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# OPEN ENVIRONMENT DESIGN FOR INFANT AND TODDLER DAY CARE

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Group care settings for dependent people must be organized to facilitate delivery of responsive care and to prevent inadvertant neglect or deliberate abuse. Accordingly, in an infant and a toddler day-care center, an open environment was examined as a means to increase the visibility of children to staff and of staff-child interactions to the supervisor, and to investigate potential adverse effects of the open environment on infants' and toddlers' activities. These studies demonstrated that: (1) an open environment markedly decreased the amount of time a child could not be seen by any adult and the amount of time staff members' activities were not visible to the supervisor, and markedly reduced the effort required to supervise those who were not immediately visible; (2) an open environment did not adversely affect the sleep of either infants or toddlers; and (3) an open environment is as conducive to small group pre-academic activities with toddlers as is a separate room. These studies convinced us that infant and toddler day care can and should be accomplished in an open environment.

In group care settings for dependent people, *i.e.*, day-care centers, nursing homes, institutions for the retarded, classrooms, and hospitals, the first concern is the delivery of responsive care and the prevention of inadvertant neglect or deliberate abuse. However, even with the best-intentioned administrators and staff, clients may be overlooked because staff are not in a position to interact with them, forgotten and left to their own devices so that injury occurs, and occasionally deliberately abused socially or physically. Writers on child-care situations have expressed concern that troublesome children may simply be kept out of sight (Keyserling, 1972), and have recommended that staff be trained to use strategic positions for supervising, *i.e.*, standing between two groups or areas, and developing the skill of being aware of all that is happening (National Federation of Settlements and Neighborhood Centers, 1968).

One of the common conditions involved in court cases brought for injuries received at school is the failure to provide adequate supervision (Hunt, 1973), and consistent reference to the toddler age as the "age of accidents" (Dittmann, 1967; USDHEW, 1962) underscores the necessity for nearly constant supervision to avoid serious injury. Concern about physical and social abuse is evident in day-care standards that prohibit physical punishment (Kansas State Departments of Health and Social Welfare, 1973; American Academy of Pediatrics, 1971) and recommendations that staff be attentive to their tone of voice and selection of words when speaking to a child (National Federation of Settlements and Neighborhood Centers, 1968).

In the model being developed by the Lawrence Day Care Program Infant and Toddler Centers,

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an open environment was seen as the essential first step toward ensuring that infants and toddlers would not be overlooked, forgotten, or abused. It was felt that, in an open environment, children would not only be almost continuously visible to staff and staff to the supervisor, but that minimal effort would be required to see what they were doing if they were not immediately visible. Furthermore, an open environment would provide a context within which care routines could be developed, and would facilitate their correct performance.

The impact of the physical environment on behavior was emphasized by Barker and Wright and their colleagues over 20 yr ago (Barker, 1951; Barker and Wright, 1955). Since then, many studies have related behavior to the characteristics of the setting in which it occurs. Gump, Schoggen, and Redl (1963) measured the behavior of the same child in different settings, recording everything the child did, dividing the "behavior stream" into episodes, and classifying each episode. Tars and Appleby (1973) employed similar methods to compare the day of a boy at home and at a residential treatment facility. Ittelson, Proshansky, and Rivlin (1970*a*) used a behavioral mapping technique to compare private, city, and state mental hospitals on a number of dimensions, including distribution of activities on the wards, distribution of activities in bedrooms as a function of bedroom size, and use of bedrooms as a function of bedroom size.

Recently, investigators have realized that aspects of the physical environment can be modified to encourage specific types of behavior. Sommer (1969) measured brief and extended conversation between elderly ladies in a nursing home before and after the seating arrangements in the dayroom were changed. He found that conversation almost doubled when the chairs were moved from their position against the wall to tables on which flowers and magazines were placed. Similarly, Ittelson *et al.* (1970*b*) equipped the seldom-used solarium of a mental hospital with comfortable and attractive furnishings, and found that its per cent of the ward's total activity increased, while activity in the corridor and dayroom decreased. Krantz and Risley (unpublished) experimentally demonstrated that spacing children, rather than letting them crowd during teaching demonstrations at a preschool for disadvantaged children, increased their attention to the teacher.

These studies suggest that the arrangement of the physical environment should be one of the first considerations when planning a program of providing care for dependent persons. The entire Lawrence Day Care Program is premised on the open environment, since it appeared self-evident that it would result in more visibility of children to staff and staff to the supervisor. Therefore, this series of studies on the open environment was our first priority, both to determine if assumptions about the presumed benefits would be borne out by empirical data, and to ensure that it was not detrimental to the children's sleep or pre-academic activities.

### *The Infant and Toddler Centers*

The studies were conducted at the Lawrence Day Care Program Infant and Toddler Centers, associated with the Department of Human Development at the University of Kansas and the National Program on Early Childhood Education. The purpose of the program was to develop a technology for caring for a group of up to 20 infants from one month to walking age with five caregivers (Cataldo and Risley, 1974), and a group of 20 toddlers from walking to preschool age with four caregivers. Both centers were originally modern two-bedroom apartments, which were later structurally modified into open environments.

## STUDY I: THE EFFECT OF AN OPEN ENVIRONMENT ON THE VISIBILITY AND SUPERVISION OF CHILDREN

In group care settings for dependent people, it is extremely important that they be visible so that caregivers can watch over them continuously, supervise their activities, provide respon-

sive care, and avoid neglect. In an infant center, staff can be hampered by an environment divided by walls. In such an environment, children must either be left unsupervised or floor space can be used only when staff members are available to supervise each room. Furthermore, even enthusiastic staff members would probably supervise children less often if a high response effort, *i.e.,* walking to another room, were required. At our Infant Center, a nearly optimal situation exists. Although there are no internal walls, children are rarely left in an activity area unless an adult is present. The exception is the sleep area, which can be seen from other parts of the center. This study sought to demonstrate that an open environment markedly decreases the amount of time a child cannot be seen by any adult and the effort required to supervise those not immediately visible.

## METHOD

### *Subjects*

Twenty-four children from one month to walking age attended the Infant Center for full- or part-time care, and an average of 13 were present each day. Five staff members cared for the children.

### *Experimental Conditions*

During the first eight days of the study, the Center was an open environment, *i.e.,* the sleep area was not separated from the rest of the Center. For the next 11 days, a partition was created by hanging a sheet from ceiling to floor, visually separating the sleep area from the rest of the Center. (Since a staff member was assigned to every other area whenever children were present, partitioning the other areas in

Fig. 1. Four views of the open environment Infant Center showing the ease of supervision when there are no walls. Top left, view of the play, sleep, and diapering areas from the feeding area. Top right, view of the receiving and diapering areas from the food preparation area. Bottom left, view of the play, feeding, food preparation, and receiving areas from the sleep area. Bottom right, view of the feeding and food preparation areas from the play area.

addition to the sleep area would not have produced different results.) Then, the open condition was in effect for another 10 days, the partition condition for six days, and the open condition for 10 more days.

