8th Annual International Conference on Cognitive and Behavioral Psychology (CBP 2019)

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Fax: +65 6327 0162
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E-mail: secretariat@cognitive-behavior.org
Website: http://cognitive-behavior.org/

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Editorial

It is our pleasure to present you the Proceedings of 8th Annual International Conference on Cognitive and Behavioral Psychology, organized by the Global Science and Technology Forum, held in Singapore on 18 -19 February 2019.

This conference serves as a forum for scholars, policy makers, experienced professionals, and business executives to present and exchange new ideas on cognitive and behavioral psychology. The conference is also of interest to scholars in related fields.

All papers selected for presentation at this conference and for publication in the proceedings have been subjected to double blind peer review.

We thank all review committee members, partner universities, organizing committee members, and especially all the conference participants for making this conference a great success.

We are sure that all participants will benefit from the contributions to the Proceedings of CBP 2019 and trust that this volume will be useful in their future research endeavors.

Editor-in-Chief

Prof. Craig Speelman
Associate Dean Research
Professor of Psychology
Director of the Cognition Research Group
School of Arts and Humanities
Edith Cowan University

Foreword

This volume of conference proceedings contains a collection of research papers presented at the 8th Annual International Conference on Cognitive and Behavioral Science (CBP 2019) organized by Global Science and Technology Forum in Singapore on 18th – 19th February 2019.

The CBP 2019 conference is an international event for the presentation, interaction and dissemination of new advances relevant to psychological practice. As chairman of the Board of Governors, GSTF, I would like to express my sincere thanks to all those who have contributed to the success of CBP 2019.

A special thanks to all our speakers, authors and delegates for making CBP 2019 a successful platform for the industry, fostering growth, learning, networking and inspiration. We sincerely hope you find the conference proceedings enriching and thought-provoking.

Professor the Hon. Dr. Stephen Martin
Chairman, Board of Governors, GSTF

Preface

We are pleased to welcome you to the 8th Annual International Conference on Cognitive and Behavioral Science. CBP 2019 continuously aims to foster the growth of research in cognitive and behavioral science and its concomitant benefits for the community at large. The research papers published in the proceedings are comprehensive in that they contain a wealth of information that is extremely useful to academics and professionals working in this and related fields.

It is my pleasure to announce the participation of leading academics and researchers in their respective areas of focus from various countries at this event. The Conference Proceedings and the presentations made at CBP 2019, are the end results of a tremendous amount of innovative work and a highly selective review process.

We have received research papers from distinguished participating academics from various countries. There will be "BEST PAPER AWARDS" for authors and students, to recognize outstanding contributions and research publications.

We thank all authors for their participation and are happy that they have chosen CBP 2019 as the platform to present their work. Credit also goes to all Program Committee members and Review Panel members for their contributions in reviewing and evaluating the submissions and for making CBP 2019, a success and for increasing the standing of this annual conference from year to year.

Dr. Anton Ravindran CEng (UK), FBCS, FSCS
President, Global Science and Technology Forum

Program Committee

Program Chair

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Associations between effortful and automatic aspects of self-regulation in kindergarten children

Antje von Suchodoletz
Department of Psychology
New York University Abu Dhabi
Abu Dhabi, UAE
avs5@nyu.edu

Ross A. Larsen
Department of Instructional Psychology and Technology
Brigham Young University
Provo, USA
ross.larsen@byu.edu

Iryna Nadyukova
Department of Psychology
New York University Abu Dhabi
Abu Dhabi, UAE
in380@nyu.edu

***Abstract*—Self-regulation is one key component of young children's school readiness. Theoretical models describe self-regulation as a bidirectional system of effortful (higher-order) and automatic (lower-order) aspects of the person that, together, enable goal-directed action [1]. Yet, evidence with regard to the direction and strength of the relation is mixed. The present study aimed to (a) explore linear and quadratic associations between effortful aspects (measured as executive functions) and automatic aspects (i.e., stress response physiology, measured through cortisol levels), and (b) examine whether associations were similar or different for boys and girls. Participants were 141 typically developing kindergarten children (55% boys) from the United Arab Emirates. Executive functions were measured with four tasks. Measures of stress response physiology included the overall output of salivary and hair cortisol. Results showed a systematic, U-shaped, relationship between effortful and automatic aspects of self-regulation (salivary cortisol: B=.18, S.E.=.08, β=.14, p<.05; hair cortisol: B=.30, S.E.=.10, β=.18, p<.01), thus suggesting that stress may not be uniformly harmful. The present data did not detect statistically different associations between boys and girls in our sample. Findings are discussed with regard to the role of context and the need to consider context-dependent effects of stress response physiology on executive functioning.**

Keywords*—self-regulation, effortful processes, automatic processes, kindergarten children

I. INTRODUCTION

Children's responses to their environment differ based on inter-individual differences in a variety of developmental domains including social, emotional, and cognitive development. In early childhood, self-regulation is an important domain of development. It refers to the child's growing ability to adapt behavior to the demands of the environment and situation [2]. A fast-growing body of empirical studies indicates that self-regulation is one of the key components of school readiness in young children and an important predictor of academic and social competence [2;3;4].

Self-regulation is a comprehensive construct that describes people's capacities for rational thinking and goal-directed action [5;6]. There is considerable debate about the components of self-regulation [5;6]. Theoretical models describe self-regulation as a bidirectional system of effortful, more deliberative (higher-order) aspects and nonconscious, more automatic (lower-order) aspects of the person [1]. Lower-order aspects include, for example, the regulation of the stress response system that is automatically activated when dealing with contingencies in the environment, such as stimulation [1]. Higher-order processes involved in self-regulation have been referred to as executive functions [1;3]. Executive functions enable individuals to consciously control thoughts and behaviors [7]. More specifically, executive functions are considered the cognitive foundation of the ability to apply attention, working memory, and inhibitory control to behavior [3;8]. It is thought that effortful and automatic processes are interrelated. Yet, the evidence regarding the strength and direction of the association is far from conclusive, and studies have predominately focused on children from low-income at-risk backgrounds in the United States. The present study aimed to add to prior research by examining the relationship between young children's stress response physiology and performance on executive function tasks in a sample of kindergarten children in the United Arab Emirates. In addition, research documents gender differences in executive functions, favouring girls [9]. We therefore also aimed to explore whether the

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association between effortful and automatic aspects of self-regulation is similar or different for boys and girls.

A. Theoretical model of self-regulation

According to Blair and Ursache (2011) [1], self-regulation reflects a hierarchically organized system of effortful and automatic processes, that are influenced by each other. The model assumes that effortful processes are associated with executive functions and automatic processes with physiological responses to stimulation. It is suggested that brain areas associated with executive functions interact with brain areas associated with the control of attention and emotions as well as one's physiology of stress responses through both top-down and bottom-up processes [1]. Executive functions organize physiological responses to stimulation through top-down processes, such as using rational cognitive strategies to maintain an optimal level of arousal that enables behavior appropriate to one's personal goals as well as to the demands of the situation [10]. At the same time, executive functions are dependent on attention and stress response physiology in a bottom-up fashion [11;12]. Thus, effortful and automatic aspects of self-regulation are assumed to interact in a bidirectional feedback loop [1].

The model of self-regulation argues that neuroendocrine hormones that are associated with one's stress response physiology play an important role in shaping the bidirectional feedback loop between effortful and automatic aspects of self-regulation [1]. The hypothalamic-pituitary-adrenocortical (HPA) axis is a major neuroendocrine system that, among other functions, secrets the hormone cortisol in response to stressors from the environment [13]. Cortisol levels are widely used as a biomarker for activity in the HPA axis [14]. Although HPA axis activity has been linked to cognitive functioning, the literature regarding the direction and strength of effects is inconclusive, finding evidence for both facilitating and impairing influences [15;16]. Impairments in executive functions have been observed under acute and chronic stress, in both children and adult samples [17;18;19]. Based on this research, it has been suggested that very high levels of stress disrupt executive functioning whereas moderate levels of stress facilitate executive functions [1]. In contrast, too low level of stress (i.e., a level below an individual threshold for optimal arousal) may also result in impaired executive functions, thus suggesting an inverted U-shape relation following the Yerkes-Dodson principle [1].

However, it has been suggested that "there are substantial individual differences in [the] effect, with stress impairing executive function in some people more than others" ([20], p. 75). Boyce and Ellis (2005) [15] argue that dependent on the context, stress can exert risk-augmenting or risk-protective effects. According to the biological sensitivity to context model, conditions of adversity may lead to potential negative effects of heightened stress whereas conditions of support and protection may result in positive effects [15]. This view is consistent with results from experimental studies with adults finding that, depending on the context, poor performance may be turned into successful performance under stress [21]. Similarly, it has been found that better executive functions under stress can have a positive effect on individuals' health outcomes [20].

To date, empirical support for the assumptions of the theoretical model of self-regulation comes from research that has predominately focused on children growing up in adverse child-rearing environments in the Unites States that include conditions of poverty and low income [22;23]. Yet, the empirical base to conclude whether the findings may generalize to children growing up under economically and educationally advantaged conditions remains limited. Individual differences in children's self-regulation have not only been observed in children from adverse and disadvantaged backgrounds but have also been reported for children from middle- and upper-class families [24;25;26].

B. Development of self-regulation

It is well documented that the early childhood years are especially important in the development of self-regulation [8;27]. Early signs of self-regulated behavior can be observed already during the first year of life, such as directing and focusing attention to certain objects [28]. Rapid growth in self-regulation has been documented between ages 3 and 6, a period of maturation of the prefrontal cortex [8;29]. Self-regulation emerges in children's interactions with their social contexts [1]. It shifts

from external sources of regulation to internal processes and the intentional regulation of cognition, behavior, and emotion [30]. As children grow older, they are more and more able to detach the control of their actions from the environment and become increasingly able to self-regulate cognition, behavior, and emotion that were previously regulated by caregivers.

C. Child gender and self-regulation

Although the mechanisms are not clear, girls tend to outperform boys on various measures of self-regulation, including executive function tasks and behavioral manifestations of self-regulation in the classroom [9;31;32]. It has been suggested that different socialization experiences of boys and girls, such as gender-specific interactions with the caregiver, may, in part, account for gender differences [9;33]. However, not all studies find evidence for gender differences in children's self-regulation [33;34]. More specifically, gender differences seem to depend on the measure used and the age of the child [26]. In addition, gender differences seem to be less consistently shown in non-American samples suggesting that findings from the United States might not be generalizable to other contexts [25;33].

D. The Present Study

The aims of the present study are twofold. First, we explored associations between effortful and automatic aspects of self-regulation in kindergarten children. Given that previous evidence regarding the strength and direction of the association is mixed, with studies reporting a linear [35] or quadratic [36] relationship, we followed an exploratory approach. Based on results from prior work [33;37;38], we included child age, gender and learning-related behavior in the classroom as control variables when examining the association between effortful and automatic aspects of self-regulation. Second, we explored whether there were gender differences in girls' and boys' executive function skills as well as in the relations between effortful and automatic aspects of self-regulation.

II. Method

A. Participants

Participants were 141 typically developing children from the United Arab Emirates (55% boys). The United Arab Emirates are among the wealthiest nations in the world, with a GDP per capita of US$40,698 in 2017 [39]. Children were recruited in their kindergarten. Kindergartens, all English-medium services, were selected through convenience sampling. Parents of second-year kindergarten children received a letter describing the study together with an invitation for their child to participate. Children were included in the study when written parental consent was given prior to the data collection and they spoke English well enough to understand simple instructions. Children were, on average, 63 months old (*SD*=4.97). Reflecting the diverse population in the United Arab Emirates (over 80% of the population are expatriates), children were of different backgrounds. The majority of children (68%) were of Arab background, 13% were from an American background, 12 % were Asian, and 7% from other backgrounds. All children came from relatively affluent middle- to upper-class families.

B. Procedure

The data was collected during the second semester of the kindergarten year (spring). Children were tested during normal school hours, on two days of the same week. On the first day, children's saliva and hair samples were collected. Following previous research [40], saliva samples were taken at three time points: upon arrival (*M*=8:32am, range=8:03-9:25am), before the morning snack (*M*=9:45am, range=9:05-11:00am), and before children left school for the day (*M*=12:22pm, range=11:18am-1:25pm). Teachers were instructed to ensure that children did not to eat or drink at least 30 minutes before the saliva collection. The hair for the hair cortisol analyses was collected along with the last saliva sample by cutting a strand of hair from the back of the child's head. Children's executive functions were assessed on another day during an individual 30-minute "pull-out" session. The assessment included four different short, age-appropriate games: Pencil Tapping, Dimensional Change Card Sorting, Head-Toes-Knees-Shoulders task, and Hand Movements that were presented in

the order given. Children's learning-related behavior in the classroom was assessed as teacher report.

C. Measures

Children's stress response physiology was assessed based on cortisol levels in saliva and hair samples. Salivette® Cortisol blue (Sarstedt, Nuembrecht, Germany), a hydrocellulose microsponge, was used to collect saliva samples. Salivette® Cortisol blue is a standardized method for obtaining full saliva samples from small volumes and samples with very low cortisol levels. The synthetic swab was placed in the mouth, chewed for about 45 seconds to stimulate salivation, and then returned to the plastic container. All samples were sealed in plastic storage bags and placed on ice for transport to a storage freezer, where they remained at -20℃ until shipped to the laboratory of the Biopsychological Department at the Technical University Dresden/Germany. The laboratory stored the samples at -80℃ until assayed. The saliva samples (25µL of saliva) were analyzed using Enzyme Immuno Assay (EIA). Duplicate assays for all samples were performed to ensure reliability (r=.989-.998, p<.01). In the analyses, averaged scores were used. In line with previous studies [44], outliers above or below 3 SD from the mean were replaced with the sample mean (less than 1.7% of cortisol values were affected). We calculated the Area under the Curve with respect to ground (AUCg) using the three saliva samples as an estimate of the total activity within the HPA axis, with higher values reflecting higher cortisol output across the school day. We used the formula recommended by Pruessner et al. (2003) [41] that accounts for time between collection points. Non-transformed values (i.e., the raw cortisol values) were used to compute the AUCg.

In addition, hair samples were obtained from children. Hair cortisol is an easily obtainable, non-invasive measure of cortisol secretion. A 3 cm hair segment is enough to analyze cortisol secretion [42]. The hair sample was shipped to the laboratory of the Biopsychological Department at the Technical University Dresden/Germany for analyses. The hair cortisol concentration (HCC) was used as an index of long-term systemic cortisol concentrations [42]. Both cortisol variables (AUCg and HCC) were skewed and subsequently transformed using log transformation for further analyses [40].

Measures of children's executive functions were selected based on a literature review and proven to be reliable and valid measures in different contexts. The Pencil Tapping task was used as a measure of children's inhibition, i.e., their ability to inhibit a natural tendency to mimic the action of the experimenter while remembering the rule for the correct response [3]. Children were instructed to tap twice with a pencil when the experimenter taps once, and once when the experimenter taps twice. Following practice trials, 16 test trials were administered in a consistent, counterbalanced sequence. One point was given for each correct response, with the total score ranging between 0-16 points.

The Dimensional Change Card Sorting task [43] was used to assess children's ability to flexibly shift attention. Stimuli cards varied with regard to three dimensions (shape; color; size). Children were instructed to attend to one of the dimensions and to sort the cards by that dimensions. Each dimension consisted of six items. First, children were instructed to sort by shape. They were then instructed to switch and sort the cards by color. After another six trials, children were asked to switch again and sort the cards by size. Each correct response was coded with one point. If a child scored 5 or more points for the first three parts, a fourth set of six items was administered with a more complex rule. Some cards had black borders, indicating that the card was to be sorted by size. In contrast, a card without a black border was to be sorted by color. The total score ranged from 0-24.

The Copy Hand Movement task of the Kaufman Assessment Battery for Children [44] was used to assess children's working memory skills, i.e., their active maintenance and updating of information over a relatively short period of time. Three hand movements were introduced to the child: fist (F), palm (HP), and edge of the hand (HE). The child was instructed to copy each set of hand movements the experimenter illustrates (for example, F–F; F–HE–HP; F–HE–HE–F). The task consisted of 15 items, with the total score (0-15) indicating the total number of correct responses.

In the Head-Toes-Knees-Shoulder task [45] was used as a behavioral assessment of global executive functions that measures the integration of working memory, attention shifting, and inhibition. The task

consists of two parts with 10 items each. The first part includes two types of paired commands (e.g., "touch your head" and "touch your toes"). In the second part, two new paired commands are added (e.g., "touch your shoulders" and "touch your knees"). In the task, the child is asked to do the opposite of what the examiner says. For example, when the experimenter says, "Touch your head." the correct response is to touch the toes. Items were scored with 0 for incorrect responses, 1 for self-corrected responses, and 2 for correct responses. Scores ranged between 0 and 40.

Children's learning-related classroom behavior was included as a control variable. Two relevant items (good at following instructions; listening /attention) were selected from report cards. The items were rated on a 3-point scale (1=*emerging* to 3=*exceeding*) and highly correlated (r=.79, p<.01). The mean score of both items was in the analyses.

