

Methodological Problems in Direct Observation of Children's Dietary and Activity Behaviors

應用「直接觀察法」在學童飲食及活動行為研究的問題

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Abstract

The purpose of this research paper is to report the methodological difficulties which resulted from a study first conducted in the US and replicated in Hong Kong. Using the Behavior of Eating and Activity for Children's Health Evaluation System (BEACHES). Forty participants between the age of 6 and 8 drawn from middle income areas of the city were selected. Eight research assistants set up 4 1-hour home observations and 6 20-minute observations in the school during the recess period. The implication of the present study is that the instrumentation and the method created interference to the extent that the research interval, in which the participants were observed, failed to represent the normal behavior patterns especially those related to dietary behaviors. Specifically, the interactive impact and the cultural differences undetected by the research instrument are significant problems which demand consideration for future direct observational research.

摘要

本研究旨在討論應用「直接觀察法」在學童飲食及活動行為研究時所出現的問題。採用BEACHES研究工具直接觀察本地四十位6至8歲學童在學校小息及家庭中的行為模式。研究結果顯示在使用直接觀察法及BEACHES工具時所遇到的問題，體育同工在選擇應用同類的研究方法及工具時，應注意有關文化差異等問題。

The purpose of this paper is to report the methodological difficulties which resulted from adopting a model for the direct observation of children's dietary and activity behaviors. The model known as the Behavior of Eating and Activity for Children's Health Evaluation System (BEACHES) was developed by (McKenzie, Sallis, Nader, Patterson, Elder, Berry, Rupp, Atkins, Buono, & Nelson, 1991). According to the authors, it is a system which can be used in most settings and provides an integrated mechanism for the measurement of dietary and activity behaviors of children as potential determinants of children's health.

In the study, from which this paper was developed, an attempt was made to closely replicate the BEACHES to confirm the utility of the instrument across ethnic groups as suggested by McKenzie et al. (1991). The present paper reports the difficulties encountered when an attempting to replicate the BEACHES and provides some general insights into the pitfalls which may occur

when researchers attempt to adopt a research instrument designed for one culturally specific group and used in another.

Review of Observational Methods

Direct observational research conducted by Kleges, Coates, Moldernhauer-Kleges, Holzer, Gustavson, and Barnes, (1984), McKenzie, Sallis, Nader, Patterson, Elder, Berry, Rupp, Atkins, Buono, and Nelson, (1991), McKenzie, Sallis, and Nader, (1991), Sallis, Berry, Broyles, McKenzie, and Nader, (1995) have all produced highly reliable systematic models for observing children's behaviors. Their findings reflect the complexity of the relationships which exist between dietary behaviors, physical activity and health risk considerations. For example, ethnic differences (McKenzie, Sallis, Nader, Broyles, & Nelson, 1992), location of play (in or out of doors), degree of prompting (Sallis, Nader, Broyles, Berry, Elder, McKenzie, & Nelson, 1993) and parental modeling

(Sallis, Patterson, McKenzie, & Nader, 1988), all influence the child's activity level.

The pattern of dietary behavior seems more difficult to define but an interest in children's eating habits has been stimulated by several revelations in the literature. For example, there is disagreement that obese children are less active than non-obese children (Kleiges, Coates, Moldenhauer-Kleiges, Holzer, Gustavson, & Barnes, 1984; Kleiges, Malott, Boschee, & Weber, 1986; Waxman & Stunkard, 1980) but may be more likely to suffer from high levels of serum cholesterol (Leung, Ng, tan, Lam, Wang, Xu, & Tsang, 1994). On the other hand, physical activity in children has been linked to the amount of high-density lipoprotein cholesterol found in their blood stream (Durant, Linder, & Harkness, 1983) and their low blood pressure (Sallis, Patterson, Buono, & Nader, 1988; Simons-Morton, Parcel, & O'Hara, 1988; Fraser, Phillips, & Harris, 1983). Therefore, it is important to pursue further research which will provide more systematic and precise information on the dietary behaviors and the effects of eating patterns on children.