*Measures*

Figure 2 is a scale drawing of the Infant Center. The heavy dashed line between the sleep and play areas represents the partition in use during this study. An observer with a map of the Center entered every hour between 8:30 A.M. and 4:00 P.M. The observer marked an X on the map to indicate the location of each staff member and noted if the adults were standing or sitting. Then, the observer looked at each area and placed a dot to record the position of each child. The total number of children at the Center was recorded. The observer then went to each of the locations where an X on the map marked the position of an adult, assumed the position the adult had been in, and counted the children each adult could see by turning completely around. At least one-half of the child's body had to be visible to be counted as seen. (It should be emphasized that the observer referred to the dots on the map, representing the positions the children had occupied when the observation was taken.) After doing this for each adult, the observer recorded the number of children who could not be seen by any adult. To aid in keeping track of children who could not be seen from the various positions, the dots representing children were crossed off as soon as they were judged to be seen. The per cent of children seen was computed by dividing the number of children seen by the total number present.

If the observer recorded that one or more children could not be seen by any adult, the distance the adult nearest these children would have to travel to see them was measured, beginning on Day 27. A piece of tape was placed on the floor to mark the position of the staff

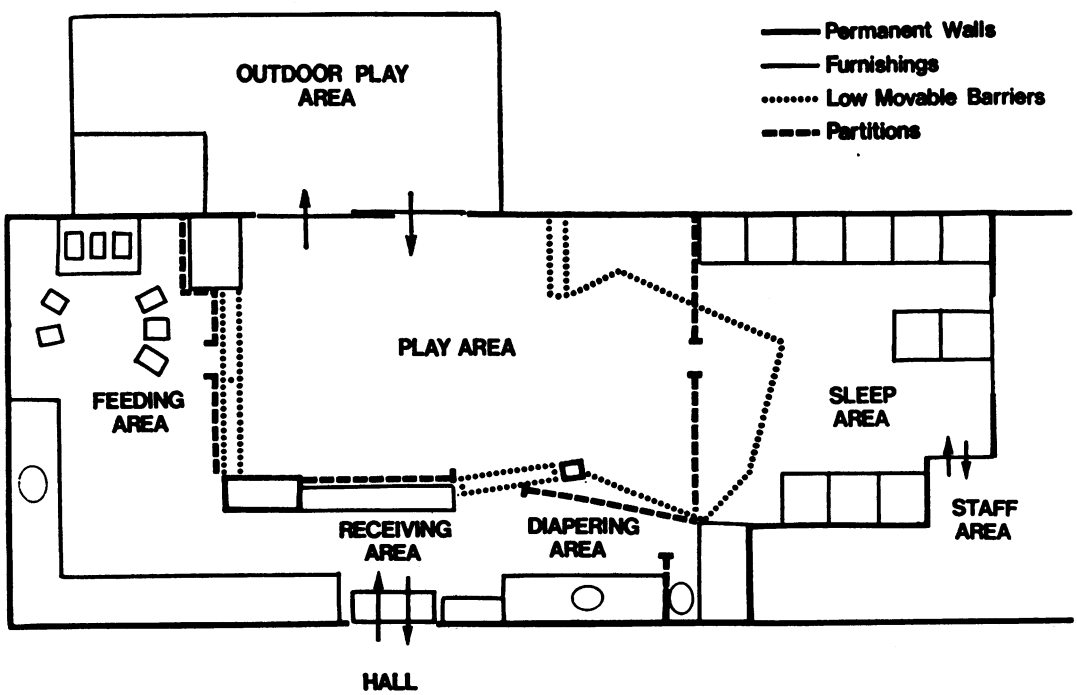


Fig. 2. Scale drawing of the Infant Center. The Center is divided into areas according to function. Low, movable baby barriers (dotted lines) which separate the areas allow the staff, but not the babies, to move easily from area to area. Dashed lines represent the partitions in use during Study I (partition between sleep and play areas only) and Study II (all partitions). The Center measures approximately 20 ft by 50 ft.

member nearest the unseen children. The observer then walked to a position where these children were visible, and measured the distance from that position to the tape. (All of the children did not have to be visible at once from this final position; only the unseen children had to be brought in view.) Average feet travelled was computed by dividing total feet travelled by the number of observations taken each day. (Note: comparably high interobserver agreement was obtained if the distance from the position of the nearest staff member to the position where the unseen children became visible was computed by placing Xs on the map and measuring the distance from the map rather than the floor. Agreement was also very high [above 95%] between the distance measured from the map and the floor. We recommend the map method because it is more efficient.)

Several pairs of observers took the measures simultaneously but independently for 52 checks distributed over 25 days throughout the study. This was accomplished by having both observers enter the Center and record the position of the adults and children simultaneously on separate maps. Then, one observer left the room while the other completed the observation procedures. The second observer then re-entered and completed the observation. Agreement averaged 98% per check for children seen and 92% for feet travelled. These estimates were computed by dividing the smaller number recorded by an observer by the larger number.

## RESULTS

Figure 3 shows the percentage of children seen by any adult and the number of feet travelled by the nearest staff member to supervise the unseen children. The mean percentage of children seen in the open conditions was 97%, but only 78% when the partition separated the sleep area. Average feet travelled per observation to supervise the unseen children was only 1 ft (0.3 m) during the open condition,

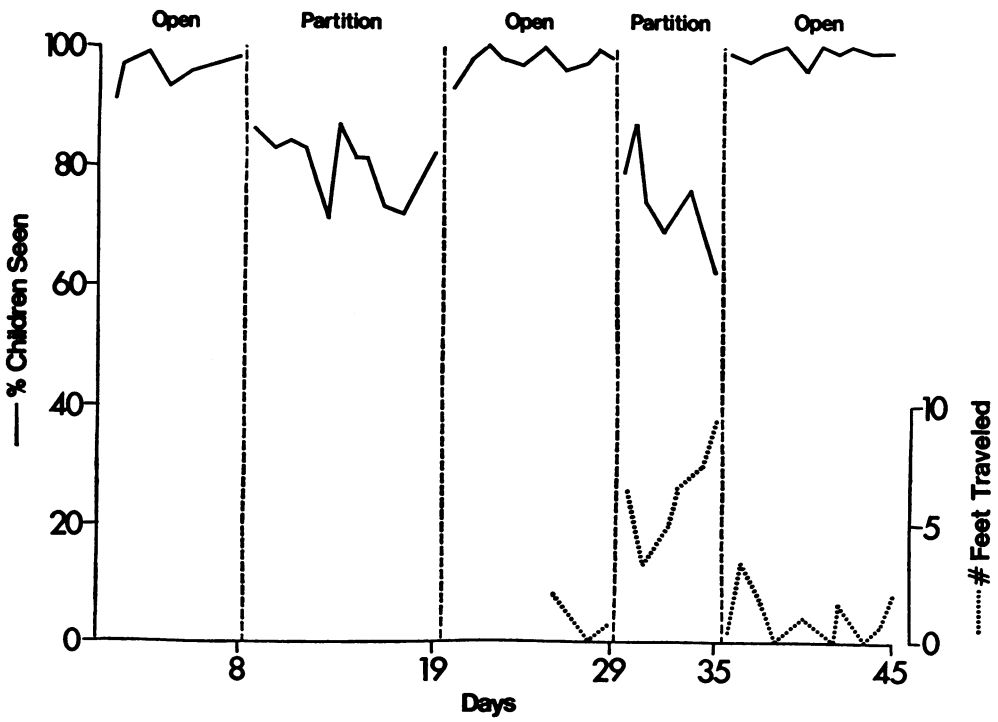


Fig. 3. Percentage of children at the Infant Center visible to one or more staff, and the number of feet the staff member nearest the unseen children was required to travel to see them, when the sleep area was part of the open environment, and when a partition separated the sleep area from the rest of the Center.

but 6.4 ft (1.9 m) during the partition condition. Thus, not only were fewer children immediately visible during the partition condition, but an adult would be required to walk six times as far to supervise the unseen children.