D. Analytic Strategy

Sum scores were calculated for the four executive function tasks, with higher scores reflecting higher levels of executive function skills. First, a latent variable was created for executive functions by performing a confirmatory factor analyses (CFA). The majority of fit statistic indicators suggested acceptable model fit (RMSEA=0.121; CFI=0.982; TLI=0.945; SRMR=0.028). Multi-level analyses were conducted using Mplus Version 7.4. Multi-level models were used to account for the nested structure of the data (children nested in classrooms). Intraclass correlations ranged from 0.09 to 0.41. The lack of independence was controlled for by using the TYPE=COMPLEX option in Mplus. In addition, missing data was examined using Little's test, determined to be Missing at Random, and handled with the full information maximum likelihood method [46].

To explore the associations between effortful and automatic aspects of self-regulation, two regression models were estimated, one for each cortisol variable (salivary cortisol: AUCg, hair cortisol: HCC). The models included a linear term and a curvilinear term simultaneously. In addition, the models controlled for child age, gender, and classroom behavior. To investigate whether there were gender differences in the relations between effortful and automatic aspects of self-regulation, a multi group analysis was conducted for each regression model. The model specified an additional parameter to test whether the regression coefficients for the linear and curvilinear term for girls and boys differed significantly from each other.

III. Results

A. Association between effortful and automatic aspects of self-regulation

The first research question explored associations between effortful (measured as executive functions) and automatic aspects of self-regulation (stress response physiology, measured as salivary cortisol output [AUCg] and hair cortisol concentration [HCC]). The first regression model included salivary cortisol output (Table 1). We found a significant quadratic relation between executive functions and salivary cortisol output. The second regression model included hair cortisol concentration (Table 2). We found a significant quadratic relation between executive functions and hair cortisol concentration. When plotting the results, Fig. 1 shows that both low and high levels of salivary cortisol output/hair cortisol concentration were associated with higher performance on executive function tasks, while moderate levels of hair cortisol concentration were associated with lower executive function performance.

In addition, there was a significant positive association between child age and executive functions, and between classroom behavior and executive functions.

TABLE I. Associations between salivary cortisol output and executive functions

	Executive functions		
	B	SE	β
Control Variables			
Child age	0.25	0.05	0.51**
Child gender (boy)	0.26	0.46	0.06
Classroom behavior	1.00	0.30	0.29**
Salivary cortisol (AUCg)			
Linear term	-0.23	0.19	-0.10
Curvilinear term	0.18	0.08	0.14*

Note. * p<.05. ** p<.01.

TABLE II. ASSOCIATIONS BETWEEN HAIR CORTISOL CONCENTRATION AND EXECUTIVE FUNCTIONS

	Executive functions		
	B	SE	β
Control Variables			
Child age	0.24	0.05	0.51**
Child gender	0.35	0.47	0.07
Classroom behavior	0.95	0.29	0.28**
Hair cortisol concentration			
Linear term	-0.28	0.17	-0.12+
Curvilinear term	0.30	0.10	0.18**

Note. + p<.10. * p<.05. ** p<.01.

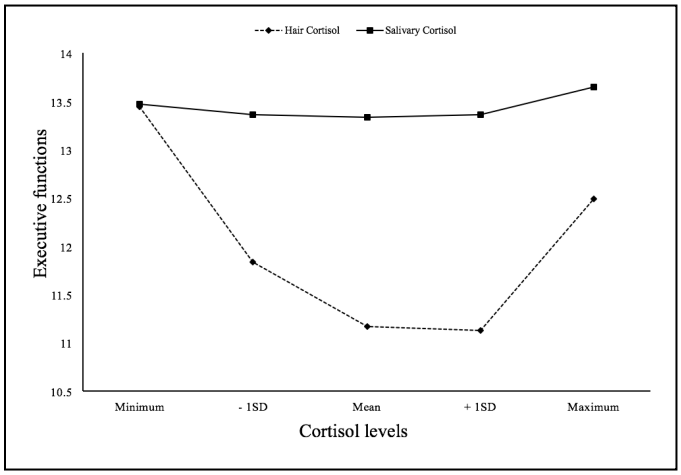

Fig. 1. Quadratic associations between the levels of cortisol and executive functions.

B. *Gender differences in the association between effortful and automatic aspects of self-regulation*

Based on the latent executive function variable, there were no significant gender differences in executive function skills between girls and boys (B=.16, S.E.=.54, β=.07, p=.77). Next, the regressions were run as multi group models, i.e., the same two models, one for each cortisol variable, with all coefficients estimated for both boys and girls simultaneously (Tables 3 and 4). The parameter testing the difference between the coefficients for boys and girls indicated no significant gender differences in the associations between effortful and automatic aspects of self-regulation (regression model including salivary cortisol output: difference parameter for linear term B=-.03, S.E.=.50, p=.97 / differences parameter for curvilinear term B=-.27, S.E.=.22, p=.21; regression model including hair cortisol concentration: difference parameter for linear term B=-.45, S.E.=.29, p=.12 / differences parameter for curvilinear term B=.24, S.E.=.22, p=.27).

TABLE III. ASSOCIATIONS BETWEEN SALIVARY CORTISOL OUTPUT AND EXECUTIVE FUNCTIONS, SEPARATELY FOR GIRLS AND BOYS

	Executive functions		
	B girls/boys	SE girls/boys	β girls/boys
Control Variables			
Child age	0.28/0.26	0.08/0.06	0.47**/0.63**
Learning-related behavior	1.26/0.93	0.51/0.36	0.28*/0.30*
Salivary cortisol (AUCg)			
Linear term	-0.30/-0.27	0.38/0.27	-0.11/-0.12
Curvilinear term	0.33/0.06	0.16/0.11	0.24**/0.05

Note. * p<.05. ** p<.01.

TABLE IV. ASSOCIATIONS BETWEEN HAIR CORTISOL CONCENTRATION AND EXECUTIVE FUNCTIONS, SEPARATELY FOR GIRLS AND BOYS

	Executive functions		
	B girls/boys	SE girls/boys	β girls/boys
Control Variables			
Child age	0.28/0.24	0.08/0.05	0.47**/0.60**
Learning-related behavior	1.26/0.99	0.50/0.38	0.28*/0.33*
Hair cortisol concentration (HCC)			
Linear term	-0.50/-0.05	0.26/0.19	-0.19*/-0.02
Curvilinear term	0.18/0.42	0.16/0.13	0.10/0.27**

Note. * p<.05. ** p<.01.

IV. DISCUSSION

Self-regulation has been described as a bidirectional system of effortful and automatic processes [1]. The present study investigated the association between effortful and automatic aspects of self-regulation among kindergarten children in the United Arab Emirates. While previous research predominately focused on samples of children in regions of high poverty in the United States, the present study extended prior research by investigating the association among children from an affluent country and economically advantaged families.

The results were supportive of a systematic relationship between effortful (measured as executive functions) and automatic (stress response physiology, measured as saliva and hair cortisol levels) aspects of self-regulation. However, in

contrast to findings from studies with low-income, at-risk populations, we did not find evidence for an inverted U-shaped association [22;23]. Instead, our findings are supportive of a U-shaped pattern suggesting that among children from more advantaged backgrounds low and high levels of stress might be conducive to executive function performance. Although speculative, it could be that the economically advantaged conditions provided children in our sample with the support needed to protect them from negative effects of heightened stress. Instead, higher levels of stress were associated with increased executive functions. As such, our findings support assumptions that stress may not be uniformly harmful [15]. High stress reactivity has not only been documented for children growing up in highly stressful environments but also for children growing up in highly protective environments [15]. It may be possible that effects of high stress reactivity on children's executive functioning differ across these children, thus resulting in different patterns of associations between effortful and automatic aspects of self-regulation. A similar phenomenon has been described by Boyce and Ellis (2005) [15] regarding the relation between reactivity and health in children: "highly reactive children in high-stress families […] sustained significantly higher rates of respiratory illness than their low reactive peers, but equally reactive children in low-stress settings were the healthiest of all children in the samples" (p. 281). Moreover, low levels of stress were also associated with higher executive functioning in our sample. Though unexpected, the finding adds to prior work showing that children with no activation in the stress response system had the fewest behavioral problems (Bauer, 2002, cited in [15], p. 280).

However, findings of the present study should be interpreted with caution and it is important to note that executive functions and stress response physiology are complex processes and many other factors influence their bidirectional feedback loop. While it is a strength of the study that stress response physiology was measured by both, salivary and hair cortisol levels, samples were only taken at one time point. Thus, the cross-sectional nature of our data does not allow for causal conclusions nor does it allow to test the bidirectionality between effortful and automatic aspects of self-regulation over time. In addition, stress response physiology has been measured under normal condition. Under acute stress, however, reactivity of the children in our sample might have differed. Thus, before making final conclusions regarding the association between effortful and automatic aspects of self-regulation among children from economically advantaged background, longitudinal studies covering the early childhood years, i.e., a period of rapid development in self-regulation, are needed to shed more light on differences between trajectories of self-regulation processes among children from both, advantaged and disadvantaged backgrounds.

There were no significant gender differences on the latent executive function variable, suggesting that girls and boys in our sample performed equally well. The findings adds to research from outside the United States reporting similar levels of executive functions for girls and boys [25;33;34]. A multi group analysis explored possible gender differences in the association between effortful and automatic aspects of self-regulation. Although the coefficients may suggest differences in the strength of associations for girls and boys, the present data did not detect statistically different patterns between boys and girls in our sample. The finding is consistent with other research suggesting a lack of gender differences in associations between different aspects of self-regulation [33;34]. However, the lack of gender differences could be due to the small sample size, in particluar, the smaller sample sizes for girls and boys in the multi group analysis. Perhaps with a larger sample, the difference might have become significant.

There are some other limitations of the present study that should be noted when interpreting the findings. In addition to the small sample size, the convenience sampling has resulted in a sample that cannot be considered representative of kindergarten children in the United Arab Emirates. Convenience sample was chosen as it was a time- and cost-effective approach for reaching kindergarten-aged children in a country where this was, to the best of our knowledge, the first study of this kind. Moreover, saliva samples could only be taken after children arrived at school. In future research, it would be important to control for awakening cortisol levels to account for individual differences in children's stress response physiology. We also

have to acknowledge limitations in the available data. For example, the present study could not include an investigation of the home environment. For example, previous research suggested, that even among children from advantaged backgrounds, differences in family educational resources and the home environment account for differences in children's self-regulation [26]. Information about the home environment should thus be included in future studies to enhance our understanding about the specific factors in the home environment that might shape associations between stress response physiology and executive functions.

In conclusion, our findings suggest a systematic, U-shaped, relationship between executive functions and stress response physiology. While previous research among children from low-income families suggests impairments of executive functions under heightened stress, our findings provide preliminary evidence that effects of heightened stress on executive functions might differ for children from affluent families. The finding is in line with assumptions that stress may not be uniformly harmful but depends on the context and underlines the important role of context and the need to consider structured, context-dependent effects of the stress response physiology [15].

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Cognitive Behavioral Perspective on How to Reduce Fears of Surgery of Qatari's Children

Dr. Kaltam Gabor Alkuwari
Associate Professor of Social Work
Faculty of Arts and Sciences
Department of Social Sciences
Qatar University – Qatar
alkawarik@qu.edu.qa

Dr. Tarek Zidan
Assistant Professor of Social Work
School of Social Work
Indiana University
U.S.A
tzidan@iu.edu

Abstract :

The moment a patient is admitted to a hospital for surgery, certain factors such as life pressure with negative behaviors and emotions involved fear, anxiety and surgery declining. The problem exacerbates when the patient is a child depicting lack of sleep, and rejection of medical treatment as a whole not to mention the disregard of the physician's directions. Other negative behaviors include withdrawal, bedwetting, intense fear, and bursts of anger. Professional practice in hospitals relies on a working team of inter-disciplinary with the importance of the social worker in the transitional period. The team adopts several professional models to enable disorder interventions in children. One common model utilized is the Cognitive Behavioral Therapy an effective treatment of mental disorders, in particular social disorders. Summarized in the abstract is the present research problem, identifying program indicators reducing children's fears of surgical intervention through Cognitive Behavioral Therapy (CBT).

The study considering the following: the first question is what are some children's disorders due to surgical intervention? In addition to the second question, what are the indicators prevalent in a program designed to reduce children's surgical intervention using the Cognitive Behavioral Therapy?

The present research is one of the basic research types providing basic information on phenomena and problems examined by researchers to find answers to theoretical questions. Results provided answers to research questions after review of related literature and previous studies. The researcher has concluded that it is of great importance to identify children's disorders related to surgical intervention with details of the suggested program to reduce and eliminate such fears using Cognitive Behavioral Treatment.

Key words: *Fear, surgical operations, Cognitive Behavioral Therapy (CBT).*

First : Research Problem :

Health care teams are aware of a reality related to informing a patient of undergoing a surgical operation, that is the series of disorders and fears entailed by the patient family and friends. The problem exacerbates when the patient is a child, knowing the impact of such medical intervention on developmental stages and the child's welfare in general. Despite the fact that a surgical operation

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could be the ultimate solution to save a patient's life, he or she is frequently overcome with disorders and fear that might hinder the potential recovery.

Pediatric surgery is a unique discipline as it is unlike other surgeries, (i.e) neurological, orthopedic, cardio – theoretic ones, targets a certain developmental age, namely childhood. Childhood is crucial for the ensuing changes mental, social and psychological aspects contributing to growth and maturity later on. Meanwhile major surgeries for children require special attention on the part of the operating team in the hospital.(1)

Further, major surgeries arouse common fears gripping both the patient and their families some of which are misgivings about what might go wrong in the operating room, with potential death hanging over. Such feelings intensify particularly within free of charge hospitals, the surgery is performed by an obscure doctors (2)

On the other hand, fears and disorders accompanying surgical operations can be classified into the following(3) :

1- Prior surgery disorders :

These may be in the form of psychological ones (e.g restlessness and tension, sleeping problems), along with physical disturbances such as irregular heartbeats, headache and trembling of children).

2- Post – surgery disorders:

These are related to the termination of a surgical intervention.

Alternately, professional practice in health care is based on dynamics within different specialties, underpinning a number of forces and interactions thus making the entire process rest on teamwork. Social work is expected to play a key role in health care area to alleviate the level of surgery – related fears. Green , affirms that the attainment of desired goals, and quality services are led by the effective part practiced on the part of social workers helping patients and their families understand realities surrounding health care providers, thus operational- zing the medical treatment (4)

Field studies and research conducted stress the objectives and professional practice of social work in general and how the individual is provided the proper service in particular, to enhance negative perceptions held by patients afflicted with chronic diseases. To this end, professional practice of social workers is based on various professional models with therapeutic methods assisting in the improvement of feelings among chronic disease patients as well as alleviating fears from surgical intervention.

Professional intervention by a social worker when dealing with a child undergoing a surgical operation from the individual service method perspective is based on multiple therapeutic approaches attempting to curtail fears from a surgical operation. Cognitive – Behavioral therapy (C.B.T), is a recent approach utilized by the researcher to manifest the harmony between C.B.T and development features among children particularly during teen – aging, to emphasize the effective practice of C.B.T with children (5) .

The problem of the present research tackles the determination of certain indications to alleviate fears among children from surgical intervention as cited by social work professional practice perspective on cognitive – behavioral therapy.

Second : importance of the research :

1. Indications of the purposed program by the researcher to alleviate fears among children from surgical intervention using cognitive – behavioral therapy, are evidence – based. This should help enhance effectiveness and competence of social workers with pediatric surgery hospitals.
2. The proposed program is expected to increase effectiveness of pediatric medical treatment.

Third : Objectives:

1- Provide a professional intervention program to alleviate fears of children from surgical intervention.

2- Support the status of social workers within the Qatari hospitals, through emphasizing the practice of cognitive behavioral therapy in the Arab world as a whole.

Fourth : Research Questions :

3- What are the children's disorders due to the surgical intervention?

4- What are the indications of the proposed professional intervention program designed to alleviate children's fears from surgical intervention using the cognitive behavioral perspective?

Fifth : Theoretical Orientations:

Theoretical orientations are a number of general variables that may be termed basic conceptions, to help determine indications of a professional intervention program designed to alleviate children's fears from surgical intervention, using cognitive – behavioral therapy perspective these elements are summed up as follows

1. Fear 2. Surgical intervention 3. cognitive – behavioral therapy.

Sixth : Methodology:

The present research is categorized as basic research sometimes named rule research or critical research. These studies provide basic information on phenomena and problems, examined by researchers interested in providing scientific cognitive contributions to formulate answers to theoretical questions

Seventh : Research steps:

Research results provide the answers for the study questions, the researcher relied on the following steps to find the answers:

Step No. (1) :

Determination of data bases the aim of this step was to find the appropriate evidence as defined by the competent and professional entities, the most significant data bases used to compile the scientific evidence cited above are as follows:

1. www.libraryauckland.ac.nz. Data base affiliate to university of Auckland, newzealand.
2. www.cochrane.org. it is considered one of the most important data bases concerned with publications on evidence – based professional practice in the field of health care.
3. www.socialcareonline.org.u.k. a critical data base concerned with evidence – based professional practice in The United Kingdom on social work and social care
4. www.q.n.l.qatar. National library of Qatar, it has a special section on social studies.
5. http://stv1.ev/c.edu.eg./eu/c association of Egyptian universities libraries.
6. www.istss.org. special site on evidence – based therapy for "post – traumatic stress disorders"
7. www.guideline.gov. Data base providing scientific evidence on healthcare .