Procedures for Data Collection

In order to replicate the study by McKenzie et al.(1991), on a different ethnic group, a sample of Hong Kong school age children was drawn. The study called for 40 participants between the age of 6 and 8 from middle income areas of the city. True randomization was not possible due to the intrusive nature of this study. Consequently, participants were selected with the help of the school principals who informed parents and requested their cooperation. Once the approval of the parents had been granted, 8 research assistants contacted the parents of five students who were randomly assigned to them in order to arrange 4 1-hour home observations and 6 20-minute observations in the school during the recess period. The number and length of observations were based on the optimum numbers suggested in previous studies conducted in North America (Kleiges, Coates et al. 1984; McKenzie et al. 1991).

In order to prepare the observers for this study, eight research assistants attended 25 hours of observational training. Training video tapes of children in home and school playground settings were produced and shown to the research assistants. The research assistants were required to identify independently and code the behaviors of the children according to the system described by McKenzie et al. (1991). Several training formats including group and individual sessions were arranged to familiarize the research assistants with the coding system. Prior to the commencement of the study, the research assistants practised their observational skills until independent inter-observer agreement of 85% had been reached or exceeded. Inter-observer agreement scores were

calculated from interval-by-interval assessments and recorded as percentage of agreement (Darst, Zakrajsek, & Mancini, 1989). In addition to weekly meetings with the principal researchers to check inter-observer reliability, the research assistants also discussed difficulties which may have arisen during the observation sessions. During the discussions, the research assistants were asked to report on the effectiveness of the method, how it might be improved and whether any difficulties were experienced during data collection. The research assistants were encouraged to be frank and disclose any information, even though it may have been critical of the method, in order that future research would avoid such pitfalls.

Results

Consistent with other similar studies, the BEACHES generated approximately 360 behaviors recorded over an average of 5.5 hours of close observation for each child. The instrument also provided information on the context of the recorded behaviors which are summarized and explained in the following figures:

As indicated in Figure 1, mothers, siblings and peers were the most frequently recorded individuals who associated with the participants during the observation period whereas at school, peers represent the membership of the social environment.

Figure 2 illustrates the observations of the activities of participants in the physical environment of their home surroundings. These activities included, sitting alone or sitting alone and watching TV, getting a snack, doing homework, reading or playing computer games. Although the participants were either about to go to school or had been to school, the results indicate that subjects spent over 36% of the time doing nothing.

Figure 3 shows that the limitations of facilities, play spaces and equipment was a discouraging factor which affected the amount of activity. Only 4% of all observations indicate very active levels of physical activity with 13% of the observations being characterized as active. Over half (55%) of the observations recorded sitting as the preoccupation of the subjects while an additional 20% of the observations recorded standing as the main activity.

Figure 4 indicates that only 15% of the children ingested food. The low frequency of this behavior is plausible because the results show that there was little interaction during the home visits and over 50% of the observation period was spent undisturbed and alone. When interaction took place, 15% of the interaction was with the mother and 17% presumably was with peers during the school recess.

Chi Square tests were run to examine possible differences in eating behaviors based on gender and location. With regard to eating behaviors, there were no significant differences between boys and girls in terms of their eating behaviors ($X^2=0.05$, $df=1$, $p<.05$) or between boys and their locations ($X^2= 2.90$, $df =2$, $p<.05$) or girls and their locations ($X^2= 9.36$, $df =2$, $p<.05$). It was not possible to determine if cultural or circumstantial factors influenced the rare occurrence of eating.

Discussion

The data collected on physical activity behaviors patterns were analyzed and published (Johns & Ha, 1999). The data on dietary behaviors, on the other hand, were unimpressive and provided little insight into the eating behaviors of the children under study. It was concluded that the behaviors were so unnatural for 6 -8 year old children that further examination of the data and methodology were required.

A summary of the debriefing:

A close examination of the research methodology and findings exposed differences between what was expected to happen and what happened. According to the research assistants, the children observed in this study were, for the most part, cooperative and permitted the direct observation to be conducted. Nevertheless, the following interactive occurrences cannot be ignored.

Initial interactive effect. Although few have expressed concern about the possible interactive effect of the direct observation method (Patterson, Sallis, Nader, Rupp, McKenzie, Roppe, and Bartok, 1988), the research assistants in this study suggested that their presence had a noticeable influence particularly at the beginning of the home and school observation period. However, as participants got use to the presence of the research assistants, the effects of interactivity diminished.

