convention. Also, it minimizes the risk associated with making Type I error.

CHAPTER IV

RESULTS

The application of the "t" test used to assess the significance of difference between the sample means of fatigue behaviors of resters and nonresters rendered no statistically significant difference between the two groups and the number of fatigue behaviors observed ($t = .982$, $df = 6$, $P > .05$).

Lambda values were used to determine the degree of association between different free play activities and the number of fatigue behaviors observed. No association was observed between the resters and nonresters in each of the ten free play activities investigated. These data are presented in Table 1 on the following page.

Fatigue behavior percentages were then computed for each free play category by dividing the total fatigue behaviors observed by the total signs of fatigue and signs of nonfatigue behaviors for both the resters and nonresters. This procedure permitted direct comparisons to be made between percentages of fatigue behaviors observed for both resters and nonresters in each of the ten free play classifications. The activities were ranked in percentage magnitude (the proportionate incidence of each of the activities relative to the others) from most frequently to least frequently occurring. These data are presented in Table 2. As can be seen by examining the figures in the table, those activities which logically are regarded as requiring greater self-control, restriction of

Table 1

Lambda Coefficients Reflecting Magnitude of Association between Fatigue and Nap Behavior and Free Play Activities*

Activity	Coefficient
Language	$\lambda_1 = 0.00$
Music	$\lambda_2 = 0.00$
Table Materials	$\lambda_3 = 0.00$
Creative Experience	$\lambda_4 = 0.00$
Sand Play	$\lambda_5 = 0.00$
Unstructured Large Motor	$\lambda_6 = 0.00$
Block Play	$\lambda_7 = 0.00$
Water Play	$\lambda_8 = 0.00$
Dramatic Play	$\lambda_9 = 0.00$
Transition	$\lambda_{10} = 0.00$

*All λ values are not significant at .05 level.

Table 2

Rankings of Free Play Activities According to Percentage of Fatigue Behaviors Observed

Activities	Percentages (%)
Language	98%
Music	87%
Table Materials	51%
Creative Experiences	44%
Sand Play	42%
Transition	35%
Unstructured Large Motor	35%
Block Play	24%
Water Play	21%
Dramatic Play	17%

movement, and stipulations associated with participation reflected the greater percentages of fatigue behaviors. By the same token, those activities which are relatively unstructured and allow greater degrees of free movement and increased creativity in play tend to generate lower percentages of fatigue behaviors.

To supplement the above information, the nightly sleep data obtained from the parents throughout the observation period were averaged for each subject as well as for the entire aggregates of resters and nonresters. Table 3 presents the individual and group averages. While a "t" test revealed no statistically significant differences between these two groups of children at the .05 level, the nonsignificant difference was nevertheless in the predicted direction. In other words, it appeared that the nonresters' nightly sleep was slightly longer than that of the resters both individually and collectively.

I. CONCLUSIONS

The results have revealed no statistically significant differences between the sample means of resters and nonresters and the amount of fatigue behaviors observed. Additionally, no associations between the amount of fatigue behaviors observed and the various free play activities were observed to occur.

Percentages of fatigue behaviors for each free play category were computed, and the free play activities were ranked according to the magnitude of the percentage of fatigue behaviors found. The nightly sleep records of the children showed that the nonresters slept slightly

Table 3

Individual and Group Nightly Sleep Averages for Resters and Nonresters*

	Subject	Average Hours of Nightly Sleep
Resters:	1	10.3
	2	9.6
	5	10.2
	6	9.3
		($\overline{X}_r$ = 9.9)
Nonresters:	4	10.5
	7	10.6
	8	10.2
	9	9.8
		($\overline{X}_{NR}$ = 10.3)

*t = 1.31, df - 6, P > .05, not significant

longer than the resters, although this difference was not significant statistically. This finding was a matter of impression and was not based upon statistical observations exclusively.

CHAPTER V

DISCUSSION AND CONCLUSIONS

This chapter will focus upon three purposes of the study which were as follows:

1. the formation of operational definitions of fatigue;

2. the investigation of the association between resters and nonresters and the number of fatigue behaviors exhibited during systematically selected afternoons at a day care center; and

3. the investigation of the degree of association between various free play activities and the amount of fatigue behaviors observed in a group of ten free play categories.

