EXTERNALITY AND LOCUS OF CONTROL IN OBESE CHILDREN

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ABSTRACT

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Separate operational definitions of external-cue responsivity and locus of control were measured and independently related to obesity in children. The relationship between these behavioral and personality measures of externality was also examined.

Subjects were 28 obese and 31 normal-weight middle class children, aged 8-12 years. Each subject completed a food-related measure of external-cue responsivity, and three non-food-related measures of immediate recall, time estimation and emotionality. As well, each child completed the Nowicki-Strickland Locus of Control Scale (CNS-IE).

Results indicated that none of the measures of externality was related to weight, nor were any measures strongly or consistently correlated. Thus little support was provided for the notion of a single underlying dimension of externality. All children were more responsive to food-related than non-food related items on the immediate recall task. Significant sex differences were obtained on both the preload measure and the CNS-IE. Boys ate more than girls and clinical observations indicated that obese girls in particular attempted to restrain their intake. Girls were more external than boys in locus of control orientation. These results were discussed in relation to current reformulations of the external-cue hypothesis. The importance of variables such as degree of obesity, age, sex, socio-economic level, familial factors and social-emotional dysfunction, in the etiology of developmental obesity, as well as their implications for differential treatment strategies, were discussed.

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Obesity is a disease characterized by an excessive generalized deposition and storage of nonessential subcutaneous body fat or adipose tissue. It results from prolonged positive caloric balance, i.e., a chronic state of energy intake exceeding energy expenditure (Hollenberg, 1978). Obesity has been implicated as a causal and/or aggravating factor in such medical conditions as atherosclerosis and diabetes (Knittle & Ginsberg-Fellner, 1975; Oscanova & Hejda, 1975). The enduring psycho-social sequelae of obesity have also been documented (Brownell & Stunkard, 1978; Foreyt & Frohwirth, 1977; Hirsch, 1975; Lebow, 1977). Based on such findings, researchers are attempting to understand and control obesity in young children (Hollenberg, 1978).

It has been suggested, for example, that associated medical risks are higher and psychological disturbance more pervasive and persistent in those whose obesity dates from childhood (Hirsch, 1975; Rivinus, Drummond, & Combrinck-Graham, 1975). Epidemiological and clinical evidence confirms the persistence of childhood obesity into adulthood, (LeBow, 1977; Mayer, 1975; Oscanova & Hejda, 1975) and suggests that the prevalence of obesity is increasing in American (Hammar, 1975) and Canadian (Oscanova & Hejda, 1975) children. Raub, Schumsky, and Witt (1967) have conservatively estimated 10% of all children in the United States, Canada and Great Britain to be obese.

Indeed, obesity is considered by some authorities (Howard, Dub, & McMahon, 1971) to be the most common pediatric nutritional disorder in the developed countries, evident as early as the nursery school level (Knittle & Ginsberg-Fellner, 1975).

Further, while clearly identifiable hazards were thought rare in the pediatric age group (Hammar, 1975), LeBow (1977) notes correlational data linking childhood obesity with hyperlipidemia, back and spine disorders, knocknees , hypertension and arthero-sclerosis, both present and imminent. Stigmatization and negative self-concept associated with obesity have been observed in children as young as four years (LeBow, 1977) and in adolescents (Canning & Mayer, 1966; Dwyer & Mayer, 1973; Mayer, 1975; Stunkard, d'Aquili, Fox & Filion, 1972).

Biologically, infancy and adolescence have been identified as critical periods for the development of obesity, with implications for treatment prognosis. Should hypernutrition occur at these stages, the individual is predisposed towards life-long obesity, due to the irreversible proliferation of adipose cells (Hager, Sjostrom, Arvidsson, Bjorntorp & Smith, 1978; Hirsch & Knittle, 1970; LeBow, 1977). The success rate of treatment for obesity in adults is notoriously disappointing (Hall, 1973; Stunkard & McLaren-Hume, 1969). The results for long-term treatment of obese children are comparable, with an estimated relapse rate of 80% (Stark, Llyod & Wolff, 1974).

The myth of the "healthy, chubby baby" -- bound to outgrow his

baby fat -- is being replaced by the grim reality of the obese child as a prime candidate for "disease, discomfort and despair" (LeBow, 1977, p. 324). The urgency of developing methods to identify in early life the controllable biological and psychosocial factors contributing to obesity, their correction, and ultimately prevention, is clear.

One such potentially useful factor is "externality", a concept which has received considerable attention in the psychological literature on adult obesity. Investigations of externality have tended to confound external locus of control as defined by Rotter's (1966) construct of locus of control of reinforcement and external-cue responsivity as originally defined by Schacter (1972). Both concepts of externality have theoretical origins in Bruch's (1975) psychodynamic formulation of the relationship of early mother-child interaction to personality development in the obese. Bruch's work is based upon extensive clinical research, beginning in the 1940's, with anorexic and obese children, and on retrospective accounts of adults seeking psychiatric care. In her model of the etiology of the eating disorders she proposes that: (1) The obese are unable to correctly identify hunger or to distinguish it from other states of bodily needs or emotional arousal. (2) Confusion in hunger awareness, the specific assumption of eating disorders, is only one of many deficiencies developing out of inappropriate or contradictory maternal reaction to behavior or clues initiated in the child. (3) Excess weight is only the "visible symptom of failures in many areas of functioning with

serious deficits in initiative, autonomy, experience of control and self-regulation" (p. 111).

Schacter (1972) links his behavioral studies of eating to Bruch's first proposition. Bruch advances a notion strikingly similar to locus of control in the third proposition. The obese are described as feeling not self-directed, but "helpless under the influence of external forces, and they may even experience internal stimuli as externally induced" (Bruch, 1975, p. 113).

While Bruch's formulation theoretically links external-cue responsivity and locus of control, their relationship awaits empirical demonstration. Furthermore, the two concepts of "externality" are often interchanged, and neither has been studied in obese children.

In the present study, separate operational definitions of external-cue responsivity and external locus of control were measured and independently related to obesity in children. The relationship between the behavioral and personality measures of "externality" was also examined.

BACKGROUND

External-cue Hypothesis

The external-cue or stimulus-binding hypothesis states that "The obese eat in response to external food-relevant cues such as the taste and sight of food and are relatively insensitive to internal physiological signals such as gastric motility and changes in blood sugar level" (Rodin, 1975, p. 898). Subsequent research aimed at describing the manifestations of the phenomenon (Johnson, 1974; Nisbett, 1968a, 1968b; Ross, 1974), its extension to nonconsummatory behavior (Pliner, 1974; Schacter & Rodin, 1974), and the search for underlying causal mechanisms (Herman, 1978; Nisbett, 1972; Rodin, Slochower, & Fleming, 1977) has spanned a decade. The literature has been reviewed by Leon and Roth (1977) and Pauze and Roskies (1978).

Despite recent disenchantment with this formulation of eating on both conceptual (Herman, 1978; Rodin, 1979) and methodological (Leon & Roth, 1977) grounds, the external-cue hypothesis has provided a coherent and comprehensive conceptualization integrating psychodynamic, behavioral and physiological data amassed from human and animal experimentation, clinical studies and naturalistic observation.

Criticism has centered mainly on the lack of generalizability of the early studies and contradictory findings, owing to methodological and sampling limitations (Leon & Roth; Levitz, 1975; Mahoney, 1975;

Pauze & Roskies, 1978; Wagner & Schumaker, 1977).

Although current treatment programs for obese children emphasize stimulus control procedures, few studies have investigated external-cue responsivity in children (Ellis, 1978; Jeffrey & Katz, 1977; Kingsley & Shapiro, 1977). One aim of the present study was to examine the external-cue hypothesis and its extensions in obese children.

Major developments in the evolution of the external-cue hypothesis are highlighted in the following sections. Those studies which have suggested a methodology for the present investigation of both food-related and non-food-related measures of externality in obese children are described. Specifically, these measures are: the effects of preloading on consumption under conditions of high cue salience; and immediate recall, time estimation, and emotionality. Since most studies have used adult subjects, these will be reviewed briefly, followed by a summary of relevant research with children.

Food-related Measures

Schacter (1972) emphasized the interaction of cognitive and physiological determinants of emotional states. His observation that "attaching a particular label to any particular internal or visceral syndrome is a learned, cognitively and socially determined act" (Schacter, Goldman & Gordon, 1968, p. 91) was extrapolated to hunger. It was suggested that whether or not the label "hunger" is applied to the feelings associated with symptoms of food deprivation e.g. gastric

motility, has little to do with the symptom itself, but is determined by the individual's developmental feeding history. If feeding is chronically inappropriate to physiological conditions, due to an inability or unwillingness of the mother to recognize the proper cues, there is little reason to anticipate that the label "hunger" will be applied exclusively to gastric motility and hypoglycemia. Almost any state of arousal may be labelled hunger. Alternatively, no internal state will be labelled hunger. Schacter acknowledges this formulation to be the core of Bruch's (1961) theorizing about the etiology of obesity, i.e. the obese have not learned to discriminate between the physiological symptoms accompanying food deprivation and the condition of arousal characteristic of emotional states such as fear, anger, and anxiety. Schacter credits Stunkard and Koch (1964) with providing experimental confirmation of this proposed failure, of the obese to label gastric contractions as hunger. In their classic study, it was demonstrated that nonobese subjects were more likely than the obese to report subjective feelings of hunger in association with stomach contractions measured via gastric balloon. Although the notion of differential sensitivity to internal stimuli has since been questioned (Levitz, 1975), it has nevertheless provided an operational definition of external-cue responsivity, in association with food-related measures. Within this context, two important factors, preloading and food-cue prominence are discussed.

Preloading.

Extrapolating Stunkard and Koch's findings on subjective reports of hunger to actual eating behavior, Schacter, Goldman, and Gordon (1968) reasoned that direct manipulation of the physiological correlates of food deprivation would affect feelings of hunger and eating behavior in nonobese individuals but would be unrelated in the obese. Specifically, preloading of the stomach was expected to reduce the amount eaten by nonobese subjects while having no effect on the eating of the obese.

Undergraduate males were told the experiment concerned taste and were asked to skip the meal preceeding their experimental appointment. In order to manipulate preloading, those in the full-stomach condition were fed roast beef sandwiches, ostensibly, to guarantee identical eating experiences. While eating, they completed a food preference questionnaire. Subjects in the empty-stomach condition completed the questionnaire but were offered no food. Following a 15 minute eating period, the subject "tasted" and rated 5 types of "very low calorie" crackers.