Reactive behavior. Other reactive behaviors were noted by the research assistants. For example, one research assistant reported that the participant was "naughty" and refused to cooperate by locking herself in her room for most of the observation hour. Fortunately, this behavior was not repeated. In two other cases, the research assistants discovered that supervising adults scolded their children and warned them that the research assistant would report them to the teacher if they misbehaved. One research assistant informed the group that she had difficulty in following the participant in the school observation session because the target child deliberately attempted to hide from the observer during the recess, making it difficult for her to record the observations.

Problematic home settings. The intrusive nature of this research was amplified, particularly in the home settings, by the proximity of the research assistants to the participant. The relatively confined space of Hong Kong flats, combined with the close proximity of two adults, generated an unnatural social environment in which it was impossible to ignore the researcher and avoid the threat of the parent to behave in his or her presence.

This lack of interaction was reflected in the data which indicated that very little interaction took place between the participant and others during the observation period. This raises the question of whether such an unusually quiet, and non-reactive behavior is truly representative of what really happens in family life. Paradoxically, while the research assistants were successful in gaining entry to the private world of children and their families, a screen of silence prevented the full understanding of normal family life as it influences the child's eating and activity behaviors. Regardless of whether the child had been to school or was about to go to school, eating and moderate to high activity were both rare occurrences. Consequently, very little was discovered about the normal eating behaviors of the participant whose lack of interest in food seemed inappropriate in children so young.

Problematic school settings. As suggested earlier, school recess behaviors did not appear to be unduly influenced by the presence of the research assistant. Nevertheless, there were other methodological issues which have not been reported in the literature with regard to direct observation work in noisy settings, such as children's playgrounds. For example, one research assistant reported that he found it difficult to hear what the participant were saying when they were in groups and when there was a high volume of competing sounds. Consequently, the research assistant, was unable to discern the prompts and exchanges between participants and peers and failed to accurately code the verbal prompts related to both eating and activity in the playground.

Cultural Component. While the above validity questions are common in this type of research, it is more difficult to ascertain the impact of the cultural influence on the research. It is not known, for example, to what extent the intrusive nature of this research was resisted by the family even though they had agreed to allow the research assistants to enter their home. It is difficult to gauge the effect of adult intervention in substantially altering the behavior patterns of the participants. Furthermore, it is not known whether the exhibited passivity in the home continued at school because the participants sensed continued surveillance in the school recess period.

Conclusions

The purpose of this paper was to report the methodological difficulties which resulted from adopting the BEACHES developed by McKenzie et al.(1991) and provide some insights into the pitfalls which may occur when researchers attempt to adopt a research model designed for one culturally specific group and used in another.

It was determined that major problems arose which were difficult to predict before the research commenced. The implications are that the instrumentation and the method created interference to the extent that the research interval, in which the participants were observed, failed to represent the normal behavior patterns especially those related to dietary behaviors. Consideration must be given to the interactive impact of direct observational research in culturally different groups.

With the exception of Patterson et al. (1988), none of the North American studies reviewed encountered problems with insensitive instrumentation. Nevertheless, as a precaution, it is advisable when conducting direct observational research, to arrange to conduct preliminary investigations in order to make the necessary modifications in methodology and instrumentation. This is crucial especially when conducting research in cultures which are different from the place of origin of the research model.

Recommendations

Although there are reservations about the interactive impact, the direct observational method is a practical way of collecting data even in culturally sensitive settings such as the participant's home surroundings. The following suggestions are offered as recommendations for future research in culturally diverse populations and different ethnic groups.

1. Being more aware of the cultural differences may assist in gaining access to the participants without disturbing the rhythm of their lives. Researchers should attempt to work with trained professionals who are of the same ethnic background as the population being observed in order that they may become more culturally sensitive. This will improve the quality of data and reduce perceived threats to privacy.
2. Reduce proximity problems by observing the child in more natural settings created when siblings, peers and family members are present. This may reduce the interactive effect of feeling like a specimen under microscopic examination.
3. Reactivity may also be reduced by using the same research assistant to visit the same home over an extended period of time prior to commencing the data collection. In so doing, the family and the target child become use to the observer.
4. Talk to adults about natural behavior and establish which times of the day are more relaxed for observational purposes so that the observation may take place when a variety of behaviors can be observed. This would avoid times of the day when the participant is abnormally quiet or preoccupied with activities which are bound by adult expectations and constraints.
5. Find out what cultural taboos exist and establish the cultural significance of eating in the home, in public or in front of strangers. This is particularly important in studies, such as the present one, where discovery of normal eating behaviors is central to the problem being investigated.