Step No. (2) : Determination of scientific evidence :

The researcher conducted a review of related literature and previous studies for the master and doctoral degrees on children's disorders related to surgical operations. The evidence covered the following dimensions:

- **1st dimension** : Arabic scientific evidence the following studies for the master and doctoral degree submitted by Arab scholars were examined:

1- **Mohamed Ahmed Mahmoud Khattab , Maha Ismaiel Al-Helbawy** (2015) " Discrepancies prior to and after surgical intervention for or the don tic patients, Quasi – experimental study , published research, "Psychology counseling magazine, psychotherapy center, Ain – Shams University, vol (42), Apr.

2- **Mona Aziz Gobran Ibrahiem** (**2012**) "effectiveness of a cognitive – behavioral program in alleviating social and psychological problems of open – heart surgery patients , Master Degree thesis , not published , individuals service department faculty of social work, Helwan university

3- Nour Saied Al Saied (2011)

" levels of anxiety and depression prior to a surgical operation, relevance to the type of operation, other demographics among a sample of cardiology patients hospitalized in Oman city, Master Degree thesis, psychology department, faculty of higher studies, Jordanian university.

4- Hoda Gallal Abdul Wahab & Mona Moh. Heed (2009)

" Effectiveness of a counseling program for the alleviation of children's fears prior to surgical operations, published research, psychology counseling magazine, center of psychotherapy, Ain – Shams University, vol. 23.

5- Zattar Nour Al-Din (2009)

"effectiveness of a proposed Islamic psychotherapy program for the anxiety alleviation prior to a surgical operation master degree thesis, not published, psychology department, faculty of arts & science, social sciences, moh. Khodair university Bokra, Algeria.

6- Rafat Abdul Rahman Moh. Moh. (2007)

"practice of a professional intervention program from the perspective of social work to curtail children's fears among children " published research

7- Mohamed Tayib Abdul Razik Hakimy (2002)

" Cardiac systems disorders during the surgical operation , Master Degree thesis, not published, anesthesiology and resuscitation faculty of medicine, Damascus university.

8- Mohamed Ahmed Naboulsi (1996)

"psychological aspects in plastic surgery for congenital deformations among abnormal children ", published, "psychology culture magazine, center for psychological and psycho – determatology studies, Lebanon, V.26 , 7th issue

9- Ryad Ahmed Al- Nabalsi (1953):

"surgical operation trauma and death delusions " , published psychology culture magazine center for psychological, and psychosomatic) physio. Psychological studies, Lebanon vol.14, 4th issue.

10- Kebrial Al- Saba'a (1992), Psychosomatic and surgery, surgical operation anxiety "published, psychological culture magazine, center for psychological and psycho somatic studies, Lebanon, vol.12, 3rd issue.

11- Ryiad Ahmed Al Nabolsi (1991)

" surgery and psychological accidents, center for psychological, psychosomatic studies, Lebanon, vol. 6, 2nd issue.

12- Maysaa Ahmed Al- Naieyal:

"Discrepancies in anxiety and death fears prior to a surgical operation and afterwards" published research, psychological studies magazine cairo , Arabic translated studies by psychologists association, vol.2 1st issue.

13- Nermeen Effat Youssef (1983)

"Emotional responses to referral of children into surgery hospitals, "master degree thesis, not published , higher studies institute for childhood, Ain-Shams University.

14- Sania Mohamed rizk Al – Banna (1982)

"impact of child's psychological state during inpatient treatment , role played by a nurse to cope with the situation" dissertation , not published, faculty of nursing, Cairo university.

- **2nd dimension :** foreign scientific evidence the researcher reviewed a number of valuable English studies containing

Scientific evidence as follows:

- **Mc Murtry et. Al.(2011)**

" children's fears during procedural pain, preliminary investigation of the children's fear scale, health psychology, vol.30 (b) Nov. 780 – 788

- **Zeev N. Kain & Others (2007)**

Family – entered preparation for surgery improves preoperative outcomes in children: A Randomized controlled trial, anesthesiology , vol. 106

- **Zeev N. Kain & Others (2002)**

Social adaptability, cognitive abilities and other predictors for children's reactions to

surgery, journal of clinical anesthesia, vol. 12, issue 7

- **Mark G. Gabriel & others (2017)**

The psychosocial experiences and needs of children undergoing surgery and their parents, a systematic review, journal of pediatric health care.

- **Thomas Hackmann & Others (2017)**

Accuracy of children's preoperative memories , Aorn journal, volume 105, issue 6

- **Hironobu Veshima & Hiroshi Otake (2018)**

Clinical experiences of erector spinal plane block for children , journal of clinical Anesthesia volume 44.

- **Olga Brooms et al, (2015)**

Two years after epilepsy surgery in children , Epilepsy & behavior , volume 57

- **Anand Alladi (2013)**

Current status of minimal access surgery in children, Apollo medicine , volume 10, issue 4

Eighth : Research Results :

The aforementioned steps helped find answers to research questions. Analysis of scientific evidence developed by the researcher of data bases (in both Arabic and English), revealed the following answers:

- Answer to Q. (1) : first research question was " what are the children's disorders due to surgical operation?"

The researcher found that the most significant disorders experienced by children due to surgical intervention are the emotions expressed: by children referred to in patient section of the hospital. These are manifested in the following situations:

Situations (1): prior to the surgical operation these are emotions experienced by inpatient children and expressed prior to the surgical operation, in the following dimension:

- **Dimension No (1) : Explicit Knowledge and thoughts: these are determined through the following indications:**
  a- Fear of death. B- thought son rejection of surgery.
- **Dimension No (2) : behavior and actions: these are determined in the following indications:**
  a- Sleep problems. B- Pre- surgery anxiety
- **Dimension No (3): physical disorders:**

These are determined in the following indications:

(A) Breathing distress.
(B) Digestive disorders.
(C) General disorders.
(D) Circulatory system disorders.

- **Situation No. (2) : post-surgery disorders:**

These are the child's emotions referred to inpatient department, they are shown after the surgical operation in the following dimensions:

Dimension No. (1) : cognition and explicit thoughts: They are determined through the following indications:

(a) Side effects of anesthesia and injuries

(b) Delusions and surgery after – shock

Dimension No. (2) : behavioral actions

These are determined through the following indications:

a. Post – surgery anxiety. B. Not following the doctor's instructions

Dimension No. (3) : physical disorders

These are determined in the following indications:

a. Breathing disorders
b. digestive disorders
c. circulatory system disorders d. general disorders

The somatic disorders experienced before and after surgery are determined in the following.

(A) Respiratory system disorders:

These are experienced as :

- Tachy ponoea
- Brady ponoea
- Sighing respiration
- Adventitious sounds including coarse crepetitions and fine crepitations

such disorders are measured and quantified through the stethoscope given that normal breath rate is < 10 or > 25 a minute, or through simple radiography or tomography detecting physiological system or psychological causes.

(B) Digestive disorders: these are

- Nausea
- Vomiting
- Diarrhea
- Constipation

Such disorders are measured through routine checks by the medicating doctor along with ultrasound scanning to detect causes of these disorders physical or psychological.

(C) Circulatory system disorders:

- Palpitation
- Heart rate : irregular pulse, this is measured by the stethoscope, electro cardio – gram with heart throbs estimated within one minute so as to be low < 60, 60 – 80 average and > 80 - > 100 is high.

(D) General disturbances:

Using the Celsius thermometer (centigrade scale).

- Sweating - blood pressure disorders.

- **Answer to Q. (2):**

The present research second question is "what are the indications of professional intervention program to alleviate children's fear of surgical operation from a cognitive behavioral therapy perspective? Having reviewed related data bases, the researcher the conclusion that cognitive – behavioral therapy is the perfect model available to curtail fear among children from surgical operations. Consequently, the following reveals indications of the proposed cognitive behavioral therapy program:

Objective of the professional intervention program: a major objective

of the program is to alleviate children's fears of surgical operations as follows:

⇨ **Pre-operative goals:**

a. Curtail death fears.
b. Curtail misbelieves about refusal to undergo surgery.
c. Limit behavioral manifestations of pre – operative anxiety.
d. Limit physical (somatic) disturbances (shortness of the breath, digestive distress, circulatory system disorders).

⇨ **Subsidiary goals post surgical operation such as:**

e. Restrict negative thoughts on side effects of the anesthesia.
f. Restrict delusional thoughts on relapse or recurrence.
g. Limit behavioral anxiety related to post surgery.
h. Reduce lack of compatible at morpheme with the doctor's instructions.
i. Lessen physical (Somatic) disturbances (similar to those of pre – operatives)

- **Time and place of professional intervention program practice**

j. Practice of the proposed intervention program may take place throughout pediatric hospitals in the Arab world before and after surgical operations.
k. Working team of the professional intervention program consists of: social worker, the assigned doctor, a nurse.
l. Tools used to evaluate results of the professional intervention program.
m. Observation of behavioral signs of fear guide.
n. Clinical evaluation tools used by the assigned doctor.
o. Analysis of the child's self – reports.

- **Stages of the professional intervention program:**

p. Assessment phase : through the use of a cognitive functional approach.
q. This is subdivided into the following :
r. Identification of the problem.
s. Prioritization.
t. Phase no. (1) (e.g identification of the problem) begins prior to the application of the proposed professional intervention program, using tools (e.g test measurement observation form). Phase no. (1) is completed with phase no. (2) (e.g prioritization) during the first interview held between the social worker and the child.
u. Therapy:
v. This covers the following stages:
w. Self – observation : with the child becoming aware of in appropriate behavior
x. In appropriate thoughts & behavior level of awareness reached by the child in the earlier

stage, becomes a new indication that helps create self – talk

y. Development of change – related cognitive aspects : a change is cited regarding self – talk with in the child different from that happening before launching the proposed therapy.

z. Methods of professional intervention:

aa. Self-instructional training.

bb. Re-attribution training.

cc. Stress inoculation training.

dd. Self control.

ee. Modeling.

ff. Relaxation.

gg. Home work

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Research of influence of ethnopsychological concepts on intellectual development of children

Prof. Sveta Berdibayeva
Department of Philosophy and Political Science
Al-Farabi Kazakh National University
Almaty, Kazakhstan
berdibayeva.sveta1@mail.ru

Prof. Bibigul Nussipzhanova
Kazakh National Academy of Choreography
Astana, Kazakhstan
bibigul-08.08@mail.ru

Prof. Sharipbek Amirbekov
T. Zhurgenov Kazakh National Academy of Arts
Almaty, Kazakhstan
Kaz.nai@mail.ru

Prof. Marta Abdykalikova
Chair of National School of Public Policy
Academy of Public Administration under the President of the Republic of Kazakhstan
Astana, Kazakhstan
marta_nd@mail.ru

Associate Prof. Mariyam Bapayeva
Kazakh State Women's Pedagogical University
Almaty, Kazakhstan
m.bapaeva@mail.ru

Associate Prof. Bibianar Baizhumanova
L.N.Gumilyov Eurasian National University
Astana, Kazakhstan
bibianar.bayzhumanova.70@mail.ru

Associate Pfof. Farida Sakhiyeva
M.Auezov South Kazakhstan State University
Shymkent,Kazakhstan
farida777-84 @mail.ru

***Abstract*—As a result of studying the interrelations of intellectual development and ethnic views in children, it was shown that there are differences in motivation of behavior and human actions based on ethnocultural features.**

The purpose of the research: study of the relationship between intellectual development and ethnic views and their impact on the personal development of children.

During the study, it was revealed that ethnic views of subjects of different ethnic groups, such as national traditions, ethnic culture, religion, folk art, tolerance to other nations, positively influences the development of both intellectual and personal development of children.

In the psychological science of Kazakhstan for the first time it has been determined that the interrelation of intellectual development and ethnic views positively affects the development of personality.

Keywords— ethnopsychology;intellectual development; interrelation of ethnic views and intellectual development; influence of ethnopsychological views on intellectual development, ethnic values

I. INTRODUCTION

Intellect and ethnic values are formulated as adaptation to the environment. Intellectual development and ethnic views of childrenare closely interconnected, and this conclusion is mathematically proven in our experimental section.

Understanding the nature of ethnicity through the development of ethnic consciousness through the culture, language, folklore, music, art, traditions of ethnic groups affects the intellectual development of children.

Intellectual indicators, based on development of ethnocultural values, are the basis of our research.

The study of the intellectual mentality in Kazakh psychology based on historical ethnopsychological aspects originates from M.M. Mukanov's research (Mukanov, 1980). In the works of Kazakhstan scientists, such as S. Nurgaliyev (Mukanov& Nurgaliyev, 1978), S.M. Dzhakupov (Dzhakupov, 2002), V.K. Shabel'nikov (Shabel'nikov, 1994), S.K.Berdibayeva (Berdibayeva, 2012), the ethnic features in the structure of personality were investigated. In addition, it may be noted the research of S.K.Berdibayeva, where the ethnopsychological features of creative activity related to the intellect were studied (Berdibayeva, 2012).

The thinking of junior schoolchildren was studied in 60-80 years of the twentieth century by the Soviet psychologists as Z.I. Kalmykova (Kalmykova, 1981), N.A. Menchinskaya (Menchinskaya, 1989), A.L. Wenger (Wenger, 1969), A.Z. Zak (Zack, 1992).

In the studies of J. Piaget, the development of intellect was considered as a continuous process (Piaget, 1969).

Thus, intellectual development and ethnopsychological concepts are differentiated in the process of person's adaptation to the environment and depend on the environment. Ethnocultural values are very close to ethnic consciousness and can be the basis of intellectual development.

II. METHODS

A. Subjects

We decided to investigate children of primary school age that this age is a period of intense organizational intellectual development and the formation of ethnic views.

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The study was in the form of comparison of intellectual indicators and ethnic views of children of I and III grades,and influence of ethnic views on intellectual development were examined in general terms for different ethnic groups (Russian, Kazakh).

The study was carried outin Kyzylorda city among the children of I and III grades inthe Kabylov Kazakh secondary school № 12 (N = 60), the Nurseitov Kazakh-Russian school № 233 (N = 60), the gymnasium school№ 3 (N = 60). The total number of respondents: N = 180.

The methods were adapted taking into account the psychological features of children of primary school age.

1. Methods for determining person's intellectual development:

• J. Raven's "Gradual Complication Test" for determining the peculiarities of the logical formation of thinking operations in children of I and IIIgrades;

• "Classification" technique for determining the features of generalization based on the analysis of functional relationships in the real world in children of primary school age.

2. The method of M.Kuhn and T.McPartland "Who am I?" was used for determining the attitude of a person to an ethnos.

3. The scale of Bogardus "We and They" was used in order to determine ethnic tolerance to one's individual internal orientation.

4. The questionnaire method was used for determining the ethnic views.

5. Methods of mathematical and statistical processing of the received data. Pearson's tetrachoric correlation coefficient was used for dichotomic data to determine the relationship between intellectual development and ethnic views.

Our study consisted of 3 experiments. The purpose of the first experiment was to study the peculiarities of intellectual development of primary school children. Two methods have been used for this purpose, and this experiment was carried out in two stages. At the first stage the peculiarities of intellectual development of children were studied. At this stage, the first method was J. Raven's "Gradual Complication Test". It is useful for measuring the non-verbal capacity of intellect. Here we used J. Raven's technique "Patch the mat" in a modified form for carrying out work with suitable patchesfor children of primary school age.

At the second stage there were two variants of "Classification" technique, which determine children's vocabulary and logic. The "Classification" technique focuses on the study of children's thinking.

The second experiment was carried out in two stages. At the first stage, using two methods, the attitude of children to their nationality (M.Kuhn and T.McPartland's "Who am I?") and the tolerance of children to other nations (Bogardus' "We and They") were revealed. The purpose of the method "Who am I" is to determine the attitude of young children to their nationality.

At the second stage the questionnaire was used to determine the development of ethnopsychological concepts. The questionnaire consisted of questions related to the traditions, customs, proverbs and sayings of the ethnic groups (Kazakh, Russian children). The questionnaire provided us with an understanding of the extent to which ethnic views of children were formed.

After that, mathematical and statistical relationships between intellectual development and ethnic views were determined.

B. TASKS

The well-known J. Raven's technique for study of logical thinking"Gradual Complication Test" is intended to measure the non-verbal capabilities of intellect(Court & Raven, 1995).

During the study of primary school children, we have made important changes to the method. We called the task "Patch the mat". Before showing the table, the child will be shown a mat in a picture, as well as pieces of cloth. The task is to find the most suitable part from all the proposed pieces that could patch up a hole in the mat.

In our research, various test variants were used. Children are given three series A, B, C with different levels of difficulty. Difficulties are complicated from group A to group B and from group B to group C. Each set contains 12 matrices, depending on the level of complexity.

At the next stage of mathematical processing, the correct score is calculated.

