

PSYCHOSOCIAL DIFFERENCES BETWEEN LEFT-HANDED AND
RIGHT-HANDED CHILDREN

A Thesis By

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I have examined the final copy of this Thesis for form and content and recommend that it be accepted in partial fulfillment of the requirement for the degree of Master of Educational Psychology.

Dr. Linda Bakken, Committee Chair

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Dr. Randall Ellsworth, Committee Member

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DEDICATION

To my husband Ben, thank you for all the hours helping me make copies, score tests, and the endless support you gave. To my daughters Madison and Hanna, thank you for understanding that sometimes I had to work, your endless help and being interested in my research. Thank you to my parents, who even though I was “wrong handed,” loved my anyway and learned to help me function in a right handed world. To my sisters who are a never ending support system of love, understanding and grace. Thank you to my mentor and aunt who took my frantic phone calls with understanding and guidance. To my unlimited family and friends which there is not enough paper to list, without their support I never would have finished. Last but certainly not least, thank you to all the children who found it fun and interesting to be part of my study and the teachers and administrators who let me come into their schools.

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ABSTRACT

Historically left-handed people have had to cope with disparaging nicknames, sayings and misunderstanding about being left-handed. The age of hand dominance has been debated for decades with the consensus maintaining that at about 5 years old children begin to have stability in hand preference. In conjunction with hand dominance, the degree of dominance plays a significant role in the level of functioning. The impact of psychological well being during childhood is far reaching and could be life-long. Therefore, this study raised three hypotheses that could impact the future contact with students in regard to their hand preferences. Left-handed children would have significantly lower self-concept scores than right-handed children. Left-handed children would have higher anxiety levels. Left-handed children would use more external locus of control. Participants included 132 students from grades 4 through 6 from two Catholic Schools in the Wichita Diocese and one public elementary school in Reno County, Kansas. Of the 132 students 121 identified themselves as right-handed and 11 identified themselves as left-handed. To measure self-concept the Tennessee Self-Concept Scale was used. The Penn State Worry Questionnaire was used to measure anxiety. To measure locus of control the I-E Scale was used. Statistical results showed no statistically significant difference between left-handed and right-handed students in terms of anxiety and locus of control. Statistics revealed a statistically significant that left-handed students have a statistically significant higher self-concept.

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CHAPTER 1

INTRODUCTION

Imagine waking up in the morning and the whole world is backwards. Door handles are on the wrong side making leaving the bedroom difficult. Trying to get dressed is tough because the buttons are on the opposite side than usual. The can opener and pencil sharpener have handles on the wrong side. For ten percent of the population this is an everyday experience because they are left handed (Coates, 1996).

Many studies have examined the aspects of left-handedness (e.g. Coates, 1996; Hackney, 1997; Milsom, 1995; Trotter, 1974). Historically left-handed individuals have had to cope with too many other difficulties. Not only have they been persecuted by religious beliefs but left-handed individuals have also had to confront disparaging words, nicknames, and sayings (Coates, 1996; Howell, 1978; Trotter, 1974).

Much literature on left-handedness centers around the age and range of hand dominance (e.g. Bloodsworth, 1993; Gesell & Ames, 1947; Lewis, Feiring, & McGuffog, 1986; Tan, 1985). There is no consensus on the age at which children achieve hand dominance. The level of hand dominance, however, not only depends on the hand with which an individual writes with but an entire system of processes working together: eye, hand, and foot dominance.

School poses a variety of other challenges (e.g., writing difficulties) and teachers with no knowledge of how to teach left-handed students. For left-handed students, difficulties with equipment come during the first year of school. All of these difficulties may result in learning and psychological problems (Bloodsworth, 1993; Coates, 1996; Milsom, 1995).

Several research studies have looked at academic differences in left-handed and right-handed students (e.g. Banham, 1983; Bower, 1985; DeYoung, Monahan, & McCall, 1998; Kee, Gottfried, Bathurst, & Brown, 1987; Tan, 1985). During these studies, age of hand preference plays an important role. In various studies different aspects of learning have been taken into account. These studies vary in focus and level of functioning of the subjects.

For many, school is the first place a child is socialized and therefore will be the first place he/she becomes aware of his/her handedness. Historically teachers have resorted to unthinkable means to make left-handed students become right-handed (Milsom, 1995). Teachers are not the only people that change the preferred hand of the child; parents also contribute to the idea of being left-handed as unacceptable (DeYoung et al., 1998).

The difficulties faced by left-handed people bring about questions regarding their psychological wellbeing. For some children, the psychological difficulties can be onerous, including feelings of shame, abnormality, and inadequacy (Bloodsworth, 1993; Coates, 1996; Milsom, 1995). Handedness has been considered by some researchers as a concomitant variable when studying locus of control, depression, self-esteem, anxiety and self concept (Alony, 1997; Etaugh & Brausam, 1978; Hicks & Pellegrini, 1978b; Orme, 1970). In regards to psychological variables, there have been few studies in which children were used as subjects.

Purpose

Feelings of being different from the norm can potentially create problems for the left-handed child. One thing that research indicates is that suffering anxiety has

implications on self-concept and externalizing. Given that much of socialization during childhood happens in the school setting, the ramification of being left-handed in a right-handed world should be studied in this setting. Therefore, the purpose of this study was to compare left-handed children and right-handed children in terms of self-concept scores, anxiety levels, and locus of control.

Overview

Chapter 2 provides an examination of handedness literature. Literature pertaining to the historical aspects of handedness is reported followed by an examination of the literature surrounding the debate on the age at which handedness becomes dominant. The degree of hand dominance is investigated, including literature on the lateral nature of dominance. Careful consideration is placed on examining the difficulties of being left-handed and the environmental influences. Finally, studies considering achievement and psychological differences of left-handed and right-handed subjects are examined.

Chapter 3 provides details of the methods used in the present study. Comprehensive descriptions of the questionnaires used, including the *Tennessee Self-Concept Scale Second Edition* (Fitts & Warren, 1996), *Penn State Worry Questionnaire for Children* (Chorpita, Tracey, Brown, Collica, & Barlow, 1997), and *I-E Scale* (Rotter, 1966), precedes the explanation of the procedures of the present study.

Presented in Chapter 4 is information concerning the data analyses for the present study. Included are the means and standard deviations of the variables and the results of analyses of variance.

Findings of the current study are discussed in Chapter 5. Limitations of the present study are discussed and future research that is needed. Comparing left-handed

and right-handed individuals as well as problems that future research will continually face when studying left-handed subjects are identified.

Chapter 2

LITERATURE REVIEW

The literature concerning left-handed subjects is relatively small in nature; however, several topics have been researched about left-handed people. The literature reviewed in this chapter will begin by looking at the history of hand dominance. There is some research on the degree of handedness and how it relates to laterality. Difficulties faced being left handed will be reviewed including environmental influences. Many researchers looked at achievement differences based on handedness. The last section and the focus of this study will be concerned with the psychosocial differences based on handedness.