References

- Durant, R. H., Linder, C. W., & Harkness, I. W. (1983). The relationship between physical activity and serum lipids and lipoproteins in black children and adolescents. *Journal of Adolescent Health Care*, 4, 55-60.
- Fraser, G.E., Phillips, R. L., & Harris, R. (1983). Physical fitness and blood pressure in school children. *Circulation*, 67, 405-412.
- Johns, D. P. & Ha, S. C. A. (1999). Home and recess physical activity of Hong Kong children. *Research Quarterly for Sport and Exercise*, (In press.)
- Kleges, R. C. Coates, T. J., Moldernhauer-Kleges, L. M., Holzer, B., Gustavson, J., & Barnes, J. (1984). The Fats: An observational system for assessing physical activity in children and associated parent behavior. *Behavioral Assessment*, 6, 333-345.
- Kleges, R. C. Malott, J. M. Boschee, P. F. & Weber, J. M. (1986). The effects of parental influences on children's food intake, physical activity and relative weight. *International Journal of Eating Disorders*, 5, 335-346.
- Leung, S. F., Ng, M. Y., Tan, B. Y., Lam, W. K., Wang, S. F., Xu, Y. C., & Tsang, W. P. (1994). Serum cholesterol and dietary fat of two populations of southern Chinese. *Asian Pacific Journal of Clinical Nutrition*, 3, 127-130.

McKenzie, T. L. , Sallis, J. F., & Nader, P. R. (1991). SOFIT: System for observing fitness instruction time. *Journal of Teaching in Physical Education, 11*, 195-205.

McKenzie, T. L., Sallis, J. F., Nader, P. R., Patterson, T. L., Elder, J. P., Berry, C. C., Rupp, J. W., Atkins, C. J., Buono, M. J. & Nelson, J. A. (1991). BEACHES: An observational system for assessing children's eating and physical activity behaviors and associated events. *Journal of Behavior Analysis, 24*, 141-151.

McKenzie, T. L., Sallis, J. F., Nader, P. R., Broyles, S. L., & Nelson, J. A. (1992). Anglo- Mexican- American preschoolers at home and at recess: Activity patterns and environmental influences. *Journal of Behavioral and Developmental Pediatrics, 13*, 173-180.

Patterson, T. L., Sallis, J. F., Nader, P.R., Rupp, J. W., McKenzie, T. L., Roppe, Bea & Bartok, P. W. (1988). Direct observation of physical activity and dietary behaviors in a structured environment: Effects of a family-based health promotion program. *Journal of Behavioral Medicine, 11* (5). 447-457.

Sallis, J. F., Patterson, T. L., Buono, M. J. & Nader, P. R. (1988). Relation of cardiovascular disease risk factors in children and adults. *American Journal of Epidemiology, 127*, 933-941.

Sallis, J. F., Patterson, T. L., McKenzie, T. L., & Nader, P. R. (1988). Family variables and physical activity in preschool children. *Developmental and Behavioral Pediatrics, 9*, (2), April.

Sallis, J. F., Nader, P. R. Broyles, S. L., Berry, C. C., Elder, J. P., McKenzie, T. L., Nelson, J. A. (1993). Correlates of physical activity at home in Mexican-American and Anglo-American preschool children. *Health Psychology, 12*, (5), 390-398.

Sallis, J. F., Berry, C. C., Broyles, S. L., McKenzie, T. L., & Nader, P. R. (1995). Variability and tracking of physical activity over 2 yr in young children. *Medicine and Science in Sports and Exercise 27*, (7). 1042-1049.

Simons-Morton, B. G., Parcel, G. S., & O'Hara, N. M. (1988). Childhood health related physical fitness: Status and recommendations. *Annual Review of Public Health, 9*, 403-425.