As predicted, normal-weight subjects ate significantly fewer crackers in the full-stomach condition, whereas the obese ate slightly more. The authors concluded that "There is a high correspondance between the state of the viscera and the amounts eaten by normals and little correspondance for fat subjects (p. 96). Studies by Pliner (1974), Nisbett (1968a, 1968b) and Goldman, Jaffa, and Schacter (1968) support this contention. Increased consumption by the obese was also demonstrated under specifiable manipulations of external sensory and cognitive cues (Hashim & Van Itallie, 1965; Nisbett, 1972; Nisbett &

Gurwitz, 1970; Schacter & Gross, 1968).

Food-cue prominence.

Ross (1974) emphasized cue prominence pr salience as a crucial determinant in observed obese/normal differences in eating behavior. Ross's corollary states that while the obese are more sensitive than the nonobese to external food cues, this effect is limited to potent and compelling food cues (Schacter & Rodin, 1974). The obese are actually less responsive than nonobese persons to remote, less salient cues.

In order to test the hypothesis that the obese outeat normals when provided with salient but not remote food cues, Ross (1974) manipulated cue prominence by varying the illumination of the food-cue.

Obese undergraduate males consumed significanlty more food (cashew nuts) when the lights were bright then when they were dimmed. Normal-weight controls showed no significant differences in eating in the two conditions.

In a study of the determinants of food intake on obesity (Nisbett, 1968b) male undergraduates were told they were participating in a study of psychophysiological responses. Having been instructed to skip a meal preceeding their appointment, subjects were offered roast beef sandwiches while they completed questionnaires. Overweight subjects ate significantly more when three sandwiches were offered. When only one sandwich was in view, however, and additional sandwiches had

to be obtained from a nearby refrigerator, the obese ate less than normals. Nisbett explains these results in terms of the immediacy or prominence of the food stimuli. As long as food cues are prominent, in front of the subject, the obese eat. When these immediate cues have been consumed, eating ceases.

The notion that the obese and nonobese are differentially sensitive to internal cues, and that potent external cues trigger eating in the obese was confirmed in the studies reviewed above. Varying deprivation through preloading, and the manipulation of cue salience affected eating behavior in a manner consistent with the external-cue hypothesis. The inclusion of measures comparable to these early "Schacterian" food-related tasks is considered essential to an examination of externality in children. The effects of preloading, under conditions of high cue salience, on the eating behavior of obese and nonobese children were assessed in the present study.

Non-food-related Measures

The notion of externality as a general personality trait, not specific to eating behavior, has also been advanced. In contexts unrelated to eating, obese adults were observed to be more reactive to prominent external cues. Three paradigms used in the present study, i.e. immediate recall, time estimation and emotionality, were modelled on Rodin and Slochower's (1976) adaptation of these measures for

children. The original adult studies are discussed first.

Immediate recall.

Rodin, Herman, & Schacter (1974) examined obese/nonobese differences on tasks presumed in the literature of experimental psychology to indicate stimulus responsitivity. They reasoned that, if hyperresponsitivity to salient external stimuli is characteristic of the obese, then, relative to the nonobese they should exhibit superior performance on tasks of reaction time, tachistoscopic recognition and immediate recall.

A small sample of undergraduate males was told that the purpose of the experiment was to measure reactions to various sensory stimuli and that these tests would provide information on how individuals encode and respond to their sensory environment. Eight slides containing either food-related or non-food-related words or objects were presented for five seconds each. During the next 15 seconds, the subject recited aloud all items he could remember. Obese subjects recalled significantly more items per slide and made somewhat fewer incorrect responses than normals. Furthermore, overweight subjects did better whether the slides presented food-related stimuli or not. Obese subjects also exhibited faster disjunctive reaction times and lower tachistoscopic recognition thresholds than did normal subjects.

As stated, the immediate recall measure was selected for the present battery used with children.

Time estimation

The rationale for linking time estimation and obesity was discussed by Pliner (1973). She noted that the mechanisms of attention, coding, and storage of external stimuli are involved in time experience. If the obese are more responsive than normals to salient external stimuli, they would store more information in memory than normals during exposure to such stimuli. If they are less responsive than normals to stimuli low in salience they should store less information in memory. Since time experience is a function of the amount of information stored in memory (Ornstein, 1969), it was expected that when presented with a series of highly salient external stimuli; obese subjects would estimate the duration of elapsed time as longer than normals. When presented with a series of low salience external cues; obese subjects would estimate the duration of elapsed time as shorter than normals.

Pliner's (1973) study was presented to male high school student subjects as an investigation of the relationship between cognitive and physiological reactions to visual stimuli. An irrelevant visual stimulus was accompanied by stimulus tapes varying in duration (4 minutes and 8 minutes), number of stimuli (40/minute and 80/minute), and salience (45db, or 90 db). Salience was manipulated in terms of the physical properties of the stimulus. It was assumed that the salience of an auditory cue varies with loudness. Subjects estimated the length of the stimulus tapes, and rated their loudness and annoyance level.

As predicted, there was a highly significant interaction between weight and cue salience. In the high-salience condition, obese subjects estimated the time elapsed as signigicantly longer than did normals. In the low-salience condition, the direction of the difference was reversed.

These findings support the notion of the hyperresponsivity of the obese to salient external stimuli. Leon and Roth (1977) have noted that "The influence of external cues on the behavior of obese persons in noneating situations appears to have the strongest support in the area of time estimation." (p. 126). Given the reliability of this measure in differentiating obese and nonobese adults, its applicability to children warrants examination.

Emotionality.

A number of investigators have demonstrated the heightened responsiveness of the obese with respect to emotionality. The obese exhibit a stronger response when confronted with salient, affect-laden stimuli despite normal baseline levels of emotional response to neutral cues. Studies using self-ratings of emotionality have shown that obese subjects are more upset than normals by such aversive stimuli as the threat of electric shock or by tape-recorded accounts of the bombing of Hiroshima and death from leukemia (Schacter, Goldman, & Gordon, 1968; Rodin, Elman & Schacter, 1974). Rodin (1974) found that obese subjects spent a greater proportion of time working to avoid electric

shock than did normals. However, Pliner (1973) has noted that as all studies have used aversive stimuli, hyperresponsiveness may simply reflect greater anxiety and depression associated with obesity (Moore, Stunkard & Srole, 1962) rather than heightened responsiveness to affective cues in general.

Pliner argued that in order to eliminate this possibility, obese subjects would have to be shown to react more strongly than normals to positive as well as negative affective stimuli. She tested male high school and college students who believed that the purpose of the experiment was to measure their physiological responses to various stimuli. Each subject viewed a positive emotional slide, a negative emotional slide and a neutral slide. For each slide, he then completed seven rating scales, containing adjectives chosen to tap an emotional response. The interaction between weight and emotional content of the stimulus was highly significant. Obese subjects rated the positive slides more positively and the negative slides more negatively than normal-weight subjects. Pliner concluded that the obese are more extreme in their reactions only to arousing slides. The groups did not differ significantly in their reaction to neutral slides. Thus, as in the studies of immediate recall and time estimation, these findings confirm the general external-cue hypothesis, i.e., that obese adults in contexts unrelated to food, are hyperresponsive to various external stimuli. Emotionality should be assessed in considering the external-cue hypotheis in children.

The external-cue hypothesis has received substantial support in the literature (Pauze & Roskies, 1978) despite many associated problems,

especially limited sampling and failure to consider degree of obesity. In view of its strong support in adults, and its potential application in child treatment, the applicability of this hypothesis with children, should be tested. Following is a review of the few relevant child studies to date.

Externality: Child Studies

The following two studies with obese children provide limited support for the externality hypothesis.

Wagner and Schumaker (1976) examined external responsivity in 30 schoolchildren, aged 7-12, at least 15% overweight according to U.S. Government height-weight standards. The children were permitted to eat either wrapped (food nonvisible) or unwrapped (food visible) chocolate kisses while ostensibly engaged in completing a children's locus of control scale. The number of kisses eaten was unrelated to food cue prominence. However, there was a tendency for the children to eat more unwrapped kisses, consistent with the externality hypothesis. These findings are uninterpretable due to methodological flaws such as the confounding of effort and cue prominence variables. Furthermore, since the aim of the study was to determine the relationship between external responsivity and age at onset of obesity, a nonobese control group was omitted. Unfortunately, locus of control scores were not reported.

Pliner, Meyer, & Blankstein (1974) measured children's affective responses to real-life emotional situations and found that relatively heavy

hospitalized children (mean weight deviation, 18.5%, average age 1.7 years) stopped crying sooner when cuddled by a nurse (the positive emotional stimulus) than did normal-weight youngsters. There were no differences in emotional response to a negative affective stimulus. However, Leon and Roth (1977) have questionned the categorization of subjects as obese who are merely heavier than other subjects.

Rodin and Slochower (1976) found that when normal-weight girls with no history of overweight, were placed in a food-abundant setting, those who were more responsive to external cues subsequently gained the most weight. The inclusion of nonobese subjects only eliminated the possibility that obesity preceeds external responsiveness.

Subjects were 92 nonobese girls aged 9-15, attending an eight week summer camp. They ranged from -10 to 10% overweight according to the Baldwin-Wood weight norms (Wohl & Goodhart, 1964).

It was predicted, that the more external the children, independent of their actual weight, the more their eating behavior would be influenced by the shift in the environmental food cues that the camp setting represented. Nonexternal children were expected to be more responsive to internal physiological cues and thus maintain a relatively constant body weight, independent of alterations in the environment. The measures of external responsiveness were similar to those used in the present study: effects of preloading on consumption under conditions of high cue salience; immediate recall; and emotionality. Campers were told that the study was an investigation of age differences in perception. In the preload task,

full or hungry campers were given the opportunity to munch candy while presumably engaged in a listening task. High externals gained significantly more weight than low externals. Degree of weight gain was significantly related to slide recall, extremity of emotional ratings, and amount of candy eaten when full. Amount of candy eaten when hungry was not significantly correlated with weight gain. Weight gainers were clearly more external than those whose weight remained stable, and weight losers were a little more external than weight stables, indicating a nonmonotonic relationship between externality and weight change.

Twelve overweight campers were tested but their data not included in the weight change correlations. For these subjects, there was a tendency for degree of externality to be related to weight gain. When absolute weight change was the correlate, the relationship was stronger i.e. the most external fat subjects either gained or lost the most weight. Overweight subjects were somewhat, but not significantly more external than the normal weight gainers and far more external than normal weight stables and normal weight losers. The degree of overweight among the heavy campers was not significantly related to the degree of externality.