One difficulty of examining fatigue behavior has been the lack of operational definitions of the term. Therefore, the research has had as one of its guiding objectives the potential formulation of operational definitions for fatigue behavior as observed among children in a day care center. An attempt has been made to partially eliminate a major obstacle (i.e., the absence of an adequate operational definition of fatigue) by presenting and examining the efficacy of alternative empirical indicators of fatigue behavior. The resulting fifteen behaviors designated as constituting child fatigue signs and subsequently utilized in the present study were obtained from a composite listing of 50 behaviors obtained from 20 adults proficient in working with young children. The combination of these fifteen behaviors functioned as our

measure of fatigue here. No additional measures were employed to validate the definition of fatigue constructed other than examinations of logical interconnections between other factors (e.g., sleep).

Based upon certain observations made during the research, it is apparent that many of the behaviors making up the fatigue definition were indicative of fatigue across most situations. These behaviors included: (a) going to sleep, (b) asking for a cot, (c) laying head on table, (d) verbal comments to the effect of being tired, (e) yawns, (f) cries, and (g) rubbing eyes. All seem to be useful in the formation of an operational definition of fatigue. For future research, such behaviors might be instrumental in identifying fatigue level, at least in a preliminary sense.

Some behaviors apparently were not as indicative of fatigue in all situations, although they probably indicate actual fatigue in some children under certain circumstances. These behaviors included: (a) short, snappy comments to peers and to teachers, (b) holding blanket or stuffed toy, (c) sucking thumb, (d) whining, (e) wanting to watch an activity rather than become involved in it personally, (f) going to locker, (g) complaining of ailments, and (h) lying down. Although these behaviors appear to represent fatigue in certain situations, it is entirely possible that they are, in fact, manifestations of parallel factors such as frustration and disappointment.

Despite the fact that interobserver reliability was high, there were some fatigue behaviors which were more difficult to osberve than others. Droopy eyelids or wanting to watch an activity rather than

participate in it were especially difficult attributes to determine with certainty. For this reason alone, such behaviors as these might likely be eliminated in future research.

The operational definitions obtained may be helpful in identifying fatigue behaviors in future research related to fatigue in preschool children. The definitions may also aid parents and teachers of young children in becoming increasingly aware of and sensitive to possible signs of fatigue.

A second purpose of the research was to determine the degree of association between the resters and the nonresters at the day care center and the number of fatigue behaviors observed. The data indicated that there was no significant difference between the two groups and the number of fatigue behaviors exhibited. There may be several variables which influenced this finding. In this study, the hours of nightly sleep were slightly longer for the resters than for the nonresters. The longer time of nightly sleep for the nonresters may be one reason no association was found.

The difference in nightly sleep data strengthens Bartley and Chute's (1947) point that mere deprivation of rest does not necessarily cause fatigue. This evidence also coincides with the conclusions of Chant and Blatz (1928) that in the early years day sleep reinforces night sleep but later interferes with it, and that day sleep begins to disappear after the third year and does so on an all or none principle.

Several authors emphasized the difficulty that individuality plays in studying fatigue (Bartley and Chute, 1947; Seham, 1926). It appears

to the writer that the subjects' individual rest and sleep needs were influencing factors in discovering no significant difference between the resters and nonresters and the amount of fatigue behaviors observed. Seham (1926) stressed the role of the individual in studying fatigue, maintaining that rest is relative to individual needs. It may also be that fatigue is so individualized that it is impossible to operationalize the behaviors and apply them to a group.

Finding no significant difference ($P > .05$) in the amount of fatigue shown by resters and nonresters provides tentative support for the view that nap should be an individualized aspect of the day care program rather than a mandatory requirement. The result possibly questions the effectiveness of nap for reducing fatigue behaviors in certain children.

Another purpose of the study was to determine the degree of association between the free play activities and the number of fatigue behaviors observed. No association was found between the activities and the number of fatigue behaviors. One implication of the result is that none of the free play activities was an influencing factor in the amount of fatigue behaviors shown.

Contrary to the above finding, a ranking of the fatigue behaviors according to the percentage of behaviors found in each activity disclosed that there are certain types of activities which appear to be associated with greater numbers of fatigue behaviors. The subjects showed the greatest number of fatigue behaviors in the following activities: (1) language, (2) music, (3) table games, (4) creative experiences, and

(5) sand play. All of these activities, with the exception of sand play, demand more self-control and restriction on movement. While this observation is based on sheer percentages and not statistical analysis, the result is consistent with the conclusions of Dawe and Foster (1935) that the type of activity influences fatigue behaviors. It is possible that the less structured activities, which include the unstructured large motor experiences—tricycles, swings, climbing equipment, block play, water play, and dramatic play, may be associated with fewer fatigue. The results of the study may have been affected by a variety of factors. For instance, no association between amount of rest and activity type may have been attributable in part to the small sample size. However, the extensive observations involved would tend to make a larger sample prohibitive in terms of time and resource allocation. The age of the subjects could have been a limiting factor in the number of fatigue behaviors observed. The mean age of the subjects was 59.6 months. According to several researchers older preschool children are more resistant to fatigue than younger preschool children (Missiuro, 1963; Chant and Blatz, 1928).

