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ARTICLE

Learning Preference among Monozygotic Twins: An Exploratory Study

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Abstract
Students have preferences for how they receive information. The goal of this pilot study was to discover whether there are differences in learning preferences among monozygotic twins doing similar course work while living together. The Visual, Auditory, Reading/writing, Kinesthetic (VARK) scale was used to evaluate learning preference. It was found that there is a marked difference in the learning preference among monozygotic twins. This difference can be attributed to the non-shared environment. An extensive study of this type using a larger sample of monozygotic twins is recommended.

Key words: Learning, monozygotic, exploratory study

Introduction

Students have different styles when it pertains to how they receive new information. Understanding a student's learning style or preference is a major factor in designing classroom instruction (1). Students have learning styles/ preferences that are often classified according to visual (V), aural (A), read-write (R), and/or kinesthetic (K) sensory modality preferences (2). Students with visual (V) preferences learn best using pictures, graphs, diagrams, drawings and other image-rich instruction tools while those with aural (A) preferences learn best by listening to and discussing material and talking through ideas. The read-write (R) preference students learn best with textual materials, and kinesthetic (K) learners internalize information best when they are involved physically in a manner that emphasizes touching and manipulating materials (2,3).

Although students can use all of these sensory modes of learning, one mode is often dominant and preferred. If a person uses only one sensory modality, he is termed as having a unimodal preference. If a person uses two or more sensory modalities, he is termed as having multimodal preferences (3). Various factors influence learning preferences. These include gender, age, academic achievement, culture, creative thinking, how an individual

processes thought, etc (4).

The sensory modality preference can be evaluated using specific tools. The most widely used tool for this preference is the Visual, Auditory, Reading/writing, Kinesthetic (VARK) questionnaire (1,2,5). In the literature to date, no research has been uncovered that solely investigates the learning preference among monozygotic twins. The rationale of this study was to discover if there is any difference in learning styles of monozygotic twins living together and completing the same course work. To the best of the author's knowledge, no such comparison has been made before.

In this study we evaluated the learning preferences of a pair of monozygotic twins, currently doing their undergraduate study in physiotherapy. The factors which may influence learning preferences, such as heredity, gender, age, academic achievement, culture, environment, etc., were identical. It was hypothesized that monozygotic twins living together studying the same curriculum will exhibit similar learning style/preferences.

Subjects and Methods

Subjects

Subjects selected for this study were 22-year-old monozygotic twins (Subject A and Subject B), living together and completing undergraduate coursework in physiotherapy.

Methods

The Visual, Auditory, Reading/writing, Kinesthetic (VARK) questionnaire (version 7.1) was administered to assess individual preferences for learning with sensory domains (http://www.vark-learn.com/english/page.asp?p_questionnaire).

The VARK questionnaire, developed by Fleming, identifies the preferences of students for particular modes of information presentation. This questionnaire is a 16-item, self-reported, multiple-choice questionnaire that can be completed in 10 –15 min (6). It was selected for its simplicity of use, free availability online, and ease with which both students and instructors can utilize results. A strong point of the VARK questionnaire is that its questions and options are drawn from real-life situations, respondents identify with the results they receive and it is validated (2, 7). The VARK questionnaire was randomly administered to the twins with the findings unknown to participants. Oral informed consent was obtained prior to administration of the questionnaire.

Results

The sensory preferences of the each subject for various sensory modalities are shown in Table 1. Subject A showed preferences in the following order: Kinesthetic, Reading/Writing ,Aural, and Visual. Subject B showed preferences in the order: Kinesthetic, Aural, Reading/Writing, and Visual. Correlation was tabulated between these sensory modal preferences of our subjects. The correlation coefficient $r=0.657$, ($p<0.05$), showed a moderate correlation. Findings of the subjects in possible sensory modal combinations are given in Table 2. The correlation coefficient between the sensory modal combinations of the two subjects is shown in Table 2: $r= 0.487 (p<0.05)$.

