Maternal-Nursling Interactions in the Collared Peccary

by

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ABSTRACT

Captive collared peccary maternal-nursling interactions were quantitatively described by determining the influence of weeks *post partum*, time of day, and diet on the relative frequency of occurrence, mean duration, and proportion of time spent on active, resting, nursing, and play behavior during the young's first six weeks of life. Eleven females with litters culled to singletons were observed from 03 Jun 83 to 10 Jul 83 at Texas A&M University in Brazos County, Texas. A chi-square analysis showed no significant difference in relative frequency of occurrence and proportion of time spent on the four behaviors according to weeks *post partum*, time of day, and diet. There were significant differences among mean durations of all behaviors across all parameters except nursing and young active behavior. A dietary effect on the behaviors was not evident in this study, but further research is encouraged.

DEDICATION

This paper is dedicated to my parents, Lester and America Dowdell, for their endless love, constant support, and persistent sense of humor.

ACKNOWLEDGEMENTS

I would like to thank W. E. Grant, Eric C. Hellgren, Robert L. Lochmiller, and Paul Ettestad for their assistance in formulating the experimental design, analyzing the data, and critiqueing the text involved in this study.

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INTRODUCTION

The collared peccary (*Tayassu tajacu*) is a highly social ungulate which ranges from the southwestern United States through Central and South America. Although several authors have discussed behavior of the collared peccary (For reviews, see Byers and Bekoff 1981; Sowls 1972; Bissonette 1982), there have been few quantitative analyses of maternal-nursling interactions. Sowls (1974) described basic mother-young behaviors and Byers (1983) discussed development of social activity in juvenile peccaries and quantified adult-juvenile interactions. Sowls (1966) also described adult-juvenile behaviors and quantitatively examined nursing behavior of three captive peccary litters. Schweinsburg (1969) documented behavior of several captive young peccaries and described nursing characteristics.

The present paper quantitatively describes maternal-nursling behavior in captive collared peccaries by presenting relative frequency, duration, and proportion of time spent on each of four behaviors as influenced by number of weeks *post partum*, time of day, and diet.

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METHODS

Eleven female peccaries and their young were observed from 03Jun83 to 10Jul83 at Texas A&M University, Brazos County, Texas. Each female was housed in a 2x3m pen with one offspring (litters were culled to singletons as part of another study). Peccaries were observed from a post 1m high and 4m from the pens.

I recorded relative frequency of occurrence, duration, and proportion of time spent on each of four behaviors during the first six weeks after birth and noted changes in frequency, duration, and proportion of time spent as a function of weeks post partum, time of day, and diet.

The four behavioral categories were: (1) active--peccary stood or moved while on four legs, (2) resting--peccary was recumbent or otherwise not on all four legs, (3) nursing--young peccary was active on the udder, and (4) play--young peccary ran and rolled about. Play has been described further by Byers (1983) and a complete ethogram of collared peccary behavior has been described by Byers and Bekoff (1981). A stop-watch was used to determine initiation and termination of a behavior.

Time of day was categorized as (1) morning (0800-1200), (2) mid-day (1200-1600), and (3) afternoon (1600-2000). Diets were categorized as (1) high energy-high protein (HEHP), (2) high energy-low protein (HELP), (3) low energy-high

protein (LEHP), and (4) low energy-low protein (LELP) (Hellgren et al., in review). Each diet was represented by at least two mother-young pairs.

The experimental design is illustrated in Table 1. A cell consisted of a 1 hr observation period within each time period within each day of the week for six weeks post partum for each mother-young pair.

Relative frequency of occurrence of each behavior within each cell of the experimental design was calculated by dividing total number of observations of the behavior by observation time. Mean duration (min) of each behavior within each cell was calculated by dividing total time (min) spent in the behavior by total number of occurrences of the behavior. Proportion of time spent on each behavior within each cell was calculated by dividing total time (min) spent on the behavior by total observation time (min). Relative frequency of occurrence, mean duration, and proportion of time spent for each diet by averaging the values of individuals on the diet. A chi-square analysis was used to determine significant differences in behaviors according to weeks post partum, time of day, and diet.

RESULTS

The relative frequency of occurrence by week of active, nursing, resting, and play behavior is shown in Figure 1. for each cell of the experimental design. The young

participated in more active bouts than the mothers. The frequency of occurrence of nursing decreased as the young matured but not significantly ($P>0.05$). Resting behavior of mothers increased dramatically during the young's sixth week of life, but there was not a significant difference among mothers in resting behavior $P>0.05$) (Table 2). Young have more play bouts during the second week post partum, but again the difference is not significant ($P>0.05$).

The relative frequency of occurrence of the behaviors according to time of day is shown in Figure 2. The frequencies of all behaviors are greater in the afternoon. This is especially true in play behavior. A chi-square analysis showed there were no significant differences ($P>0.05$) in relative frequency of occurrence of the behaviors according to time of day (Table 2).

The relative frequency of occurrence of the behaviors according to diet is shown in Figure 3 and the corresponding chi-square analysis is shown in Table 2. Mothers fed the LEHP diet and their young were most active. Young of HEHP mothers nursed more frequently, while young of LELP mothers nursed less. Mothers fed LEHP diets and their young also participated in more resting bouts. Young of LEHP mothers played most frequently, while young of LELP mothers played least frequently. A chi-square analysis showed no significant differences across all parameters ($P>0.05$).

The mean durations of the four behaviors according to

weeks post partum are seen in Figure 4 with corresponding chi-square analysis results in Table 3. The young participated in active behavior for longer periods than the mothers. The mean duration for both mothers and young during the sixth week of life of active and resting behavior decreases. There is little variation in the mean nursing duration across the first six weeks of life. The mean duration of play behavior increases by nearly 100min from the first week to the third week post partum. A chi-square analysis indicated there were significant differences ($P<0.05$) in the active behavior of the mothers, resting of the mothers, resting of the young, and the play of the young. There was no significant difference ($P>0.05$) in either young active or nursing behavior.