The second experiment was divided into two stages. At the first stage, we carried out the methods for studying the "Ethnic-I" and ethnic tolerance of children. The study used the method "Who am I?", proposed by M. Kuhn and T. McPartland. Participants were asked "Who am I?", so we were able to study their attitude to their ethnicity. That is, the levels of "Ethnic-I" and ethnic tolerance were revealed.

The degree of visibility of Ethnic-I, ethnic tolerance in combination with all, includes ethnic views that form the ethnic world of children.

In addition, the study used Bogardus' scale "We and They". The questionnaire on ethnic stereotypes was used in open and closed forms. All the techniques were modified, and we ourselves composed the questions.

If we analyze the first method, the level of Ethnic-I will depend on how a person identifies oneself. The visibility of Ethnic-I is determined by ethnic tolerance and ethnos stereotypes. For this, an ethnopsychological diagnostic test was performed.

Method of study of Ethnic-I test (20 statements) by M. Kuhn and T. McPartland. In our study, we decided to take 10 statements, modifying the test with taking into account the peculiarities of children of primary school age and the lack of formation of ethnic consciousness at a sufficient level.One of the most important issues is the study of visibility of Ethnic-I, based on person's identification on empirical ethnopsychological and ethnosocial levels.

The participants were given the following instructions: answer 10 statements "Who am I?"Since the question is exclusively for you, you must answer for yourself, not for others.

Participants are given about 12 minutes to express their opinion. In this method, we divided the questions that reveal the degree of visibility of Ethnic-I, which determines one's nationality "I-Kazakh" ("I-Russian"). On this basis, we can find out how important is an ethnic status forthe respondent and to which place of 10 statements he will put his status(1-5 is a high accentuation of ethnic status, 6-8 is the average accentuation of ethnic status, if ethnic status is shown from 9-10, 1 point is given when performing digital mathematical processing of the results).

Taking into account the age characteristics of the participants, the second part of test "Who am I?" was not performed.

We used Bogardus' scale "We and They" to identify ethnic tolerance.

The study was based on four indicators:

1. "I want many Russians (Kazakhs) to live in Kyzylorda"

2. "I want in a multi-story building, where I live, there were many Russians (Kazakhs)"

3. "I want to play with Russian (Kazakh) children"

4. "I want my friends to be Russians (Kazakhs)"

The following are the results obtained by diagnostic tests and methods of quantitative treatments:

If the participant will answer the question "Who am I?" as "I am Kazakh", "I am Russian" in the interval from №1 to №5 out of 10, then it means that he puts his ethnos higher. And if he does not write even one question out of ten, it means that it does not matter for him to which nationality he belongs.

Quantitative processing of the results obtained during the study:

The first ethnopsychological index (10 opinions), i.e. (№1), is that if the participant points out the opinion "I am Kazakh" in one of the opinions, the position in which he puts it will be determined. For example, if the opinion of the participant "I'm Kazakh" is on the 2nd place among 10 opinions, then x=2, where x is the order of 10 opinions. Thus, if x=2, then a=2 or the ethnopsychological index of the position "I-Kazakh" or the indicator "a" or № 1 is 9. The reason is that we have N = 10.

Similarly, the results of other ethnopsychological indicators processed identically: 3; 4; ... 10.

The second method is ethnic tolerance – all indicators of interethnic tolerance from 2 to 5 are treated identically. Participants were given an absolute value of 100 people, due to the fact that they could not give an accurate percentage. For example, it was given the task "If on one of the streets of Kyzylorda lived 100 people, how many Kazakhs and Russians there were?" In addition, one participant will determine "I am Kazakh" ("I am Russian") in the range from 1 to 5 – we give 5 points, if it is between 6-8 – 4 points, and give a score of 1 point between 9-10. Only 10 points.

The second method is interethnic tolerance "We and they".

2) I want 100 people in Kyzylorda on Abai avenue ... for Russians (for the Kazakh group), and ... for the Kazakhs (for the Russian group). It is recommended to choose Russians for Kazakhs and Kazakhs for Russians.

3) I want 100 people living in a multi-storey building ... for Russians (for the Kazakh group), and ... for the Kazakhs (for the Russian group). It is recommended to choose Russians for Kazakhs and Kazakhs for Russians.

4) I would play 100 children... for Russians (for the Kazakh group), and ... for the Kazakhs (for the Russian group).

This stage of experiment has a special significance in addressing the issue of ethnopsychological aspects of intellect. Knowledge of the person in the ethnic world, especially the identification of ethnopsychological concepts of primary school children, increases the value of our work.

The Table 1 presents empirical data on ethnopsychological features.

TABLE I. EMPIRICAL INDICATORS OF ETHNOPSYCHOLOGICAL FEATURES

Constructs	Empirical Indicators	Units of Measurement	Notes
Study of "Ethnic-I"	1. 10 opinions (M. Kuhn's method) – I-Kazakh (I-Russian)	1-10 points	The statements were made I-Kazakh (I-Russian)
Definition of Ethnic Tolerance	2. In my city (Kyzylorda) 3. In a multi-storey building where I live 4. I'm playing with 5. My friends are	1-10 points	The participants' statements were given in percentage and 1-10 points.

[a.] Note. Not all participants were involved in this ethnopsychological research, only those who showed high intellectual development.

III. RESULTS

Let's analyze the results of the first experiment, obtained on the basis of J. Raven's technique.The execution of tasks by J. Raven'stechniqueled to a positive emotional relationship in children of I-III grades.Some children asked for another task.During the tasks, it was noted that not all children were able to find effective ways to complete the task. For example, they could not find the pattern of drawing, could not use this pattern in the little cards.

Thus, Table 2 shows the results of performance of tasks for children of I-III grades.As can be seen from Table 2, 35.1% of the I grade children and 22.1% of the III grade children have shown low levels.The average level of logical development of thinking was 45.3% for the I grade and 45% for the children of the III grade. This justifies the average index of intellectual development.

The percentage of children who show high rates is minimal. Among the I grade – 19.6 and 32.9% in the III grade. Of these, 9 points were shown only by children of the III grade– 10.8%. They demonstrated the ability to identify horizontal and vertical transformation of figures in J. Raven'stechnique.

In the next stage, we show the results of tasks performed by the Russian children participating in the experiment. It allowed us to determine the specifics of performingtasks by representatives of various ethnic groups.

In Table 3 we analyzed the index of intellect of children in the Russian group, 34.3% of the Igradechildren and 20.5% of the III grade children showed low levels.The average level of logical formation of children's thinking in the Russian group was 46% for the I grade and 44.8% for the children of the IIIgrade.A high level – 19.7% of children of the Igrade, 34.7% of children of the IIIgrade.

In both groups there was a small percentage of the highest 9 points. The main difficulties in performing tasks using J. Raven's method were to find an analogy between pair figures on the basis of part differentiation. It is well known that the successful completion of this task is possible with differentiation of the child's perception and with the full development of attention.As indicated in Tables 2-4, the percentage of children with high rates is minimal. Among the I grade children of two groups (Kazakh, Russian) – 19.6 and 33.8% among the IIIgrade. Of these, 11.3% of children showed 9 points. They demonstrated the ability to identify horizontal and vertical transformation of forms, which are the most complex of the 36 tasks in J. Raven'stechnique.

Analyzing the results of J. Raven's method, we came to conclusion that:

I. Depending on the logic of cognitive ability, three groups of children of I and IIIgrades were identified.

1. A low level is characterized by the ability to identify the same and different, identical and unusual forms, as well as the ability to identify figures in the reception field and in other objects.

2. On the average level of logical thinking, children compare similar changes in patterns that establish the logic of their thinking. However, this logic does not apply to the child's ability, but it is used in performing complex types of tasks.

3. A high level is characterized by the ability to distinguish between integral components and symbols, including the skills that are encountered on the first two levels.

II. The main difficulties in performing the tasks of J. Raven's method are typical for many children, which are connected with the search for analogies between pair figures, based on the differentiation of details. This can be explained by the fact that the differentiation of attention and perception from the point of view of logical thinking is not sufficiently developed. This led to difficulties that arise in the performance of tasks.

TABLE II. THE RESULTS OF PERFORMANCE OF TASKS BY THE KAZAKH GROUP CHILDREN OFI AND IIIGRADESBY J. RAVEN'S METHOD– (%), (N = 120)

Level	Low			Medium			High		
Number of points	1	2	3	4	5	6	7	8	9
I grade	2,8	19,2	13,1	22,7	9,0	13,6	-	19,6	-
III grade	-	7,2	14,9	10,5	16,5	18,0	11,7	10,4	10,8

TABLE III. THE RESULTS OF PERFORMANCE OF TASKS BY THE RUSSIAN GROUP CHILDREN OFI AND IIIGRADESBY J. RAVEN'S METHOD– (%), (N = 60)

Level	Low			Medium			High		
Number of points	1	2	3	4	5	6	7	8	9
I grade	2,4	19	12,9	22,9	9,3	13,8	-	19,7	-
III grade	-	6,2	14,3	11,5	16,1	17,2	12	10,8	11,9

TABLE IV. THE RESULTS OF PERFORMANCE OF TASKS BY KAZAKH ANDRUSSIAN GROUPS CHILDREN OFI AND IIIGRADESBY J. RAVEN'SMETHOD – (%), (N=120)

Level	Kazakh group			Russian group		
	Low	Medium	High	Low	Medium	High
I grade	35,1	45,3	19,6	34,3	46	19,7
III grade	22,1	45	32,9	20,5	44,8	34,7

III. J. Raven's methodshowed that the level of intellectual development in accordance with ethnicity is insignificant, since it allows us to identify non-verbal intellect. And this is similar to the role of ethnocultural values in personal development.

The second experiment. Analyzing and processing the data at the sample size – 120 children (60 in Russian group, 60 inKazakh group). Ethnopsychological indicators include five variables for measuring Ethnic-I and ethnic tolerance. If we

give a brief overview of some results of diagnostic tests for children, we will see the following features:

1. Russian children (60 participants) showed the highest level in the question "Who am I?" – 22 respondents (37%); neutral level – 21 respondents (34%); the average level – 17 participants (29%) (See Figure 1).

2. Ethnopsychological index"I want more Russians in my city" – 21 Kazakh children answered the question that they are "neutral", i.e. 35% of 60 respondents; "I want" – 17 respondents, i.e. 28%; 37% – 22 children answered "I don't want". Meanwhile, Russian children answered the question: "I want more Kazakhs in my city", 22 respondents are neutral and answered: "I do not care", i.e. 37% of 60 respondents; "I want" – 20 respondents, i.e. 33%; "I don't want", – said 18 children (30%) (See Figure 2).

3. Ethnopsychological index "I want the Russians to live in a multi-storey building where I live" – 21 of the Kazakh children answered – "I want", that is 35% and 16 participants answered "I don't want" – 27%; 23 respondents (38%) showed a neutral position. Russian children – "I want many Kazakhs to live in a multi-storey building where I live" – 18 participants answered "I want", that is 30%, and 29 respondents "I don't want" – 48%; 13 children (22%) took a neutral position (See Figure 3).

4. Ethnopsychological index"I play with Russian children" – 23 respondents answered "I want", that is 38% and 9 participants answered – "I don't want", i.e. 15%; 28 respondents (47%) answered: "It does not matter". According to this question, "I want to play with Kazakh children" 35 participants of Russian children answered "I want", that is 58%, and 6 respondents "I don't want to play" – 10%; 19 respondents answered: "It does not matter", that is 32% (See Figure 4).

5. Ethnopsychological index"I want most of my friends to be Russian" – 22 children of Kazakh children "want", that is 37%; 11 participants do not want, that is 18%; and 27 respondents said: "It does not matter", that is 45%. And among the children of the Russian group. "I want most of my friends tobe Kazakhs" –"I want" answered 28 Russian children – 46%; 8 participants said "I don't want", that is 14%; and 24 respondents answered "It does not matter", that is 40% (See Figure 5).

Thus, based on the results of the above indicators, it can be said that children of primary school did not have negative opinions about other people. When it comes to them, national separation is less important. In addition, since our state is independent and of an poliethnic nature, it does not adversely affect the development of children's mental health. Merging with the Russian people from Soviet times for several years has become a testament to ethnic tolerance.

Empirical indicators of ethnocultural identity are given in Table 5. In Table 5 we can offer the following situations:

1. The level of understanding of ethnic diversity in the environment is related to the process of understanding.

2. The level of appearance of "Ethnic-I" depends on formation of the concept.

3. The ethnocultural understanding of ethnic tolerance depends on the nature of the characteristics.

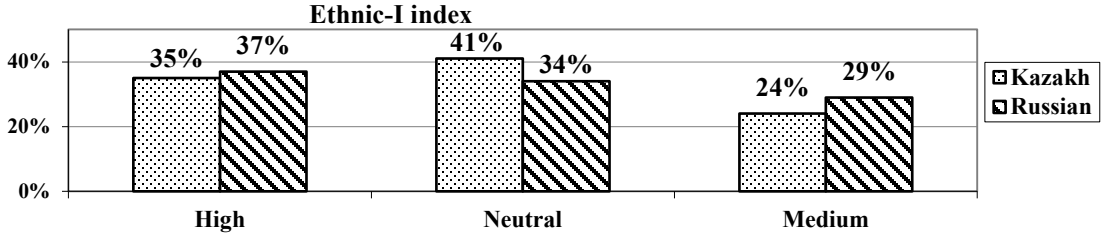

Figure1 –Ethnic-Iindexin children of primary school (Kazakh, Russian groups)

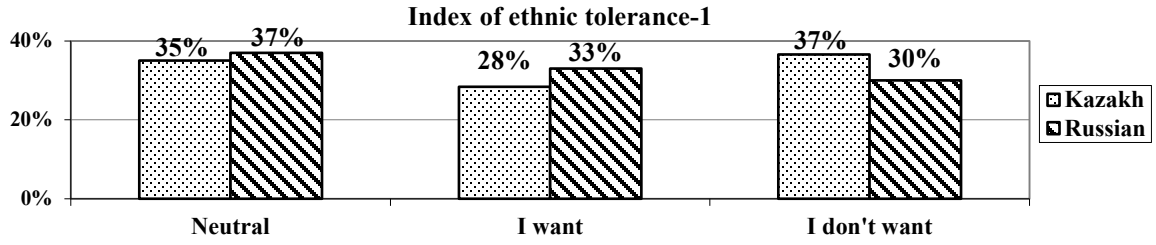

Figure 2 – Indexofethnictolerance-1 inthe children of primary school age (Kazakh, Russian groups)

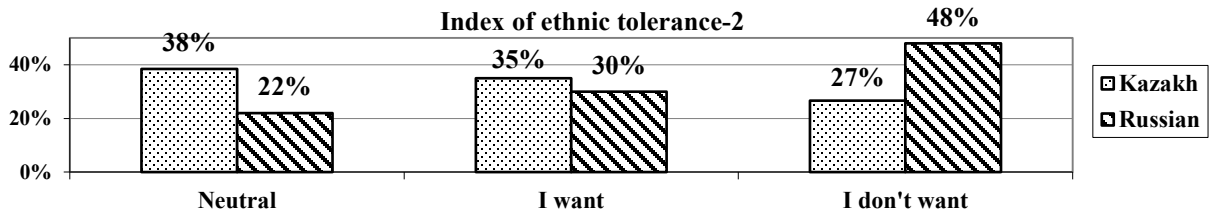

Figure3 – Indexofethnictolerance-2inthe children of primary school age (Kazakh, Russian groups)

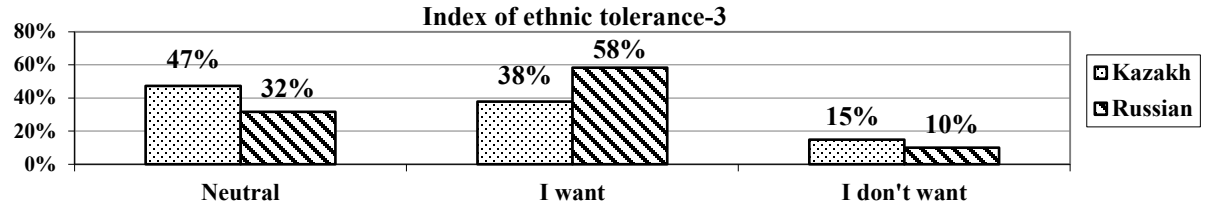

Figure4 – Indexofethnictolerance-3inthe children of primary school age (Kazakh, Russian groups)

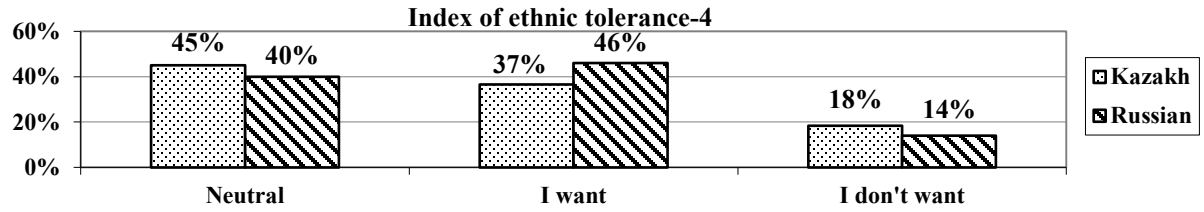

Figure5 – Indexofethnictolerance-4inthe children of primary school age (Kazakh, Russian groups)

TABLE V. EMPIRICAL INDICATORS OF ETHNOCULTURAL IDENTITY

1		2	
The levels of visibility of "Ethnic-I"		Degrees of interethnic tolerance	
Kazakh group	Russian group	Kazakh group	Russian group
45 %	55%	48%	42%

At the second stage of the second experiment, mutual influence of ethnic views and intellectual development was determined by questionnaires developed by us. A special idea of this research is that more developed ethnic views of children are associated with higher intellect.