## STUDY II: THE EFFECT OF AN OPEN ENVIRONMENT ON THE VISIBILITY AND SUPERVISION OF STAFF

Study I demonstrated that a partition separating the sleep area from the rest of the Center markedly reduced the percentage of children visible to the staff and greatly increased the response cost to supervise unseen children. The impaired visibility caused by partitions may also affect the ability of the day-care supervisor to monitor staff activities. A second study was, therefore, designed to demonstrate that an open environment markedly decreases the amount of time that staff activities are not visible to the supervisor and the effort required to supervise those not immediately visible.

### METHOD

#### *Subjects*

Approximately the same number of children were present as during Study I and were cared for by five staff members.

#### *Experimental Conditions*

The study lasted 29 days. During the first eight days, no internal walls divided the Center (open condition). During the next 11 days, sheets were hung from ceiling to floor to separate the sleep, play, diapering, feeding, and receiving and departing areas. The heavy dashed lines on the scale drawing in Figure 2 indicate where the partitions were hung, and the openings for moving from area to area. On the twentieth day, the open condition was restored.

#### *Measures*

An observer with a map of the Center entered the room every 2 hr. Times of observation were predetermined for each day so that all half-hours of the day are equally represented in the data. Measures and reliability were taken and computed as during Study I, except that the visibility of staff members to the supervisor and the distance she would have to travel to view each staff member's activity was measured. For distance, two patterns of movement were tried and the shorter was recorded. Agreement averaged 85% per check for percentage of staff seen by the supervisor, and 80% for number of feet travelled to see remaining staff, computed for a total of 19 checks distributed across 13 days.

Probe observations were taken several times during the partitioned and final open condition to determine the percentage of children that could be seen by the supervisor and the number of feet travelled to see the remaining children. (The same methods were used as during Study I.)

### RESULTS

Figure 4 shows the percentage of staff seen by the supervisor and the number of feet travelled to monitor the remaining staff. The average percentage of staff seen during the open conditions was 76%, but only 44% could be seen when the Center was partitioned. Similarly, the supervisor had to travel only 2.8 ft (0.8 m) per observation to bring unseen staff into view during the open conditions, as opposed to 12.3 ft (3.7 m) during the partitioned condition. Thus, not only were the activities of fewer staff members visible to the supervisor during the partitioned condition, but the supervisor would be required to walk more than four times as far to monitor unseen staff.

Furthermore, probe observations indicated that, during the partitioned condition, the supervisor could see only 30% of the children from her location, and travelled an average of 36 ft (10.8 m) to see the remaining children. During the open condition, however, 66% of the children could be seen, and the supervisor had to travel only 16 ft (4.8 m) to see the others, less than half the effort required during the partitioned condition.

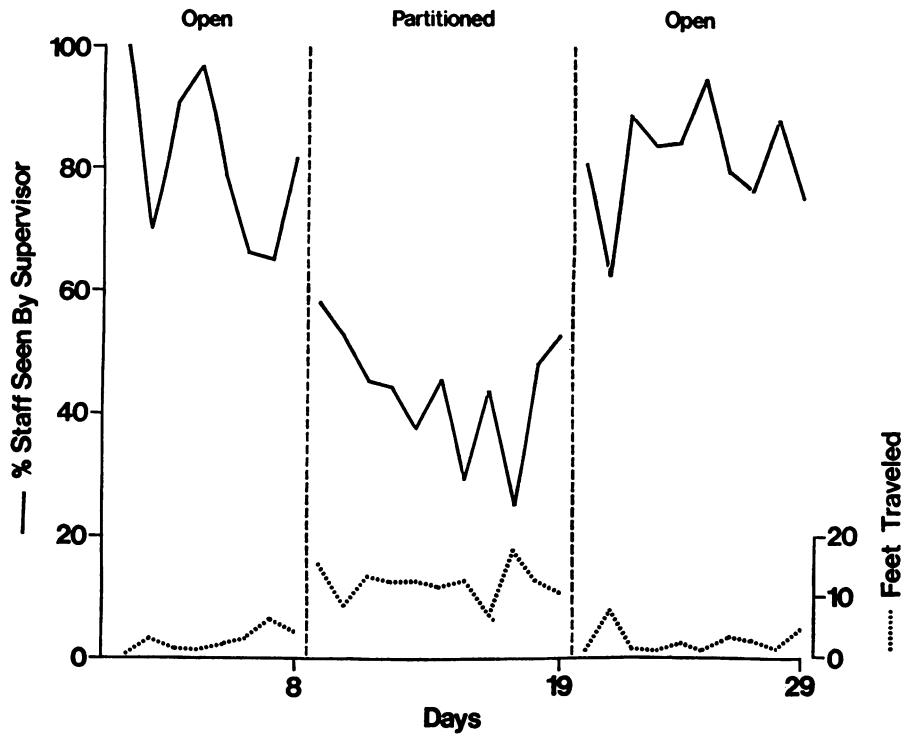


Fig. 4. Percentage of staff at the Infant Center visible to the supervisor from her position and the number of feet she travelled to monitor any unseen staff during open conditions, when no partition separated areas of the Center, and during partitioned conditions, when each area of the Center was separated by a partition.

## STUDY III: THE EFFECT OF A NOISY AND LIGHT ENVIRONMENT ON INFANTS' SLEEP

Studies I and II showed that an open environment resolves the problem of visibility and ease of monitoring of children and staff. However, the general assumption, which we shared, was that an open environment would adversely affect the children's sleep because of the light and noise of other activities. This would differ from the usual home situation, where a child is placed in his own darkened room and the door closed. This study sought to determine how much effect light and noise had on infant sleep, compared to a closed dark room.

### METHOD

*Subjects, Setting, and Nap Routine*

The Infant Center was a two-bedroom apartment with permanent walls. Thirteen children from one month to walking age, who attended the Infant Center for full- or part-time care, participated in the study. The cribs were arranged in one bedroom and the children were put down for naps each day, either at the times specified by their parents or when the supervisor decided they were ready for a nap. Most of the babies did not require any additional attention before going to sleep; however, staff occasionally soothed a restless baby by patting or rubbing his back. Center policy specified that the child be removed from the crib as soon as he had awakened.