The mean durations according to time of day are shown in Figure 5 with corresponding chi-square analysis in Table 3. The mean durations of active behavior were greater in the morning and afternoon periods for both mothers and young. Mean nursing durations were greater during these same time periods. Resting durations were greatest in the morning for mothers and young. Play bouts lasted for longer time periods in the morning. A chi-square analysis indicated significant differences ($P<0.05$) in all behaviors except nursing according to time of day.

The mean durations of the behaviors according to diet are shown in Figure 6 with the corresponding chi-square

analysis results in Table 3. Both mothers and young on high energy diets had greater mean durations for active behavior. There was little variation in mean nursing durations across the diets. The young of mothers on low energy diets had greater mean durations for play behavior. A chi-square analysis showed significant differences ($P < 0.05$) for all mean durations according to diet.

The proportion of time spent on the behaviors according to weeks post partum is shown in Figure 7. Mothers spend more time in active behavior than the young. Young during the first week of life are active about 19% of the time. Their activity declines during subsequent weeks until the sixth week. Total time spent nursing decreases from 8% the first week to 3% the sixth week. Both mothers and young rested more during the fourth week. The young played for a greater proportion of time during the second week.

The proportion of time spent on the behaviors by time of day is illustrated in Figure 8. Mothers and young are active for a greater length of time in the afternoon. Young nurse and play for a greater proportion of time in the same time period.

The proportion of time spent on the behaviors according to diet is seen in Figure 9. Mothers on the HEHP diet and their young were most active, while mothers and young on the LELP were least active. Young of LEHP mothers nursed for a greater amount of time, while those of HELP mothers

nursed for a lesser amount. Young of LEHP mothers also played more.

A chi-square analysis on the influence of weeks post partum, time of day, and diet (table 4) on the proportion of time spent on each behavior showed no significant differences ($P > 0.05$) across all parameters.

DISCUSSION

A dietary effect on the frequency, duration, or proportion of time spent on the four behaviors was not evident in this study. There was a lack of any definite trend as a reflection of diet. This may be a result of the small sample size, the physiological adaptability of the peccaries, nonlimiting dietary restrictions, individual genetics, or a combination of these. A more detailed study of dietary effects on peccary behavior is needed. Thus, individual behavioral development of peccaries of the same age, as well as those of subsequent litters, could be compared.

It was interesting to note that nursing behavior does not significantly decrease during the young's first six weeks of life. It might be speculated that the mother's lactational yield increased during the nursling's first six weeks post partum so that the young received more milk over weeks even though the time expended on nursing was not significantly different. Further study is called for to

justify this. Another note concerning nursing was that it was the only behavior in which the mean duration time was not significantly different as a function of time of day and is only one of two behaviors in which mean duration time was not significantly different as a function of weeks post partum. So there seemed to be little variation in the frequency, duration, or time proportion expended on nursing.

Sowls (1966) found variation in nursing time in the three litters of captive peccaries he observed. One litter of two nursed 24% of the time. Another litter of two nursed 16% of the time, while a sinle young nursed for 4% of the time. Sowls (1966) determined these values by observing the three litters for periods of 3hr at the age of 9 days, 15 days, and 12 days respectively. My results indicated that singletons during the second week of life nurse for 6% of the time. This relates closely to the findings of Sowls (1966).

Young were observed initiating all behaviors most of the time, as observed by Byers (1983). Byers (1983) observed play in peccaries of all ages. Play was not seen in peccaries over three weeks old. This might be due to chance, the lack of contact with other juveniles, or the captive environment. I never observed mothers playing with young.

When quantitatively comparing the behavior of juvenile collared peccaries to domestic swine piglets (Sus scrofa), I found both similarities and differences. Fraser (1978)

found that piglets were active 20% of the time during the first week of life; about 24% during the second week with the percent of activity rising as the piglets matured. I found that peccary nurslings were active 19% of the time during the first week of life. However, the activity percentage of the peccaries decreased after that. Both piglets and peccaries were housed in 2x3m pens; but, it should be noted that the piglets were kept indoors. This, in addition the natures of the two species, could account for the differences observed.

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Table 1. Experimental design.

		WEEK 1						
		1	2	3	4	5	6	7
individual mother-young pair	TOD 1							
	TOD 2							
	TOD 3							

Table 2. Summary of the chi-square analysis of the frequency of occurrence of the four given behavior categories according to weeks *post partum*, time of day, and diet.

Individual/Behavior	week *post partum*	time of day	diet
mother/active	+	+	+
young/active	+	+	+
young/nursing	+	+	+
mother/resting	+	+	+
young/resting	+	+	+
young/playing	+	+	+

Table 3. Summary of the chi-square analysis of the mean duration of the four given behavior categories according to weeks *post partum*, time of day, and diet.

Individual/Behavior	week *post partum*	time of day	diet
mother/active	--	--	--
young/active	+	--	--
young/nursing	+	+	--
mother/resting	--	--	--
young/resting	--	--	--
young/playing	--	--	--

Table 4. Summary of the chi-square analysis of the total time expended on the given behavior categories according to weeks *post partum*, time of day, and diet.

Individual/Behavior	week *post partum*	time of day	diet
mother/active	+	+	+
young/active	+	+	+
young/nursing	+	+	+
mother/resting	+	+	+
young/resting	+	+	+
young/playing	+	+	+