In our study, 15 questions for Kazakh children were related to the peculiarities of their ethnic nation, and 5 questions were asked about representatives of other nationalities (Kazakh, Russian).Questions for the children of Russian groups were changed accordingly.

The results of experimental study of ethnic views.

The answers to the survey questions were determined by the following criteria, which reflected the results of the analysis:1. The ratio of the values characterizing one's ethnic group ("+" and "-") (autostereotype);2. The ratio of the values characterizing another's ethnic group ("+" and "-") (heterostereotype);

U-criterion of Mann-Whitney was used to test the experimental hypotheses in determining the reliability of the data obtained when studying the level of ethnic views in the Kazakh and Russian groups.

The value of the table for$U_{cr}$is as follows:114 ($p \leq 0,01$),138 ($p \leq 0,05$).

Comparing U_{emp} and U_{cr}, we determined the level of ethnic concepts in children (Tables 6 and 7).

As can be seen from Table 6, the children of primary school age in the Kazakh group seems to have a positive attitude towards the ethnic groups. Thus, our experimental hypothesis was proved by the results of ethnopsychological diagnosis.

Children's attitude to one's and another ethnos was analyzed on the basis of positive and negative attitudes. Its statistical significance was determined. Some of peculiarities of formation of ethnic views for Russian children are shown in Table 7.

Table 8 shows the reliability of determining the features of the development of ethnopsychological concepts of the two groups. As can be seen from Table 8, the development of

ethnic views in the Kazakh and Russian groups has no significant difference. However, therearesomepeculiarities.

We have shown the comparative development of ethnic viewsthat the Russian ethnos related to the Kazakh ethnos, andthe Kazakh ethnos related to the Russian ethnos.

In Table 9 we present the comparative indicators of formation of Ethnic-I and intellect, which is the basis of our research.

As shown in Table 9, in comparison with the Russian group, the Kazakh children are more tolerant and have higher intellect. And in the Russian group of children, Ethnic-I is more developed. Thus, we see significant ethnic differences between the intellectual and personal qualities of respondents. If we justify these differences, we can say that the Kazakh ethnos is a titular nation in Kazakhstan, therefore their sense of tolerance prevails. Because they feel that they live in their country at a high level.In this regard, children also have a high intellectual level.Meanwhile, in the Russian group, a strong sense of their own "Ethnic-I" is explained by the fact that they put their nation above all else and that all the representatives of the nation adequately assess themselves due to the stability of the national policy in the country.

In general, we can see the relationship between high intellect and ethnic views, tolerance and ethnic-I (Table 10).

The reason why we compare the indicators of intellect and ethnic tolerance is that these are qualities of a developed personality.

In addition, comparing the average arithmetic values of levels of intellect and ethnic views of tolerant and non-tolerant children in Kazakh and Russian groups, we note that in both ethnic groups a high levels of intellect and ethnic viewsare among tolerant pupils. Intolerant respondents showed lower than average intelligence. It confirms the basic assumption of our research and confirms the dependence of intellectual development and ethnic views of primary school children on their ethnic values.

Tolerance is very important for harmonious development of the individual. As far as a person is tolerant of another nationality, the indicator of intellectual development and ethnic views are so related to each other.

TABLE VI. STATISTICAL SIGNIFICANCE OF PECULIARITIES OF FORMATION OF ETHNIC VIEWS IN KAZAKH GROUP IN ACCORDANCE WITH U-CRITERION

Compared series		Average	U_{emp}	Out-of-range values
1	"+" to own ethnicity	1.49	48	Relevance $p \leq 0,01$
	"–" to own ethnicity	0.31		
2	"+" to other ethnicity	1.41	44.3	Relevance $p \leq 0,05$
	"–" to other ethnicity	0.45		

TABLE VII. STATISTICAL SIGNIFICANCE OF PECULIARITIES OF FORMATION OFETHNICVIEWS IN RUSSIANGROUP IN ACCORDANCE WITH U-CRITERION

Compared series		Average	U_{emp}	Out-of-range values
1	"+" to own ethnicity	1.51	22	Relevance $p \leq 0,01$
	"–" to own ethnicity	0.22		
2	"+" to other ethnicity	1.37	37.6	Relevance $p \leq 0,05$
	"–" to other ethnicity	0.18		

TABLE VIII. RELIABILITY OF DETERMINING THE FEATURES OF THE DEVELOPMENT OF ETHNOPSYCHOLOGICAL CONCEPTS OF THE TWO GROUPS

Ethnopsychological concepts Kazakh-Russian	Ethnopsychological concepts Kazakh-Russian
Positive $U_{emp} = 58.9$ ($p \leq 0,05$)	Positive $U_{emp} = 58.9$ ($p \leq 0,05$)

TABLE IX. THE RESULTS OF THE DIAGNOSTICS OF THE VALUE SPHERE OF DIFFERENT AGE GROUPS OF THE TITULAR ETHNOS OF KAZAKHSTAN BY THE SCHWARTZ METHOD (AVERAGE POINTS / U-CRITERION OF MANN WHITNEY)

Index	Kazakh children	Russian children
High intellect	47,4 %	46,6%
Ethnic views	31,8 %	35,7 %
Ethnic tolerance	48 %	42 %

Ethnic-I	45 %	55 %

We present the following conclusions:

1. Ethnic-I is directly correlated with the self-determination of school-age children;

2. Ethnic-I in children is determined by obvious ethnic tolerance and ethnic stereotypes;

3. High ethnic tolerance and ethnic index have a positive effect on intellectual and personal development.

4. Itwas revealed that the understanding of different ethnic groups (Russian, Kazakh) about their ethnicity has a positive effect on the development ofintellect and personal development.

According to the results of the study, the influence of ethnic views on the development of intellect was mathematically justified by Pearson's tetrachoric correlation coefficient.

Using Pearson's correlation coefficient, we have the following results:

In the group №1 R = -0,74

In the group №2 R = 0,14

Thus, intellectual development is closely related to such ethnic views, as Ethnic-I and ethnic tolerance.

TABLE X. AVERAGE ARITHMETIC INDICATORS OF THE LEVELS OF THE DEVELOPMENT OF INTELLECT AND ETHNIC VIEWS OF TOLERANT AND NON-TOLERANT CHILDREN IN KAZAKH AND RUSSIAN GROUPS

Scale-value	Intellect	Ethnic views
Tolerant children in Kazakh group	5.7	6.4
Non-tolerant children in Kazakh group	3.6	4.0
Tolerant children in Russian group	6.0	6.5
Non-tolerant children in Russian group	4.1	4.5

I. CONCLUSION

Thus, based on the results of the study, we came to the following conclusion:

1. At the level of formation of classification thinking, five groups of children of I and IIIgrades were identified.

–Children who have shown very low and low results, classify distributions based on external forms or functional relationships, rather than on the important attributes.

– At the average level, a child can perform tasks, his initial decision is not based on an important attribute, but after experimenter's help he performs the task correctly. On the second type of classification the child identifies and applies the important features of things, but the functional relationships between the things are not always taken into account.

– High and very high classification thinking are characterized by easy and quick understanding of the principles of classification cards in groups. When performing tasks,children rely on basic functions and important atributes of things.

– The difficulties of primary school children in the performance of tasks are directly related to the absence of the main external signs of features of classification of cards. This problem is correctly solved with the help of teachers.

– Errors of children of the I grade are characterized by complexity of transition from one type of classification to another, that is, from the principle of generalization to the principle of functional communication.

2. The intellectual development of person is positively influenced by formation of ethnic views (ethnocultural values).

3.High level of tolerance has a positive impact on the intellectual development of the individual.

4. A mathematical and statistical justification of the relationship between intellectual development and ethnic views is established.

At present, radical social transformations require a psychologically new character of structure of personality.As our country is one of the multinational countries, it is important to determine the psychological features, ethnic values and ethnopsychological differences between the various ethnic groups living there.

Intellect develops in the social environment in which a person lives.Ethnic values have a positive impact on intellectual development.It is also believed that ethnic views, formed in every nation, has a positive impact on intellectual development. As far as person's ethnic tolerance is high and ethnic views are developed, so intellectual development will be formed.That is, if a person expresses a positive attitude towards oneself and other nationalities, one's intellect will grow.

At the present stage of modern ethnic revival, special attention is paid to ethnicity.It was revealed that tolerance for another nationality at an early age, respect for its features, good communication with other people, knowledge of other ethnocultural values of people are the basis for intellectual and personal development.

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Social closeness and perception of interpersonal spatial distance

Hironori Oto
Hiroshima international University
Department of Psychology, Faculty of Psychology
Higashi-hiroshima, Japan
h-ootou@he.hirokoku-u.ac.jp

***Abstract*—This study examines whether the social closeness experienced by people in relation to others affects the spatial distance they perceive between themselves and others. In this experiment, participants within the same social group stood facing other participants at a distance and estimated the spatial distance between them. Next, they were instructed to evaluate their social closeness with the participants facing them. The results indicated that male participants estimated distance as further from others whom they regarded as socially distant and nearer to those whom they regarded as socially close to them. This finding provides new evidence of the impact of social interaction on perception with not only out-group but also in-group members.**

Keywords- Distance perception, Judgment of distance, social closeness

I. INTRODUCTION

When communicating, it is important to recognize the distance between people. Getting close to an unfamiliar person within reachable distance may make one uncomfortable. A partner who keeps their distance from you may imply that they have negative feelings, such as anger, toward you. Interpersonal distance is a fine barometer of the depth of social relationship between two people, and an effective way to convey to others how close you feel to them. Ignoring such nonverbal messages can cause trouble with others. Along these lines, the present study examines the hypothesis that the degree of social relationship also affects the physical proximity people *perceive* between themselves and others.

Perceived space seems to stretch and shrink, and this principle corresponds to the importance of survival and involvement information. For example, stimuli that threaten perceivers appear to be closer than those that are not [1]. Perceived proximity is believed to encourage defensive behavior such as escaping from the threatening object. Objects that can be reached look closer than those that are out of reach [2] [3], and people carrying a heavy backpack perceive distances to be further away than those with no backpack [4]. These investigations indicate that the space between people and a target is adjusted according to the degree of threat they feel about it and the effort expected for the involvement with it. Witt [5] points out that biased perception affects people's ability to choose an adaptive action.

Biased perception also has been shown to affect social interaction. Soliman, Gibson, and Glenberg [6] demonstrated that members of the same cultural group (in-group) perceived others in that group as closer to them physically than those who belonged to a different cultural group (out-group). Furthermore, Soliman & Glenberg [7] explained the result by considering expected effort for interactions, that is, out-group members look further away because they are expected to require more effort to interact than in-group members. Thomas, Davoli, and Brockmole [8] showed that players who won in a competitive game looked more distant than those who played together as a team. They described how competitors were perceived as physically further away, which may help people to more easily define them as out-group members, or as those who are not on their side. These studies demonstrate the impact of social interaction on perceptions of interpersonal distance by focusing on social group differences, i.e., members of a common culture vs. those from a different culture, winner vs. loser, or competitor vs. ally. This study, however, focuses on social closeness in terms of the degree of familiarity people feel with others. Dibble, Levine, & Sun Park [9] described social closeness as a conceptual continuum of varying gradations. Social closeness is recognized differently even between in-group members, from acquaintances to very good friends. In this study, we asked whether perceived spatial distance is affected by the degree of social closeness between people formed through daily interaction.

Social closeness refers to people's degree of ease with social interaction. When people interact with less friendly people, they tend to keep their interpersonal distance for longer [10]. Due to the expected effort involved in social interaction, a lack of social closeness should cause people to perceive the space between themselves and others as more distant.

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II. Method

A. Participants

Twenty-eight undergraduates (20 men, 8 women) from Hiroshima international university participated in the experiment. Among them, 26 undergraduates excluding two women (20 men, 6 women) were third graders from the department of communication and psychology and had participated in long-term interaction with each other during various classes and events at the university. In this sense, they were treated as in-group members. However, the remaining two women were in the same department but the fourth grade and had little previous involvement with lower grade students. They were recruited to the study to make up the number of participants, as well as contribute data about other participants' estimated distances from them. However, they were later removed from the analysis to avoid a lack of clarity about whether they should be treated as in-group members.

B. Apparatus and stimuli

The university gymnasium was the location used to estimate interpersonal spatial distances between participants. Participants stood facing each other at controlled distances, which were marked by 15 pairs of black wooden bars (4.5 cm x 20 cm) placed on the floor at random inter-linear distances between 80 cm and 360 cm in 20 cm increments. All pairs of bars were laterally aligned in zigzags and were diagonally arranged to the surrounding wall. This prevented the layout of adjacent pairs of bars or objects in the gymnasium from cueing distance estimations as much as possible. In addition, a line 1 m from the wall was marked on the floor to cue the reference distance to participants. Recording sheets in binders were prepared for participants to estimate spatial distances and social closeness.

C. Procedure

The experiment was conducted as part of a class with all participants gathered at the gymnasium. At first, participants stood at a line facing the wall 1 m away and were instructed to learn the space between themselves and the wall using the reference distance of 1 m. Next, they were divided into 14 pairs of two people each. Each pair stood at one of the 15 pairs of bars facing each other and was asked to fill in the sheet on the binder by estimating the height of their partner and the distance between both of them. Note that the estimations of height were included to encourage participants to recognize their partner by raising face from their feet and to potentially consider how socially close they were. Estimations were repeated 14 times, changing pairs by rotating to each side, with one place when no partner was on opposite bars. Further, participants returned to their initial position facing the partner they first paired with. They evaluated how close they felt socially to the partner facing them, with a number from 1 (least close) to 10 (closest). This was also repeated 14 times in the same way as before.

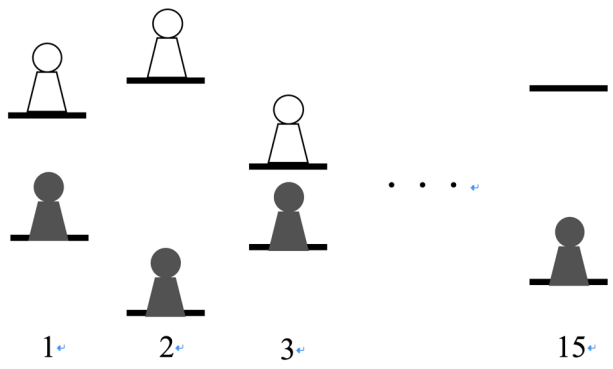

Figure 1. Layout of the experiment.

D. Statistical analyses

The averages of social closeness and physical and estimated distance were calculated for each participant. Each participant's gender was coded as 0 for male and 1 for female. A hierarchical multiple regression analysis was used to test whether estimated interpersonal spatial distances were affected by the social closeness participants had experienced with others while standing on the bars. The objective variable was estimated distance. In step 1 (Model 1), mean physical interpersonal distances were entered to control the difference of means among participants. This control was executed because each participant had one trial at a different set distance; therefore, the mean physical distance they experienced during the experiment was expected to differ respectively. Social closeness and gender were entered in step 2 (Model 2), and their interaction was added in step 3 (Model 3). A simple slope analysis was conducted after finding the interaction of gender and closeness to examine the simple main effect of social closeness at male and female participants. During the analysis, social closeness scores were centered to avoid multicollinearity. A supplemental analysis was also conducted using distance estimation data for same gender pairs as an objective variable. Because little data was available from female participants, only the data collected from male participants' estimated distance from each other were used in the analysis. Mean physical interpersonal distances were included in step 1, and social closeness was added in step 2. All analyses were conducted using HAD version 16 software [11].

III. Result and Discussion

Data from four men who had completed the sheet for distance estimations and/or evaluations of social closeness incorrectly were excluded from further analysis. Table I shows the result of the hierarchical multiple regression analysis. It indicated the significant interaction between social closeness and gender ($\beta = .54$, $p < .05$), suggesting that male participants estimated distance as further when faced with others who were socially more distant ($\beta = -.40$, $p < .10$). Female participants did not report such a relationship between them. Fig 2. illustrates the interactions between gender and social closeness.