Review of Research

According to DeYoung et al. (1998), 40% percent of the population should be left handed. Historical investigations revealed that there were more left handed people in the population at one time. By studying the cave drawings and artifacts of tools from the Stone Age, researchers found that during this time period equal proportions of the population were left handed or right handed (Coates, 1996; DeYoung et al., 1998). Researchers suggest that the change in the amount of left handed people happened in the Bronze Age due to religious ceremonies centered on the sun also developing the belief that the left hand was evil and the right hand was lucky (Coates, 1996; DeYoung et al., 1998; Howell, 1978). Even the Bible, a widely available and used book, frequently refers to the left hand as evil (Coates, 1996). The Book of Judges in the Bible associates left handedness with warlike tendencies (Trotter, 1974).

In conjunction with religious beliefs, hunting techniques played a role in right-hand dominance. Primitive hunters needed to protect their most vital organ of the body (the heart), so their left hand was used to hold a shield. The right hand was used to hold the sword or knife. Therefore the right hand acquired greater agility which was passed down through the generations (Coates, 1996; Hollingworth, 1923). One issue that creates controversy is the age at which hand dominance becomes a salient trait. Is the use of left hand due to cultural influences or is it innate?

Age of Hand Dominance

The age at which children show their preferred hand has been debated. Gesell and Ames (1947) indicated that marked handedness is not clear cut until about the age of 10. Their research examined the manual responses of children developmentally between 16 weeks and 10 years of age. Findings showed that, although there is not a rigid time schedule, and there are individual differences, children follow a comparable sequence of handedness fluctuating between unilaterally (right hand preferred or left hand preferred) with each hand being dominant at times and bilaterally (using both hands equally). Lewis et al. (1986) argue that children under the age of 5 years are likely to switch hand preference or show evidence of ambidexterity, whereas after 5 years of age hand preference becomes a more reliable indicator of later handedness. Tan (1985) states that handedness is considered to be stable in most children by the age of 5 at least. Bloodsworth (1993) concluded that the period of switching between right and left hands is during the first four years of life. Bloodsworth states that approximately 60% of early education students are inconsistent in hand dominance. Although hand dominance is

important to education, the trend in thinking by researchers is that it is more important to consider the level of dominance of hand preference.

Degree of Dominance

According to researchers there is no clear cut division between being left handed and being right handed; instead there are levels of dominance with completely left handed and completely right handed being at each end of the spectrum (Bloodsworth, 1993; Hollingworth, 1923; Tan, 1985). Researchers agree that there is a need for assessing the degree of handedness during research and teaching, cautioning teachers not to generalize the potential problem areas because, depending on the degree of handedness, some tasks might be carried out with the left hand whereas others are carried out by the right hand (Milsom, 1995; Tan, 1985). Researchers have gone on to find that degree of hand preference alone does not provide a clear picture of the individual's laterality.

In a study conducted by Casey, Brabeck, and Ludlow (1986), researchers went further by dividing right-handed, left-handed and ambidextrous individuals into two groups: those that have no left-handed individuals in their family (familial right handed) and those that have left-handed individuals in their family (familial non-right handed). Familial non-right handed, those who had one or more left-handed or ambidextrous individuals in their family, benefited significantly from mental rotation instructions when compared both to their own control group and familial right-handed subjects who were given the same instructions. Also, when given the orientation instructions, familial non-right handed showed significantly less posttest improvement than their control group.

This suggests that right-handed relatives of left-handed individuals are more similar in many respects to left-handed individuals than they are to other right handed.

Handedness should not be considered as only which hand an individual uses to write with but viewed as an entire system of interrelated functions including eyedness and footness, referred to as laterality (Annett & Turner, 1974; Gesell & Ames, 1947; Hardyck, 1977; Trotter, 1974). Spillman, Friedman, and Hutchcraft (1994) found a statistically significant relationship between handedness and eye dominance, contending that writers and readers need to position their writing tools and hand on the paper to accommodate the dominant field of vision. This creates one of the many difficulties faced by left-handed people.

Difficulties of Being Left Handed

Many languages have dual meanings for the word left, leading to negative connotations for being left handed. In Latin, which is a base language for many European languages, the word for left is *sinister*. In Spanish the word for left means malicious (Coates, 1996). In the French language the word for left is *gauche*, awkward and clumsy. The German word for left also means awkward. *Mancino* in Italian means left or deceitful or defective (Coates, 1996; Trotter, 1974). *Nolevo* is Russian for left or *doing things the sneaky way* (Trotter, 1974). Each of these negative meanings brings about a social world where being left handed is not acceptable.

There are many terms that refer to being left handed in a negative way. Some of the most used terms are lefty, southpaw, backwards child, and left handers. Other sayings that are meant to be disparaging include: *left wing*, *out in left field*, *two left feet*,

and a *left-handed compliment* (Howell, 1978). People that are right-hand dominant do not have to succumb to these disparaging nicknames.

As mentioned before, there are many things used everyday that have a right-handed bias. Bottle caps, vegetable peelers, serrated knives, scissors, musical instruments, gum wrapper tabs, chair desks, computer keyboards and many power tools, to name just a few, cause difficulty for the left handed user (Coates, 1996; Hackney, 1997; Milsom, 1995; Trotter, 1974). Although these tasks are difficult to overcome, writing and writing utensils appear to cause some of the most difficult problems, both mechanically and socially for the left-handed person.

The act of writing poses a variety of difficulties for the left-handed person to overcome. Since writing takes place from left to right, the left handed person cannot see what they have just written because their hand covers the writing. Many left handed individuals accommodate by using a hooked position, which can cause problems because the arm does not have the full range of motion (Hackney, 1997). Not only not seeing what is being written causes a problem, but the left hand is dragged across the freshly written letters and smears the writing (Bloodsworth, 1993; Milsom, 1995). If the left-handed writer is using a pen, the nub of the pen is pushed rather than pulled across the paper the way the pen was designed to perform. This action can cause erratic ink flow and allows the writing to be smeared easier (Milsom, 1995).

Writing letters in the acceptable way causes the left-handed person to go against their natural instincts of moving away from the body's midline (right to left). Consequently this causes left-handed children to be slower, more awkward and uncomfortable in their hand and body positions. In addition, it causes left-handed

children to experience more fatigue when engaged in prolonged periods of writing (Harrison, 1981). Letters such as *b*, *d*, *p*, and *q* are frequently reversed due to the circles that are involved in the creation of the letters (Hackney, 1997; Harrison, 1981; Simner, 1984). Given that circles are a frequent occurrence in writing, especially in numbers, reversals could be found in writing other figures. Furthermore the slant of the letters is more irregular so the written product is usually less legible (Harrison, 1981). On the contrary, Coates (1996) found that there was no significant difference in speed and quality of left-handed and right-handed writing.

Difficulty for left-handed children can develop early. Toys and clothing tend to have a right-hand bias. Part of children's early development is to learn to adapt and find effective ways of making things work (Milsom, 1995). This raises the question of what happens to those children that are unable to accommodate and what the psychological ramifications are for the left-handed child. Not only are left-handed people laden with unflattering nicknames, they have also been the subjects of abusive treatment for following their natural instincts.

Environmental Influences

In the past teachers would rap the knuckles of a child who tried to use his or her left hand. Teachers would also tie the left arm behind a child's back to make the right hand the only usable hand (Milsom, 1995). Left-handed children were seen as rebelling against authority if they used their left hand since school was the first place that the idea of left handed versus right handed emerged (Bloodsworth, 1993). Through these reprimands left-handed children suffered feelings of shame, abnormality, and inadequacy (Bloodsworth, 1993; Coates, 1996; Milsom, 1995).