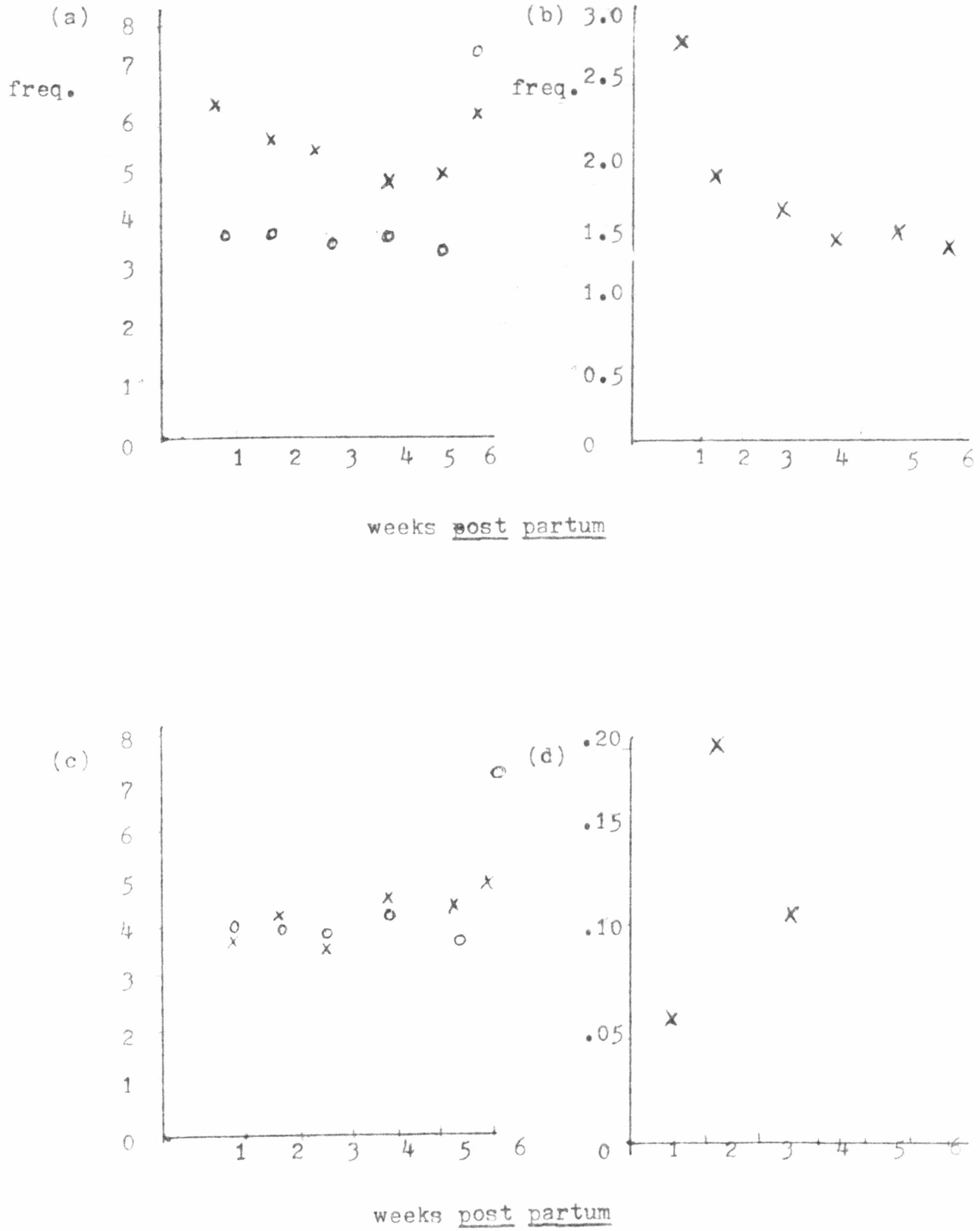


Figure 1. The frequencies of the weekly occurrences of the behavioral categories (a) active, (b) nursing, (c) resting, and (d) play.