With distance estimations between a hetero pair, it was considered that a disturbance factor that was not a focus of this experiment may have influenced the result. For example,

TABLE I. Result of Hierarchical Multiple Regression

	Estimated distance		
	Step1 (Model 1)	Step 2 (Model 2)	Step 3 (Model 3)
Physical distance	.16	.20	−.31
Gender		−.38 +	.001
Closeness		−.18	.14
Gender*Closeness			.54 *
R^2	.15	.18	.35 +
ΔR^2		.03	.17 *

* $p < .05$ + $p < .10$

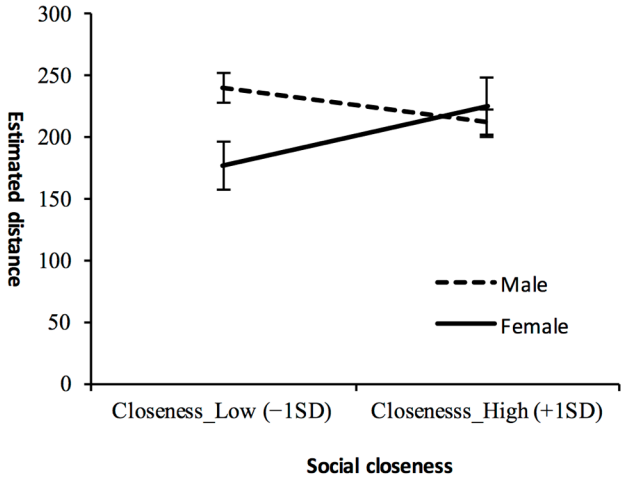

Figure 2. Simple slope of mean estimated distance and standard error for interaction of gender and mean social closeness. Male and female simple slope is illustrated at both low (mean − 1SD) and high (mean + 1SD) values of the mean social closeness

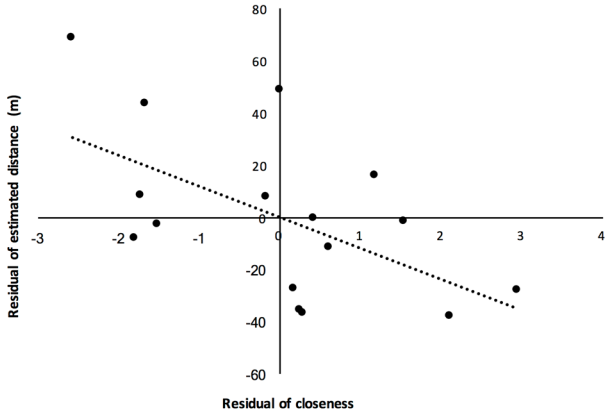

Figure 3. Partial regression plot of the residual of estimated distance against residual social closeness using the data collected from male participants' estimated distance from each other

participants might hesitate to look at a partner of the opposite gender and it might prevent perceptual judgments. Therefore, a supplemental analysis was conducted using data where male participants judged only other male participants (Table II). This result indicated the same tendency described above, but more clearly. Male participants estimated the distance between themselves and other male participants as greater with decreasing social closeness ($\beta = -.57$, $p < .05$). Fig 3. shows a partial regression plot using the data collected from male participants' estimated distance from each other.

The effort needed to interact with objects, places, or people has been shown to affect perception [4] [7]. This viewpoint could also explain the result of present study. The less socially close or familiar the other person is, the more difficulty people experience in getting involved with them. The potential effort required to interact is assumed to affect the perceptional system and adjust the space people perceive between themselves and others. Recent studies have pointed out this possibility in situations where perceivers found it difficult to regard others as belonging to the same social category, in that they were a winner and a loser, or a competitor and an allay [8], or from a different cultural area [7]. The present study has provided evidence for the first time that social interaction also impacts upon the perceptions of in-group members by focusing on social closeness.

TABLE II. RESULT OF HIERARCHICAL MULTIPLE REGRESSION ANALYSIS FOR MALE PARTICIPANTS USING DATA COLLECTED FROM MALE PARTICIPANTS' ESTIMATED DISTANCE FROM EACH OTHER.

	Estimated distance	
	Step 1 (Model 1)	Step 2 (Model 2)
Physical distance	.59 *	.60 *
Closeness		−.47 *
R^2	.35 *	.56 *
ΔR^2		.22 *

* $p < .05$ + $p < .10$

This study demonstrated gender differences among female participants tending to estimate distances as a little longer from male and less familiar female participants although the effect of social closeness was not significant. However, the reverse pattern of results occurred with male participants, which seemed to fit with the known effect of negative feelings such as fear on perception [1]. Female participants might have felt threatened when faced with unfamiliar members, and may have perceived their in-group members as nearer to encourage defensive behavior.

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Impact of self-concepts and social skills of students with ADHD on their behavior

Doaa.F. Hashem
Lecture of Psychology
Faculty of Arts
Asyut University
Doaafarouk24@yahoo.com

Abstract

Attention deficit is determined by the student's inattention and troubles in focusing the attention. Thus, the symptoms of Attention Deficit and Hyperactivity Disorder (ADHD) cause a real social and psychological stress on children, which leads to poor performance and difficulties in social interaction with their peers, a matter that in turn might lead to isolation and social rejection.

Study Objectives:

1- To identify prevalence of different subtypes of ADHD among primary school students
2- To identify prevalence of behavioral problems among primary school students with attention deficit hyperactivity disorder.
3- To clarify self-concepts, social skills and behavior problems of 4th grade primary school students with ADHD compared to their normal peers.
4- To identify the relationship between behavioral problems and self concept and social skills among students with attention deficit hyperactivity disorder.

Sample:

The study sample consists of 87 students in the fourth, fifth and sixth primary grades in Asyut city-Egypt, out of whom, 39 students were diagnosed with attention deficit hyperactivity disorder.

Study Tools:

1- All subjects (n=87) were subjected to the following:
2- Application of the teacher's form of the questionnaire for Diagnosis of Attention Deficit Hyperactivity Disorder (ADHD), using Conners Rating Scales–revised: User's Manual
3- The Arabic form of Piers-Harris Children' s Self Concept Scale for assessment of students' self concepts.
4- The Arabic form of Matson Evaluation of Social Skills with Youngsters (MESSY)for evaluation of students' social skills (Matson, et al.,1983).
5- Application of children's Behavior problems scale for evaluation of behavioral problems (Nehad abd el Wahab.,2015)

Results:

1- It was found that the most prevalent behavioral problems among students with ADHD were truancy and tendency to escape from home (30.77%), followed by defiance and lying (58.97), annoyance (43.59) and aggression (44.59%) and lastly stealing or theft (46.15%) respectively.
2- There is an inverse statistically significant relationship between Self concept (conduct- happiness and satisfaction) and behavioral disorders such as (defiance- lying- stealing- annoyance- aggression and destruction) among students with ADHD.
3- There is an inverse statistically significant relationship between social skills (inappropriate assertiveness- impulsive behavior) and behavioral disorders such as (defiance- lying- stealing- escaping- aggression and destruction) in ADHD children.

Conclusion:

The cumulative effect of years of negative self-perception and low self-esteem may have significant life consequences. So, attention should be focused on fostering self-esteem and positive self-perception among children with ADHD through support groups and behavioral training programs.

Key words :(ADHD, social skills, self concept)

Introduction:

Attention Deficit Hyperactivity Disorder (ADHD) is the most common behavioral disorder in school-aged children,

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(Ramalho, et al 2018).[20] Its prevalence ragned from 5-8% of primary school children in South Africa, (Moodley et al 2018) [17] and in a world-wide sample of school-aged children its prevalence may be independent of economic development, (3.4% in developing countries and 4.3% in the US), (Pinna et al.,2019) [19]

Attention-deficit/hyperactivity disorder (ADHD) is characterized by age-inappropriate, persistent, and pervasive inattention and/or over activity/impulsivity that impair daily functioning[1] ,and is associated with substantial long-term burden on patients, families, and health care givers, in addition to interference with educational services. (Daley et al., 2014) [8].

ADHD is a complex multifactorial disorder, characterized by a variety of symptoms, including concentration problems, excessive motor activity and impulsivity which interferes with execution of simple school tasks. Diagnosis has been essentially subjective, since no specific laboratory tests are available. However, ADHD remains over-diagnosed, probably due to social pressures which lead parents to seek medical support for their children to be successful in school from an early age, (Ramalhoet al., 2018)[20]. Compared to the general population, individuals with ADHD have poorer functional outcomes in many areas, starting from difficulties in academic achievement, reaching to impairment of job performance, together with difficulties in social relations that might lead to even rejection and social isolation (Huang et al., 2015; & Schoenmacker et al.,2018) [12][21].

Self-concept is the totality of the individual's cognitive image of himself or herself. It includes ideas, beliefs, and attitudes about the self and one's competencies in various domains, (Houck et al., 2013) [11]. In turn self-concept results from the sum of personal identity plus social identity. The integration of the social identity into self-concept begins during childhood through the experience of peer relationships (Silvestri et al.,2018) [22]. A positive self-concept in children has been associated with improved academic performance, effective use of coping skills, safe and healthy social relationships, and dynamic movement through successive developmental stages, (Houck et al.,2013) [11].

Social skills are defined as socially acceptable behaviors that help to promote positive social interactions. Social skills can be described as skills of adapting to the social environment and using appropriate communication paths to cope with conflicts that may occur. Social skills are influenced by individual characteristics and environmental factors (Major et al .,2015)[14]. During early years, social skills are regarded as a fundamental component of children's school readiness, and are positively linked to children's future academic achievements, social and behavioral functioning, and even physical and mental health (Wu et al .,2018)[25].

On the other hand Social skill deficits may reflect the absence of a specific social skill, an inability to perform the essential steps to enact socially skilled behavior, or an inability to inhibit or control competing behavior that interferes with the performance of socially skilled behavior.4 Social skills deficit can include a range of difficulties in peer interactions, including making new friends, initiating or maintaining conversations, coping with bullying, managing anger, or struggling with feeling shy or socially awkward. Early social skills deficits may have long lasting effects on social, emotional, academic, and behavioral outcomes (Coiro et al., 2016)[6]. For children with ADHD, social difficulty may not be a result of lack of understanding of social rules but rather, may be due to impairment in application of this knowledge to the relevant social situation or interaction, (Brain et al., 2012)[5].

Aim of the work:

1- To identify prevalence of different subtypes of ADHD among primary school students
2- To identify prevalence of behavioral problems among primary school students with attention deficit hyperactivity disorder.
3- To clarify self-concepts, social skills and behavior problems of 4th grade primary school students with ADHD compared to their normal peers.
4- To identify the relationship between behavioral problems and self concept and social skills among students with attention deficit hyperactivity disorder.
5- To recognize the role of self concept and social skills in predicting behavioral problems of students with attention deficit hyperactivity disorder.

Subject and Methods:

Sample:

The study sample consists of 87 students in the fourth, fifth and sixth primary grades in Asyut city-Egypt, out of whom, 39 students were diagnosed with attention deficit hyperactivity disorder.

Tools:

1) Conners' Parent and Teacher Rating Scale-Revised (S)

The Conners' is a thorough assessment of attention-deficit/hyperactivity disorder (ADHD) in children and adolescents aged 6 to 18 years. The scale is composed of four sub-scales (Inattentive-passive, 10-item hyperactivity index, conduct problem, Hyperactivity) Behavioral problems were excluded, due to the use of a specific scale of behavioral problems and their dimensions.

2) Piers-Harris Children's Self-Concept Scale:

The Piers-Harris Children's Self-Concept Scale – Second Edition (Piers-Harris 2) is a 60-item self report questionnaire (subtitled "The Way I Feel About Myself") designed to assess self-concept in children between the ages of 7 and 18 years.

The Piers-Harris 2 measures six domain areas in addition to overall self-concept. The domain scales are: • Behavioral Adjustment (BEH): 14-item scale that measures admission or denial of problematic behaviours. • Intellectual and School Status (INT): 16-item scale that measures the child's evaluation of his or her own abilities in terms of intellectual and academic tasks. • Physical Appearance and Attributes (PHY): 11-item scale that measures a child's assessment of his or her own physical appearance as well as their appraisals of certain personality attributes such as ability to express one's ideas and leadership abilities. • Freedom from Anxiety (FRE): 14-item scale that measures anxiety and dsyphoric mood. • Popularity (POP): 12-item scale that captures the child's evaluation of his or her own social functioning. • Happiness and Satisfaction (HAP): 10-item scale that measures a child's feelings of happiness and satisfaction with life (Piers&Herzberg,2002). The scale had reliability coefficient of 0.70 using Cronbach's Alpha method. This can be reached by calculating the scores obtained by the students (+1 more than mean) and then comparing them with the scores exhibited (-1 less than mean) on the total scale and its dimensions among normal students. It was found that the value of the statistical significance lies between (0.05 to 0.001)

2) The Matson Evalution of social skills youngsters (MESSY):

The Matson Evaluation of Social Skills with Youngsters (MESSY) is a self-report measure developed by Matson, Rotatori and Helsel (1983). The scale consists of 62 items, which are rated by the child or adolescent according to a five point Likert scale. The items are related to 6 factors/dimensions originally named 'Appropriate Social Skill', 'Inappropriate Assertiveness', 'Impulsive/Recalcitrant', 'Overconfident', 'Jealousy/Withdrawal' and 'Miscellaneous Items' (rest of the items difficult to classify) The higher the score of test dimensions, the more socially skillful the child is (there is no remarkable weaknesses in social skills) (Matson et al., 1983). The scale had reliability coefficient of 0.60 using Cronbach's Alpha method. The validity of the scale is determined according to construct related validity. This can be reached by calculating the scores obtained by the students (+1 more than mean) and then comparing them with the scores exhibited (-1 less than mean) on the total scale and its dimensions among normal students. It was found that the value of the statistical significance lies between (0.05 to 0.001)

3-The children's Behavior problem scale:

The scale is prepared by Nehad Abdelwahab Mahmoud. Six main behavioral problems were detected and considered to be the sub-scales of this tool. The items were formulated under each sub-scale to be either negative or positive. Those items were written in colloquial Arabic to make it easier to grasp and answered by the children. These six sub-scales are as follows:

Annoyance and Teasing: It is meant to be the conduct which annoys and teases others. This sub-scale consists of 10 phrases

Defiance and Disobedience: It is meant to be disobeying adults' rules and requests or conducting a sort of undesirable behavior such as defying authority figures and not cooperating with others. This sub-scale consists of 12 phrases

Lying: where the child avoids telling the truth or fabricates events and exaggerates in telling what happened to get quick gains or to avoid punishment. This sub-scale contains 9 phrases.

Aggression and Destruction: It is that behavior through which the child intends to harm someone or something physically or morally, and tends to destroy things or public properties either totally or partially. This sub-scale contains 13 phrases.

Theft or Stealing: A behavior through which the child intends to take (another person's property or money) without permission or legal right and deceives others to gain benefits. This sub-scale contains 11 phrases.

Escaping: means the deliberate absence from home or skipping school without permission from parents or the school to perform some activities or to avoid some actions. This sub-scale contains 10 phrases. (abd el Wahab., 2015)[1]. The scale had reliability coefficient of

0.82 using Cronbach's Alpha method. This can be reached by calculating the scores obtained by the students (+1 more than mean) and then comparing them with the scores exhibited (-1 less than mean) on the total scale and its dimensions among normal students. It was found that the value of the statistical significance lies between (0.05 to 0.001)

Discussion:

Early researchers have suggested that negative behaviors related to core ADHD symptoms are largely responsible for impaired peer relationships. However, recent researches, have identified other possible contributory factors. One such factors that may be, particularly, relevant is a lack of social insight, or an inability to accurately report on one's own social competence (Linnea, et al, 2012) [13]. Here we hypothesized that negative behaviors or behavioral problems noticed among students with ADHD reflect their built up negative self concepts and their poverty of social skills.

In the current study it was found the prevalence of children with ADHD was 28.74 of the total study sample. This percentage was higher than the prevalence percentage reached by (Albatt et al.,2017) [2] study that aimed at determining the prevalence of Attention Deficit Hyperactivity Disorder (ADHD) among primary Saudi school children, prevalence found a 3.4% prevalence of ADHD among school children in Riyadh, Saudi Arabia.

In the current study it was found also That nearly all students with ADHD suffer behavioral disorders (38.5%), the most prevalent behavioral problems among students with ADHD, in order of frequency were truancy and tendency to escape from home (30.77%), followed by defiance and lying (58.97), annoyance (43.59) and aggression (44.59%) and lastly stealing or theft (46.15%). The current study agreed with objectives and results of (Vidal, et al., 2013) [24] in the evaluation of prevalence of ADHD symptoms in adolescents and young adults. The study sample consisted of 795 out-patients aged between 15 to 24 years old. Moderate ADHD symptoms were exhibited remarkably in drug addiction disorders (40.3%), borderline personality disorder (48.3%), behavioral disorders (41.7%), Antisocial personality disorder (57.1%) when compare with the remaining diagnostic sub groups.

Similarly Alzaben and his coworkers (2018) studied comorbid psychiatric, academic, and behavioral problems among students with ADHD in Jeddah. They found that 56.5% of them had oppositional defiant disorder/conduct disorder, 54.4% suffer impaired academic performance, 44.4% had classroom behavioral problems, and 41.3% suffer depression/anxiety.