*Experimental Conditions*

Alternate conditions of noise and light and quiet and dark were created in the sleep room. During noise and light conditions, an open environment was simulated. The door was left open so that the noise from other activities could be heard and some of these activities were visible from some of the cribs. Light entered

the area from a large picture window covered only by a thin white drape. These conditions were in effect for the first 19 days of the study. During the quiet and dark condition, in effect for the next 14 days, the door to the sleep area was closed, and the picture window was covered with aluminum foil to make the room very dark. The noise and light condition was then repeated for another 12 days.

*Measures*

Throughout the study, an observer quietly entered the sleep room every 15 min for the 4 hr each day (10:00 A.M. to noon, 1:30 to 3:30 P.M.) when the greatest number of children were scheduled to take naps. The observer glanced at each child for an instant and recorded if he was sleeping, awake, or crying, and if an adult was present in the sleep room. Percentages of sleep, crying, and presence of an adult were computed by dividing the number of observations of these behaviors by the total number of observations. In addition, the Infant Center staff recorded the time each child was put down for a nap and the time he was removed from the sleep room. Percentage of children asleep by the first quarter-hour check after being put in the crib was computed by dividing the number of children whose first entry indicated sleep by the number of naps taken that day.

Several pairs of observers recorded the behavior simultaneously but independently several times during each condition for a total of 117 checks distributed across 13 days. Reliability estimates were computed by comparing both observers' records for each observation. An agreement was scored if both had recorded the same behavior. Percentage agreement was obtained by dividing the number of agreements by the sum of agreements and disagreements. Agreement averaged 95% per check for sleep, 80% for crying, 88% for presence of an adult, and 97% for time in and out of crib.

## RESULTS

Figure 5, showing the percentage of sleep and crying that occurred during each condition, clearly indicates that quiet and dark, and noise and light room conditions made no difference. Mean percentage of sleep was 55% and 60%

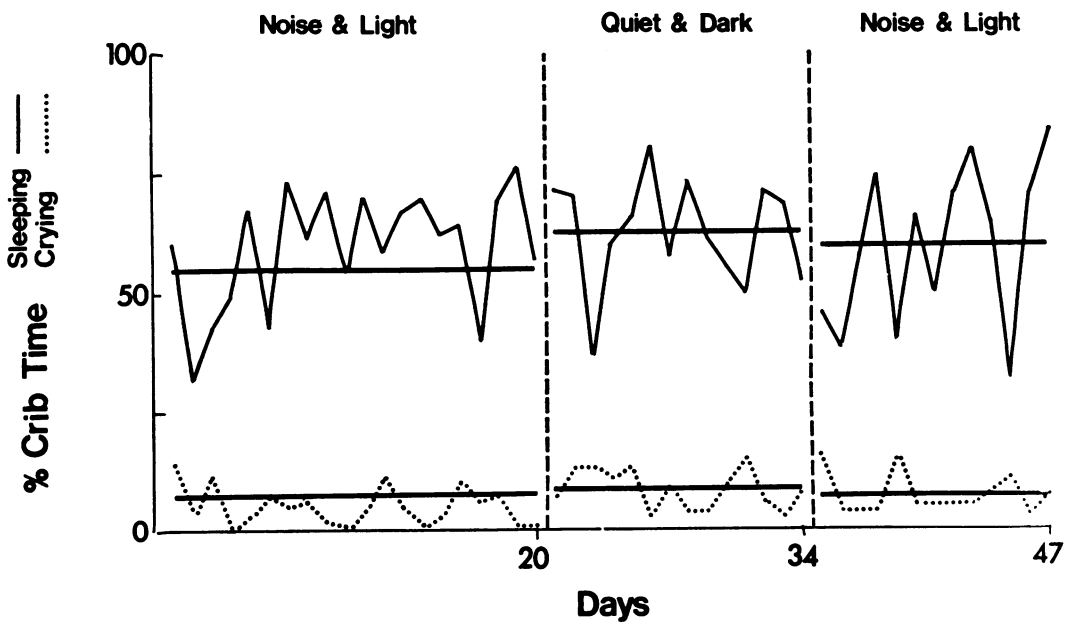


Fig. 5. Percentage of crib time babies spent sleeping and crying in the sleep room of the Infant Center during conditions of noise and light, when the door was left open and the room was light, and quiet and dark, when the door was closed and the room was very dark. Heavy solid lines indicate means for each condition.

for the noise and light conditions and 63% for the quiet and dark condition. Mean percentage of crying was 7.5% and 7% for the noise and light conditions and 8.4% for the quiet and dark condition. The results apply not only to the group, but also to individual children; *i.e.*, none of the babies' sleep was adversely affected by noise and light.

Staff members spent about the same amount of time in the sleep room (about 8%) throughout the study. The children spent about the same amount of time in their cribs and were put down for naps at about the same time throughout the study.

## STUDY IV: THE EFFECT OF VISIBILITY OF INFANT CENTER ACTIVITIES ON INFANTS' SLEEP

Study III showed that, contrary to our expectations, infants' sleep was not affected by a noisy and light environment. However, in an open environment, the infants in the sleep area would not only be exposed to light and noise, but also to the sight of play, feeding, and diapering activities. There was continuing concern on the part of the staff and some parents that the infants could not sleep in the open environment. This study sought to determine if the sight of activities would affect infants' sleep.

### METHOD

#### *Subjects, Setting, and Nap Routines*

The Infant Center was now an open environment as depicted in Figure 2. Twenty-four children from one month to walking age participated in the study and the daily average was 13. Nap routines were the same as during the previous study.

#### *Experimental Conditions*

The sleep area was alternated between open and partition conditions. During Days 1 to 5 and 16 to 21, the sleep area was separated from the rest of the Center by a sheet hung from ceiling to floor. During Days 6 to 15 and 22 to 35, the sleep area was open to the rest of the Center. Although light and noise remained at about the same level during both conditions, none of the Center's activities was visible to the children in the sleep area during the partition conditions.

#### *Measures*

Throughout the study, an observer entered the sleep area every hour from 8:30 A.M. to 4:00 P.M. On alternate days, these checks were taken on the hour or half-hour. Number of children in the area, number sleeping, number crying, and presence of an adult were recorded. These behaviors were computed as during the previous study. Several pairs of observers recorded the behaviors simultaneously but independently throughout the study for a total of 41 checks distributed across 19 days. Agreement per check averaged 98% for sleep, 100% for crying, and 100% for presence of an adult. These were computed as during the previous study.

### RESULTS

Figure 6 shows the percentage of sleep and crying during both experimental conditions. The mean percentage of sleep was 73% and 65% during the partition conditions and 75% and 62% during the open conditions. Mean percentage crying was 7.4% and 7.3% during partition conditions and 2.4% and 3% during open conditions. Thus, sleep was not affected, and crying, which was very low throughout the study, occurred even less during the open conditions. Amount of adult time in the sleep area remained constant throughout the study at about 26%.