Many left-handed children can be embarrassed about the difficulty they are having and instead blame themselves rather than the equipment (Milsom, 1995). Therefore it is not surprising some children change their own hand preference in order to be more accommodating (DeYoung et al., 1998).

Bloodsworth (1993) states that teaching left-handed students was first mentioned in 1915. The author went on to say that left-handed people were neglected and subjected to poor instruction, maintaining that if the ability to learn was the same between left-handed and right-handed children that it would be hard for left-handed children to overcome the manipulation of information to make sense. Teachers have no formal training on how to teach left-handed children properly because methods are developed for right-handed learners (Harrison, 1981; Milsom, 1995). The only help for left-handed children comes from either a left-handed teacher or a teacher with a left-handed child, suggesting that only those teachers who have experienced the difficulties faced by left-handed learners first hand are aware of how important accurate assistance is to the learning process (Milsom, 1995).

Teachers are not the only people who attempt to change the preferred hand of the child; parents too are guilty. De Young et al., (1998) contended that switching handedness is likely more prevalent. When parents were asked, they readily admitted to researchers that they had deliberately changed their child's handedness from left to right. Parents could also inadvertently change the handedness by placing objects into the right hand. Parents of deaf children are also at risk for encouraging hand preference by modeling their child's right hand into the correct sign hand shape and following the child's hand through the correct sign movement (Bonvillian et al., 1993).

Achievement Differences Based on Handedness

According to Kee et al. (1987) and Tan (1985), consistency in hand preference during infancy and the preschool years is important for intellectual development and predicts language asymmetries; those who establish this early are better coordinated than those who might establish hand preference later or not at all. Children lacking a definite hand preference had significantly lower motor abilities (Tan, 1985). This raises concern with earlier findings that stability in hand preference does not occur until approximately the age of ten.

Many studies compared development and skills of left- and right-handed people. Banham (1983) found that left-handed children were definitely slower in developing speech and language skills than right-handed children but believed that, with the proper training, left-handed children could eventually catch up with right-handed children in linguistic development. On the contrary, Bower (1985) found that children who possessed extremely high levels of verbal or mathematical ability tended to be left handed. Findings by DeYoung et al. (1998) indicated that mixed-sided children had more trouble reading.

Another study, Lewis et al. (1986), provided evidence that gifted left- and right-handed groups performed comparably in areas of motor, vocabulary, pre-reading and quantitative skills. Conversely, when comparing normal left- and right-handed groups, differences occurred in the areas of vocabulary, memory, spatial and motor skills, with the right-handed group doing better. Tan (1985) found no evidence to support the suggestions found in the older literature and made by teachers that left-handed children are poorly coordinated and inferior to right-handed children with regard to motor

abilities. Tan suggested that perhaps left-handed people are evaluated as less skillful just because their mode of action looks different from that of the right-handed majority.

Hardyck, Petrinovich, and Goldman (1976) conducted handedness research on elementary students relating it to intellectual ability, motivation, scholastic achievement, and socioeconomic status. These researchers found no differences in terms of handedness on any tests performed and went on to say left-handed groups are ideal in researching differences in cerebral organization. A study by Hicks and Beverdige (1978) using college students found a significant difference in fluid intelligence between left-handed and right-handed students with left-handed students being inferior; these researchers caution that fluid intelligence (e.g. reasoning, matrices, mazes, and word groupings) deficits are not to be seen as a characteristic of left handedness. Further research by Hardyck (1977) concluded left-handed children are as likely to be at the upper end of an ability distribution as at the lower end. In other findings, Orme (1970) found that handedness was not related to intellectual ability. In Bemporad's (1986) dissertation, the left-handed subjects were the lowest performing group on all of the academic achievement tests while the mixed left-handed group was one of the highest performing groups. Although Bemporad reports that the left-handed group was also the lowest performing group on the majority of the cognitive tests (including verbal and spatial), she goes on to explain that none of the comparisons were statistically significant.

Psychological Differences Based on Handedness

Researchers have questioned whether being left-handed in a right-handed world effects an individual's personality. As Etaugh and Brausam (1978) point out, the frequent reminders of being left-handed, such as *I didn't know you were left handed*, and

It's hard for me to show you because you're left-handed, have frequently been heard by left-handed persons. In a recent study, Kalodner, Rodin, and Lester (1994) found that left-handed men scored lower than right-handed men on psychoticism. Orme (1970) found that left-handed individuals were significantly more unstable than right handed individuals.

A few studies focused on locus of control differences between left-handed and right-handed individuals. An individual is considered to have an external locus of control when he/she perceives the reinforcement that follows an action to be the result of fate, chance, or luck. Conversely, an individual that perceives reinforcement as the result of his/her own action or behavior is considered to have an internal locus of control (Rotter, 1966).

Jakobsen (1983) conducted a study to determine if handedness had an effect on personality in terms of locus of control and tolerance for ambiguity. Her sample consisted of 102 graduate students, nine left handed, from statistics, research, psychology, and speech pathology classes. The study found no significant differences between any of the handedness group means. Jakobsen hypothesized that the small number of left-handed subjects may have affected the precision of the statistical analysis. Hicks and Pellegrini (1978b), also using an adult sample, found that both left- and right-handed individuals scored significantly higher than mixed-handed individuals in terms of being more externally controlled on locus of control constructs.

In the only study conducted using school-aged students, Alony (1997) found that the 974 right-handed students and the 108 left-handed students did not differ in terms of

motivation and locus of control, but the teachers indicated that left-handed students had significantly lower social skills. This finding is similar to the studies with adult subjects.

In terms of depression inventory scores, Bemporad's study (1986) found the mixed left-handed group was marginally higher in scores when compared to the right handed group. None of these were statistically significant findings.

In a study by Harburg, Roeper, Ozgoren, and Feldstein (1981) using data collected in the Tecumseh Community Health Study, researchers studied answers to a questionnaire answered by members of the study. Findings indicated that right-handed respondents rated themselves as less emotional than by left-handed respondents.

Likewise, Harburg and his colleagues produced similar findings. Bemporad (1986) found that, for self-esteem inventory scores, the mixed left-handed group was marginally higher in scores when compared to the right handed group (the findings were not statistically significant).

The effects of hand preference on anxiety level in individuals have been debated in several research studies. Hicks and Pellegrini (1978a) found that left-handed and mixed-handed groups of college students were significantly more anxious than the right-handed group. Conversely, French and Richards (1990) reported findings that handedness was not related to state or trait anxiety in volunteer subjects ranging from 16 to 67 years old. In another study using college students, Wienrich, Wells, and McManus (1982) found there was no significant relationship between handedness and anxiety scores but did indicate that mixed-handed individuals tended to select less extreme responses to items. Beaton and Moseley's (1984) study, also using college students, concluded there was no relationship between hand dominance and anxiety and,

Alony (1997) concluded that left-handed and right-handed students had the same levels of anxiety.