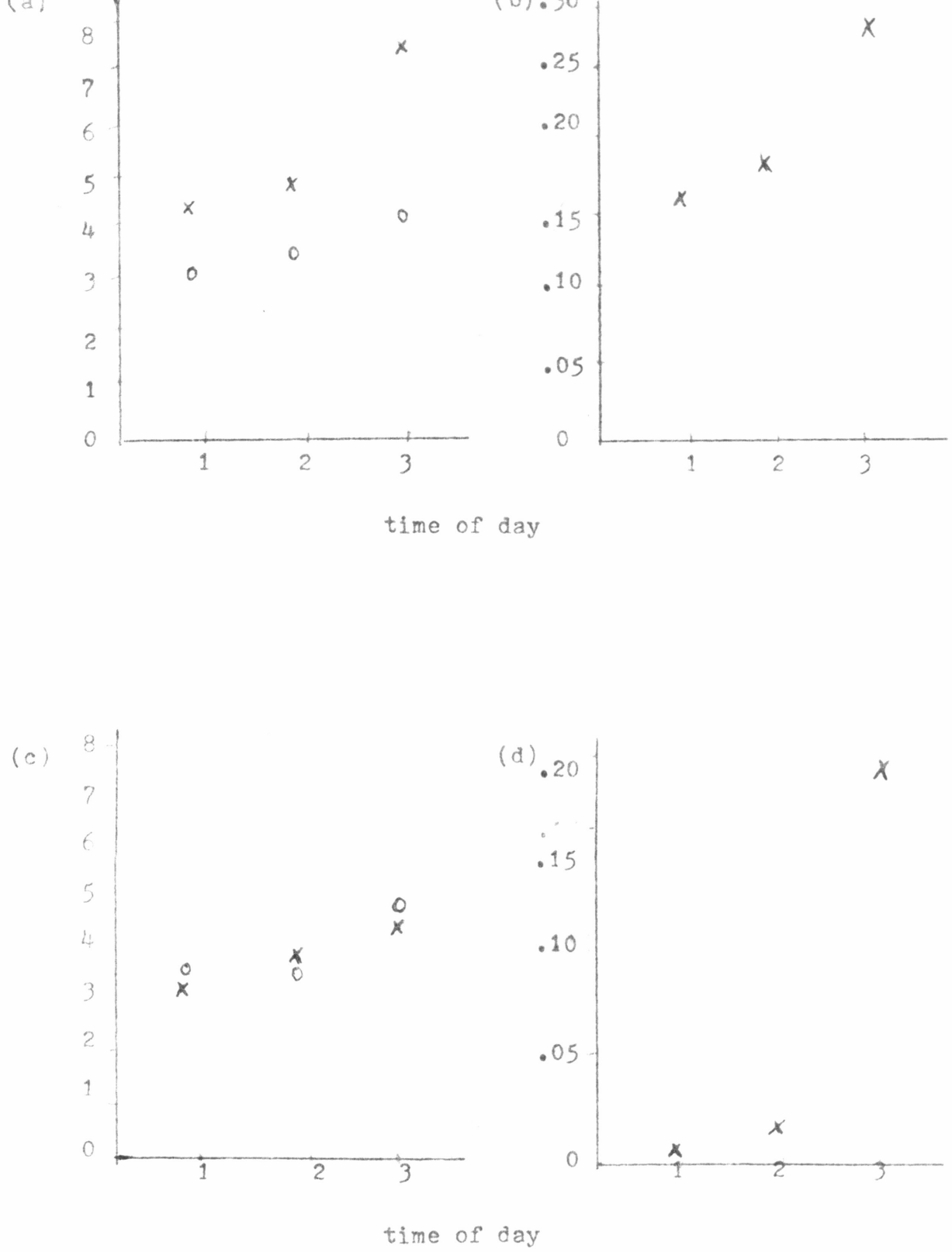
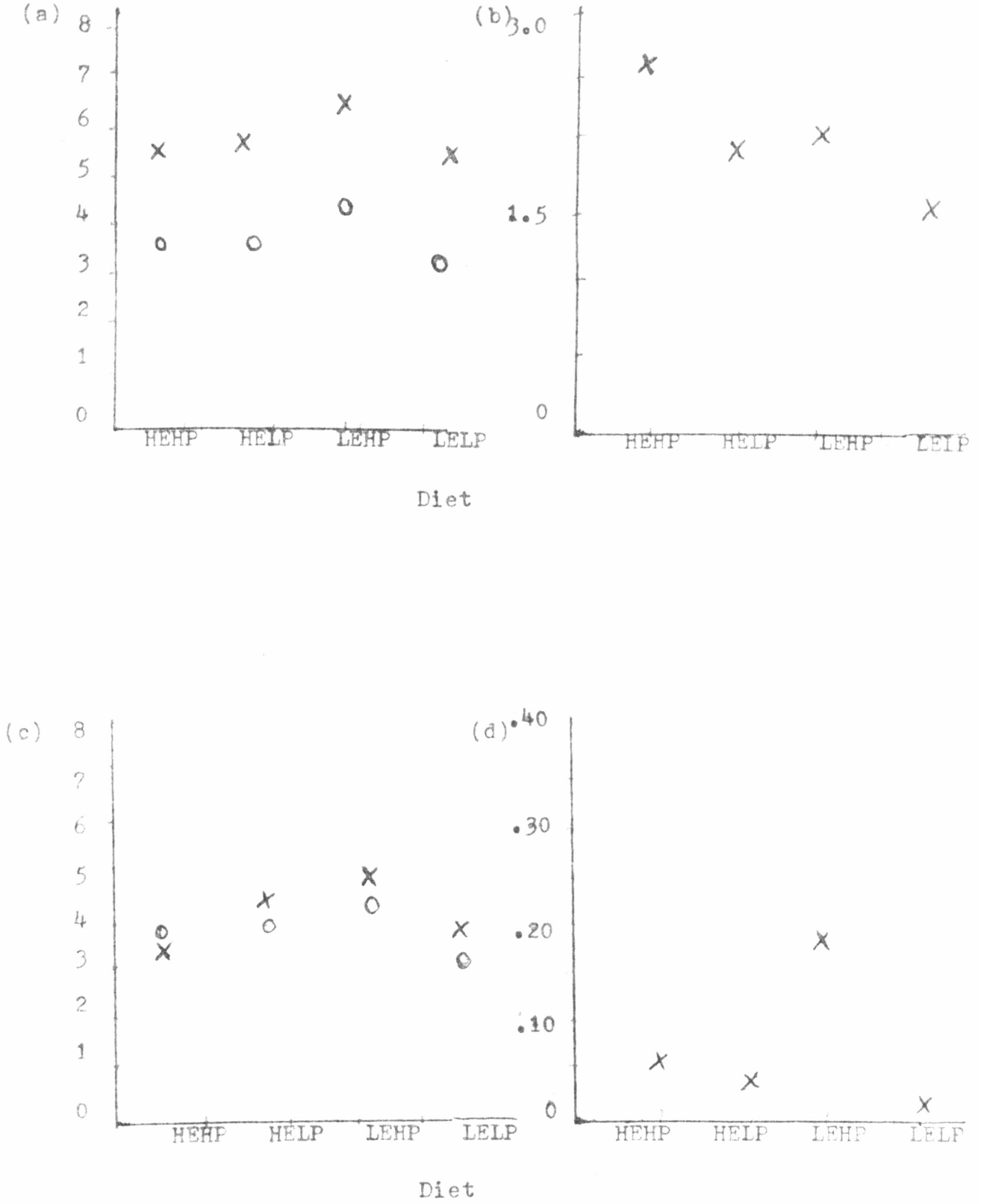


Figure 2. The frequency of occurrence according to time of day of the behavioral categories (a) active, (b) nursing, (c) resting, and (d) play.



x - young

o - mother

Figure 3. The dietary frequencies of the behavior categories (a) active, (b) nursing, (c) resting, and (d) play.