Some studies have also been found that conduct problem severity mediates between ADHD severity and nicotine use, but not with more severe alcohol or substance use. More severe ADHD-inattentive symptoms lead to more severe gaming habits. Furthermore, our model suggests that ADHD severity has no influence on severity of alcohol or other drug use.(Schoenmacker, et al .,2018) [21] Common comorbidities of ADHD including anxiety, depression, sleep disorder, and anti-social personality disorder were previously shown not to differ in individuals with ADHD with or without SUD in a non-overlapping sample from IM-AGE (Miranda et al., 2016) [16]

For purposes of comparing the Self-perceptions, social skills and behavioral problems of ADHD children with those of undiagnosed ADHD children, The current study to reached that students with ADHD scored significantly lower mean scores of nearly all domains of self-concepts, as well as social skills domains than control group. On the other hand ADHD students scored significantly higher mean scores than control group on most conduct problem domains. The results of the study also found that significant negative correlation between sense of happiness, as a self-concept domain, and some conduct problems as annoyance, lying, aggression and destruction. Moreover, significant negative correlations were found between some social skills particularly; inappropriate assertiveness, impulsive/ recalcitrant and jealousy /withdrawal; and all conduct problems.

Several studies have provided possible explanations for this association and comparison. For example, Schachar reported that ADHD was associated with a deficit in cognitive processing that led to failures in social and academic performance, which in turn gave rise to subsequent anxiety (Barkly found that ADHD was correlated with deficits in the inhibition of executive function, which caused problems in family and peer relationships and subsequently resulted in anxiety (Shen.et al.,2018) [23] social deficit has been demonstrated in studies that place children with ADHD in naturalistic and laboratory settings with unfamiliar peers. For example, one study that compared non familiar boys with and without ADHD on peer rejection and liking during the first 3 days of a summer camp found that after the first day, boys with ADHD were more rejected by their peers than non-ADHD

participants (Linnea, et al., 2012) [13] social difficulty may not be a result of lack of understanding of social rules but rather, may be due to impairment in application of this knowledge to relevant social situation (Brain et al.,2012) [5] compare self-concept between children and adolescents with epilepsy and healthy controls, and (2) identify which psychiatric, familial and epilepsy-related variables are associated with a poor self-concept. The results showed a link between the concept of self-diminishing symptoms of hyperactivity and attention deficit in children with epilepsy (Ekinci, et al .,2016) [10]

In accordance with these results also, show the study of (Barber, et al., 2005) [4] have investigated 77 children aged between 8 to 12 years. The sample was divided into two groups; 38 children in the ADHD group and 39 children in the control group. The children completed a self- perception questionnaire designed to measure the self- awareness of school- age children. The results of their study agreed with the results of the current study as to the presence of a difference in self- perception of ADHD children compared to their normal peers. Additionally, both studies agreed in proving that the children have some behavioral problems resulting from the Self concept and social.

The results of the current study came in accordance with the results of (Dupaulph, et al.,2001) [9] study which was conducted on 58 children suffering from symptoms ADHD, 36 normal controls between 3 and 5 years old participated the result have indicated that Preschool-age children with ADHD are at significant risk for behavioral, social, familial, and academic difficulties relative to their normal counterparts.

The current study agreed with the study of (Zirt et al., 2005)[26] , where 21 ADHD university students were compared with 20 undiagnosed ADHD students, all being similar in age, gender and average scores. ADHD students manifested lower levels social skills. The results have indicated that ADHD is closely related with self- esteem

Conclusion

The cumulative effect of years of negative self-perception and low self-esteem may have significant life consequences. So, attention should be focused on fostering self-esteem and positive self-perception among children with ADHD through support groups and behavioral training programs.

Results:

Table 1 : sex distribution of students with ADHD among different subtypes of ADHD

Subtypes of ADHD	**Male (N=31)**		**Female (N=8)**	
	N	**%**	**N**	**%**
Hyperactivity/impulsivity ADHD-HI	6	19.35	3	37.5
Attention Deficit ADHD-In	4	12.90	1	12.5
Attention Deficit Hyperactivity Mixed type	21	67.74	4	50

Table (1) shows that ADHD is more common among boys (n=31/39; 79.5%) than girls (20.5%), and the mixed type is the most common subtype of this disorder

table (2) Rate of students with ADHD and control group having negative self-concepts and poor social skills of behavioral problems among primary school students with attention deficit hyperactivity disorder (N=39)

Scale	**Subscale**	Control				Total		ADHD				Total	
		Male (N=30)		Female (N=18)		(N=48)		Female (N=8)		Male (N=31)		(N=39)	
		N	%	N	%	N	%	N	%	N	%	N	%
Self-Concept	**Intellectual and school status**	2	6.67	9	50	11	22.92	2	25	7	22.58	9	23.08
	Physical appearance	2	6.67	6	33.33	8	16.67	5	62.5	10	32.26	15	38.46
	Anxiety	1	3.33	6	33.33	7	14.58	4	50	10	32.26	14	35.90
	Popularity	6	20	7	38.89	13	27.08	4	50	11	35.48	15	38.46
	Happiness	3	10	5	27.78	8	16.67	2	25	9	29.03	11	28.21
	Total Self-Concept	2	11.1	7	23.3	9	18.8	4	50	9	29	13	33.3
Social Skills	**Appropriate social skill**	3	10	7	38.89	10	20.83	5	62.5	11	35.48	16	41.03
	Inappropriate Assertiveness	5	16.67	5	27.78	10	20.83	1	12.5	5	16.13	6	15.38
	Impulsive / Recalcitrant	5	16.67	8	44.44	13	27.08	2	25	24	77.42	26	66.67

	Overconfident	5	16.67	4	22.22	9	18.75	3	37.5	10	32.26	13	33.33
	Jealousy/ withdrawal	3	10	9	50	12	25	3	37.5	13	41.94	16	41.03
	Total Social Skills	4	22.2	5	16.7	9	18.8	4	50	8	25.8	12	30.8
Conduct Problem	**annoyance and teasing**	3	10	7	38.89	10	20.83	1	12.5	16	51.61	17	43.59
	Defiance and disobedience	3	10	6	33.33	9	18.75	2	25	14	45.16	16	41.03
	Lying	0	0	3	16.67	3	6.25	3	37.5	20	64.52	23	58.97
	aggression and destruction	4	13.33	5	27.78	9	18.75	1	12.5	16	51.61	17	44.59
	theft or stealing	3	10	7	38.89	10	20.83	2	25	16	51.61	18	46.15
	tendency to escape from home	4	13.33	4	22.22	8	16.67	1	12.5	11	35.48	12	30.77
	Total Conduct Problem	1	5.6	6	20	7	14.6	1	12.5	14	45.2	15	38.5

Table 3 shows that negative self-concepts and poor social skills appeared in variable rates among both ADHD students as well as control group but with higher rates among students with ADHD particularly impulsive/recalcitrant (66.7%# 27.1%), negative concept about physical appearance (38.5%# 16.7%). On the other hand all Conduct problems were recorded with higher rate among students with ADHD specially lying (59%#6.3%), theft or stealing (46.2%#20.8%), aggression and destruction (44.6%#18.8%).

Table (3): Mean scores of Self-Concepts, Social skill domains and conduct problems of students with ADHD versus Control group

Scale	Subscale	Control	ADHD	T	P . Value	CI 95%
		Mean ± Std	Mean ± Std			
Self-Concept	Intellectual and school status	15.8542±2.13372	14.6667±2.37679	2.453	0.02	{-2.15:-0.22}
	Physical appearance	10.7917±1.70054	9.7179±1.99933	2.707	0.008	{-1.86:-0.28}
	Anxiety	8.8750±2.11001	8.0256±2.94232	1.566	0.121	{-1.93:-0.23}
	Popularity	9.8958±1.75329	8.7692±2.26485	2.615	0.011	{-1.98:-0.27}
	Happiness	6.8542±1.48739	6.0000±1.39548	2.738	0.008	{-1.47:-0.23}
	Total Self-concept	52.27±6.71	47.18±9.40	2.94	0.004	{-8.53:-1.65}
Social Skills	Appropriate social skill	55.5000±6.76977	52.0000±7.20015	2.331	0.022	{-6.49:-0.51}
	Inappropriate Assertiveness	39.1250±5.44460	38.3077±5.74527	0.679	0.499	{-3.21:-1.57}
	Impulsive / Recalcitrant	11.5625±1.93409	10.1282±1.47219	3.818	0.000	{-2.18:-0.69}
	Overconfident	9.0417±2.10327	7.8205±3.52339	2.003	0.048	{-2.43:-0.01}
	Jealousy/ withdrawal	9.6042±1.95415	8.6410±2.35626	2.085	0.040	{-1.88:-0.044}
	Total social Skills	142.88±12.57	136.54±12.09	2.38	0.020	{-11.63:-1.04}
Conduct Problem	annoyance and teasing	12.4792±3.38325	15.1026±4.95663	2.925	0.004	{-0.84:4.41}
	Defiance and disobedience	16.5000±3.80369	18.7949±4.74718	2.504	0.014	{0.47:0.42}
	Lying	10.6875±2.64299	13.5385±3.50823	4.322	0.000	{1.54:4.16}
	aggression and destruction	16.7917±3.48496	20.0256±5.98457	3.050	0.003	{1.13:5.34}
	theft or stealing	13.9375±3.48496	17.2051±4.76379	3.691	0.000	{1.51:5.03}
	tendency to escape from home	11.9375±3.15154	14.5897±5.08205	2.981	0.004	{0.88:4.42}
	Total conduct problem	82.33±17.46	99.26±26.83	3.55	0.001	{-7.43:-26.41}

Table (3) shows that students with ADHD scored significantly lower mean scores of nearly all domains of self-concepts, as well as social skills domains than control group. On the other hand ADHD students scored significantly higher mean scores than control group on most conduct problem domains.

table (4): Correlation between self-concepts, social skills and conduct problems among students with attention deficit hyperactivity disorder (N=39)

	Self Concept					Social Skills				
Conduct problems	Intellectual and school status	Physical appearance	Anxiety	popularity	Happiness	Appropriate social skill	Inappropriate Assertiveness	Impulsive / Recalcitrant	Overconfident	Jealousy / withdrawal
1-annoyance and teasing	-.102	.107	-.235	-.127	-.346*	-.035	-.725**	-.618**	-.135	-.590**
2-defiance and disobedience	-.190	-.003	-.218	-.208	-.310	-.113	-.528**	-.555**	-.111	-.675**
3-lying	-.170	.086	-.236	-.219	-.398*	-.060	-.535**	-.548**	-.113	-.524**
4-aggression and destruction	-.053	.183	-.218	-.149	-.350*	.002	-.691**	-.577**	-.207	-.624**
5-theft or stealing	-.061	.136	-.122	-.081	-.257	-.062	-.689**	-.523**	-.296	-.605**
6- tendency to escape from home	-.033	.087	-.073	-.068	-.237	-.075	-.469**	-.477**	-.104	-.654**

Table 4 shows significant negative correlation between sense of happiness, as a self-concept domain, and some conduct problems as annoyance, lying, aggression and destruction. Moreover, significant negative correlations were found between some social skills particularly; inappropriate assertiveness, impulsive/recalcitrant and jealousy/withdrawal; and all conduct problems

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The Effectiveness of a Computerized Program on Diagnosing and Rehabilitating Children with Dyscalculia

Wafaa M.A. Farghaly
Department of Neurology and psychiatry
Faculty of Medicine (Asyut University)
Asyut- Egypt
Wafmaf2002@yahoo.com

Amr S. Ramadan
Department of Hearing disability
Faculty of Sciences of Special Needs (Beni-Sueif University)
Beni-Sueif - Egypt
amr.sayed@ssn.bsu.edu.eg

Mohamed Sh. Farghaly
Department of Educational Psychology
Faculty of Education (Asyut University)
Asyut - Egypt

Sara H. El Tallawy
Department of Psychology
Faculty of Arts (Asyut University)
Asyut- Egypt
sarahneltellawy@yahoo.com

Mohammed A. Abdel-Hameed
Department of Neurology and psychiatry
Faculty of Medicine (Asyut University)
Asyut- Egypt
moh78_abdelhamed@yahoo.com

Mohammed M. Ahmed
Department of Neurology and psychiatry
Faculty of Medicine (Asyut University)
Asyut- Egypt
mma202022@yahoo.com

Abstract:

The current study aimed to diagnose the deficit of visual and auditory cognitive skills for students who show learning disability in mathematics, and to rehabilitee the deficit/deficits of visual and auditory cognitive kills for those students.

This cross-sectional study was conducted on school children between 8 and 9 years of age from six geographically distributed governmental second grade primary school students (n=369 students). The Math test was applied to evaluate mathematics' achievement level. The total number of students with dyscalculia (scores < mean - SD) was 55 students who were our target in this study. A Math Cognitive Abilities Diagnostic Battery (MCADB), in the native (Arabic) language, based on the suggested auditory and visual cognitive skills that contribute mostly in the process of learning math and that might be deficient among students with dyscalculia was applied to identify the deficient cognitive skills. Implementation of a computerized Math Cognitive Skill Training Battery (MCSTB) to a sample of students with dyscalculia (n=13) was carried out to enhance their visual and auditory cognitive skills that are related to math learning. Then reassessment of math achievement, and math cognitive skills of the trainee sample was carried out

The results show that the prevalence of dyscalculia among 2nd grade public school student was14.9% which was slightly higher among girls (15.5%) than boys (14.3%). The MCADB has acceptable reliability (Cronbach's Alpha coefficient value 0.714) and high specificity (84.4%). Reassessment of the trainee sample after training showed statistically significant increase in the total as well as most studied Math cognitive skills (Text Reading Comprehension P 0.00 , Whole-Part relationship P .004 , visual discrimination P. 0.031, Visuo-Spatial abilities P 0.17, and total Math Cog. Skills P 0.003). Math achievement level of the trainee sample after training revealed significant increase in the total and all studied sub-skills.

Conclusion: dyscalculia is multifactorial and may result from failure of interaction in many cognitive skills. Improvements in grasping early math facts education may provide the foundation necessary for later proficiency in math.

Keywords - Dyscalculia , Computerized, Diagnosing, Rehabilitating (key words)

Introduction

Specific Learning Disability (SLD) is considered a type of Neurodevelopmental disorder that impedes the ability to learn or use specific academic skills (e.g., reading, writing, or arithmetic), which are the foundation for other academic learning.[1] Dyscalculia is an alternative term which refers, according to DSM-5, to a pattern of difficulties characterized by problems in processing numerical information, learning arithmetic facts and performing accurate or fluent calculations.[1]

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Dyscalculia is presumed to be due to a specific impairment in brain function [2,3]. Neuropsychological studies[4] and Neuro-imaging literatures[5] have suggested different types of dyscalculia. These subtypes are "**number sense dyscalculia"** linked to functional or structural impairment of the horizontal intra-parietal sulcus (HIPS), a **"verbal dyscalculia**" linked to impairment of the angular gyrus, and a **"spatial attention dyscalculia"** linked to impairment of the posterior superior parietal lobule (PSP).[6] However, it is hard to find "pure" cases of verbal or number sense dyscalculia. The proximity of the parietal areas involved means that they are likely to be lesioned together[7].

The prevalence of dyscalculia is around 5-8% of school aged children.[8,9] However it reaches higher rates (11.4%) among Arabic speaking children[10]. Despite the immense size of the problem, world-wide researches directed to investigate and trying to help children with dyscalculia is much fewer than those directed to help children with dyslexia. So this work aimed to investigate some cognitive skills that are supposed to have significant role in early mathematical learning process, might be deficient in children with dyscalculia, and hence need rehabilitation.

Subjects and methods

Subjects:

Study group

This cross-sectional study was conducted on school children between 8 and 9 years of age from six geographically distributed governmental second grade primary school students in Assiut city (n=560 students).

Inclusion criteria:

(1) Poor Mathematic Achievement as documented by: Obtaining < mean - SD score on math standardized achievement test.

(2) Normal neurological, basic audiological, and ophthalmological examination.

Control group

The control group was selected from second grade students of the same public schools who fulfilled the following criteria:

(1) Good scholastic achievement: Obtaining > mean + SD score according to the standardized Math test.

(2) Normal neurological, basic audiological, and ophthalmological examination.

Methods

The current study included seven stages:

First stage: Identification of students with dyscalculia:

All students in second grade from the chosen six public primary schools in Assiut city (n=560) were interviewed, except those who were absent during their school visits (n=84), or those who refused to complete the test battery (n=107). The rest of the sample (n=369) completed the test battery personally under the supervision of four neuropsychiatrists, two expert psychometrists, and 12 social workers.

All students were subjected to the following:

(1) Evaluation of mathematics' achievement level using the Math test specially designed for this study (total score 25 degree). According to their achievement level students were classified into three groups.

(1) Group I: included those with poor achievement (scores < mean - SD) and were considered students with dyscalculia (our target in this study) (*n* = 55 students)

(2) Group II: included those with average achievement (scores = mean +/-SD) (n=219)

(3) Group III: included those with good achievement (>mean + SD) and were considered as a control group (n=95).

Thereafter, the students with dyscalculia were subjected to complete neurological, audiological and ophthalmological examination to exclude those with sensory deprivation (visual, auditory, or kinesthetic impairment).