Rodin, et al (1977) used similar non-food-related measures of external responsivity with a larger sample of obese campers in a study designed to assess the effects of deprivation and weight loss on external responsivity. A time estimation task, the model for that used in the present study, was included. A significant main effect for weight was observed. While these four studies appear to support the notion of the

relative externality of obese children, definitive conclusions are unwarrented. Relatively few children have been tested, and no attempt was made to evaluate the relationship between sex and externality. Furthermore, direct comparison of obese and nonobese groups on this dimension has been incidental or secondary to the major hypotheses of these studies and as such, appropriate control groups are lacking. The data suggest, however, that externality in obese versus nonobese children merits further investigation as a main focus of interest.

Locus of Control of Reinforcement

The internal-external locus of control of reinforcement (I-F) dimension is an expectancy variable within Rotter's (1954) social learning theory. Essentially, this theory posits that the potential of a given behavior, or set of behaviors, occurring in a specific situation is a function of an individual's expectation that the behavior(s) will lead to a particular reinforcement available in that situation and the value of that reinforcement. The locus of control construct is conceptualized as a generalized expectancy related to a person's belief concerning the locus of causality for events. At one extreme are "internals" who perceive the reinforcements they receive as a function of their own actions or characteristics. At the other extreme are "externals" who perceive the reinforcements they receive as a function of external agents such as luck, fate, chance or powerful others. Locus

of control is usually assessed via the Rotter I-E (Internal-External) scale.

Locus of Control in Adults

A number of investigators have attempted to relate an external locus of control orientation to obesity based mainly on the external-cue hypothesis, while others have simply confused the two constructs by using them interchangeably. Beyond the obvious descriptive similarity, the rationale for linking personality and behavioral "externality" has been neither theoretically nor empirically justified. The relationship between obesity and locus of control in adults and adolescents has been explored (Gormanous & Lowe, 1975; Held & Snow, 1972; Karpowitz & Zeis, 1975; Martin, Hawryluk, & Gerson, 1975; O'Bryan, 1972).

Individually, these studies are difficult to interpret and limited in generalizability due to numerous methodological problems, particularly in sampling. Samples varied widely with respect to subject background variables such as age, sex and degree of obesity. Subjects were selected from such divergent populations as volunteers, participants in self-help weight loss groups, university clinic patients being treated for obesity, general medical clinic patients, high school and university students. Other methodological weaknesses include lack of appropriate control groups and as in many studies of locus of control, failure to consider moderating variables such as reinforcement value and the psychological situation (Walliston & Walliston, 1977). Finally, issues

specific to the Rotter scale, in particular, social desirability, multidimensionality and generality-specificity have been elaborated elsewhere (Gurin, Gurin, Luo & Beattie, 1969; Joe, 1971; Levenson, 1972; Lefcourt, 1976; Little, 1977; Phares, 1976; Reid & Ware, 1973, 1974; Rotter, 1975).

Collectively, the relevant studies have yielded equivocal findings and offer no clear support for the notion of an association between external locus of control and obesity in adults and adolescents.

Locus of Control in Children

Surprisingly, the relationship between locus of control orientation and obesity in children remains unexplored. In fact, a recent, comprehensive review of locus of control and adaptive behavior in children and adolescents (Gilmor, 1978) contains no reference to obesity.

Gilmor reports that, as in adults, the results for different scales, age groups and samples indicate that "Children and adolescents who hold internal beliefs function in a more positive, efficacious and adaptive manner in both achievement and non-achievement activities and situations, than do their external counterparts." (p.2) Specifically, sense of self, ability to delay gratification, persistence, interpersonal relations, creativity, utilization of information and academic achievement have been assessed.

It is proposed that locus of control is more pertinent to childhood, than to adult obesity. Several independent lines of research suggest

that obese children are external relative to control children. This contention is supported by literature on measurement of locus of control; psychogenic and sociogenic factors in the etiology of obesity (Cahnman, 1979), developmental aspects of locus of control, parental antecedents of locus of control and obesity, and eating behavior in children.

Developmental changes in locus of control orientation might reflect measurement artifacts in addition to bona fide maturational processes. The Nowicki-Strickland Locus of Control Scale (CNS-IE) was originally adapted from the Rotter I-E scale which was used in the majority of the studies discussed. However, factor analyses indicate that each scale emphasizes different aspects of the locus of control dimension. Reid and Ware (1973, 1974) identified a Fatalism, Social-System and Self-Control factor in the Rotter scale, and noted that mainly the first two factors were being tapped. The Rotter scale thus appears to emphasize broad, socio-political control. In contrast, the CNS-IE emphasizes personal, self-control, (Nowicki, 1976) and as such is likely more appropriate to research on consummatory or addictive behaviors.

Externality has been shown to characterize individuals, particularly children, whose physical, emotional or learning handicaps have made adjustment to everyday living difficult (Gilmor, 1978; Strickland, 1978). Obesity can be regarded as both a physical and psycho-social handicap. While the negative consequences of obesity in adults and adolescents are well-documented (Bruch, 1975; Dwyer & Mayer, 1975; Monello & Mayer, 1963;

Stuart & Davis, 1972), those influencing the developing child are particularly pervasive, enduring and malignant.

LeBow cites correlational data linking childhood obesity with hyperlipidemia, back and spine disorders, knocknees, hypertension and artherosclerosis. The psycho-social disadvantages of obesity are apparent in children as young as four years old. Fatter children were selected less often as best friends than thinner peers, and endomorphs rated compared to mesomorphs, as mean and lazy (Staffieri, 1967; Kirkpatrick & Sanders, 1978). Obese children were rated less likable, by peers and professionals than children with a variety of physical handicaps (Richardson, Goodman & Hastorf, 1961). LeBow (1978) noting that children learn early to define themselves positively or negatively, suggests that "For some, the stigma of obesity begins so early and becomes so entrenched that they come to accept their minority group status as deserving." (p. 324). From a sociogenic perspective, Phares (1976) suggests that persons with restricted access to significant power or material advantages, for example minority groups, often develop external locus of control orientations. Similarly, lower socioeconomic status is associated with externality (p. 156).

Within contemporary Western culture, then, the obese child is a handicapped child, with diminished social status and access to opportunity and personal satisfaction. This condition would appear to connote the essence of an external locus of control orientation.

The consistent correlation between age and internality observed

across most measures of children's locus of control (Lefcourt, 1972) can be linked to parental antecedents of locus of control orientation. Furthermore, since children are in general, more external than adults, externality might logically be expected to characterize more obese children than obese adults. Gilmore has speculated (1978) that the developmental change in locus of control "Reflects children's growing independence from parental dominance and increased exploration of the environment. Both serve to heighten awareness that they are ever more responsible for the reinforcements they receive. This is a trend that continues through adolescence into adulthood." (p. 7).

Research on parental antecedents of locus of control has provided a remarkably consistent constellation of positive parental child-rearing practices associated with internality, despite the use of different age samples and measures (Lefcourt, 1976). Associated with internality are parental warmth, protectiveness, nurturance and consistent reinforcement (Davis & Phares, 1969; Nowicki & Segal, 1974; Phares, 1976) and a milieu that is attentive, responsive, critical and contingent (Lefcourt, 1976; Yates, Kennelly & Cox, 1975). Conversely, externality has been linked to parental overprotection and the use of deprivation of privileges and affective punishment (Levenson, 1973; MacDonald, 1971).

While the specification of parental antecedents of obesity in children awaits empirical validation, parallels with antecedents of external locus of control are apparent. Bruch (1975) considers specific feeding practices to reflect general mother-child interaction. When maternal

reaction to behavior or clues initiated in the child is inappropriate or contradictory, the child may display global personality deficits as well as obesity. The locus of control construct appears to provide a direct operationalization of these deficits. Bruch views the excess weight as "only the visible symptom of failures in many areas of functioning with serious deficits in initiative, autonomy, experience of control and self-regulation." (p. 111). She continues "Victims of anorexia and developmental obesity do not feel self-directed but helpless under the influence of external forces." (p. 113). Their intense preoccupation with weight, reflects an extreme dependence on societal opinion and judgement. Individuals who become obese later in life, in contrast, rarely suffer from such severe degrees of inner insecurity and distorted self-concept. Their obesity simply reflects changes in life-style. While the external expectancies of childhood-onset obese adults may have been moderated by compensatory life experiences, an external orientation would be expected to characterize the currently obese child.

A final line of research supporting this hypothesis is a study of eating behavior in preschool children (Eppright, Fox, Fryer, Lamkin & Vivian 1969, 1970a, 1970b; Fox, Fryer, Lamkin, Vivian & Eppright, 1970). Although more children were allowed to decide the amount eaten than to select foods, half the mothers decided the amounts of foods children ate. Eppright et al (1969) suggest that half the children enter school with little experience in making decisions about food selection (p. 18). As stated previously, independence training is a crucial factor in the

development of an internal locus of control orientation. Interestingly, "permissiveness" was defined (Eppright et al., 1970a) as "Letting the child eat what he wants." (p. 331). This factor was significantly correlated, negatively, with all elements of the child's diet, except fat. An estimated 1/4 to 1/3 of the mothers endorsed "permissive" attitudes. Given the nature of the diet associated with permissiveness, a high proportion of obese children might be expected in this sample. This information was not reported. Furthermore, it is noted that "permissiveness" as defined here, distinctly recalls Bruch's "indiscriminate permissiveness". Overindulgence may be construed as inappropriate and non-contingent parental behavior, likely to result in an external orientation.

Stuart and Davis (1972) state that "It defies the imagination to conceive of an obese child who has not gained or maintained his weight with the planned or unwitting complicity of his mother." (p. 20).

Eppright et al. (1969), describing a period of "physiological anorexia" observed by pediatricians to occur between 18 and 24 months of age, note that "Another factor involved in eating behavior at this stage may be the growing autonomy of the child with his struggle for independence and his involvment in the socialization process." (p. 19). This statement provides further support for Bruch's notion of the relation of specific feeding practices to general personality development. While "most of the meals of the preschool child are eaten in the home under the direction of the mother", (Eppright et al., 1970b, p. 410) one might

expect that maternal control is diminished as the child develops and presumably eats more meals away from home. Indeed, this provides an important instance of the child's "growing independence from parental dominance" (Gilmor, 1978) resulting in the developmental increase in internal expectancies for locus of control. While early feeding of children may influence lifetime eating habits (Amit & Sutherland, 1975), except in cases of institutionalization, few adults would argue that their food intake was literally "controlled" by others, maternal or otherwise. While external locus of control orientation need not necessarily characterize the obese adult, it might be highly pertinent to the obese child.