A further reason for the result of no association between variables may be the fact that there was no way of insuring that the subjects spent equal amounts of time in each activity since this was a free choice part of the program and no controls for time were used. A more adequate measure of fatigue in each activity might have been achieved if all the subjects had participated an equal amount of time in each activity.

I. SUGGESTIONS FOR FURTHER RESEARCH

One suggestion for further reserach would be to use a larger sample size, as well as using a sample with a wider age range, including younger children. Further, the observations could include a structured organized group activity which would require participation for a certain length of time, in addition to the relatively unstructured free play activities. This definite delineation between structured and unstructured activities would give additional strength to the data concerning the type of activities which are associated with the greatest amount of fatigue behaviors.

Having parents estimate the degree of fatigue in their children at home from the time they leave the center until the child is in bed would be one way of determining whether the operational definitions used in the study actually measure fatigue in most children. This estimation could also be used in noting if the behaviors shown at the day care center are typical of those shown at home.

Additional factors which influence fatigue behaviors in day care children might be such items as peer influence and food intake. Further research could investigate the relationship of these factors to fatigue. Missiuro (1963) alluded to the role that peer influence plays in increasing resistance of fatigue in older children. The researcher observed that the older subjects in this investigation appeared to show fewer fatigue behaviors when in company of a liked peer.

In conclusion, with the increased emphasis on expansion of and improvements in day care centers, it would appear that an expansion of

this study is warranted, so as to maximize the positive potential of nap time and free play activities in a total programmatic approach to a quality day care experience.

CHAPTER VI

SUMMARY AND CONCLUSIONS

One purpose of the study was to determine whether there was an association between nap behaviors and fatigue behaviors in a day care center. The association between fatigue behaviors and free play activities was also examined. A third purpose of the study was to formulate operational definitions of fatigue behaviors in preschool children.

The subjects consisted of eight children ranging in age from 47 to 69 months, enrolled at The University of Tennessee Child Day Care Center. Fifteen fatigue behaviors used in the data collection were obtained from a modified Q sort technique based on the description of Kerlinger (1973). A time sampling technique was used to record fatigue behaviors observed in the subjects while participating in free play activities during the afternoon program at the day care center. An interobserver reliability coefficient of 96 was obtained from a total of four hours of observations at two week intervals.

To assess the significant difference between the sample means of resters and nonresters and the number of fatigue behaviors observed, a t test was used. Lambdas were used to determine the degree of association between different free play activities and the number of fatigue behaviors observed. Fatigue behaviors percentages were determined for each free play activity by dividing total fatigue behaviors observed, by the total of the signs of fatigue and signs of no fatigue.

The results showed that there was no significant difference between the mean number of fatigue behaviors of resters and nonresters and the number of fatigue behaviors observed. No association was found between the free play activities and the number of fatigue behaviors observed in each activity. However, a ranking of the number of fatigue behaviors in each free play category indicated that the higher number of fatigue behaviors were associated with the more structured activities, while the more unstructured activities were associated with fewer fatigue behavior.

A discussion of the value and limitations of the operational definition of fatigue, and factors influencing the results of the study were presented. Implications of the present study, as well as suggestions for future research related to fatigue were provided.

Some concluding comments are in order which pertain to the nonsignificance associated with the present study. Obviously, the small N associated with the research limited greatly the generalizability of the findings. But even more important are the cultural factors as various dimensions of socioeconomic status. The children selected were, in all likelihood, not representative of the average child in a day care center, whatever that may be. Children at the University of Tennessee Gold Range Day Care Center are atypical in that their parents are primarily affiliated with the university in some respect as either student parents, faculty, or staff. Certainly the representativeness of the sample is questionable on this basis alone.

Also, while every effort was made to ensure that the children were not being dramatically affected by the various observers, it may be the

case that these particular children were more sensitive to being observed "for scientific purposes" compared with other children in more private day care facilities. Therefore, we must contend with the philosophical question (which will remain unanswered in the present instance, of course) of "What is the effect of the observer upon the observed?"