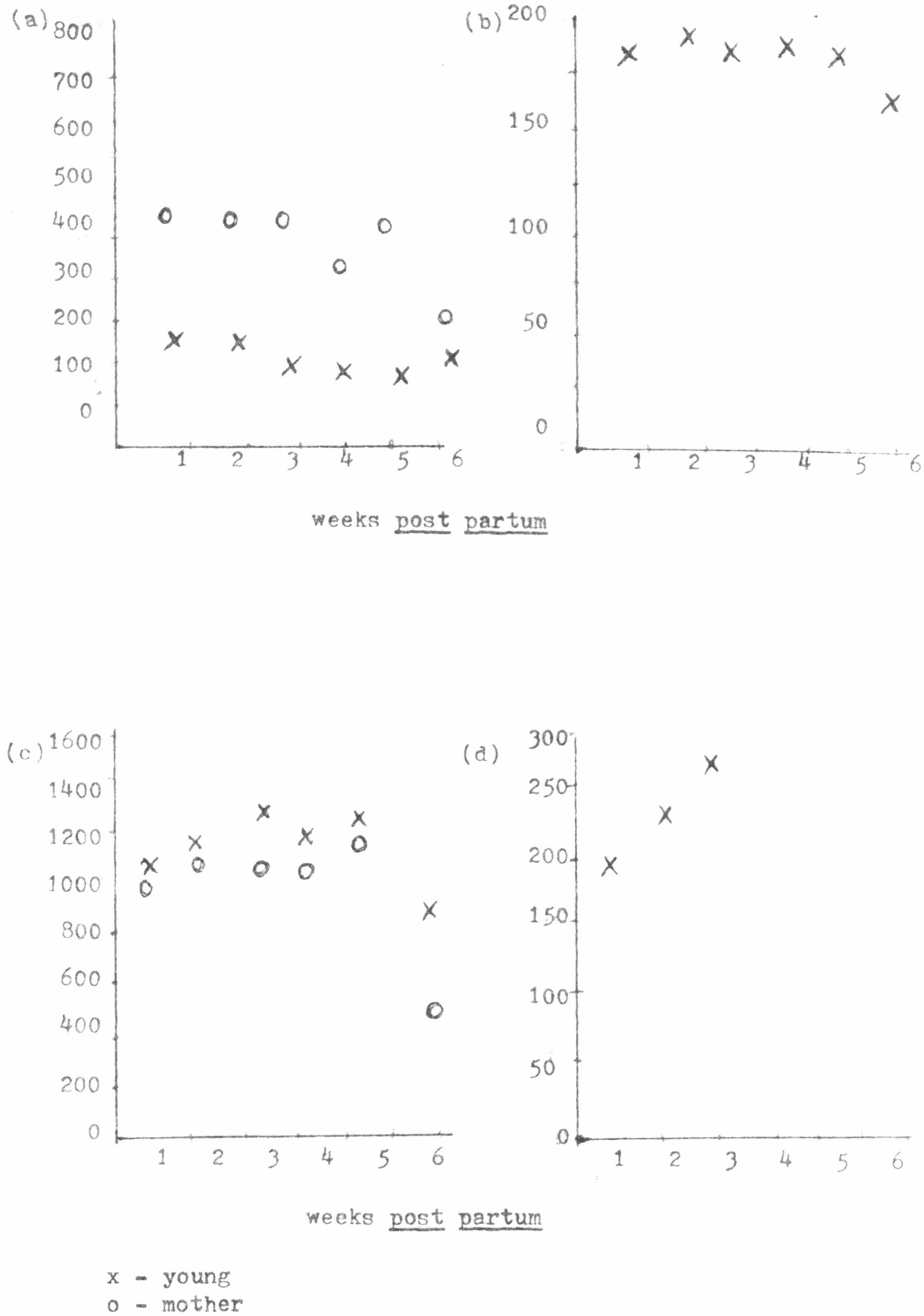
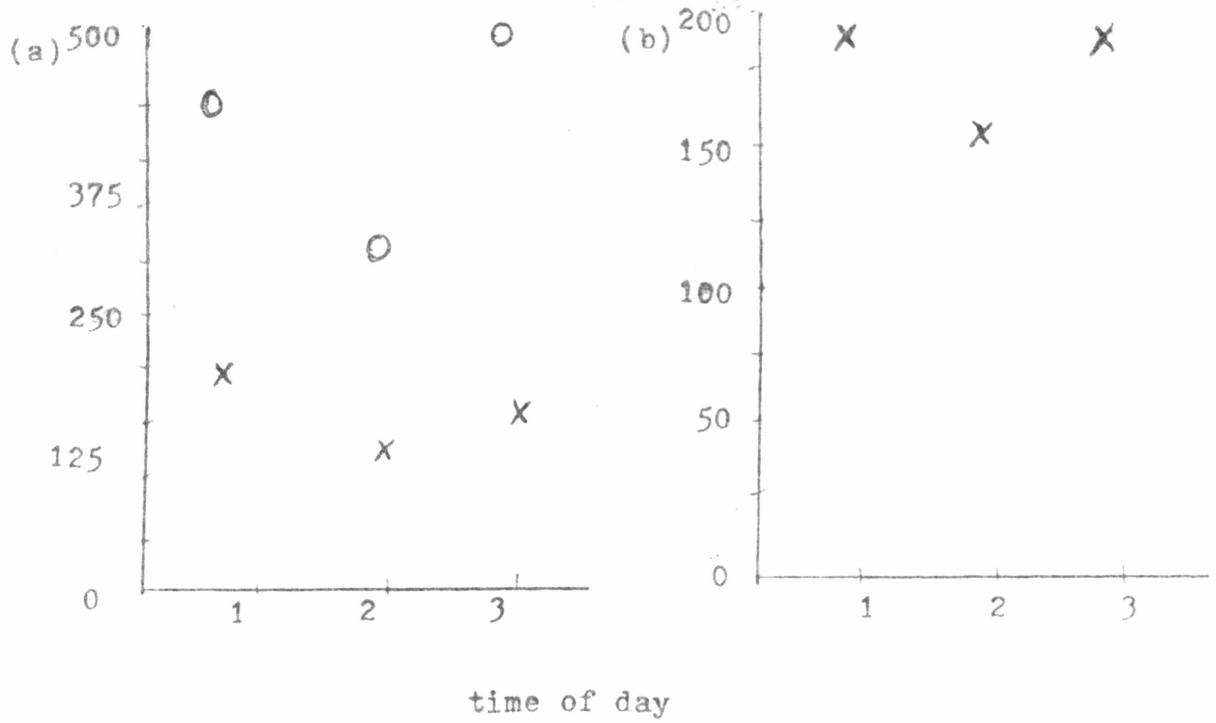
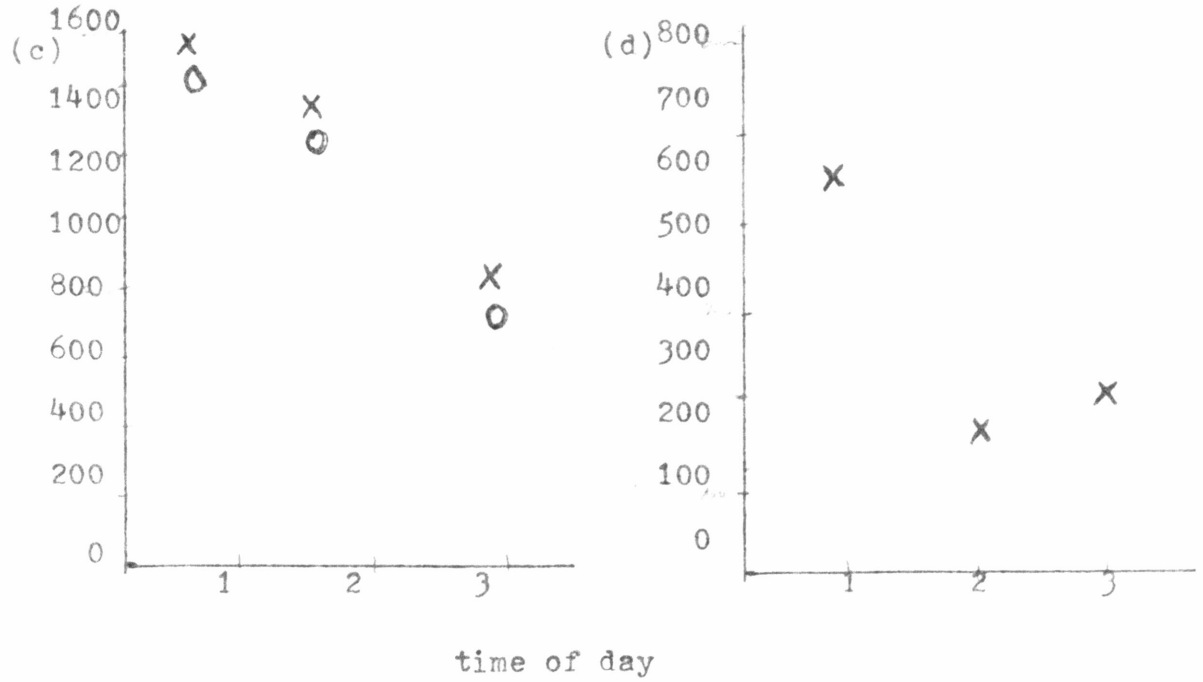