STATEMENT OF THE PROBLEM

Theoretical grounds for relating the Social Learning construct of locus of control of reinforcement to the Schacterian notion of external-cue responsivity have been proposed. Neither of these dimensions of "externality" has been explored, either independently or in combination, in children. Yet, therapeutic strategies derived from demonstrations that obese adults are hyperresponsive to external, environmental cues in a variety of food and non-food-related contexts, have been applied to children. The suitability of "stimulus control" technology with obese children awaits evaluation.

One aim of the present study was to determine whether obese children, relative to normal-weight controls, would exhibit heightened external cue-responsivity in a food-related context. A number of studies using mostly male undergraduates have indicated that there is virtually no relationship between internal state and eating behavior for such individuals. Their eating behavior is instead, largely controlled by external, environmental cues unrelated to the physiological state of hunger (Leon & Roth, 1977). Ross's (1974) corollary states that this effect is limited to potent and compelling food cues. The obese are actually less responsive than nonobese persons, to remote, less salient cues. Rodin and Slochower (1976) demonstrated that the degree of weight gain by normal-weight female campers was related to the amount of good-tasting food eaten when full, under conditions of

high cue salience. In this study, the following predictions regarding the Preload task were made: It was hypothesized that obese children, relative to normal-weight controls, would consume more grams of smarties, under conditions of high cue salience. Control children would consume fewer grams of smarties after a preload than before a preload, i.e., when they were full than when they were hungrey. In contrast, obese children were expected to consume the same amount of smarties in both preload conditions.

A second aim of the study was to examine the notion of a generalized external-cue responsivity in obese children. The proposed hypersensitivity of the obese to external cues high in salience has been extended to include externality as a general personality trait rather than as one specific to eating behavior (Schacter & Rodin, 1974). Those measures selected for the present study were: immediate recall of objects and words briefly presented on a slide; extremity of affective ratings to positive and negative versus neutral visual stimuli; and time estimation of salient versus weak auditory stimuli. The following hypotheses were proposed:

(1) It was hypothesized that obese children would recall more items presented briefly on a slide, compared to control children.

(2) It was hypothesized that obese children would give lower ratings to negative, and higher ratings to positive visual stimuli, compared to control children. No difference was expected in ratings of neutral visual stimuli by obese and control children.

(3) It was hypothesized that when presented with a series of highly salient auditory stimuli, obese children would estimate the duration of elapsed time as longer, compared to control children. When a series of low salience external stimuli were presented, obese children were expected to estimate the duration of elapsed time as no longer and perhaps shorter, compared to control children.

The third aim of the study was to examine locus of control of reinforcement in obese children. While investigations of the construct with obese adults have yielded equivocal results, there are several lines of evidence to suggest that obese children would be external, compared to control children, even if this was not the case for obese adults. The pertinent studies concern psychogenic and sociogenic factors in the etiology of obesity; developmental aspects of locus of control; parental antecedents of locus of control and obesity; measurement issues in locus of control and eating behavior in children. It was hypothesized, that obese children would score externally, compared to control children, on the Nowicki-Strickland Locus of Control scale.

The final aim of the study was to examine the interrelationships amongst the various measures of external-cue responsivity and locus of control of reinforcement to determine whether there is a conceptual, as well as descriptive basis for their similarity.

It was hypothesized that the Schacterian food-related and non-food related measures of external cue responsivity would be positively correlated with each other, and with locus of control scores.

In addition to testing the various hypotheses, the study was designed to evaluate sex differences. The literature reviewed did not provide sufficient grounds for the formulation of specific hypotheses.

METHOD

Subjects

Background data on age, grade, and percent overweight are summarized in Table 1. The subjects included 28 boys and 31 girls ranging in age from 8 to 12 years. All children were functionning at the grade level appropriate to their age, and were judged free of major emotional disturbances by the referral source and the examiner (author). The sample was divided into two groups having the following characteristics:

Obese Group: The obese group included 13 boys and 15 girls at least 15% overweight according to the Baldwin-Wood (Wohl & Goodhart, 1964) weight norms for children, adjusted for height. Obese girls ranged from 16.9% - 62% overweight. Obese boys ranged from 15% - 41% overweight. All obese girls were prepubescent.

Control Group: The control group included 15 boys and 16 girls who were less than 5% overweight. Control boys ranged from -14 - 1.5% overweight. Control girls ranged from -32 - 4.7% overweight. A two-way analysis of variance indicated that the groups did not differ significantly with respect to either age, F (1,55) = .33 or grade, F (1,55) = .19. Obese and control groups were highly differentiated in terms of percent overweight, F (1,55) = 225.7, $p < .001$. (See Appendix I). There were no significant sex differences on any of these variables.

Subjects were drawn from a number of sources. They were either

Table 1

Mean and Standard Deviation Age, Grade and Percentage Overweight for Obese and Control Boys and Girls

Group	n	m	SD
		Age	
Obese			
Boys	13	9.8	1.4
Girls	15	9.8	1.1
Control			
Boys	15	9.3	1.0
Girls	16	9.8	.7
		Grade	
Obese			
Boys	13	4.3	1.6
Girls	15	4.0	1.5
Control			
Boys	15	3.3	1.2
Girls	16	4.1	.8
		Percent Overweight	
Obese			
Boys	13	27.0	9.6
Girls	15	34.8	13.2
Control			
Boys	15	-6.1	4.7
Girls	16	-8.0	9.6

referred by their pediatrician, attending a combined second and third grade class at a private English elementary school, or were participants in a Y.M.C.A. summer day-camp program. Several obese subjects were selected from closed files provided by the Montreal Children's Hospital dietician.

Although socio-economic status was not directly measured, the selection of obese and control subjects from the same pediatric practices, class or daycamp suggests a uniform sample. The area of the city sampled is predominantly middle-class, with higher socio-economic levels somewhat overrepresented.

Procedure

Mothers of children satisfying the selection criteria were telephoned and asked to participate in a psychology department study on how children of different ages think and feel. Those whose children had been referred to a weight program were assured that acceptance was unrelated to participation in the research project.

Mothers were instructed to bring their child to the hospital directly after school and to expect a small meal, courtesy of the department, in appreciation of their participation.

In 26 cases, children were tested before and after regular lunch break at the Y.M.C.A. daycamp. Parental consent was obtained by telephone. All children were tested individually by the same examiner. Once rapport had been established, the child was told that he would complete a series

of tasks designed to tell the experimenter something about the way children his age think and feel. He was reassured that the tasks would be fun, that there were no right or wrong answers and that no one was expected to finish everything. The food-related test was presented first and last for each child. The order of presentation of the non-food-related tests, namely immediate recall, time estimation, and emotionality; and the locus of control scale, was varied for each child. All tests except the "full" condition of the food-related test were completed in the first hour before the meal break. Following testing, all subjects were debriefed, weighed and measured, and thanked for their participation.

Experimental Measures

Nowicki-Strickland Locus of Control Scale (CNS-IE).

The CNS-IE is a paper and pencil measure adapted from the Rotter I-E scale for use with children in 3rd through 12th grades. The standardization sample included over 1000 subjects, mostly white elementary and high school students in four communities (Phares, 1976). The scale contains 40 yes/no items describing reinforcement situations in a variety of interpersonal and motivational areas, such as affiliation, achievement and dependency. Gilmore (1978) notes that internal consistency and retest reliabilities are moderately high. Split-half correlations ranged from .63 - .80. Test-retest reliabilities over six-week periods were from .63 for third graders to .71 for tenth graders. Internality was found to increase with age and tended to be associated with higher

socioeconomic status.

The CNS-IE has been used in over 50 studies on topics ranging from achievement to psychological maladjustment. Reported evidence of construct validity involves correlations with such variables as self-esteem, popularity, academic competence, ability to delay gratification, and prejudice. Externality has been associated with constitutional differences such as: mental retardation, cerebral palsy, dyslexia, physically handicapped, chronically ill, deafness, emotionally disturbed, blindness and delinquency, and cleft palate.

The CNS-IE was selected for this study from amongst available measures of children's locus of control beliefs for several reasons. Adult studies on locus of control and obesity have for the most part used the Rotter scale, from which the CNS-IE adapted. Gilmore (1978) considers the CNS-IE the "most attractive choice for measurement of generalized locus of control expectancies for efficiency of administration and continuity for different ages". The scale is not significantly correlated with either social desirability (Children's Social Desirability Questionnaire) or IQ (Otis-Lennon Mental Ability Test). There are no consistent sex differences in mean response to the CNS-IE regardless of age or race.

Factor analysis of the CNS-IE, using the principal components method, indicates a general factor of locus of control consistent across all ages and relating to a general feeling of helplessness and failure to control or direct things occuring around the person. There are also

differential factors which may be sex related at different ages. These include: luck; getting what one wants by persistence, work, and planning; acceptance that fate, chance and/or powerful others govern things; deference to parents and ability to manipulate others. Thus, whereas the Rotter scale emphasizes broader, socio-political control, personal control, more relevant to research on obesity, is emphasized by the CNS-IE.

Finally, item #35 is of particular interest to this study. "Do you usually feel that you have little to say about what you get to eat at home?".

The CNS-IE was administered according to standard procedure. The instructions appearing on the booklet cover were read aloud by the experimenter. The score is the total number of items answered in an externally controlled direction. A copy of the scale is provided in Appendix II . External responses are starred.

Preload

This test is based on Rodin and Slochower's (1976) test of the amount of good-tasting food eaten by full and hungry subjects under conditions of high cue salience. However, in this study, each subject was tested in both hungry and full conditions. All subjects were tested directly after school or before lunch to insure that they had not eaten a meal in several hours. The child was seated at a table on which were placed drawing and plastic building materials, and a glass bowl containing

8oz (227 gms.) of smarties, illuminated by a desk lamp. The subject was told to listen carefully to 1 of 2 recordings from the sound track of the movie "Star Wars". He was invited to use the materials on the table or help himself to the candy. The experimenter started the tape and left the room for 4 minutes. On returning, she removed the candy and materials from the table and had the subject complete a rating scale containing questions about the tape. This served to familiarize the children with rating scales. During the meal break, the experimenter reweighed and filled the candy bowl and placed it, with the other materials on the table. When testing was resumed, the child listened to and evaluated the second tape as in the hungry condition. Half the experimental and half the control subjects heard the first tape (Tape A) in the Hungry condition and the second tape (Tape B) in the Full condition. The order of presentation of the tapes was reversed for the remaining subjects. The amount of candy consumed was determined by subtracting the weight of the candy remaining in the bowl from the original 8oz.