It should be noted that the overall percentage of sleep was higher during Study IV than during Study III. This is attributable to the fact that during Study IV, the children were removed from their cribs sooner after awakening, probably due to the instigation of a procedure whereby a staff member checked the sleep area every 15 min.

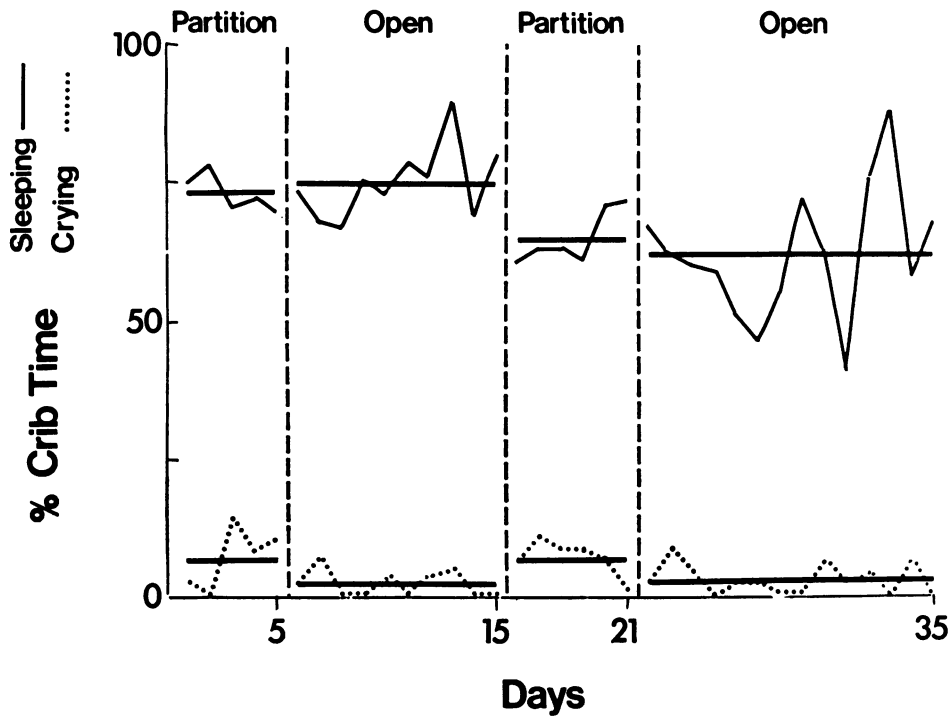


Fig. 6. Percentage of crib time the babies spent sleeping and crying during conditions when the sleep area of the open environment Infant Center was not separated from the rest of the Center (open conditions), and when the sleep area was separated by a partition from the rest of the Center.

## STUDY V: THE EFFECT OF AN OPEN ENVIRONMENT ON TODDLERS' SLEEP

Studies I, II, III, and IV showed that an open environment not only enhances the visibility and ease of monitoring of children and staff, but also does not adversely affect the sleep of infants. However, an open environment, which is ideal for ensuring the visibility of older children as well, may not be conducive to the sleep of "toddlers", who are beginning to walk and talk. These older children are more likely to resist naptime than are infants. They nap at the same time, rather than on individual schedules (as in the Infant Center), and do not need cribs, but can sleep on mats or cots, which are portable and more efficient. Thus, it might be necessary to provide a separate room for sleep or to provide cribs in the open environment so that the children could not get up. This study was designed to determine if an open environment would adversely affect sleep or make cribs necessary.

### METHOD

#### *Subjects, Setting, and Nap Routine*

The study was conducted at the Toddler Center, a modern two-bedroom apartment. Thirteen children, ranging from 13 to 30 months, who attended for full- or part-time care, participated. A mean of nine children was present each day for naps. Each child had a foam mat fitted with a contour sheet and a light blanket. The mats were arranged in the nap area, which the children entered individually after finishing lunch, beginning about 12:15 P.M. A staff member remained in the area throughout naptime to assist the children in lying down on their mats, and to calm the restless ones by rubbing their backs or foreheads. All were either asleep or lying on their mats by 12:45. As the children awakened, they left the nap area individually and were taken to the bathroom and then to the play area. Although almost all had awakened by 3 P.M., children were

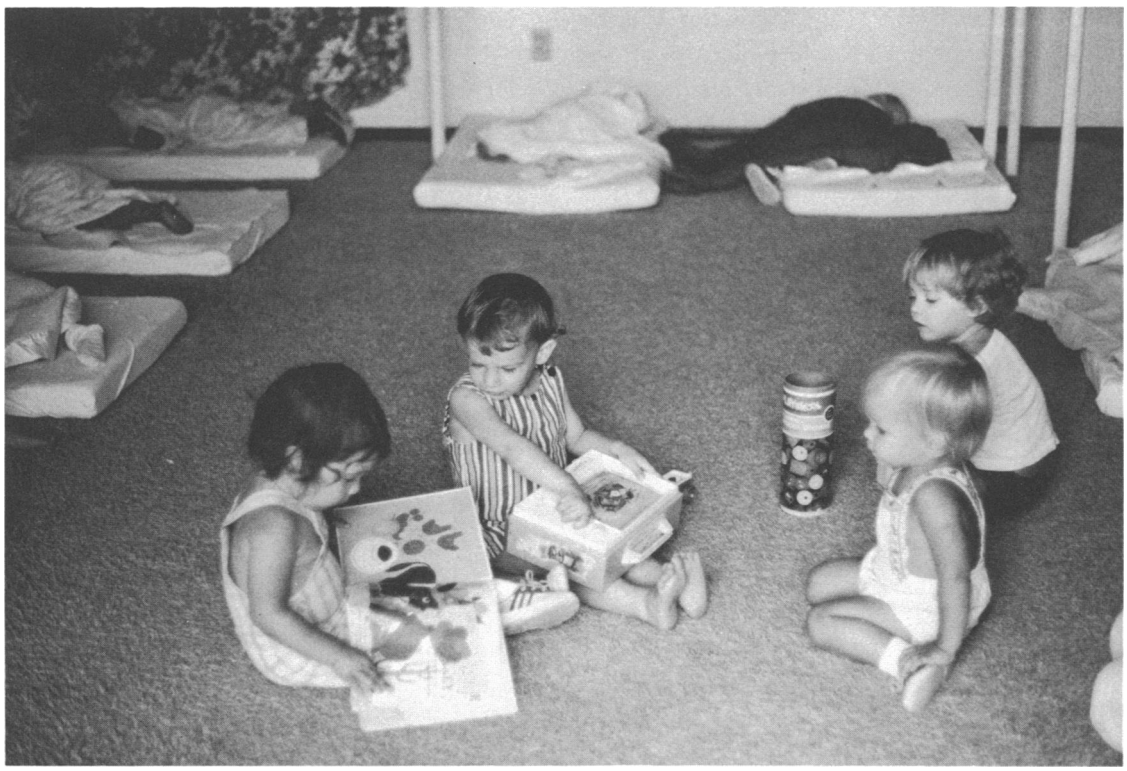

Fig. 7. Toddlers sleeping in the open play area while part-time children wait for their parents and play.

allowed to sleep until snacks at 3:30 if they desired.