Breaking new ground in a relatively unexplored area such as fatigue behavior and operational definitions for it is generally hazardous, particularly when untested instruments which will inevitably have associated with them problems of validity and reliability (e.g., were we really measuring fatigue behavior by paying attention to true correlates of it, and if so, were we doing so in a consistent manner?) are used. It may very well be the case that alternative correlates of fatigue behavior shown in Appendix D which were not used to determine the degree of this property in the children under investigation may have been more relevant to a larger sample of subjects at some later point in time, conditions permitting. Only a replication of this research with some meaningful modification will reveal whether or not this was, indeed, the case.

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APPENDICES

APPENDIX A

FREE PLAY ACTIVITIES AVAILABLE TO THE SUBJECTS DURING THE OBSERVATIONS

1. Creative Experiences: easel paint, fingerpaint, crayons, chalk, collage, play dough, cooking activities, cutting, pasting, and other experiences using creative media.
2. Block Play: play with the large or small wooden blocks.
3. Unstructured Large Motor: tricycles, swings, climbing equipment.
4. Music: rhythm instruments, records, singing.
5. Table Materials: lotto, puzzles, Developmental Learning Materials, Montessori equipment, table games, small manipulatory equipment.
6. Language: flannel board stories, books, puppets, storytelling.
7. Water Play: play at the water table, in the wading pools, with the hose, or at the lavatories.
8. Dramatic Play: imaginative or fantasy play such as doctor, house, "Spiderman," "Emergency."
9. Sand Play: play with sand in the sandboxes.

APPENDIX B

LIST OF AGE AND SEX OF SUBJECTS

Subject #	Age	Sex
1	55 months	male
2	65 months	male dropped
3	65 months	female
4	47 months	female
5	69 months	male
6	53 months	female
7	59 months	male
8	69 months	male
9	60 months	male
10	61 months	female dropped

APPENDIX C

WRITTEN INSTRUCTIONS GIVEN TO PARENTS, PROFESSIONALS, AND TEACHERS LISTING FATIGUE BEHAVIORS

Please list all the behaviors which you have seen or that you feel represent signs of fatigue in 4 & 5 year old children. Please list only operational definitions. An example of an operational definition would be loud laughing. List as many as you can and return to the box labeled, "Fatigue Lists" at the day care center or return to Amy Potter.

APPENDIX D

COMPOSITE LIST OF 50 FATIGUE BEHAVIORS

Behaviors		Scores
1.	Verbal comment of dislike for teacher/peers/school	120
2.	Complains of physical ailments—upset stomach, scratches, etc.	160*
3.	Constant use of negative statements	110
4.	Uncoordinated body movements	110
5.	Teases other children	70
6.	Sits in locker	150*
7.	Asks for teachers assistance or for the teacher to do things for the child	120
8.	Laughs and giggles	80
9.	Answers teachers and/or peers with short, snappy comments	170*
10.	Increased affection towards teacher holding, hugging teacher	110
11.	Asks for a cat	150*
12.	Repetition of same statements	80
13.	Stays close to teacher or other adult	110
14.	Refuses to complete a task	110
15.	Falls frequently	80
16.	Rapid, continuous speech	90
17.	Loud talking	60
18.	Plays with genitals	90

Behaviors	Score
19. Thumb sucking	120
20. Yawning	150*
21. Silent—won't talk	120
22. Makes demands of other children	80
23. Crying	140*
24. Enters into quarrels	120
25. Verbal comment of being tired or sleepy	110*
26. Asks for TV or other quiet activity	120
27. Relaxed posture	100
28. Asks when it will be time to go home	130
29. Plays fighting games	100
30. Stares into space	110
31. Twists hair	70
32. Holds and cuddles blanket, wet pad, or stuffed animal	140*
33. Excessive running and jumping	90
34. Lies down	150*
35. Inability to become involved in an activity—wandering around aimlessly	120
36. Whining	160*
37. Asks for parents	100
38. Rubs eyes	150*
39. Sits or leans on objects	120
40. Falls asleep	170*
41. Misuses materials	100

Behaviors		Score
42.	Immature language patterns	100
43.	Expresses desire to watch others play rather than becoming involved	140*
44.	Loss of appetite	90
45.	Refuses to share toys with others	100
46.	Props head with hands/lies head on table	170*
47.	Plays with food	90
48.	Expresses displeasure with activities	120
49.	Inability to set/participate in a group experience	120
50.	Exhibits droopy eyelids, red eyes	150*

*Those behaviors scoring 140 and above which were used as the signs of fatigue in the researcher.