Handedness has also been related to measures of self-concept. Researchers conclude that the more distinctive a characteristic, the more aware an individual becomes of the characteristic as being different (McGuire & McGuire, 1980; Thompson & Harris, 1978). Etaugh and Brausam (1978) studied left-handed and right-handed college students' responses to questions pertaining to the content of a picture which the subjects had been allowed to view for 2 ½ minutes. Results showed that left-handed students were more aware of the handedness portrayed in the picture than right-handed students. In a literature review, Thompson and Harris (1978) hypothesized that left-handed individuals would be more likely than right-handed individuals to identify themselves and others in terms of their handedness. They also state that left-handed people's experiences socially (whether positive or negative) as related to handedness could contribute to the awareness of being unusual but would not be needed as long as the trait is directly apparent. Research by McGuire and McGuire, (1980) using both college students and public school children, studied the spontaneous response to the statement *Tell us about yourself*. Responses indicated the consciousness of the student's handedness. Results indicated that left-handed individuals were more likely to attend to the characteristic of handedness in their concept of self. Alony (1997) found that left-handed and right-handed Israeli schoolchildren ages 8 to 11 years old had the same scores in terms of self-concept.

Heslet (1984) asked if there was a difference between left-handed and right-handed students on self concept using the Piers-Harris Children's Self Concept Scale.

The study had 111 students in fourth and fifth grades. Of these students 16 were left handed and 95 were right-handed. Results indicated that left-handed students felt better about themselves in terms of *physical appearance and attributes* and they scored higher in *happiness and satisfaction*. Heslet (1984) reported that, although there was no significant difference in self concept between right-handed and left-handed students, left-handed students scored higher overall on the Piers-Harris Children's Self Concept Scale. Heslet (1984) hypothesized that the higher scores by the left-handed students might indicate that self concept is strengthened by being *different*. Conversely, Thurlow (1976), studied 15 left-handed and 15 right-handed students (ranging in age from 7-12 years old) from two elementary schools using the Piers-Harris Children's Self Concept Scale and found no statistically significant difference between the two groups in terms of self concept, though results did favor that the right-handed students.

Summary

Historically left-handed people have had to cope with disparaging nicknames, sayings and misunderstanding about being left-handed (Howell, 1978). The age of hand dominance has been debated for decades with the consensus maintaining that at about 5 years old children begin to have stability in hand preference (Bloodsworth, 1993; Gesell & Ames, 1947; Lewis et al., 1986; Tan, 1985). In conjunction with hand dominance, the degree of dominance plays a significant role in the level of functioning (Annett & Turner, 1974; Bloodsworth, 1993; Casey et al., 1986; Hardyck, 1977; Hollingworth, 1923; Milsom, 1995; Spillman et al., 1994; Tan, 1985; Trotter, 1974).

In terms of psychological functioning, differences between left-handed and right-handed individuals have been assessed with regards to locus of control, depression,

anxiety and self-concept (Alony, 1997; Beaton & Moseley, 1984; Bemporad, 1986; Etaugh & Brausam, 1978; French & Richards, 1990; Harburg et al., 1981; Heslet, 1984; Hicks & Pellegrini, 1978b; Jakobsen, 1983; Kalodner et al., 1994; McGuire & McGuire, 1980; Orme, 1970; Rotter, 1966; Thompson & Harris, 1978; Thurlow, 1976) . These areas are of particular interest due to the long lasting consequences to many areas of functioning.

Few studies have questioned the difference in locus of control with regards to hand preference. The studies found no difference between left-handed and right-handed individuals in terms of locus of control but used college aged students as subjects (Jakobsen, 1983; Hicks & Pellegrini, 1978b).

Only one study was found that measured the difference between the different degrees of handedness of left-handed and right-handed individuals with regards to depression scores. The depression scores were found to be higher for the mixed-left handed group (Bemporad, 1986). Due to the difficulty in studying depression in children, this construct will not be assessed in this study.

Difference in levels of anxiety between left-handed, right-handed and mixed-handed individuals has brought conflicting reports. Hicks and Pellegrini (1978a) reported findings that left-handed and mixed-handed subjects reported higher scores on anxiety constructs than right-handed subjects. Wienrich et al., (1982) did not find differences in hand preference in terms of anxiety but found that mixed-handed individuals reported less extreme responses. Studies by French and Richards (1990) and Beaton and Moseley (1984) found no differences between hand preference and anxiety scores. Each of these studies used college aged students or older subjects.

Studies regarding self-concept have been assessed in terms of hand preference. Etaugh and Brausam's (1978) study of college students found that left-handed students were more aware of their handedness, thus making it a more salient trait in their self-concept. A study by McGuire and McGuire (1980) using college students and elementary students as subjects found that handedness was related to self-concept. The findings by Heslet (1984) and Thurlow (1976) who each studied fourth and fifth graders, contradicted each other. Both studies indicated that the small sample size created a problem.

Hypotheses for Study

Most of the studies regarding psychological constructs in terms of hand preference used college students as subjects or had small sample sizes which limited the findings. The impact of psychological well being during childhood is far reaching and could be life-long. Therefore, this study raised hypotheses that could impact the future contact with students in regard to their hand preference. First, left-handed children would have significantly lower self-concept scores than right-handed children. Second, left-handed children would have higher anxiety levels. Third, left-handed children would use more external locus of control.

CHAPTER 3

METHODS

Participants

The 132 subjects for this study came from two Catholic Schools in the Wichita Diocese (N = 77; 58%) and one public elementary school (N = 55; 42%) in Reno County, Kansas. One Catholic school has 53.4% of its students receiving free or reduced lunches while the other Catholic school has 30.9% of the target population receiving free or reduced lunches. The public school has 66.9% of the total population receiving free or reduced lunches.

Students from grades 4 through 6 were tested and they ranged in age from 9-12 years old (mean age = 10.7). This target group was chosen (a) due to hand preference being estimated to be consistent by this age and, (b) developmentally, the sense of self is more articulated. Students were asked demographic questions on the Tennessee Self Concept Scale that assess for age, grade, ethnicity, and gender. Socio-economic status (SES) was assessed by free and reduced lunch status. Each student was asked to indicate his/her hand preference at the top of each survey in place of his/her name to maintain anonymity.

Of the 132 students participating in this study, 121 identified themselves as right-handed and 11 identified themselves as left-handed. The distribution of left-handed students represents approximately 8% of the total group (slightly below what Coates, 1996, reported as the percent of left-handed individuals). Of the 11 left-handed subjects 10 identified themselves as white and one identified herself as Hispanic. Eight of the left-handed students were females and three were males.

The total sample was 52% female and 48% male. When asked about their ethnic background 56% reported white, 20% reported Hispanic, 1% reported African American, 3% reported Native American, .7% reported Asian, and 5% reported Other.

Instruments

Tennessee Self-Concept Scale: Second Edition (TSCS: 2) (Fitts & Warren, 1996). To measure self-concept, the Child Form of the TSCS: 2 was administered. Since the TSCS: 2 is copywrited, only sample questions from each subscale will be included with each subscale description.

The TSCS: 2 can be administered either individually or in a group, and takes approximately 10 to 20 minutes to complete. The Child Form was written for ages 7 to 14 years for those who are able to read at a second grade level or higher. The TSCS: 2 has a total of 76 questions which are answered using to a five point Likert scale (always true – always false). The TSCS:2 was standardized using over 3000 individuals 7 to 90 years old in a nationwide sample.