*Experimental Conditions*

During the dark closed-room conditions, the nap area was a separate room that was made very dark by covering the window with aluminum foil. The door was closed to minimize noise from other parts of the Center. During the light open-room condition, the window was covered only by a white drape and the door was left open so the children could hear the sounds of the lunch, bathroom, and clean-up routine, and other children playing in the play area. During the open play area condition, the nap area was transferred to the play area where the children were not only exposed to light and noise, but were in the same area as the part-time children who were playing before going home, and could see the staff cleaning up after lunch. Furthermore, children who awakened first began playing in the same area. The sequence of conditions was: dark closed room, light open room, dark closed room, open play area, dark closed room, open play area. The study lasted 78 days.

*Measures*

The staff member in charge of the nap area observed each child every 15 min throughout naptime. (These sleep checks were routinely used to inform the parents about their children's naps.) The staff member glanced at each child for an instant, and recorded if he was sleeping, awake, or crying. Average minutes asleep was computed by dividing the total number of observations the children were recorded as sleeping by the number of children taking naps, and multiplying by 15. Percentage of children sleeping across successive 15-min observations was computed by dividing the number sleeping at a particular check by the number of children taking naps that day, for the last five days of each of the dark closed room and open play area conditions. In addition, an observer quietly

entered the nap area every 4 min for 1 hr or until all children were asleep, looked at the adult in charge for an instant, and recorded if the adult was attending to a child (touching, talking to, covering, *etc.*). The percentage of time an adult spent attending to children was computed by dividing the number of observations it occurred by the total number of observations.

Several observers took the sleep checks with the staff several times during each condition, for a total of 148 checks distributed across 22 days, and a second person observed staff behavior. To make sure the staff took the sleep checks on time, an observer entered the Center at unspecified times and ascertained if the previous checks had been taken. Agreement per check averaged 99% for sleep and 98% for adult attention, and was computed as during the previous study.

## RESULTS

Figure 8 shows the average minutes asleep for the group of toddlers during all conditions of the study. The mean for the dark closed room was 107 min, for the light open room 101 min, and for the open play area 102 min. Although the overall amount of sleep was not affected by the environmental conditions, there was a great deal of day-to-day variability.

Figure 9 shows the average minutes asleep in the closed dark room and open play area for the 10 children who napped under both conditions. These data indicate that there were no large differences for any child, and that there were no trends attributable to the open or closed environment across age. Thus, the assumption that some children need a separate room for naps is not supported.

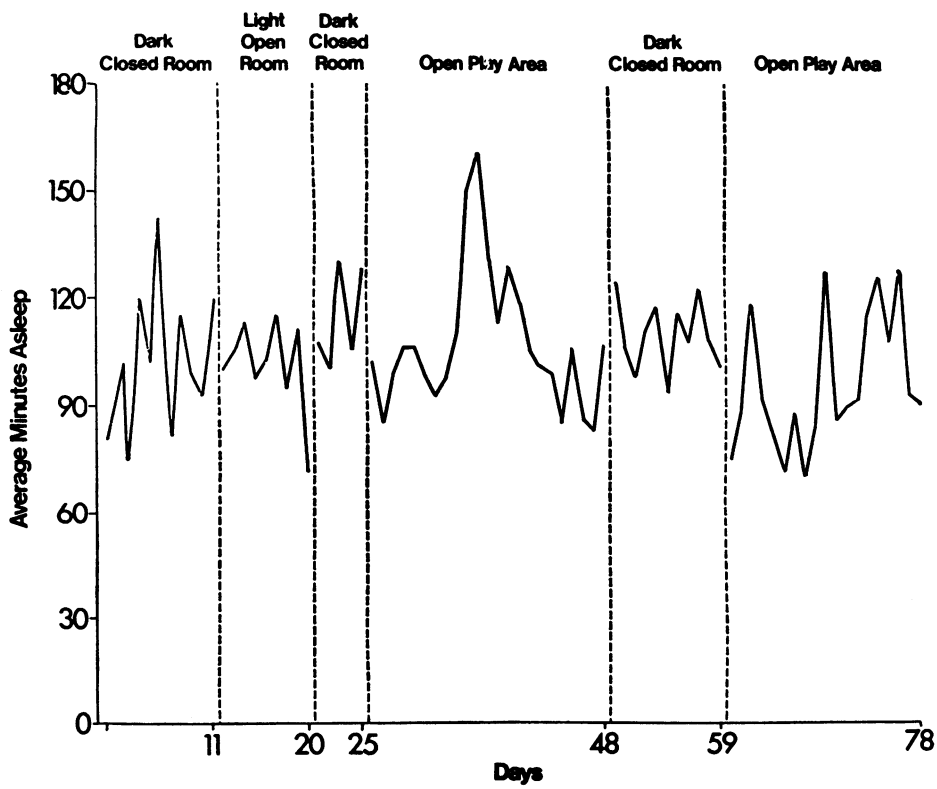


Fig. 8. Average minutes asleep for a group of children at the Toddler Center sleeping in a dark closed room, a light open room, and the open play area. The open play area was not only light and noisy, but children were playing in the area.

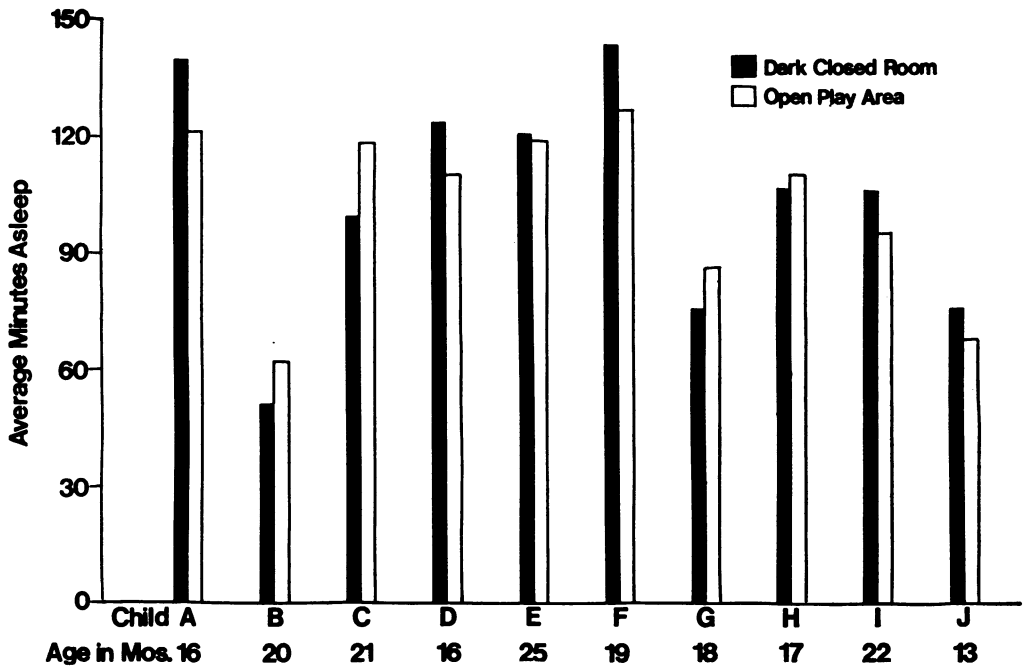


Fig. 9. Average minutes asleep for 10 children at the Toddler Center sleeping in a dark closed room and the open play area.