Waxman, M., & Stunkard, A. J. (1980). Caloric intake and expenditure of obese boys. *Journal of Pediatrics, 96*, 187-193.

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Figure 1. Distribution of social environment for all subjects.

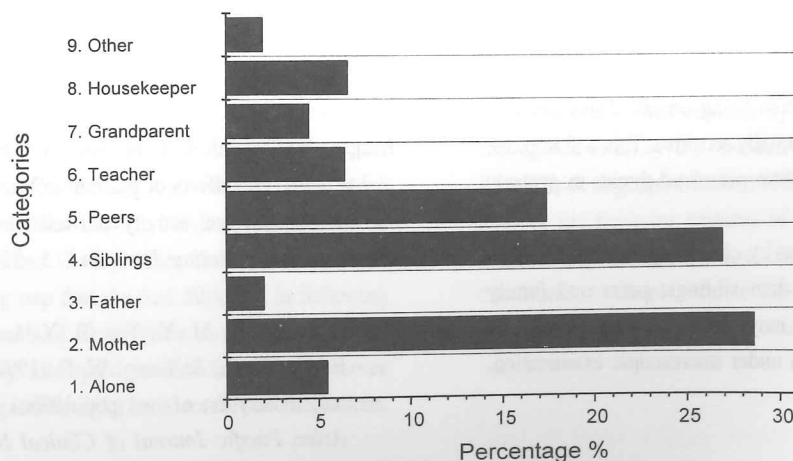


Figure 2. Distribution of physical environment for all subjects.

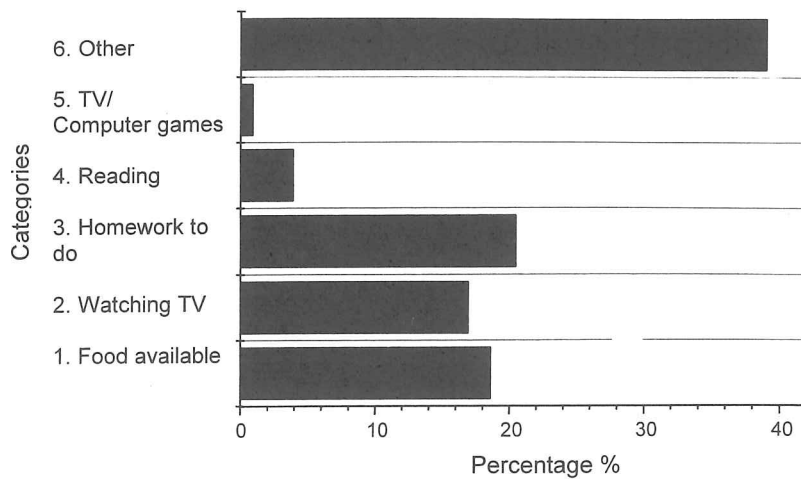


Figure 3. Distribution of activity level for all subjects.

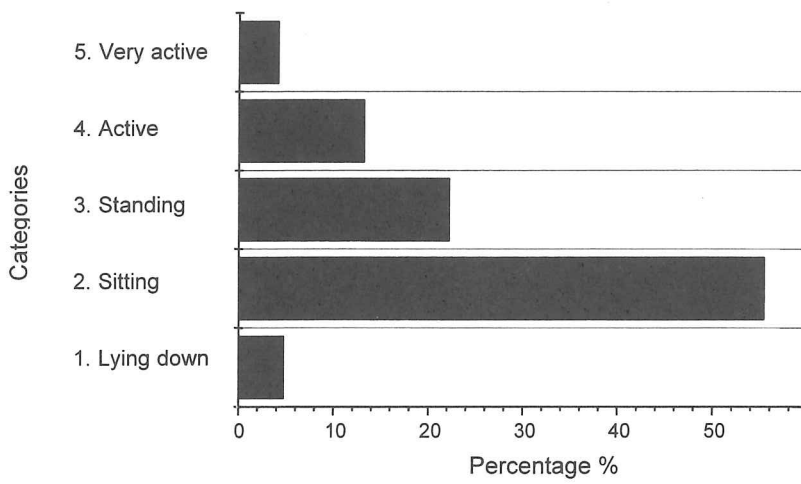


Figure 4. Distribution of eating behaviour for all subjects.