The TSCS: 2 consists of two summary scores including the Total Score (TOT) and Conflict (CON). For the purpose of this research only the TOT score and the subscale scores will be used. The TOT score on the TSCS: 2 is a rating of the subject's overall self-concept or self-definition. A high total score indicates that the subject feels valued, worthy, has self confidence and acts accordingly. A low total score indicates a subject that is disbelieving of their self-worth and sees themselves as undesirable. The TSCS:2 was hand scored using the AutoScore™ form.

Scores can be further divided into six self-concept subscale scores, which include Physical Self-Concept (PHY), Moral Self-Concept (MOR), Personal Self-Concept (PER),

Family Self-Concept (FAM), Social Self-Concept (SOC), and Academic/Work Self-Concept (ACA).

The Physical Self-Concept score consists of 12 items. The PHY score is the subject's opinion of his/her own body, healthiness, physical appearance, skills, and sexuality. A sample item from this subscale is: *Sometimes when I am not feeling well, I get cranky.*

The Moral Self-Concept score is the subject's belief in his/her moral worth, relationship to God including his/her satisfaction with his/her religion or lack of, and thoughts if they are a "good" or "bad" person. The MOR section is made up of 10 items such as *I think I do the right thing most of the time.*

The Personal Self-Concept score consists of 11 items and is a measure of the subject's sense of self-worth, feelings of competence as a person, and self-evaluation of the personality separate of the body or affiliation to others. Items include: *I solve my own problems very easily.*

The Family Self-Concept score suggests the subject's opinion of him/her self with respect to people with whom he/she directly associates. The FAM scale includes 11 items such as: *I really care about my family.*

The Social Self-Concept score, which has 14 items, indicates the subject's feelings of self-worth in relation to social situations with other people. An example of an item on this subscale is: *Most people are good.*

The Academic Self-Concept score is composed of 10 items and indicates how the subject sees him/herself in the school or job setting and his/her perception of how others

see them in those settings. An example of an item found in this subscale would be *I like to do math.*

The Tennessee Self-Concept Scale has been reported to be a valid and reliable measure of self-concept for over 30 years. Total score internal consistency has continuously been found to be in the .90 range with an estimate of .91 for ages 7-12 and .92 for ages 13-14. Internal consistency estimates for the six self-concept subscales range from .66 to .73 (ages 7-12) and .67 to .78 (ages 13-14).

Test-Retest Reliability for the TSCS: 2 Child Form was evaluated using a group of 81 elementary and junior high students over a one-week period. The range of correlation for the test-retest reliabilities for the Child Form are .55 (INC score) and .83 (CON score).

The TSCS: 2 has been used in numerous settings to provide evidence of its validity as a measure of general self-concept. Fitts and Warren (1996) report that a group of clinical psychologists attested to the content validity of the TSCS: 2. In addition, concurrent validity with the *Piers-Harris Children's Self-Concept Scale* (PHCSCS) (Piers, 1991, cited in Fitts & Warren 1996) has been investigated with correlations ranging from .51 to .80 identified. The Total Scores of the TSCS: 2 and the total scores of the PHCSCS were correlated ($r = .66$, Child Form).

Penn State Worry Questionnaire for Children (PSWQ-C) (Chorpita, Tracey, Brown, Collica, & Barlow, 1997) (Appendix A). To measure anxiety, the PSWQ-C was used. The PSWQ-C consists of 14 items with a grammar level at the second grade level. Subjects rate items using a 4 point Likert scale (agree to disagree) which are scored from

0 to 3 giving a possible range of scores of 0 to 42, with higher scores indicating a greater degree of worry. The PSWQ-C took approximately 3 to 5 minutes to complete.

The PSWQ-C was initially standardized on students' grades 1 through 12. Later, a second study was conducted using a clinical sample of children compared to a non-clinical sample. Children in the clinical sample were previously diagnosed with a variety of DSM-IV anxiety spectrum disorders.

The PSWQ-C possesses high internal consistency with a Cronbach's alpha score of .89 for the total score. The alpha coefficients for the test sample for the PSWQ-C ranged from .81 to .90. PSWQ-C was shown to have excellent test-retest reliability ($r = .92$). The PSWQ-C showed good convergent and discriminant validity when compared to other anxiety and depression measurements, sharing between 19% and 27% of its variance and having a correlation of .71 with the *Revised Children's Manifest Anxiety Scale* (Reynolds & Richmond, 1978, cited in Chorpita et al. 1997).

I-E Scale (Rotter, 1966) (Appendix B). To measure locus of control the Internal-External was used. I-E consists of 29 forced choice items including 6 filler items (to make the purpose of the assessment more ambiguous). Items were constructed to assess subjects' expectations about how reinforcement is controlled: internally or externally. Items are not comparable as the measurement is a sample of attitudes on a wide variety of situations. The score is the total number of external items that subjects agree with, giving a range of scores from 0 to 23. The higher the score the more externally controlled the subject is. The I-E took approximately 5 to 10 minutes for the students to complete.

Internal consistency proved to be relatively stable with a range of scores from .65 to .79. Test-retest reliability also proved to be relatively stable for a one-month period (r

= .72 to .78) and declining to $r = .55$ over two months with the one-month reliabilities estimated under group administered conditions and the two-month condition involving individually administered assessments.

Procedures

Informed Consent: Parent consent forms (Appendix C) were sent home with each child and only those who returned the forms participated in the study.

Administration: Each student was given a packet containing: assent form (Appendix D) and the three instruments. The instruments were presented in random order to control for order effect. Teachers were given instructions on how to administer the surveys (Appendix E). Students were asked to indicate their hand preference on all questionnaires and on the assent form to ensure that cross referencing was available. Students were read the instructions for each questionnaire and then asked to complete each form. When needed, students were read each questionnaire. Total time needed to complete the entire packet was 30 to 40 minutes. After all the surveys were returned, the researcher was available to answer any questions and when asked went back to discuss the findings. Several teachers failed to administer the surveys even though there were additional students who had returned consent forms, creating a shortcoming for the study.

CHAPTER 4

DATA ANALYSIS

The purpose of this study was to explore the differences between left-handed and right-handed children in regards to self-concept, anxiety, and locus of control. Three hypotheses were posed for examination. (1) Left-handed children would have significantly lower self-concept scores on the TSCS: 2 than right-handed children. (2) Left-handed children would have higher anxiety levels on the PSWQ-C. (3) Left-handed would demonstrate more external locus of control on the I-E Scale of Locus of Control.

Table 1 provides the means, standard deviations, and sample sizes for the dependent variables. Left handed children scored higher on higher on all self-concept scales and the total scale. They scored just slightly higher on the PSWQ-C and were slightly lower in terms of external locus of control.

Analysis of Variance

To address the three research questions three Analyses of Variance were conducted between handedness and scores on the Penn State Worry Questionnaire, I-E Scale, and the Tennessee Self Concept Scale. There was no statistical significant difference between handedness and the scores on the Penn State Worry Questionnaire ($F(1) = .10; p = .92$) or between handedness and the I-E Scale of Locus of Control ($F(1) = .13; p = .72$).