Figure 10 shows the percentage of children sleeping across successive 15-min observations in the dark closed room and the open play area. The figure indicates that the children fell asleep faster in the dark closed room than they did in the open play area. By 12:45, 90% of the children in the dark closed room were asleep, but only 62% in the open play area were asleep. However, the children also awakened earlier and more gradually in the dark closed room. In the dark closed room, the children tended to awaken in 10 to 15% increments from check to check, whereas, between 2:00 and 2:15 and 2:30, the per cent awake in the open play area increased in 20 to 35% increments.

Thus, the children slept about as long in the open play area as in the dark closed room, but took slightly longer to fall asleep and awakened in groups. The adult spent the same amount of time attending to the children throughout the study, about 66% of the time children were awake. Crying occurred so rarely that it was not included as a dependent variable.

## STUDY VI: THE EFFECT OF AN OPEN ENVIRONMENT ON TODDLER PRE-ACADEMIC ACTIVITIES

Studies I and II showed that an open environment resolves the problem of the visibility and ease of supervision of children and staff in an infant day-care center. Studies III, IV, and V showed that an open environment is not detrimental to sleep of either infants or toddlers. The final study investigated the question of whether an open environment is conducive to pre-academic activities for toddlers. In these activities, children sat at a small table for 10 min with an adult and another child and participated in a semistructured way with pre-academic materials. Such activities, because they focus a child's attention on one activity for a period of time, can be used to teach children the proper use of materials; they were also seen as a means of providing children with short periods of concentrated personal attention from adults, which they may not receive in a group.

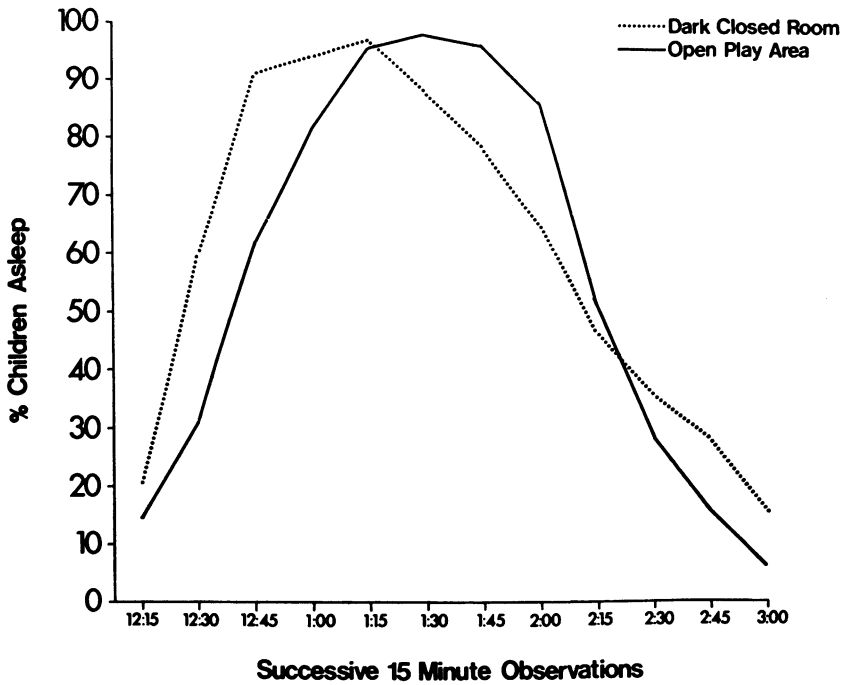


Fig. 10. Percentage of children asleep at the Toddler Center across successive 15-min observations when they slept in a dark closed room and the open play area.

It was thought that a separate room might be needed for pre-academic activities because the sights and sounds of the children in the play area might be distracting for those at the table, or they might leave the table to join the larger group. In addition, children from the play area might disrupt the activities by grabbing the materials or trying to participate, or the adults might attend less to the children if another adult were available to talk to.

## METHOD

### *Subjects and Description of Pre-academic Activities*

Sixteen full- or part-time children at the Toddler Center, ranging from 13 to 26 months, participated in the study. All four staff members conducted the activities.

Six activities were planned and tested with the toddlers before the study began. These were puzzles, beads, coloring, body parts, pegs, and pictures. The staff received brief instructions for each activity, describing what they should try to have the child do. Except for the very young children who required a great deal of adult help, the children generally determined their own pace, since several pieces of the material were available to them. The exceptions were pictures and body parts, where an adult request preceded the response.

Three 10-min sessions, each involving two children and an adult, were held both in the morning and the afternoon. The observer selected children for a pre-academic activity by drawing names from a name pool of all children present. Names were not replaced until all the children had participated in an activity. Staff were chosen to conduct the activities so that each one conducted about the same number of activities in each of the environmental conditions, and each conducted a variety of the six activities.

### *Experimental Conditions*

At the beginning of the study, pre-academic activities were held either in a separate room or behind a screen in the play area. Environmental

Fig. 11. Pre-academic activities in the open play area of the Toddler Center.

conditions were counterbalanced across time of day such that, on Day 1, morning activities were held in a separate room and afternoon activities were held behind the screen. The following day, the order of conditions was reversed. This rotation continued for 12 days.

For the next 16 days, pre-academic activities were held either behind the screen or in the open play area. The conditions were counterbalanced across the time of day as described above. Throughout the 26 days of the study, the type of activity was counterbalanced across the time of day and across the type of environment.

For the final four days, the adults were given specific instructions not to try to keep the children in their chairs by either verbal or physical means. Although they had rarely been observed to do this, this step was intended to emphasize the fact that additional effort was not required by the open environment. If a child left the activity, the adult was to continue interacting with the remaining child and resume interaction as soon as the child returned to the activity.

Child attention to activity, out-of-seat, number of products (*i.e.,* pieces placed in a puzzle, beads on string, *etc.*), and adult attention to children were measured. Each child at the pre-academic activity was observed for an instant four times per session and recorded as attending if he was manipulating the play materials or looking at the play materials, the adult, or the other child at the activity. If the child was completely out-of-seat, this was recorded.

Each child was also observed for 1 min four times per session. The observer counted the number of times the child accomplished the product for that activity with or without adult help. These were defined as follows for each activity:

Puzzles—number of times a piece was placed in its correct space.