Non-food-related Tests

Immediate Recall.

This test is based on the slide recall tasks described by Rodin et al (1974) and Rodin et al (1977). The child was seated in a darkened room, approximately 15 feet from a screen. He was told that some slides, depicting either words or objects would be presented and he would be asked to verbally recall whatever items he could following each slide. He was

warned not to expect to remember everything, as each slide would be withdrawn after several seconds. Following a ready signal, each slide was presented for 10 seconds. During the following 15 second interval the experimenter recorded on a scoresheet, those items recalled. A practice slide was presented first to all subjects, followed by 7 experimental slides. The order of presentation of the experimental slides was varied for each child. Slides depicting words contained 13 items arranged in 3 columns. Slides depicting objects contained 12 items arranged in 3 columns.

The content of the slides was as follows:

Practice slide: two letter, non-food-related words

Experimental slides:

Words	1.	Three letter, food-related and non-food-related
	2.	Three letter, non-food-related
	3.	Four letter, non-food-related
	4.	Four letter, food-related
Objects	5.	Food-related and non-food related
	6.	Food-related
	7.	Non-food-related

The actual items are provided in Appendix III .

Time Estimation.

This test was based on the time perception test described by Rodin et al (1977). However, each subject served as his own control. It was

presented to subjects as an investigation of the relationship between vision and hearing.

The auditory stimuli consisted of tape-recorded .2 second tone pulses of frequency 500 cycles per second (c.p.s.). The high salience stimulus consisted of pulses produced at a rate of 80 per minute, played at 85 dB. The low salience stimulus consisted of pulses produced at a rate of 40 per minute and played at 45 dB (SPL). Decibel level of the stimuli was varied by adjusting the volume dial of the tape recorder to one of two predetermined levels. The duration of the salient and weak pulse trains was exactly two minutes each. Stimulus tapes were played on a monaural reel-to-reel tape recorder placed directly behind the subject at a distance of approximately 30 inches.

The irrelevant visual stimuli were two black on white abstract designs, each mounted on 8½ X 11 cardboard and each rated as equally complex by a group of independent judges. (See Appendix IV). The first visual stimulus was placed, face downward on the desk at which the subject was seated. He was instructed on hearing the tape-recorded beeps, to turn over the cardboard and stare at the design for the duration of the beeps (two minutes). As soon as the beeps stopped, he was to turn over the cardboard. The subject then completed a questionnaire containing several questions on the irrelevant visual stimulus, rated the loudness and annoyance level of the auditory stimulus, and its estimated duration. Next, the second auditory stimulus and irrelevant visual stimulus were presented in the same manner and a second questionnaire completed.

Subjects were advised to pay particular attention to differences between the two sets of stimuli. This was to minimize the likelihood that subjects would assume both pulse trains to be of equal duration and to dispel any compulsion to respond consistently (Pliner, 1974). Half the experimental subjects heard the salient stimulus first and the weak stimulus second, while the order of presentation was reversed for the remaining subjects. Pairing of the auditory and visual stimuli were similarly counterbalanced. The influence of external cues on judgement of time was taken as the difference between time estimates for the salient and weak stimulus in response to the question "How long was the period during which the tape was on?".

Emotionality.

This test is a modification of that described by Rodin et al (1977). Subjects arranged 10 photographs into 3 piles based on whether their initial emotional reaction to each photo was positive, negative or neutral. The child was instructed to decide on the basis of his emotional response, rather than on the technical quality of the photo. The order of presentation of the photos was varied for each child. Next, from each of the 3 piles, the child selected those two he felt best reflected the particular emotion and completed a rating scale for each. A verbally anchored 9 point scale, from ugly to pretty, sad to happy, serious to funny and bad to good was used. The order in which the photos were rated, was varied for each child. The colour photographs, selected from

a variety of newsmagazines and mounted on white cardboard depicted a colt; a giraffe; an old man holding a baby; "Miss Piggy" and "Kermit" the Frog from the "Muppet" television show; a solitary old woman; two fantasy scenes; an abstract design; two landscapes.

This procedure departs considerably from the Rodin et al (1977) test in which three photos were presented, presumed, on the basis of pretesting, to elicit either a positive, negative or neutral emotional response. The present method was designed so that for each child, the appropriate emotional response was in fact elicited by each photo, given the high interindividual variability of ratings noted in pretesting for the current sample. The use of two photos per category of emotional response was intended to enhance reliability of ratings.

RESULTS AND DISCUSSION

Food-Related Externality

Three hypotheses were proposed concerning the relative externality of obese children on a Schacter-type, food-related measure of external-cue responsivity. It was expected that obese children would consume more grams of smarties, compared to controls, under conditions of high cue salience. Control children were expected to consume less when full than when hungry whereas obese children were expected to consume the same amount in both preload conditions. Means and standard deviations of smarties eaten by both groups are presented in Table 2. A three-way (2x2x2) analysis of variance for repeated measures, using Balanova 5 analysis of variance package, was performed on these data to assess the effects of sex, weight and preload on smartie consumption. The results of this analysis are presented in Table 3.

Contrary to expectations, obese children did not consume more smarties than controls. In fact, obese girls consumed considerably, although not significantly, less than all other groups. An unexpected main effect for sex indicated that boys ate significantly more smarties than girls, $F(1,54) = 8.07$, $p < .006$. This finding must be interpreted with caution given the high intergroup variability on this measure. Tests for homogeneity of variance (Glass & Stanley, 1970) confirmed that the homogeneity of variance assumption of analysis of variance had been violated. The effect of this violation, when sample sizes are unequal and

Table 2

Mean and Standard Deviation Grams of Smarties Consumed by Obese and Control Boys and Girls

Group	n	m	SD
Hungry Condition			
Obese			
Boys	13	36.0	38.3
Girls	15	8.9	12.2
Control			
Boys	15	33.8	28.6
Girls	16	23.9	21.5
Full Condition			
Obese			
Boys	13	24.0	25.6
Girls	15	14.2	17.5
Control			
Boys	14[a]	29.7	23.8
Girls	15	19.6	21.1
Total			
Obese			
Boys	13	60.1	57.5
Girls	15	23.1	21.8
Control			
Boys	14	64.8	39.8
Girls	15	44.1	32.4

[a]One subject in this group was unable to return after lunch.

Table 3

Analysis of Variance

Grams of Smarties Consumed in Hungry and Full

Preload Conditions by Obese and Control Boys and Girls

Source	SS	df	MS	F
Sex	6108.88	1	6108.88	8.08*
Weight	1132.86	1	1132.86	1.50
Preload	475.51	1	475.51	1.11
Error Between	40852.5	54	756.53	
Interaction Sex X Weight	441.27	1	441.27	.58
Interaction Sex X Preload	585.63	1	585.63	1.36
Interaction Weight X Preload	15.50	1	15.50	.36
Interaction Sex X Weight X Preload	481.66	1	481.66	1.12
Error Within	23189.0	54	429.43	

* $p < .001$

fewer persons are sampled from the population with the larger variance is that the probability of a Type I error is greater than alpha (p. 372). However, given the magnitude of the significance level in this case, it is reasonable to accept this result.

With regard to the effect of preload on subsequent smartie consumption, all groups, except obese girls, tended to consume slightly less when full then when hungry (See Table 2). However, as indicated in Table 3, neither the main effect for preload condition nor the interaction between weight and preload were statistically significant.

The present study failed to support the findings of adult studies reviewed previously either with respect to the total amount consumed by the obese under conditions of high cue salience, or the differential effect of preloading on obese and normal-weight subjects. However, before dismissing the food-related externality hypothesis in obese children, certain cognitive-motivational and methodological issues should be considered.

Clinical observations support the idea that the girls, particularly the obese girls differed from the boys in actively avoiding smarties. This abstention was typically accompanied by statements about being "on a diet" or "not allowed to eat candy". Some obese girls actually requested that the candy be removed as it posed an irresistible temptation. Furthermore, percent overweight was found to be significantly and negatively correlated with amount of smarties eaten when hungry, only for obese girls, $r = -.67$, $p < .006$. In fact, inspection of raw scores indicated that subjects in this group were most likely to eat no smarties at all, when hungry. The

absence of this pattern in obese boys may reflect a tendency to be less restrained in their eating, as evidenced by their higher overall smartie consumption. The restraint and reduced consumption shown by girls in the present study may be related to the type of food offered. In previous studies, subjects were offered sandwiches or crackers. Rodin and Slochower (1976) presumably chose candy to maximize cue salience for children. However, candy is widely used as a reward in contexts unrelated to hunger and may simply not be considered "food" by most individuals. Furthermore, candy is considered "junk" food, taboo for the health conscious and particularly for obese persons, compared to neutral crackers or sandwiches. Many of the obese children, connecting their hospital visit to an ensuing weight loss program, may have been reluctant to indulge in candy.

The sex difference in the present study may also reflect differential socio-cultural expectations regarding obesity in males and females (Cahnman, 1979). This issue will be elaborated further in the General Discussion.

It is difficult to interpret the preload data given the reduced intake of girls, the small amounts consumed when hungry, by several obese girls, and some methodological features of the study. The observation that girls, particularly obese girls deliberately curtailed their intake is consistent with the adult literature (Herman, 1978) demonstrating that females have tended to score higher than males, on an Eating Restraint scale. Briefly, restraint is conceived as a self-imposed counteravailing resistence to eat- subjectively an exertion of will, and objectively a failure to eat despite

internal and external demands (p. 598). Herman and Mack (1975) have demonstrated that, while unrestrained eaters compensated for a calorically excessive preload in the expected fashion, i.e., by reducing subsequent intake, restrained eaters actually increased their intake or "counter-regulated", presumably due to an inhibition of restraint. The developmental aspects of eating restraint as a function of sex suggests an interesting direction for future research.

With regard to methodological factors, the choice of smarties as food in the present study may have influenced differential preload behavior as well as the total amount eaten. Furthermore, although the length of deprivation was reasonably controlled, the preload itself was highly variable. In some cases, children consumed a full meal including dessert. In other cases, where the mother intended to serve a meal at home, a token fruit was eaten, insufficient to ensure satiation. Finally, each child in this study served as his own control. The tendency of children to respond consistently in such a situation has not been evaluated. There is no reason to assume however that the original adult studies were less subject to similar control issues, and therefore the failure to replicate needn't be attributed to methodological departures of the present study.

Non-Food-Related Externality

Immediate Recall.