Table 1. Sensory preference of subjects

Subjects	Sensory Preference of Subjects			
	Visual	Aural	Reading/Writing	Kinesthetic
Subject A	2	5	7	7
Subject B	2	7	4	9

Key: V=Visual, A=Aural, R=Reading/Writing, K=Kinesthetic

Discussion

The results showed a significant difference between learning preference of Subject A and Subject B (Table1). Sensory modality preference between the subjects showed only moderate correlation (r=0.657). Subject A preferred primarily Reading/Writing(R) and Kinesthetic (K) as

Table 2. Findings of the subjects in possible sensory modal combinations.

Subjects	Sensory Modal Combinations														
	VARK	VAR	ARK	RKV	VAK	VA	VR	VK	AR	AK	RK	V	A	R	K
Subject A	0	0	0	0	0	0	0	1	1	1	2	1	3	4	3
Subject B	0	0	0	0	0	0	1	0	2	3	0	1	1	1	6

Key: V=Visual; A=Aura;, R=Reading/Writing; K=Kinesthetic

sensory modes while Subject B prefers Kinesthetic (K). This showed that Subject A equally prefers to learn by reading or writing textual materials and by physically doing things, whereas Subject B prefers to learn mostly by physically approaching problems (2, 3). Correlation between the sensory modal combinations selected by the subjects showed a minimal correlation (r=0.487) (Table 2). Therefore, the hypothesis that monozygotic twins with identical genetic and environmental factors will display similar sensory modality preference for learning could not be proved. The marks secured by the subjects in their undergraduate physiotherapy exams conducted the previous year showed a consistent correlation (r= 0.988). This implies that their academic performance is identical. Research conducted on learning abilities and disabilities among monozygotic twins consistently yield high genetic correlations (8).

If genetic correlations were so high between learning abilities, it would make sense to expect components within each learning domain are equally correlated genetically, and that is the case.(8) Substantial genetic overlap has been found for more basic information-processing measures, such as speed of processing, as well as measures of brain volume (8). Behavioral genetic research among identical twins has consistently indicated that academic achievement is moderately heritable and that Non-Shared Environmental influence (NSE) can account for approximately 25% of the variability in children's achievement (9).

The findings of this study are of great importance in academic and clinical teaching. This study sheds the light on to the fact that in spite of sharing similar variables like heredity, gender, age, environment, academic performance, etc., there is a marked difference in the sensory modality preference for learning among monozygotic twins as shown in this study. Due to this variation, there is a need to overcome the predisposition to treat monozygotic twin students in a similar way. To enhance effective learning, teachers should provide a blend of visual, auditory, reading/writing, and kinesthetic activities. In short, instruction should be multi-sensory and filled with variety (3). Twins reared together resemble each other due to the compounded effects of shared genes or shared (common) environmental factors. For identical or monozygotic twins, the correlation between their genes is 1.00. The correlation between monozygotic twins for shared environment is, by definition, 1.00. Non-shared environmental influences are uncorrelated and contribute to differences between twins. It is said that each child perceive his/her environment differently (10). Non Shared Environment represents a child's unique experiences or perceptions, the parts of life that are not shared by children growing up within the same family (10). It was found that the classroom is experienced uniquely, even by monozygotic twins who share all of their genes and much of their environment (10). This Non-Shared Environment may be a factor causing differences in modality preference for learning among monozygotic twins.

This is the first study of its kind exploring such a new area. Limitation of the study is that generalizations cannot be made based on one case report. A detailed exploratory study of learning preference among monozygotic twins with a larger sample size is recommended. Studies are needed to explore the role of Non-Shared Environment in learning abilities and learning preference.

Conclusion: The present study showed that there is a significant difference in learning preferences among monozygotic twins. This difference can be attributed to the

non-shared environment. A study of this kind using a larger sample of monozygotic twins is needed to confirm these findings.

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