TABLE 1

MEANS, STANDARD DEVIATIONS AND SAMPLE SIZES OF THE PENN STATE WORRY QUESTIONNAIRE, I-E SCALE, AND TENNESSEE SELF CONCEPT SCALE

Variable	Left Handed (N=11)		Right Handed (N=113)		Total
	M	(SD)	M	(SD)	
Penn State Worry Questionnaire	20.91	(8.7)	20.63	(8.9)	20.65 (8.8)
I-E Scale	10.09	(2.2)	10.40	(2.8)	10.37 (2.7)
Physical TSCS	56.45	(9.4)	49.88	(9.7)	50.46 (10.2)
Moral TSCS	58.00	(10.9)	50.54	(10)	51.2 (10.2)
Personal TSCS	58.27	(9.3)	50.31	(8.8)	51.02 (9.1)
Family TSCS	56.55	(11.2)	48.74	(8.9)	49.44 (9.3)
Social TSCS	57.82	(10.3)	51.79	(10.2)	52.32 (10.3)
Academic TSCS	53.73	(13.2)	48.39	(9.5)	48.86 (10)
Total TSCS	58.91	(8.8)	49.93	(9.7)	50.73 (10.2)

Conversely, findings show there is a statistically significant difference at the .05 level between handedness and the total self concept score with left-handed subjects having a higher total self-concept score than right-handed subjects ($F(1) = 8.23; p = .01$). Several subscales of the Tennessee Self Concept Scale also produced statistically significant differences at the .05 level. Subscales scores for physical ($F(1) = 4.65; p = .03$), moral ($F(1) = 5.52; p = .02$), personal ($F(1) = 8.06; p = .01$), and family ($F(1) = 7.35; p = .01$) indicated left-handed subjects had more positive self concepts than right-

handed subjects. No statistical significance was found between handedness on two subscales of the Tennessee Self Concept Scale including: social ($F(1) = 3.48; p = .07$) and academic ($F(1) = 2.93; p = .09$). These findings do not support the research question “Will left-handed children have significantly lower self-concept scores than right-handed children?”

TABLE 2
ANALYSES OF VARIANCE FOR THE PENN STATE WORRY QUESTIONNAIRE, I-E SCALE, AND TENNESSEE SELF CONCEPT SCALE WITH SUBSCALES

Dependent Variable	df	Mean Square	F	Sig.	Σ^2
Penn State Worry Questionnaire	1	.79	.01	.92	NA
I-E Scale	1	.95	.13	.72	NA
Physical (TSCS)	1	433.81	4.65	.03	.04
Moral (TSCS)	1	557.89	5.52	.02	.04
Personal (TSCS)	1	635.63	8.06	.01	.06
Family (TSCS)	1	610.20	7.35	.01	.06
Social (TSCS)	1	364.56	3.48	.07	NA
Academic (TSCS)	1	285.62	2.93	.09	NA
Total Self Concept Score	1	808.34	8.23	.01	.06

Results of Hypotheses

These findings answer the last two research questions indicating that there is no difference between left-handed and right-handed children in terms of anxiety and locus of

control. The results of the self concept are also not supported because the left-handed children in this study were significantly higher than their right-handed peers. Therefore, there was no support for any of the hypotheses.

CHAPTER 5

DISCUSSION

The purpose of this study was to show that being different from the norm created problems for left-handed children. With such a low population distribution, it is conceivable that left-handed individuals would feel as if they stood out from the norm. In other words, the more distinctive a characteristic, the more aware an individual becomes of the characteristic as being different (McGuire & McGuire, 1980; Thompson & Harris, 1978). In order to test if left-handedness is a distinctive characteristic, school aged children were asked to complete questionnaires to determine self-concept, anxiety, and locus of control for left-handed and right-handed students.

The current research shows that left-handed students are not affected negatively by the feelings of being different; in fact left-handed students have a higher self-concept than right-handed students. As Heslet (1984) hypothesized, current research indicates that higher scores by the left-handed students imply that being *different* strengthens self-concept. Neither Heslet (1984) nor Thurlow (1976), both using the Piers-Harris Children's Self Concept Scale, found statistically significant differences in self-concept between left-handed and right-handed students raising the question if differences could be attributed to the scale used. Future research should be directed toward examining the idea of being *different* and how it affects individuals in other areas.

Subtest scores reveal that left-handed students have a higher opinion of their own body, healthiness, physical appearance, skills, and sexuality. Left-handed students also have a higher belief on their moral worth and relationship to God, satisfaction with their religious activities, and feelings of being a good person (although this could be due to

over half of the sample being from religious private schools). Left-handed students' opinions of themselves with regards to the people that they are is directly associated is more positive than right-handed students. Although there was no statistical significance, there was a trend in that left-handed students had a higher mean in terms of feelings of self-worth in relation to social situations with other people and how subjects sees themselves in the school or job setting and their perceptions of how others see them in those settings.

Regarding anxiety, as with previous research studies current research showed no difference between left-handed and right-handed students. Although there was no statistically significant difference between handedness and locus of control, means indicate that left-handed students are slightly more internally motivated than right-handed students.

Limitations

One limitation with the current study (as in previous studies) continues to be the sample size of left-handed students. Even with the extremely small sample size, significant difference was found for self-concept indicating that further research in this area is needed with larger sample sizes in order to adequately assess how much higher left-handed subjects are in terms of self concept.

The minority and gender distribution of left-handed students creates questions for further research. The current study showed the majority of the left-handed students were white females. Could it be that females are more likely to attend private church-related schools? Further research should look for reasons for this phenomenon.

As with similar small scale research studies, the current study is limited by cultural differences due to the region in which the researcher was doing research. In order to obtain results that can be generalized, samples from multiple regions are needed to assess regional cultural differences.

REFERENCES

REFERENCES

- Alony, S. (1997). *Aspects of handedness cognitive and affective variables*. Unpublished doctoral dissertation, University of Toronto, Ontario.
- Annett, M., & Turner, A. (1974). Laterality and the growth of intellectual abilities. *British Journal of Educational Psychology*, 44, 37 – 46.
- Banham, K. M. (1983). Left-handed preschool children with orthopedic disabilities. *Rehabilitation Literature*, 44, 23-26.
- Beaton, A. A., & Moseley, L. G. (1984). Anxiety and the measurement of handedness. *The British Journal of Psychology*, 75, 275-278.
- Bemporad, B. (1986). *Handedness subtypes, cognitive, achievement and psychopathological measures in learning disabled children and adolescents*. Unpublished doctoral dissertation, The City University of New York, New York.
- Bloodsworth, J.G. (1993). The left-handed writer. (Report No. CS213788) Washington D.C.: Office of Educational Research and Improvement. (ERIC Document Reproduction Service No. ED 356494)
- Bonvillian, J.D., Richards, H.C., Dooley, T.T., Kinzler, S., Mayer, L.E., Maynard, A.E., Saah, M.I., & Slavoff, G.R. (1993). Hand preference in young children's early signing. (Report No. EC 30 2336) Washington D.C.: Office of Educational Research and Improvement. (ERIC Document Reproduction Service No. ED 360765)
- Bower, B. (1985). The left hand of math and verbal talent. *Science News*, 127, 263.
- Casey, M. B., Brabeck, M. M., & Ludlow, L. H. (1986). Familial handedness and its relation to spatial ability following strategy instructions. *Intelligence*, 10, 389 – 406.
- Chorpita, B. F., Tracey, S. A., Brown, T. A., Collica, T. J., & Barlow, D. H. (1997). Assessment of worry in children and adolescents: An adaptation of the Penn State Worry Questionnaire. *Behavior Research and Therapy*, 35, 569-581.
- Coates, E.F. (1996). The left-handed: "Their sinister" history. (Report No. CS012602) Washington D.C.: Office of Educational Research and Improvement. (ERIC Document Reproduction Service No. ED 399519)
- DeYoung, S.L., Monahan, P. K., & McCall, C. H. (1998). Leveling the learning field; near-sidedness: The circuit to literacy. (Report No. EC 307111) Washington D.C.: Office of Educational Research and Improvement. (ERIC Document Reproduction Service No. ED 429378)