Figure 4. The mean durations of the behavioral categories (a) active, (b) nursing, (c) resting, and (d) play in minutes.





x - young

o - mother

Figure 5. The mean durations (min) according to time of day of the behavioral categories (a) active, (b) nursing, (c) resting, and (d) play.

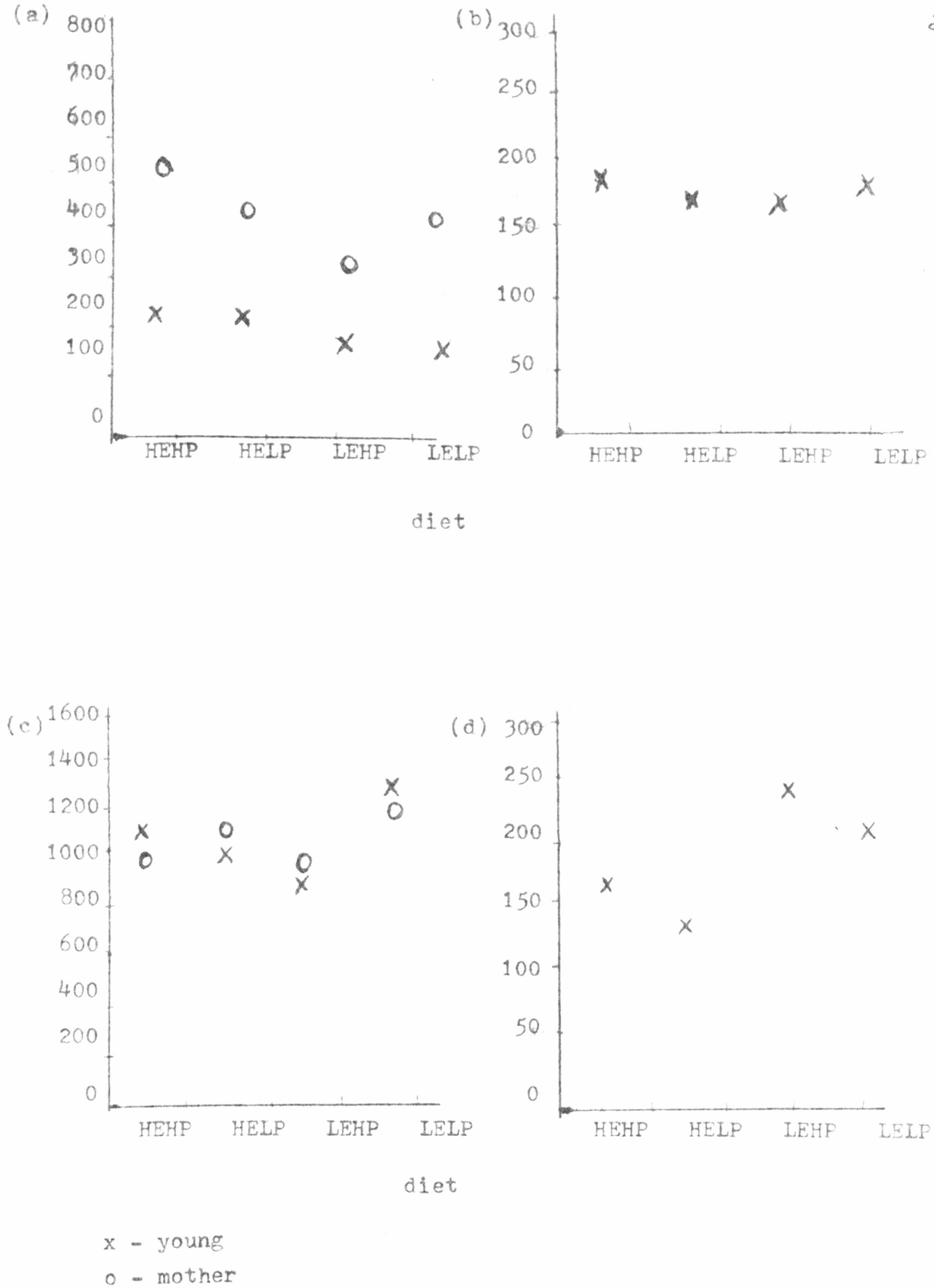


Figure 6. The dietary mean durations (min) of the behavioral categories (a) active, (b) nursing, (c) resting, and (d) play.