The mean and standard deviation recall scores for all groups are presented in Table 4. Examination of these data reveals that the total

Table 4

Mean and Standard Deviation Immediate Recall Scores[a] for Obese and Control Boys and Girls

Group	n	m	SD
Food-Related-Items			
Obese			
Boys	13	37.0	12.2
Girls	15	41.7	8.4
Control			
Boys	15	40.1	12.1
Girls	16	38.1	10.2
Non-Food-Related Items			
Obese			
Boys	13	33.9	7.8
Girls	15	34.3	9.8
Control			
Boys	15	34.1	9.1
Girls	16	33.6	8.1
Total Items			
Obese			
Boys	13	35.2	8.7
Girls	15	37.3	8.4
Control			
Boys	15	36.6	7.8
Girls	16	35.5	7.3

[a]Scores are percentage of items correctly recalled.

number of items recalled by all groups of children was similar, and that all children recalled more food-related, compared to non-food-related items. Obese girls had the highest mean recall scores for food-related items. A three-way (2x2x2) analysis of variance for repeated measures, using Balanova 5 analysis of variance package, was performed to test the significance of these findings. The results of this analysis, which are presented in Table 5, confirmed that there were no significant differences in the number of items recalled, as a function of weight. Significantly more food-related items were recalled by all subjects, F (1,55) = 12.86, $p < .001$. Again this significance level may be somewhat elevated due to a violation of the homogeneity of variance assumption. However, as in the preload measure, given its magnitude, it is reasonable to accept this result. No significant interactions by weight, sex or condition were observed.

Failure to substantiate the hypothesis that obese children would recall more items than controls differs from the adult literature. Rodin et al (1974) found that obese male undergraduates had higher recall scores than controls. Rodin et al (1976) also found slide recall to be significantly correlated with subsequent weight gain in normal-weight girls. However, the present results are consistent with Rodin et al's (1977) study in which the recall task was the only measure of external responsitivity which failed to differentiate weight groups in females aged 12-28. The finding that more food-related than non-food related items were recalled by all subjects also departs from the adult literature. Rodin et al's

Table 5

Analysis of Variance

Immediate Recall[a] Scores of

Obese and Control Boys and Girls

Source	SS	df	MS	F
Sex	.26	1	.26	.11
Weight	.59	1	.59	.25
Recall	.11	1	.1114	12.86**
Error Between	1.30	55	.24	
Interaction Sex X Weight	.14	1	.14	.60
Interaction Sex X Recall	.39	1	.49	.60
Interaction Weight X Recall	.18	1	.18	.21
Interaction Sex X Weight X Recall	.14	1	.14	1.60
Error Within	.48	55	.87	

**$p < .001$

[a]Percent recall data was transformed to logarithms.

(1974) male obese undergraduates obtained higher recall scores than controls, regardless of whether items were food-related or non-food-related. The heightened responsivity of children in the present study to food-related cues suggest developmental aspects of food cue salience as an area for future research. Failure of the immediate recall task to differentiate weight groups challenges the notion that obese children such as those sampled are external compared to their normal-weight counterparts, in contexts unrelated to eating.

Time Estimation.

Mean and standard deviation time estimates are presented in Table 6. Inspection of these data indicates that all subjects overestimated the duration of both strong and weak stimuli, and that the groups were not differentiated by their time estimates. Tests for homogeneity of variance (Glass & Stanley, 1970) confirmed that obese girls exhibited a significantly higher degree of variability in their time estimates, relative to other groups. A three-way (2x2x2) analysis of variance for repeated measures, using Balanova 5 analysis of variance package, is presented in Table 7. The results of this analysis confirmed that the main effects for weight and sex were nonsignificant, as were all interaction effects. The children appeared to respond consistently, despite instructions to attend to differences between the two stimuli. A high correlation was obtained between strong and weak stimuli for all subjects, $r = .750$, $p < .001$. These results failed to support the hypothesis that obese subjects would overestimate the

Table 6

Mean and Standard Deviation Time

Estimates[a] of Obese and Control Boys and Girls

Group	n	m	sd
Strong auditory pulse train			
Obese			
Boys	13	3.5	2.4
Girls	15	5.1	4.5
Control			
Boys	15	5.2	2.4
Girls	16	4.1	3.1
Weak auditory pulse train			
Obese			
Boys	13	3.2	1.7
Girls	15	4.7	4.2
Control			
Boys	15	4.3	2.3
Girls	16	3.6	1.5

Note. Actual duration of both pulse trains = 2 minutes.

[a]In minutes.

Table 7

Analysis of Variance

Time Estimates for Strong and Weak Auditory

Pulse Trains for Obese and Control Boys and Girls

Source	SS	df	MS	F
Sex	3.55	1	3.55	.24
Weight	.96	1	.96	.64
Salience	7.31	1	7.31	2.98
Error Between	830.62	55	15.10	
Interaction Sex X Weight	45.06	1	45.06	2.98
Interaction Sex X Salience	.71	1	.71	.29
Interaction Weight X Salience	.99	1	.99	.41
Interaction Sex X WeightX Salience	.53	1	.53	.22
Error Within	134.82	55	2.45	

duration of elapsed time, relative to controls, when presented with a series of highly salient stimuli; and that they would estimate the duration of elapsed time as no longer (or perhaps shorter) than controls, when presented with a series of low salience external stimuli. In contrast, the proposed relationship was obtained in previous studies with male high school students (Pliner, 1973) and children (Rodin et al, 1977).

Pliner (1973) reported using a between-subjects as opposed to a within-subjects design on the basis of pretesting as subsequent discussion with subjects revealed that they had attempted to respond consistently. Rodin et al (1977) sought to circumvent this problem by instructing subjects to be sensitive to differences between the stimuli. As the methodology of the present study deviated little from that described by Rodin et al (1977) it is unlikely to have accounted for the discrepant findings. However, they used an older and somewhat biased sample of girls attending a camp for overweight children. Regarding the finding that obese girls were significantly more variable in their time estimates relative to other groups, Leon & Roth (1977) have described a study in which obese subjects (sex not reported) similarly exhibited greater variability than controls, in estimating the amount of time elapsed after sitting in a darkened room for 15 minutes. Furthermore, as in the present study, mean time estimates of obese and control subjects did not differ.

Clinical observations indicated that many children in this study found the task boring, suggesting that the role of motivational factors in children's performance on such a measure need consideration. Furthermore,

it has been shown that the influence of motivational factors on time estimation may be particularly salient for obese adults. Leon and Roth (1977) reported that relative to controls, obese subjects judged elpased time to be longer, when listening to a boring tape, then when the tape was interesting.

As in the recall task, the present findings offer no support for the proposed relationship between externality and obesity in a non-food related context in this well-defined sample of children.

Emotionality.

Means and standard deviations for subjects responses to the positive, negative and neutral visual stimuli are presented in Table 8. Examination of these data indicated that positive, negative and neutral stimuli were rated differently by all subjects. However, all subjects, regardless of sex or weight, rated each set of stimuli in a similar way. These observations are supported by a three-way (2x2x2) analysis of variance for repeated measures, using Balanova 5 analysis of variance package. The results of this analysis are presented in Table 9.

Ratings of stimuli labelled positive, negative and neutral differed significantly, F (2, 100)= 206.15, $p < .001$. Again this significance level may be somewhat elevated due to violation of the homogeneity assumption. Scheffé comparisons determined that positive stimuli were rated significantly higher, F' (1,100) = 592.80, $p < .001$, and negative stimuli lower, F (1,100) = 257.80, $p < .001$ than ratings of neutral stimuli. Contrary to

Table 8

Mean and Standard Deviation Emotionality Ratings

by Obese and Control Boys and Girls

Group	n	m	SD
	Positive Photograph		
Obese			
Boys	13	30.7	5.0
Girls	15	32.9	2.4
Control			
Boys	15	29.9	3.5
Girls	16	31.2	3.6
	Neutral Photograph		
Obese			
Boys	13	19.6	4.8
Girls	15	17.2	5.2
Control			
Boys	15	21.0	3.9
Girls	16	20.0	4.2
	Negative Photograph		
Obese			
Boys	12	10.9	5.5
Girls	15	11.6	4.5
Control			
Boys	13	14.1	5.1
Girls	14	11.6	4.7

Table 9

Analysis of Variance

Emotionality Ratings for Positive, Negative and Neutral Photographs for Obese and Control Boys and Girls

Source	SS	df	MS	F
Sex	5.23	1	5.23	.49
Weight	33.03	1	33.03	3.08
Emotion	10055.20	2	5027.61	206.15*
Error Between	536.48	50	10.73	
Interaction Sex X Weight	6.87	1	6.87	.64
Interaction Sex X Emotion	64.7	2	32.4	1.33
Interaction Weight X Emotion	103.23	2	51.66	2.12
Interaction Sex X Weight X Emotion	42.91	2	21.45	.88
Error Within	2438.87	100	24.3°	.88

* $p < .05$

expectations, there was no significant main effect for weight, nor were there any significant interactions for weight, sex, or condition. These findings are inconsistent with the literature on obese adults (Schacter et al, 1968; Rodin et al, 1974; Rodin, 1974), obese adolescents (Pliner, 1973), normal-weight children (Rodin & Slochower, 1976), and obese children (Pliner et al, 1974; Rodin et al, 1977). As in the case of the immediate recall measure, these results do not support the notion of an association between obesity and non-food-related externality in this sample.

The failure to replicate previous findings of heightened emotionality in the obese may reflect a procedural artifact. In the present study, instructions to select two pictures which most strongly elicited positive and negative emotional reactions may have "set" all subjects to respond towards the extreme ends of the rating scales, possibly obscuring obese vs. control differences.

Nowicki-Strickland Locus of Control Scale (CNS-IE)

Means and standard deviations of locus of control scores for the present sample and for the standardization sample (Nowicki & Strickland, 1973) are presented in Table 10. It can be seen that the children in the present sample were somewhat internal compared to the original subjects. This discrepency might relate to socioeconomic status of the two samples. It is recalled that lower levels were overrepresented in the original sample and underrepresented in the present sample. Given the consistent

Table 10

Mean and Standard Deviation

Nowicki-Strickland Locus of Control Scores[a]

for Present and Standardization Samples

Group	n	m	SD
	Present Sample		
Obese			
Boys	13	13.5	3.5
Girls	15	17.8	4.3
Control			
Boys	15	15.0	5.0
Girls	16	15.4	5.0
	Standardization Sample		
Grade 3			
Boys	44	18.0	4.7
Girls	55	17.4	3.1
Grade 4			
Boys	59	18.4	3.6
Girls	55	18.8	3.6

Note. Standardization sample data is from Nowicki and Strickland, 1973.