- Etaugh, C., & Brausam, M. (1978). Sensitivity to laterality as a function of handedness. *Perceptual and Motor Skills, 46*, 420-422.
- Fitts, W. H., & Warren, W. L. (1996). *Tennessee Self-Concept Scale 2nd Ed.*. Los Angeles, CA: Western Psychological Services.
- French, C.C., & Richards, A. (1990). The relationship between handedness, anxiety and questionnaire response patterns. *The British Journal of Psychology, 81*, 57-61.
- Gesell, A., & Ames, G (1947). The development of handedness. *Journal of Genetic Psychology, 70*, 155-176.
- Hackney, C.S. (1997). Left-handed in a right-handed world. (Report No. CS 215824) Washington D.C.: Office of Educational Research and Improvement. (ERIC Document Reproduction Service No. ED 406692)
- Harburg, E., Roeper, P., Ozgoren, F., & Feldstein, A. M. (1981). Handedness and temperament. *Perceptual and Motor Skills, 52*, 283-290.
- Hardyck, C. (1977). Laterality and intellectual ability: A just not noticeable difference? *British Journal of Educational Psychology, 47*, 305-311.
- Hardyck, C., Petrinovich, L. F., & Goldman, R. D. (1976). Left-handedness and cognitive deficit. *Cortex, 12*, 266-279.
- Harrison, S. (1981). Open letter from a left handed teacher: Some sinistral ideas on the teaching of handwriting. *Teaching Exceptional Children, 13*, 116-120.
- Heslet, S. S. (1984). *The relationship between left-handedness and self-concept*. Unpublished master's thesis, California States University, Hayward, California.
- Hicks, R. A., & Beverdige, R. (1978). Handedness and intelligence. *Cortex, 14*, 304-307.
- Hicks, R. A., & Pellegrini, R. J. (1978a). Handedness and anxiety. *Cortex, 14*, 119-120.
- Hicks, R. A., & Pellegrini, R. J. (1978b). Handedness and locus of control. *Perceptual and Motor Skills, 46*, 369-370.
- Hollingworth, L. S. (1923). *Special talents and defects; Their significance for education*. New York: McMillian Company.
- Howell, H. (1978). Write on, you sinistrals! *Language Arts, 55*, 852-856.

- Jakobsen, C. E. (1983). *Handedness in relation to locus of control and tolerance for ambiguity*. Unpublished dissertation, University of Northern Colorado, Greeley, CO.
- Kalodner, M. F., Rodin, R. A., & Lester, D. (1994). Handedness and personality. *Perceptual and Motor Skills*, 78, 1066.
- Kee, D. W., Gottfried, A. W., Bathurst, K., & Brown, K. (1987). Left-hemisphere language specialization: Consistency in hand preference and sex difference. *Child Development*, 58, 718 – 724.
- Lewis, M., Feiring, C., & McGuffog, C. (1986). Profiles of young gifted and normal children: Skills and abilities as related to sex and handedness. *Topics in Early Childhood Special Education*, 6, 9-22.
- McGuire, W. J., & McGuire, C. V. (1980). Saliency of handedness in the spontaneous self-concept. *Perceptual and Motor Skills*, 50, 3-7.
- Milsom, L. (1995). Left handed children are they losing out? *Educational Media International*, 32, 107-108.
- Orme, J. E. (1970). Left-handedness, ability and emotional instability. *British Journal of Social and Clinical Psychology*, 9, 87-88.
- Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied*, 80, 1-28.
- Simner, M.L. (1984). The grammar of action and reversal errors in children's printing. *Developmental Psychology*, 20, 136 -142.
- Spillman, C. V., Friedman, M.V., & Hutchcraft, G. (1994). Emerging issues in handwriting instruction. (Report No. CS21 4386) Washington D. C.: Office of Educational Research and Improvement. (ERIC Document Reproduction Service No. ED 371382).
- Tan, L. E. (1985). Laterality and motor skills in four-year-olds. *Child Development*, 56, 119 – 124.
- Thompson, E. G., & Harris, L. J. (1978). Left-handers' sensitivity to hand usage: theoretical note on saliency in the self-concept. *Perceptual and Motor Skills*, 47, 833-834.
- Thurlow, C. (1976). *Left-handedness and self concept: An investigation into the effects of environmental and attitudinal biases*. Unpublished master's thesis, United States International University, San Diego, CA.

Trotter, R. J. (1974). Sinister psychology – tests and studies indicate that left – handedness need not and should not be considered an undesirable trait. *Science News*, 106, 220-222.

Wienrich, A. M., Wells, P. A., & McManus, C. (1982). Handedness, anxiety and sex difference. *British Journal of Psychology*, 73, 69-72.

APPENDICES

APPENDIX A

Penn State Worry Questionnaire for Children

Below are some sentences that will let you say how you feel. After you have read the sentence circle the number that shows best how you feel. Remember there are no right or wrong answers.

4 = always true; 3 = sometimes true; 2 = sometimes false; 1 = false

- | | | | | |
|---|---|---|---|---|
| 1. My worries really bother me. | 4 | 3 | 2 | 1 |
| 2. I don't really worry about things. | 4 | 3 | 2 | 1 |
| 3. Many things make me worry. | 4 | 3 | 2 | 1 |
| 4. I know I shouldn't worry, but I just can't help it. | 4 | 3 | 2 | 1 |
| 5. When I am under pressure, I worry a lot. | 4 | 3 | 2 | 1 |
| 6. I am always worrying about something. | 4 | 3 | 2 | 1 |
| 7. I find it easy to stop worrying when I want. | 4 | 3 | 2 | 1 |
| 8. When I finish one thing, I start to worry about everything else. | 4 | 3 | 2 | 1 |
| 9. I never worry about anything. | 4 | 3 | 2 | 1 |
| 10. I've been a worrier all my life. | 4 | 3 | 2 | 1 |
| 11. I notice that I have been worrying about things. | 4 | 3 | 2 | 1 |
| 12. Once I start worrying, I can't stop. | 4 | 3 | 2 | 1 |
| 13. I worry all the time. | 4 | 3 | 2 | 1 |
| 14. I worry about things until they are all done. | 4 | 3 | 2 | 1 |

APPENDIX B

I-E Scale

This is a questionnaire to find out the way in which certain important events in our society affect different people. Each item consists of a pair of alternatives, lettered a or b. Please select the one statement of each pair (*and only one*) which you more strongly *believe* to be the case as far as you're concerned. Be sure to select the one you actually believe to be more true rather than the one that you think you should choose or the one you would like to be true. This is a measure of personal belief: obviously there are no right or wrong answers.