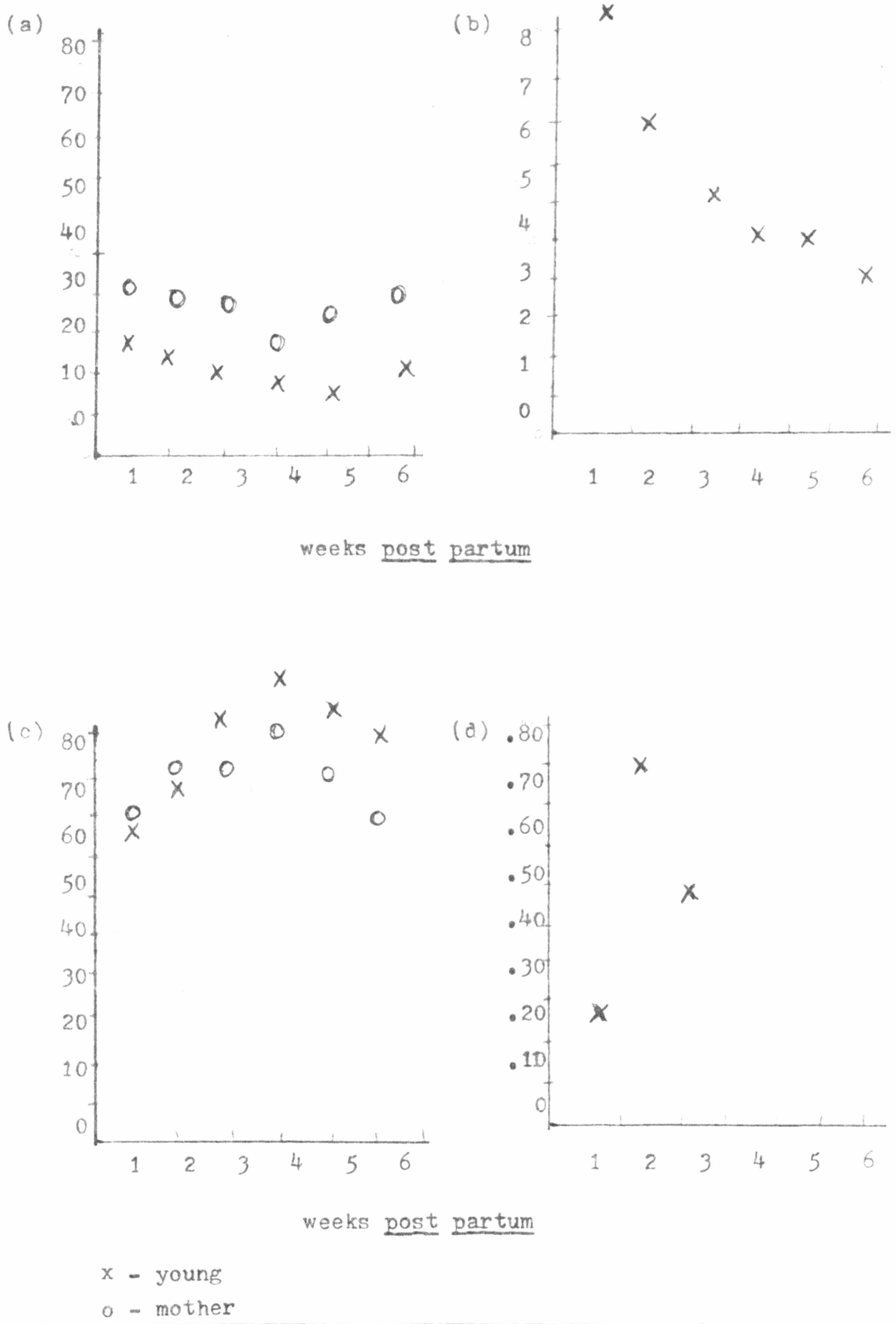
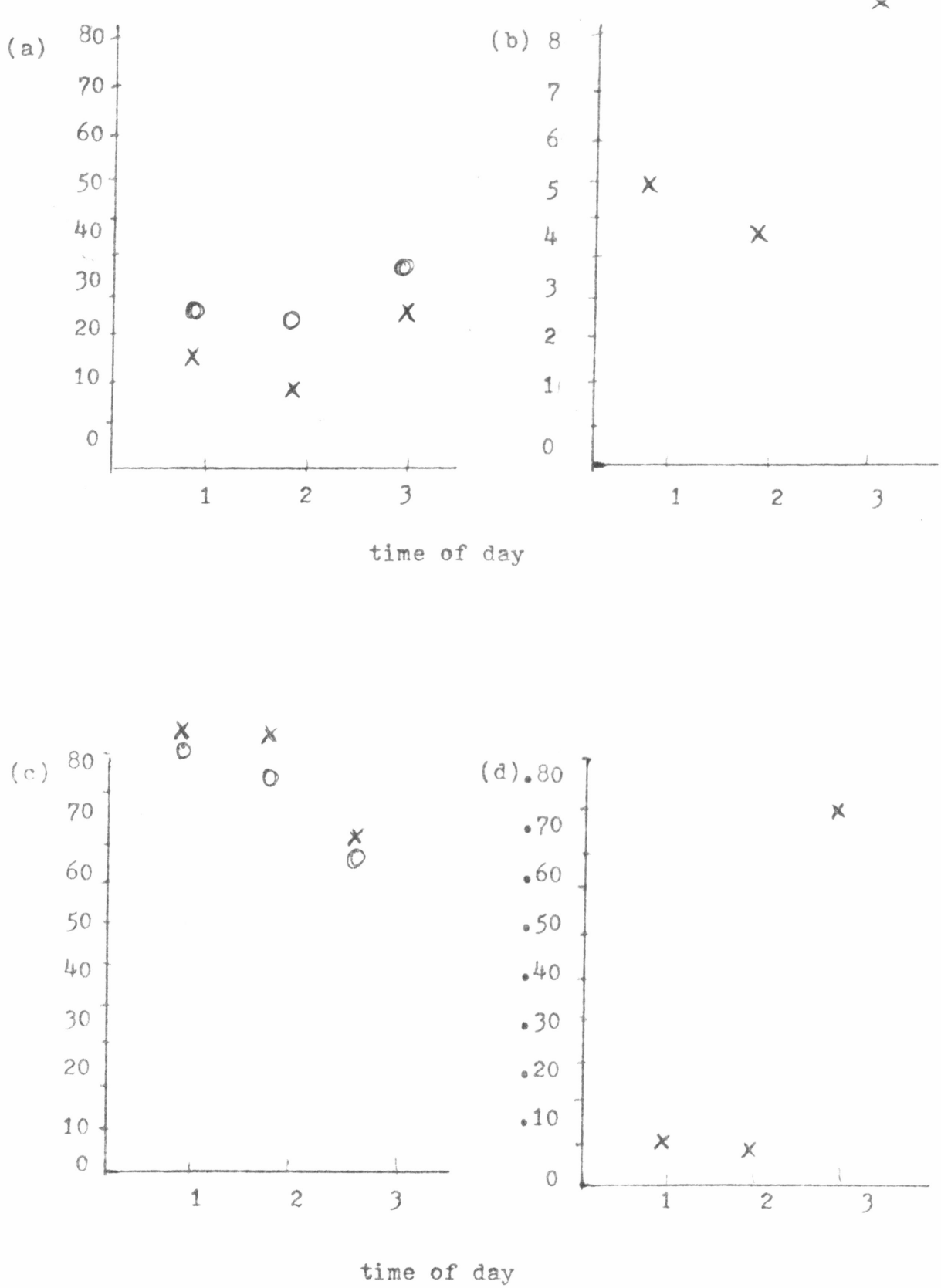
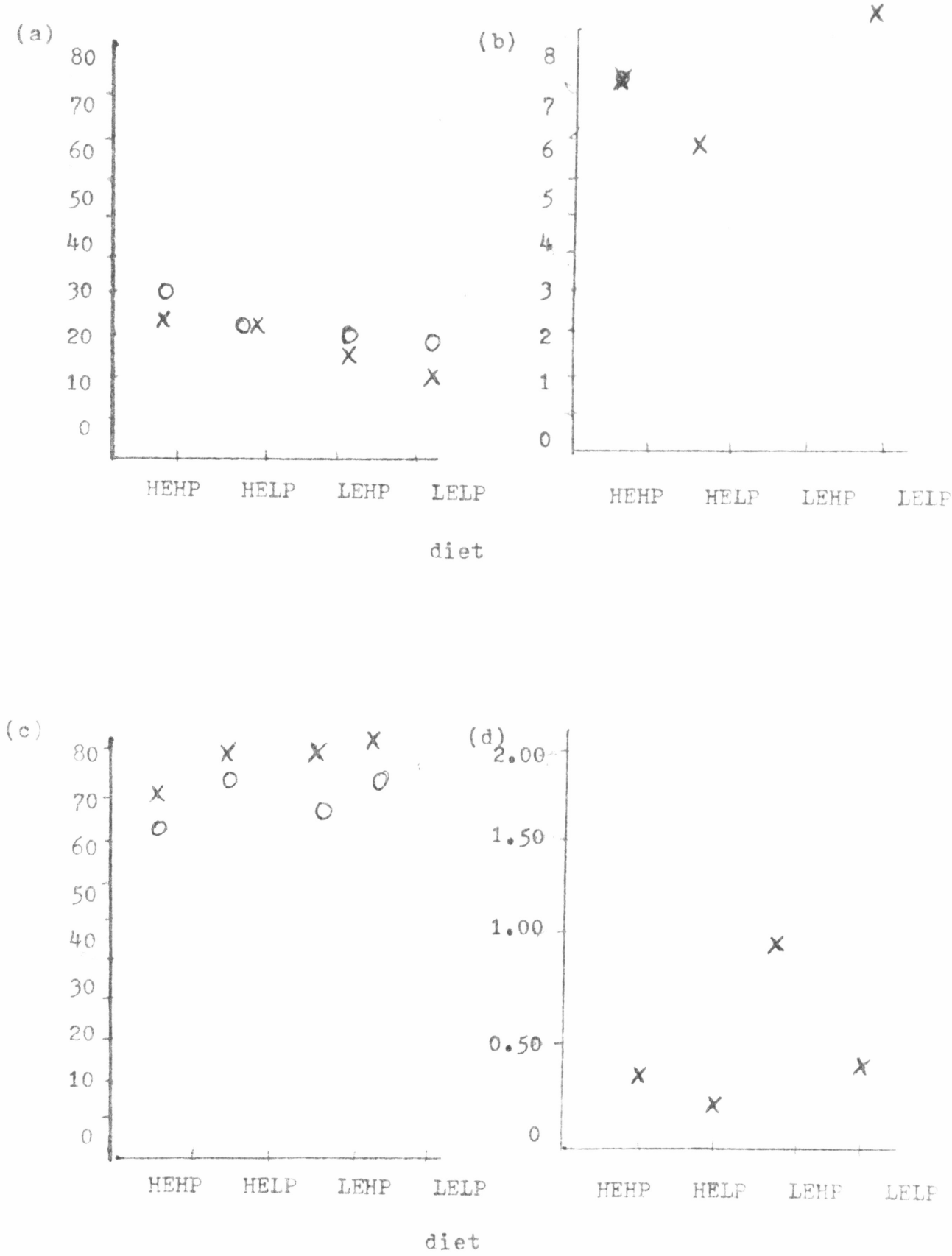


Figure 7. The total weekly time spent participating in (a) active, (b) nursing, (c) resting, and (d) play in per cent.



x - young
o - mother

Figure 8. The totai time spent %) according to time of day participating in (a) active, (b) nursing, (c) resting, and (d) play.



x - young

o - mother

Figure 9. The total time spent (%) participating in (a) active, (b) nursing, (c) resting, and (d) play.