Beads—number of times the string was put through the hole of a bead.

Pegs—number of times a peg was put in its hole and remained standing after the child removed his hand.

Pictures—number of times child pointed correctly to something in the picture after an adult request.

Body Parts—number of times child pointed correctly to a body part or imitated the adult after an adult request.

Coloring—after the session, the observer scored the child's drawing from 1 to 4. A rating of 1 meant less than one-fourth of the page was colored, while 4 meant almost all was colored.

The adult was observed for a 5-sec interval four times per session and recorded as attending to a child if she touched him, talked to him, or used a play material with him, *i.e.,* touched the same material, handed it to the child or took it away, or demonstrated how to use it. In addition, during the final nine days of the study, when sessions were conducted in the open play area, the observer watched the play area for 5 sec every 5 min and recorded whether or not other children were within 3 ft (0.9 m) of the activity table and whether they were disrupting the activity by taking materials, talking to the child at the table, *etc.* Data were computed as follows: number of products was the average total for all of the children who participated in a set of morning or afternoon activities; per cent child attention, per cent out-of-seat, and per cent intervals adult attention were the number of observations the behavior occurred, divided by the total number of observations.

Several pairs of observers recorded the behaviors simultaneously but independently at least one session per day throughout the study, for a total of 52 checks distributed across 30 days. Agreements per check, computed as during the previous study, were 94% for child attention, 90% for out-of-seat, and 98% for adult attention. For products, each 1-min observation was compared and the smaller number recorded by an observer was divided by the larger. Agreement was 89%. Agreement that no disruptions had occurred was 100% (based on nonoccurrences), and 100% for children being within 3 ft (0.9 m) of the activity (based on occurrences).

## RESULTS

Figure 12 shows the number of products, percentage of time children attended to the activity, percentage of 5-sec intervals the adult attended to a child, and the percentage of time the children were out of their seats. None of these measures indicated that one environment was superior as a setting for pre-academic activities. In all conditions, both children and adults participated almost all of the time. These group data are representative of the behavior of individual children, all of whom performed in about the same way under all conditions. Furthermore, the data on the behavior of the rest of the children in the play area indicated that, although at least one child was usually within 3 ft (0.9 m) of the activity (71% of the observations), no disruption was ever observed.

## DISCUSSION

This series of studies comparing day-care routines in open and partitioned environments clearly demonstrated the desirability of the open environment. In the open environment, the children were almost continuously visible to the staff and the staff were almost continuously visible to the supervisor. Response cost of supervision was greatly reduced. Furthermore, infant and toddler sleep was not adversely affected by an open environment and pre-academic activities for toddlers could be carried out as successfully in an open environment as in a separate room. Thus, infant and toddler day care definitely can and should be accomplished in an open environment.

Although the open environment was not detrimental to sleep or pre-academic activities, alternative possible explanations for these results

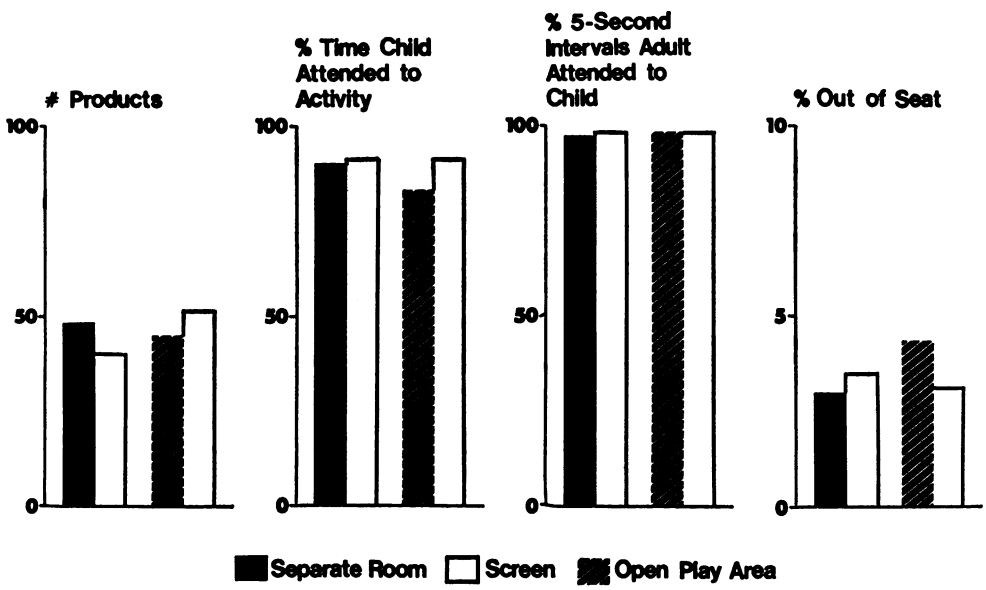


Fig. 12. Number of products, percentage of time children attended to activity, percentage of 5-sec intervals adult attended to child, and percentage of time children were out of seat at the Toddler Center when pre-academic activities were conducted in a separate room, in the play area behind a screen, and in the open play area.

were recognized. Particular attention was given to staff behavior, since changes in this variable could have countered environmental effects. Staff could have attended to the children differentially, or put them in their cribs later in one condition than in another. Staff behavior was measured to be certain this had not occurred. Similarly, staff behavior was constrained in the study on pre-academic activities, to make sure they did not keep the children in their seats or keep other children from disrupting the activities through their increased efforts.

Another dimension of concern was crying, since environmental conditions that produced a great deal of crying would probably not be recommended regardless of the other benefits obtained. At the Infant Center, it was found that the level of crying either remained the same or was slightly lower in the open environment. At the Toddler Center, crying occurred so infrequently that it could not be used as a dependent variable.

The reactions of staff to the open and partitioned environments were obtained by means of a short questionnaire distributed during Study II, when each of the areas of the Infant Center was separated from the others. The staff members were asked what type of environment they preferred to work in and what type they felt the babies preferred. Eighty per cent responded they would rather work in an open environment. Reasons given revolved around the fact that they could see other areas of the Center, which made caring for the babies easier.

However, 80% also felt that the sleep area should *not* be part of the open environment, but should be located in a separate room. The staff strongly believed that the open environment was hindering the babies' sleep, whereas these studies showed no difference in onset or duration of sleep between the open and closed environment. Clearly, the staff had a preconceived idea about the benefits of sleeping in a separate room that was not borne out by the facts.

Other preconceived ideas, which may have as little basis in fact as this one, may be preventing the adoption of the open environment design in other situations where dependent persons are cared for, *i.e.*, classrooms, residential treatment

facilities, *etc.* The feeling that the open environment leads to distractions from desired behaviors was not supported by the present studies, for children were found to sleep just as well and to participate fully in pre-academic activities despite the presumed distractions around them.

These studies, therefore, suggest that at least some of the disadvantages of the open environment have been overstated. Further study to determine the desirability of the open environment design in other situations can help to make its benefits available to greater numbers of people.

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