[a]Higher scores indicate greater externality.

association between socioeconomic advantage and increased internality (Gilmor, 1978) this finding is not surprising. Contrary to expectations, examination of Table 10 reveals no differences in locus of control scores as a function of weight. The results of a two-way analysis of variance, using "Statistical Package for the Social Sciences" (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975) are presented in Table 11. This analysis confirms that neither the main effect for weight, nor any of the interactions was significant. There was a significant main effect for sex, F (1,55) = 3.91, $p < .05$ although this result was not predicted, nor was it obtained in the standardization sample. Girls in the present study obtained higher scores, i.e. were more external than boys. Nowicki (1976) has described sex differences within the factor structure of the CNS-IE, and sex differences in locus of control research, in general, have been reported (Chandler & Dubovics, 1977). Since sex in relation to locus of control has not been studied systematically, it is difficult to evaluate the generalizability of the present findings. The failure to support the hypothesis that obese children would score externally on the CNS-IE relative to controls may owe to sample selection in the present study, with respect to psychological adjustment, socioeconomic factors and degree of obesity. These issues will be elaborated further in the General Discussion. Although statistically insignificant, a trend towards an interaction between sex and weight was obtained, F (1,55) = 2.77, $p < .10$. Obese girls were somewhat more external, and obese boys were more internal than control counterparts. The difference in scores of control boys and girls was negligible. Nowicki

Table 11

Analysis of Variance

Nowicki-Strickland Locus of Control Scores

for Obese and Control Boys and Girls

Source	SS	df	MS	F
Sex	81.45	1	81.45	3.91**
Weight	2.88	1	2.88	.14
Interaction Sex X Weight	57.59	1	57.59	2.77*
Error Within	1145.38	55	20.83	
Total	1282.71	58	22.12	

* $p < .10$

** $p < .05$

(Note 2) using the adult version of the CNS-IE has reported similar results with alcoholics and suggests that this pattern may characterize consummatory disorders. One might speculate that there are differential socio-cultural norms and expectations for males and females regarding alcoholism, obesity and other addictive behaviors.

Intercorrelations.

Pearson r correlations amongst the various measures of external-cue responsivity and locus of control are presented in Appendix V . It is evident from inspection of the matrix that few significant correlations were obtained. Those correlations which were significant were of a low magnitude and there was little consistency in the direction of significantly correlated measures. Finally, the direction of significantly correlated measures was not necessarily consistent with theoretical expectations, suggesting that chance factors may have contributed considerably to significance levels.

Rodin and Slochower (1976) reported consistent but low intercorrelations of measures of preload, recall and emotionality for normal-weight girls, with a somewhat stronger relationship for their small overweight sample. The results of the present study, however, offer little support for the notion of a single underlying dimension of externality.

GENERAL DISCUSSION

In summary, there was no relationship between obesity in the children sampled and any of the measures of external-cue responsivity, either food-related or non-food-related, or with locus of control orientation. Furthermore, these measures were neither strongly nor consistently correlated. All children were more responsive to food-related than non-food-related words and objects depicted on slides, and significant sex differences were obtained on two measures, i.e., preload and CNS-IE. Boys ate more than girls and girls exhibited a more external locus of control orientation. These findings offer little support for the notion that obese children are external relative to normal-weight controls with respect to either external-cue responsivity or locus of control.

The absence of a predictable pattern of intercorrelation amongst the various measures suggests that they do not represent a single underlying dimension of externality. On the basis of these results and the adult literature, it is possible that factors other than externality, i.e. sex, age, degree of obesity, familial factors, socioeconomic status, and degree of emotional-social dysfunction might be more relevant to the determination of differential etiologies of childhood obesity. The design of appropriately tailored treatment programs and the framing of research methodologies might likewise focus on specific samples of obese children.

Support for the external-cue hypothesis in the present study was weakest in non-food-related situations which failed consistently to replicate the

obesity-externality relationship observed in adult studies. It is tempting to attribute this discrepancy wholly to the age variable, i.e. the use of child versus adult subjects. Such an oversimplistic explanation ignores the contribution of a number of confounding factors acknowledged by obesity researchers (Leon & Roth, 1977). For example, Schacter and his colleagues sampled male undergraduates of restricted age and socioeconomic level. Furthermore, failure to control or at least specify pertinent subject variables such as degree of obesity, age at onset of obesity and degree of restraint or dieting have confused the literature. These variables are similarly confounded or unspecified in the food-related studies in which the extension of laboratory observation to eating in the natural environment is also questionnable.

Given the complexity of obesity in children, it seems premature to reject the externality hypothesis until various subsamples of obese children meeting well-defined criteria, are tested. The failure to support the hypothesis that obese children would be external compared to controls might reflect the particular type of children sampled in this study. It is noted that Bruch based her theories on a disturbed sample of pediatric clinic referrals from a lower socioeconomic and immigrant population.

Socioeconomic and cultural factors have been related to both obesity and locus of control orientation. A greater incidence of obesity is evident in the lower socioeconomic levels (Goldblatt, Moore, & Stunkard, 1964). Gilmore, (1978) notes that "Beliefs in external control quite

appropriately reflect the life conditions of less advantaged children and adolescent of the same and different race." (p. 7).

Socioeconomic advantage and relatively intact family structure may have permitted children in our sample to compensate for negative consequences of their obesity. Degree of obesity must also be considered.

Forbes (1975) has identified two groups of obese children. The first he labels "hard core", massively obese who have attempted to adapt to life situations by becoming addicted to food. The second class he calls "overweight", "mild", or "moderately" obese, far outnumbering the first class and more apt to be influenced by situational and cultural factors.

Most children in the present obese sample undoubtedly belonged in Forbes's second category. While subsequent interviews indicated that some children felt that their peer relations suffered because of their weight, most appeared to enjoy reasonable peer status. It is unlikely that the majority of children were socially or emotionally handicapped by their obesity. It is proposed that externality with respect to locus of control of orientation might characterize Bruch's sample, or Forbes's massively obese children in whom obesity reflects pervasive familial and psycho-social problems. It might be irrelevant on the other hand, in moderately obese, psychologically intact children of comfortable socioeconmic background in whom obesity may simply be indicative of nutritional mismanagement and/or sedentary lifestyle. Furthermore, these etiological distinctions might imply differential treatment. For example, while the

obese child first described might require a global, psychoanalytically oriented approach, nondisturbed obese children, such as those sampled in this study, might respond to more direct, behavioral manipulations aimed at specific food and exercise related variables.

Although externality did not appear to relate to obesity in the present sample, the significance of two factors for these children was confirmed. These factors are eating restraint and sex-related socio-cultural expectations. With regard to eating restraint, it was noted that girls ate less than boys and obese girls ate least. Clinical observations, together with the data on the amount of candy eaten and the effect of preload, confirm the role of cognitive-motivational variables, such as restraint in the social eating situation. Jeffrey and Wollersheim (1978) have stressed the importance of such variables in weight control. Herman (1978) agrees that consideration of "mental constructs" such as resistance, self-control, inhibition and even will-power are essential to the full comprehension of behavior (p. 595). Proponants of eating restraint propose the the heightened external-cue responsivity to salient food and non-food related environmental cues characterizes dieters and is not confined to the obese, the majority of whom are chronic, if unsuccessful dieters (Polivy, Herman, & Warsh, 1978). In this view, attribues considered to be correlates of obesity are better conceptualized as correlates of attempted weight suppression (Hibscher & Herman, 1977). Free fatty acid levels, distractability, preloading and emotionality have

been examined in relation to restrained eating (Herman, Polivy, Pliner, Threlkeld, 1978; Herman & Mack, 1975), however, none of these studies involved children. Herman's suggestion that the need for research to explore the parameters of restraint, particularly its developmental origins, is supported by the present findings.

Clinical observations in the present study indicated a relationship between eating restraint and sex. The psychological significance of obesity for children and their attempts at deliberate control of eating, appear to be sex-related. Obesity is condemned as physically unattractive and socially undesirable, especially in females by middle and upper-class Western society. For females, obesity is incompatible with "ideal" feminine qualities of daintiness and vulnerability. In contrast, obesity may represent an exaggeration of the "ideal" masculine qualities of power and strength.

Cahnman (1979) reviews several lines of evidence indicating that females may be particularly subject to stigmatization for their obesity. For example women whose social status decreased showed significantly higher prevalence of obesity than those who were upwardly mobile, whereas the difference among men was less conspicuous. He concludes the "The fault lies with the conscious or unconscious discrimination to which obese girls are subjected". (p. 444).

In a study by Richardson (1966) 10 and 11 year old girls consistently ranked an obese child, compared to other children with various disabilities, as the least socially preferable. Boys in contrast, more consistently

rejected an amputated child, indicating that obesity is more negatively valued by girls. One might speculate that the motivation of all girls in the present study to avoid obesity, evident in their reduced intake compared to boys, reflects a stronger compliance and social conformity. It is clear that sex and degree of restraint should also be considered in designing treatment programs for children.

The results of this study corroborate the recent claim, based on the adult literature, that the internal-external dichotomy provides a misleading and oversimplistic account of obese/nonobese differences (Note 3). Rodin argues that the role of external and internal factors, depend upon and should be in part defined by the state or role of the other rather than as two opposite ends of the same continuum. Internal and external processes are integrated into a highly interactive feedback system depending upon and reciprocally changing one another. The regulation of food consumption depends on physiological, sensory, cognitive-motivational and socio-cultural parameters. According to Rodin (1977) this view of eating as a system of motivated behaviors (p. 333) necessitates the examination of the phenomenon at many different levels of analysis and with multiple methodologies.

The relevence of cognitive-motivational and socio-cultural parameters for obese children, which has been discussed with regard to the present findings, offers support for Rodin's contention that "We must aim for greater conceptual clarity in the formulation of an external response style" (p. 339) and that measures should be developed which do not rely

only on a paper and pencil assessment but look to the interaction of dispositional and situational variables as a way of more broadly understanding the phenomenon." The absence in this study of a correlation among measures of external-cue responsivity also support Rodin's conclusion that while external responsiveness has been hitherto defined by the tests used to measure it, these tests are not all measuring the same underlying construct. She cautions against confounding constructs which are descriptively linked to external responsiveness, e.g. field-dependence, independence, introversion-extraversion, and locus of control of reinforcement, with those which are conceptually related. This admonition is supported by the absence in the present study of a relationship between locus of control and measures of cue responsivity. Rodin reiterates that more refined concepts are needed in order to understand the relevant underlying processes. She suggests that rather than relying on generalized questionnaires or tests which seem relevant because they have been labelled as assessing "externality", that responsiveness to salient environmental cues may be most clearly evaluated when subjects are tested in situations where there are complex and potentially competing internal and external processing demands (p. 338).