APPENDIX E

DATA CODING SHEET

Name and # _____
Date _____
Time _____
Observer _____

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Creative Experience, Arts Cooking

_____

_____

Unstructured Lg Motor, Swings, Climbing, Slide

_____

_____

Language, Stories, Book Corner

_____

_____

Table Materials, Games

_____

_____

Dramatic-Fantasy Play

_____

_____

Block Play

_____

_____

Sand or Water Play

_____

_____

Music

_____

_____

Transition

_____

_____

APPENDIX F

Table 4

The Association between the Fatigue Behaviors of Resters and Nonresters and Creative Experience Activities

	Resters	Nonresters	
Signs of Fatigue	1	1	2
No Fatigue Signs	3	3	6
	4	4	8
			$\lambda = 0.00$ (no association)

Table 5

The Association between the Fatigue Behaviors of Resters and Nonresters and Unstructured Large Motor Activities

	Resters	Nonresters	
Signs of Fatigue	0	0	0
No Fatigue Signs	4	4	8
	4	4	8
			$\lambda = 0.00$ (no association)

Table 6

The Association between the Fatigue Behaviors of Resters and Nonresters and the Language Activities

	Resters	Nonresters	
Signs of Fatigue	0	2	2
No Fatigue Signs	4	2	6
	4	4	8
			$\lambda = 0.00$ (no association)

Table 7

The Association between the Fatigue Behaviors of Resters and Nonresters and Sand Activities

	Resters	Nonresters	
Signs of Fatigue	0	1	1
No Fatigue Signs	3	3	6
	3	4	7
			$\lambda = 0.00$ (no association)

Table 8

The Association between the Fatigue Behaviors of Resters and Nonresters and Dramatic Play

	Resters	Nonresters	
Signs of Fatigue	0	0	0
No Fatigue Signs	4	4	8
	4	4	8
			$\lambda = 0.00$ (no association)

Table 9

The Association between the Fatigue Behaviors of Resters and Nonresters and Block Play

	Resters	Nonresters	
Signs of Fatigue	0	0	0
No Fatigue Signs	0	2	2
	0	2	2
			$\lambda = 0.00$ (no association)

Table 10

The Association between Fatigue Behaviors of Resters and Nonresters and the Transition Behaviors

	Resters	Nonresters	
Signs of Fatigue	0	0	0
No Fatigue Signs	4	4	8
	4	4	8
			$\lambda = 0.00$ (no association)

Table 11

The Association between the Fatigue Behaviors of Resters and Nonresters and Table Materials

	Resters	Nonresters	
Signs of Fatigue	1	1	2
No Fatigue Signs	3	3	6
	4	4	8
			$\lambda = 0.00$ (no association)

Table 12

The Association between the Fatigue Behaviors of Resters and Nonresters and Music Activities

	Resters	Nonresters	
Signs of Fatigue	0	1	1
No Fatigue Signs	4	1	5
	4	2	6
			$\lambda = 0.00$ (no association)

Table 13

The Association between the Fatigue Behaviors of Resters and Nonresters and Water Play

	Resters	Nonresters	
Signs of Fatigue	0	0	0
No Fatigue Signs	2	1	3
	2	1	3
			$\lambda = 0.00$ (no association)

VITA

Amelia Susan (Amy) Potter was born on July 18, 1952, in Crossville, Tennessee, and is the daughter of Mr. and Mrs. C. M. Whitehead of Jamestown, Tennessee. Ms. Potter has two older brothers, one younger brother, and one younger sister. The author was a 1970 honor graduate of Alvin C. York Agricultural Institute, with a major in Home Economics.

The author began her college studies in Child Development and Family Relationships in the fall of 1970 and received the Bachelor of Science degree with honors in June of 1974. As an undergraduate, Ms. Potter worked as a Resident Assistant, Assistant Head Resident, Summer Orientation Assistant, and received a Mortar Board Senior Citation.

While completing a Master of Science degree in Child Development and Family Relationships the author worked in a departmental assistantship as an assistant teacher at The University of Tennessee Child Day Care Center. Ms. Potter is also a member of Omicron Nu honor society and The National Association for the Education of Young Children. Upon graduation the author will be employed as Day Care Consultant at Iowa State University in Ames, Iowa, where she hopes to pursue further graduate study and research.