Please answer these items *carefully* but do not spend too much time on any one item. Be sure to find an answer for *every* choice.

In some instances you may discover that you believe both statements or neither one. In such cases, be sure to select the *one* you more strongly believe to be the case as far as you're concerned. Also try to respond to each item *independently* when making your choice; do not be influenced by your previous choices.

1. a. Children get into trouble because their parents punish them too much.
b. The trouble with most children nowadays is that their parents are too easy with them.
2. a. Many of the unhappy things in people's lives are partly due to bad luck.
b. People's misfortunes result from the mistakes they make.
3. a. One of the major reasons why we have wars is because people don't take enough interest in politics.
b. There will always be wars, no matter how hard people try to prevent them.
4. a. In the long run people get the respect they deserve in this world.
b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.
5. a. The idea that teachers are unfair to students is nonsense.
b. Most students don't realize the extent to which their grades are influenced by accidental happenings.
6. a. Without the right breaks one cannot be an effective leader.
b. Capable people who fail to become leaders have not taken advantage of their opportunities.

7.
 - a. No matter how hard you try some people just don't like you.
 - b. People who can't get others to like them don't understand how to get along with others.
8.
 - a. Heredity plays the major role in determining one's personality.
 - b. It is one's experiences in life which determine what they're like.
9.
 - a. I have often found that what is going to happen will happen.
 - b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.
10.
 - a. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.
 - b. Many times exam questions tend to be so unrelated to course work that studying is really useless.
11.
 - a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
 - b. Getting a good job depends mainly on being in the right place at the right time.
12.
 - a. The average citizen can have an influence in government decisions.
 - b. This world is run by the few people in power, and there is not much the little guy can do about it.
13.
 - a. When I make plans, I am almost certain that I can make them work.
 - b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.
14.
 - a. There are certain people who are just no good.
 - b. There is some good in everybody.
15.
 - a. In my case getting what I want has little or nothing to do with luck.
 - b. Many times we might just as well decide what to do by flipping a coin.
16.
 - a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
 - b. Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.
17.
 - a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand, nor control.
 - b. By taking an active part in political and social affairs the people can control world events.

18. a. Most people don't realize the extent to which their lives are controlled by accidental happenings.
b. There really is no such thing as "luck."
19. a. One should always be willing to admit mistakes.
b. It is usually best to cover up one's mistakes.
20. a. It is hard to know whether or not a person really likes you.
b. How many friends you have depends upon how nice a person you are.
21. a. In the long run the bad things that happen to us are balanced by the good ones.
b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.
22. a. With enough effort we can wipe out political corruption.
b. It is difficult for people to have much control over the things politicians do in office.
23. a. Sometimes I can't understand how teachers arrive at the grades they give.
b. There is a direct connection between how hard I study and the grades I get.
24. a. A good leader expects people to decide for themselves what they should do.
b. A good leader makes it clear to everybody what their jobs are.
25. a. Many times I feel that I have little influence over the things that happen to me.
b. It is impossible for me to believe that chance or luck plays an important role in my life.
26. a. People are lonely because they don't try to be friendly.
b. There's not much use in trying too hard to please people, if they like you, they like you.
27. a. There is too much emphasis on athletics in high school.
b. Team sports are an excellent way to build character.
28. a. What happens to me is my own doing.
b. Sometimes I feel that I don't have enough control over the direction my life is taking.
29. a. Most of the time I can't understand why politicians behave the way they do.
b. In the long run the people are responsible for bad government on a national as well as on the local level.

APPENDIX C
Spring 2005 / Fall 2006

Dear Parent or Guardian:

We would to have your child take part in a research study that looks at the differences between left-handed and right-handed students. We especially want to find out how left- and right-handed students differ socially (for example in self-concept). We are looking at students grades fourth through sixth because hand preference is stable by this age. Your child was selected to take part in this study because of his or her age.

If you decide to give permission for your child to participate, your child will be asked to fill out three questionnaires that will help us know how he/she feels. It will take about 30 minutes to complete all the questions. There is no time limit and he/she can work at his/her own pace. Time to complete these questionnaires will be scheduled at your convenience.

Any information that we gather in this study will remain confidential and will only be shown to others with your written permission. We will not be looking at individual results and the individual results will not be known to any other persons. We plan to write the results in a thesis to be published.

We hope that you will allow your child to participate in the study, but it is voluntary. If you change your mind, you may quit at anytime. Also, the decision regarding participation in the study will not affect any other relationships with Wichita State University or your child's school. If you would like to hear the results of the study (group analyses only), we will be happy to provide you with the conclusions.

If you have any questions about this research, you can contact me at: Jennifer Fisher (620) 664-6578 or Dr. Linda Bakken, WSU Department of Counseling, Education, and School Psychology, (316)978-5764. If you have any questions pertaining to your right as a research subject, or about research-related injury, you can contact the Office of Research Administration at Wichita State University, Wichita, KS 67260-0007, telephone (316)978-3285.

You may keep one copy of this consent form; please return the signed copy to the school. Your signature indicates that you have read the information provided in this letter and have decided to allow your child to participate in the study.

Signature of Parent or Guardian

Date

Signature of Researcher

Date

APPENDIX D

Date

You are invited to take part in a study that looks at left-handed and right-handed students. You were selected to take part of this study because of your age and because you attend this school.

If you decide to take part, you will be asked to fill out three questionnaires that will help us know how you feel. It will take about 30 minutes to complete all the questions. There is no time limit and you can work at your own pace. There are no right or wrong answers.

Any information that we gather in this study will remain confidential (private) and not be shown to anyone else. We will study the results by putting them in a group with all other students your age. We will not be looking at your results as an individual, and your individual results will not be known to anyone. We plan to write the results in a report to be published; but, again only the group results will be published. The name of your school will not be included, either.

You may keep one copy of the consent form; please return the signed copy with your questionnaires.

Your signature indicates that you have read the information provided in this letter and have decided to take part in the study.

Signature of Student

Left or Right Handed

Date

Signature of Researcher

Date

APPENDIX E

Spring/Fall 2006

Dear Teachers,

Thank you for administering the questionnaires for my thesis. I greatly appreciate it. The following are instructions for administering the questionnaires to guarantee standardization. There are three questionnaires: Tennessee Self Concept Scale, Penn State Worry Questionnaire, and the I-E Scale.

To ensure anonymity, have each student put his/her hand preference in place of his/her name on each page of each questionnaire. Do not have him/her put names on the questionnaires. The questionnaires will be numbered so that I can be sure that they are all accounted for. Students will need to sign the assent form and those forms should be collected separate from the questionnaires, again to ensure anonymity. Students will give his/her demographics on the Tennessee Self Concept Scale.

Read all instructions and make sure students understand them. If the student becomes confused on an item, reword it without changing the meaning. Instruct the student that if they make a mistake to place an X over the incorrect answer and circle or fill in the correct answer. Make sure that students know there are no right or wrong answers to the items and that this is not for a grade. Each student will pick out a prize after they finish their questionnaires.

Thank you for all your help and time. I appreciate you helping me complete my education. I hope to have my findings in early October and my thesis finished in early November if you have any questions or are interested in my findings. Feel free to call me if there are any other questions or you would like me to come talk to the students about my project.

Sincerely,

Jennifer Fisher
(620) 664-6578