Similarly, the current trend in locus of control research is the development of goal-specific scales (Walliston and Walliston, Note 2). Lefcourt (1976) suggests that "The construct will have its greatest utility if potential investigators design procedures for their own purposes and constrain themselves by formulating more appropriate and

precise hypotheses with perception of control variables." (p. 153).

Future research on the assessment of locus of control specific to eating, and its relation to general locus of control might answer Rodin's (1977) question regarding whether one of the consequences to an individual for an inability to control his or her own eating, beyond those associated with weight change per se, may relate to the experience of personal causation in other spheres (p. 336).

In conclusion, it seems that parallel trends in research in the area of locus of control and behavioral cue responsivity point toward greater precision in definition and measurement, in recognition of the complexity of the constructs. Similarly, acknowledgement of the heterogeneity of obesity in children suggests the necessity of specifying well-defined subsamples for research and clinical applications. Future studies involving obese children will hopefully reflect these trends.

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APPENDIX I

Analysis of Variance

Age, Grade and Percent Overweight for Obese and Control Boys and Girls

Variable	Source	SS	df	MS	F
Age	Sex	.97	1	.97	.85
	Weight	1.119	1	1.119	.98
	Interaction Sex X Weight	.75	1	.75	.66
	Error Within	62.64	55	1.14	
	Total	65.53	58	1.13	
Grade	Sex	.651	1	.65	.39
	Weight	3.05	1	3.05	1.80
	Interaction Sex X Weight	3.94	1	3.94	2.33
	Error Within	93.04	55	1.69	
	Total	100.576	58	1.734	
*Percent Overweight	Sex	.79	1	.79	.55
	Weight	.32	1	.32	225.75*
	Interaction Sex X Weight	.46	1	.46	3.21
	Error Within	.79	55	.14	

Note. A logarithmic transformation was applied to percent overweight data

* $p < .001$

WE ARE TRYING TO FIND OUT WHAT BOYS AND GIRLS YOUR AGE THINK ABOUT CERTAIN THINGS. WE WANT YOU TO ANSWER THE FOLLOWING QUESTIONS THE WAY YOU FEEL. THERE ARE NO RIGHT OR WRONG ANSWERS. DON'T TAKE TOO MUCH TIME ANSWERING ANY ONE QUESTION BUT DO TRY TO ANSWER THEM ALL.

For each of the following questions, place a mark in the YES column if you agree and place a mark in the NO column if you disagree. Answer every question.

		YES	NO
1.	Do you believe that most problems will solve themselves if you just don't fool with them?	*	
2.	Do you believe that you can stop yourself from catching a cold?		*
3.	Are some kids just born lucky?	*	
4.	Most of the time do you feel that getting good grades means a great deal to you?		*
5.	Are you often blamed for things that just aren't your fault?	*	
6.	Do you believe that if somebody studies hard enough he or she can pass any subject?		*
7.	Do you feel that most of the time it doesn't pay to try hard because things never turn out right anyway?	*	
8.	Do you feel that if things start out well in the morning that it's going to be a good day no matter what you do?	*	
9.	Do you feel that most of the time parents listen to what their children have to say?		*
10.	Do you believe that wishing can make good things happen?	*	
11.	When you get punished does it usually seem it's for no good reason at all?	*	
12.	Most of the time do you find it hard to change a friend's (mind) opinion?	*	
13.	Do you think that cheering more than luck helps a team to win?		*
14.	Do you feel that it's nearly impossible to change your parent's mind about anything?	*	

External responses are starred *

	YES	NO
15. Do you believe that your parents should allow you to make most of your own decisions?		*
16. Do you feel that when you do something wrong there's very little you can do to make it right?	*	
17. Do you believe that most kids are just born good at sports?	*	
18. Are most of the other kids your age stronger than you are?	*	
19. Do you feel that one of the best ways to handle most problems is just not to think about them?	*	
20. Do you feel that you have a lot of choice in deciding who your friends are?		*
21. If you find a four leaf clover do you believe that it might bring you good luck?	*	
22. Do you often feel that whether you do your homework has much to do with what kind of grades you get?		*
23. Do you feel that when a kid your age decides to hit you, there's little you can do to stop him or her?	*	
24. Have you ever had a good luck charm?	*	
25. Do you believe that whether or not people like you depends on how you act?		*
26. Will your parents usually help you if you ask them to?	*	
27. Have you felt that when people were mean to you it was usually for no reason at all?	*	
28. Most of the time, do you feel that you can change what might happen tomorrow by what you do today?		*
29. Do you believe that when bad things are going to happen they just are going to happen no matter what you try to do to stop them?	*	

3

	YES	NO
30. Do you think that kids can get their own way if they just keep trying?		*
31. Most of the time do you find it useless to try to get your own way at home?	*	
32. Do you feel that when good things happen they happen because of hard work?		*
33. Do you feel that when somebody your age wants to be your enemy there's little you can do to change matters?	*	
34. Do you feel that it's easy to get friends to do what you want them to?		*
35. Do you usually feel that you have little to say about what you get to eat at home?	*	
36. Do you feel that when someone doesn't like you there's little you can do about it?	*	
37. Do you usually feel that it's almost useless to try in school because most other children are just plain smarter than you are?	*	
38. Are you the kind of person who believes that planning ahead makes things turn out better?		*
39. Most of the time, do you feel that you have little to say about what your family decides to do?	*	
40. Do you think it's better to be smart than to be lucky?		*

IMMEDIATE RECALL

Word Lists

FR
NFR

JAM___ COD___ CAT___

SKY___ OWL___ PEG___

JET___ TEA___ HAM___

ARM___ EGG___ TOT___

BIN___

/13 F.R. /5 N.F.R. /8
ERRORS_____ ERRORS___

NFR

CAR___ BEE___ FAN___

PIN___ AXE___ LEG___

GUN___ NIB___ SUN___

JAR___ TOP___ LOT___

DOG___

/13 ERRORS___

NFR

WELL___ JUNK___ CAMP___

BOAT___ TANK___ ROPE___

FORT___ SEAL___ DROP___

RUBY___ DOLL___ TREE___

DESK___

/13 ERRORS___

FR

LARD___ CLAM___ MEAT___

RICE___ MILK___ LAMB___

VEAL___ STEW___ TUNA___

BEEF___ COKE___ PORK___

CAKE___

/13 ERRORS___

/52 (%)

MEAN CORRECT/SLIDE _____

/18 FR ___%

Objects

FR
NFR

SOCK___ BANANA___ BALL___

PENCIL___ PIE___ THREAD___

DRUM___ PURSE___ CONE___

GRAPEFRUIT___ HOTDOG___ GLASS___

/12 F.R._____ N.F.R._____
ERRORS_____ ERRORS_____

FR

APPLE___ PIE___ BANANA___

CAN___ CONE___ GRAPEFRUIT___

FISH___ PEAR___ GLASS___

STOVE___ SPOON___ MUG___

/12 ERRORS_____

NFR

BALL___ CLOCK___ CHAIR___

DRUM___ PURSE___ PIN___

THREAD___ SOCK___ UMBRELLA___

PENCIL___ BRUSH___ BELL___

/12 ERRORS_____

/18 ___% NFR

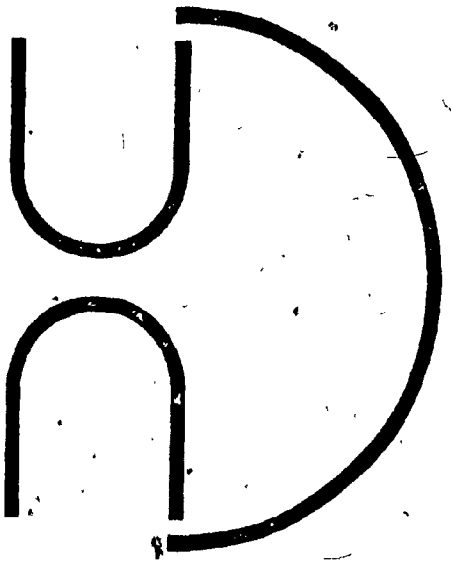
/36 (%) /18 ___% FR

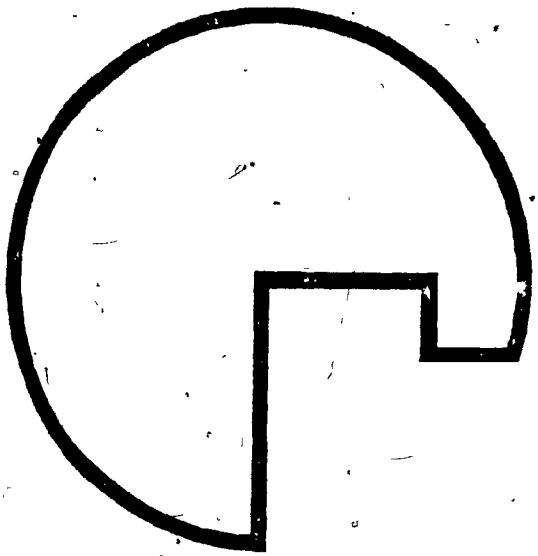
MEAN CORRECT/SLIDE_____

TOTAL ERRORS ____ FR___NFR___

/88 TOTAL ITEMS CORRECT (%)
MEAN CORRECT/SLIDE_____
/52 N.F.R. (%)
/36 F.R. (%)

APPENDIX IV





Intercorrelations for Measures of External-Cue Responsivity and Locus of Control

	Measure		1	2	3	4	5	6	7	8	9	10	11	12
Preload	1.	Hungry		.34	.86**	-.02	-.03	-.02	-.01	-.01	-.10	-.16	.21	-.08
	2.	Full			.77***	.08	.12	.02	.01	-.31*	-.19	.35**	-.07	-.31*
	3.	Total				.02	.04	.00	-.01	-.16	-.17	.29*	.11	-.23
Recall	4.	Total					.87***	.90***	.06	-.06	-.01	.11	-.02	-.16
	5.	Food						.56***	.15	.05	.03	.16	-.08	.01
	6.	Non-food							.05	-.08	.00	.05	.03	-.27*
Time Estimation	7.	Strong								.75***	.10	-.09	-.01	.36***
	8.	Weak									.28*	-.31*	.02	.41***
Emotionality	9.	Positive										-.49***	-.13	.10
	10.	Negative											-.10	-.15
	11.	Neutral												-.04
Locus of Control	12.	CNS-IE												

* $p < .05$
** $p < .01$
*** $p < .001$