Second stage: Construction of a computerized diagnostic battery, in Arabic language, based on the suggested auditory and visual cognitive skills that contribute mostly in the process of learning math and that might be deficient among students with dyscalculia.

This stage lasted for about 1 year, from 1st of October 2015 to the end of September 2016. It was carried out by seven expert staff members in the fields of neurology, education and special needs. The constructed battery was designed in a game-like manner to test a wide range of cognitive skills that are supposed to have importance in the early stages of development of learning mathematics. It includes the following skills: Text reading comprehension (15 scores), grasping whole-part relationship (41 scores), visuo-spatial abilities (10 scores), and visual discrimination skills (13scores).Total score of the constructed Math Cognitive Abilities Diagnostic Battery (**MCADB**) = 79 scores.

Third stage: Standardization of the constructed Math Cognitive Abilities Diagnostic Battery (**MCADB**).

(1) Reliability:

Assessment of reliability and of internal consistency of the newly constructed diagnostic battery was carried

out by evaluation of its Cronbach's α coefficient value and corrected item-total correlation[10].

(2) Validity:

For assessment of validity of the new diagnostic battery, we relied on measuring the following:

(a) Judgment validity: the test was judged by well-experienced referees (seven experts) to show the relevance and appropriateness of individual test items to the study purpose.

(b) Contrasted group validity: *t*-test was used for comparison of mean scores of Math cognitive abilities of students with dyscalculia (group I) and the control group (group III), using the newly constructed MCADB.

(c) Diagnostic validity: sensitivity, specificity, positive predictive value, and negative predictive value were used to determine diagnostic validity of the newly constructed MCADB.

Fourth stage: Detailed study of cognitive abilities of students with dyscalculia to identify their cognitive skill deficit or deficits that might contribute to their disability (dyscalculia).

Fifth stage: Construction of a computerized Math Cognitive Skill Training Battery (MCSTB) for development and enhancement of cognitive skills that are suggested to contribute in math learning.

The constructed training battery is composed of the visual and auditory cognitive skills of the diagnostic battery. However, it is more extended (multiple levels of increasing difficulties) and has unlimited time. The child is not allowed to pass to the next level until he masters the current one.

Sixth stage: Implementation of the training battery **(MCSTB)** to a sample of students with dyscalculia (n=13). Rehabilitation was conducted along 2 months for 13 students who accepted to participate in the study. Each student received 5 sessions per week. Each session lasted for 90-120 minutes with intervening one or two breaks in between. Rehabilitation was implemented in the Neuro-Epidemiology Research Center at Asyut University, during end year holiday. Each student attended with one or both of his/her parents. Two sessions were held per day; the first at 9-11 O'clock and the second at 12-14 O'clock. The parents were asked to choose the suitable sessions for them each day.

Seventh stage: Reassessment of students with dyscalculia at the end of the rehabilitation program for evaluation of their cognitive skill abilities as well as their math achievement level.

DISCUSSION

Dyscalculia is a topic widely discussed in neuropsychological forums but it has not yet reached the same status as dyslexia which has previously been established as a proper diagnosis of learning disorder. The prevalence of dyscalculia among 2nd grade public school students of Asyut city, Egypt was 14.9%, which is higher than that reported in Serbia (9.9 %)[11] among 1424 third-grade students. This difference could be attributed to true genetic predisposition or language consistency in different nations. On the other hand, it might be apparent difference related to age at diagnosis or methods adopted in identifying children with mathematic disability.

According to authors' opinion[12,13], the specifically constructed **Math Achievement Test** used for evaluation of math achievement level of the second grade primary school students, having Cronbach's alpha coefficient of 0.793, is internally consistent and has acceptable reliability. Furthermore deletion of any of its constituent sub-items shows minimal decrease in its Cronbach's alpha value which indicates significance of all constituent sub-items. Moreover its validity was approved by significant correlation with end year Math achievement school test (Pearson' correlation r=0.726).

According to George and Mallery[12] who suggested that a test having Cronbach's Alpha coefficient value ranging from 0.7 to <8 has acceptable reliability, the newly constructed **Math Cognitive Abilities Diagnostic Battery (MCADB)** has acceptable reliability (Cronbach's Alpha coefficient value 0.714). Furthermore this Cronbach's Alpha coefficient value showed minimal decrease when any item of the battery was deleted which indicates significance of all constituent sub-items of the battery in addition to its internal consistency (table 3). MCADB measures the text reading comprehension, the whole-part relationship, visuo-spatial abilities and visual discrimination which are considered the most important cognitive skills for good mathematic learning.

Regarding the studied cognitive skills which were suggested to have an important role in development of and learning mathematics, it was found that students with poor mathematical achievement scored significantly lower than students with good math achievement at the total and the four studied math cognitive domains (table 4). In this study, students with dyscalculia had significantly lower mean scores than good achievers on the total as well as all studied sub-items of Mathematic cognitive abilities regarding text reading comprehension, the whole part relationship, visuo-spatial abilities, and visual discrimination. Similarly in a meta-analysis conducted by Johnson et al[14], it was found that patients with dyscalculia, despite having average intelligence, were

significantly different from typically achieving students in several cognitive categories. Specifically, they scored significantly lower on tests of auditory and visual working memory, executive function, processing speed, and short-term memory. Also this might be consistent with Geary[9] who estimated that between 5 and 8% of children has mathematical learning disability in which the child has procedural deficits in visual and auditory memory.

There is no doubt that mastering visuo-spatial skills are important pre-request for basic learning of some mathematical processes as copying digits (e.g. 6#9), figures and clustering digits into numbers. They are also important for differentiating, relating, and organizing information.[15]. This relationship between visuo-spatial skills and mathematical abilities might be confirmed by the finding that using number sense (e.g. quantity multiplication, subtraction, or comparison of numbers) and thinking about space (visuo-spatial skills) both activate Intra-Parietal Sulcus (IPS). Furthermore, Dyscalculic children were found to have less grey matter in IPS and less activation of IPS during magnitude tasks[16]. It is hypothesized that IPS contains a non-verbal representation of numerical quantity analogous to a spatial map or "number line"[6]

This picture is consistent with the visuo-spatial subtype of Mathematic Learning Disability (MLD) proposed by Geary[9]. He discussed this subtype to be characterized by difficulties in representing numerical relationships spatially and in interpreting and understanding spatially presented information and relationships in math problems. Students with this type of MLD have problems with measurement, place value, aligning, and rotating numbers.[9]

Interpretation of whole-part relationship is also very essential for grasping the value of a given digit when stands alone or in different combinations (1 or 11 or 111), and this could stands more and more when combined with visuo-spatial abilities, for example grasping the value of different spatially presented digital combinations e.g. 10 or 01, 21 or 12, and so on. Thus it seems logic for students with dyscalculia to have significantly lower scores than students with good math achievement in whole-part relationship skills.

Moreover the significant difference between dyscalculic children and those with good math achievement in text reading comprehension (table 4) might reflect the importance of mastering this cognitive skill for decoding written problems into mathematical symbols, for understanding mathematical terms and concepts as well as recognizing reasonable results. This deficit in text reading comprehension might be consistent with the second type of MLD described by Geary[9] who attributed mathematical disability of those students to semantic memory deficits. Accordingly, students with this deficit could not understand relationship between words, phrases, signs, and symbols and what they stand for. Again, this type is in close proximity to the verbal symbolic type of dyscalculia related to defects if in left angular gyrus, left inferior frontal and/or temporal language areas.[6] They described this type to have deficits in verbal symbolic representation resulting in difficulties in learning and retrieving arithmetical facts, particularly multiplication tables and counting sequences.[6]

The importance of text reading comprehension in mathematic learning is documented by the high contribution of this cognitive skill as an independent variable (36%) in mathematic achievement level which is considered as a dependent variable (table 7).

Evaluation of sensitivity and specificity of the newly constructed MCADB revealed that although the new battery has poor sensitivity as a screening tool for dyscalculia (49.1%) yet, it is a good tool for diagnosis of these cases (specificity 84.4%) according to Cicchetti[20], with some of its sub-items e.g. visual discrimination has excellent specificity (92%).

After training of thirteen students of the poor achievers was done and they were reassessed, significant improvement was noticed on the total battery score as well as most sub-items of the 4 domains of cognitive rehabilitation (table 8). This improvement in math cognitive skills with rehabilitation was concomitantly associated with significant improvement in mathematic achievement (table 9).

In conclusion, dyscalculia is multifactorial and may result from failure of interaction in many cognitive skills. Improvements in grasping early math facts may provide the foundation necessary for later proficiency in math. Further studies are needed to determine the actual size of the problem among students in primary schools as early detection and rehabilitation of these patients may help in management of the problem. More facilities and awareness about the problem of dyscalculia is needed as the training and rehabilitation of these patients is possible.

Results

I- Validation of Math Achievement Test (MAT):

Validity and reliability of Math Achievement Test was carried out in a pilot study of a sample consisting of 185 of 2nd grade public school students.

Reliability of MAT:

It was found that **Cronbach's Alpha coefficient** of the newly constructed Math Achievement Test (MAT) was 0.793.

Table 1: **Corrected Item Total Correlation** of the components of Math Achievement Test (MAT):

Components of Math achievement Test	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1st Q	.708	.767
2nd Q	.747	.761
3rd Q	.721	.755
4th Q	.838	.732
5th Q	.718	.771
6th Q	.699	.783
Total	.997	.863

Table 1 illustrates corrected- item total correlation. It was found that Cronbach's alpha coefficient of MAT showed minimal decrease when any one of the component questions was deleted which means high internal consistency of MAT.

Significant correlation was found between the newly constructed MAT and end year Math Achievement School Test (r= **0.726****). (Pearson's correlation).

II- Descriptive statistics of the Sample:

Criterion-Related Validity of MAT:

Table 2: Math achievement levels of 2nd grade public school students

Math Achievement level	Boys (n=175)		Girls (n=194)		Total (n=369)	
	N	%	N	%	N	%
Group I:poor achievers	25	**14.3**	30	**15.5**	55	**14.9**
Group II : average achievers	108	61.7	111	57.2	219	59.3
Group III: good achievers	42	24	53	27.3	95	25.7
Total	175	47.4	194	52.6	369	100

This table shows that prevalence of dyscalculia among 2nd grade public school students of Asyut city was 14.9% (N=55/369), and it was slightly higher among girls (15.5%) than boys (14.3%).

III- Standardization of the Math Cognitive Abilities Diagnostic Battery (MCADB):

A}-Reliability of The newly constructed Math Cognitive Abilities Diagnostic Battery (MCADB):

The newly constructed Math Cognitive Abilities Diagnostic Battery (MCADB) has high internal consistency with Cronbach's Alpha coefficient value of 0.714.

Table 3: Corrected-item total correlation

	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Total whole battery with sub items
Audio-visual correspondence	**.376**	**.702**	**0.714**
Problem solving	**.598**	**.687**	
Line of symmetry	**.468**	**.704**	
Complete in the same pattern	**.548**	**.703**	
Coloring geometric shapes	**.543**	**.666**	
Form the greatest number	**.564**	**.693**	
Select the greatest number	**.639**	**.693**	
Select the representative fraction	**.586**	**.690**	
Select the correct number	**.257**	**.712**	
Adjusting time	**.407**	**.707**	
Choose the corresponding clock	**.436**	**.706**	
Direction and Relations	**.528**	**.702**	
Comparisons	**.159**	**.715**	
Coloring identical shapes	**.517**	**.701**	
Circle identical numbers	**.466**	**.707**	
Total Math Cog. skills	**1.000**	**.725**	

Cronbach's Alpha- value showed minimal decrease with removal of any sub-item of the battery

B}- Validation of the newly constructed Math Cognitive Skills Diagnostic Battery (MCSDB):

Table 4: Contrasted group Validity:

Math Cognitive Skills	Poor achievers (N=55)	Good achievers (N=95)	T	P . Value	CI 95%
	Mean ± SD	Mean ± SD			
MAT	10.42±3.76	23.36±0.64	32.81	0.0001	{-13.73:-12.17}
Audio-visual correspondence	2.16±1.29	2.88±0.94	3.93	0.0001	{-1.08: -0.36}
Problem Solving	1.47±1.32	3.07±0.90	8.81	0.0001	{-1.96: -1.24}
Line of symmetry	2.29±0.90	2.84±0.45	5.03	0.0001	{-0.77: -0.34}
Complete in the same pattern	2.27±0.95	2.93±0.30	6.19	0.0001	{-0.86: -0.45}
Total Text Reading Comprehension.	8.20±3.21	11.73±1.65	8.88	0.0001	{-4.31: -2.74}
Coloring geometric shapes	15.82±4.62	18.28±2.67	4.15	0.0001	{-3.64: -1.29}
Form the greatest number	3.87±1.67	4.83±0.56	5.14	0.0001	{-1.33: -0.59}
Select the greatest number	3.67±1.38	4.73±0.66	6.33	0.0001	{-1.38: -0.72}
Select the representative fraction	3.20±1.53	4.52±0.85	6.77	0.0001	{-1.70: -0.93}
Select the correct number	0.56±0.60	0.94±0.46	4.28	0.0001	{-0.55: -0.20}
Total whole-part relationship	27.13±7.42	33.29±3.02	7.15	0.0001	{-7.87: -4.46}
Adjusting time	1.35±0.82	1.83±0.54	4.37	0.0001	{-0.71: -0.27}
Choose the corresponding clock	2.31±0.90	2.88±0.35	5.54	0.0001	{-0.78: -0.37}
Directions and Relations	4.20±1.13	4.75±0.48	4.13	0.0001	{-.810: -0.29}
Total Visuo-spatial abilities	7.85±2.21	9.46±0.87	6.32	0.0001	{-2.11: -1.11}
Comparison	3.87±0.34	3.96±0.20	1.94	.054	{-0.17:- 0.002}
Coloring identical shapes	2.64±0.80	3.28±0.66	5.33	0.0001	{-0.89:-0.41}
Circle identical numbers	4.51±0.86	4.89±0.34	3.89	0.0001	{-0.58-:-0.19}
Total visual Discrimination	11.02±1.58	12.14±0.78	5.79	0.0001	{-1.50: -0.74}
Total Math Cog. Skills	54.20±12.35	66.62±4.20	8.96	0.0001	{-15.16: -9.68}

Table (4) shows that students with dyscalculia (poor Math achievers) had significantly lower mean scores of the total studied Math cognitive skills and their sub-items than students with good Math achievement.

Table 5: Distribution of students with Dyscalculia and those with normal Math achievement according to the Cut Off value of MCADB Battery

Dyscalculia	Poor Achiever (N=55)		Good & average Achievers (N=314)		Cut Off
	< Cut off (TP)	> Cut off (FN)	< Cut off (FP)	> Cut off (TN)	
Total Text Reading Comprehension	**30**	**25**	**33**	**281**	**9**
Audio-visual correspondence	**24**	**31**	**26**	**288**	**1.7**
Problem solving	**36**	**19**	**49**	**265**	**1.3**
Line of symmetry	**9**	**46**	**17**	**297**	**2**
Complete in the same pattern	**33**	**22**	**48**	**266**	**2.1**
Total whole-part relationship	**26**	**29**	**46**	**268**	**28.6**
Coloring geometric shapes	**22**	**33**	**37**	**277**	**14.2**
Form the greatest number	**21**	**34**	**56**	**258**	**3.5**
Select the greatest number	**24**	**31**	**26**	**288**	**3.6**
Select the representative fraction	**35**	**20**	**43**	**271**	**3.1**
Select the correct number	**40**	**15**	**65**	**249**	**0**
Total Visuo-spatial abilities	**27**	**28**	**55**	**259**	**8.1**
Adjusting the time	**42**	**13**	**72**	**242**	**1.1**
Choose the corresponding clock shape	**34**	**21**	**55**	**259**	**2.1**
Directions and Relations	**11**	**44**	**13**	**301**	**3.9**
Total visual Discrimination	**14**	**41**	**25**	**289**	**11**
Comparisons	**11**	**44**	**24**	**290**	**3.6**
Coloring identical shapes	**32**	**23**	**52**	**262**	**2.3**
Circle identical numbers	**27**	**28**	**36**	**278**	**4.5**
Total Math Cog. Skills	**27**	**28**	**49**	**265**	**58.8**

Table 6 : Diagnostic Validity of Math Cognitive Abilities Diagnostic Battery (MCADB): sensitivity, specificity, positive and negative predictive values:

Math cog. skill	Sensitivity	Specificity	PPV	NPV
Total MCADB	49.1%	84.4%	35.5%	90.4%
Text Reading comp.	54.5%	89.5%	47.6%	91.8%
Whole-part relationship	47.3%	85.4%	36.1%	90.2%
Visuo-spatial abilities	49.1%	82.5%	32.9%	90.2%
Visual discrim.	25.5%	92%	35.9%	87.6%

Table 7: Multiple Correlation Coefficient test:

Math Cog. Skill Battery	Correlation Coefficient	Relative efficiency			Coefficient of Determination		Coefficient of Multiple Correlation		F-Ratio (Regression)	
	Math Achievement Test	P.R	R^2	Efficiency	Each item	Total	Each item	Total	Each item	Total
Text Reading Compreh.	0.31	0.18	0.34	5.85	**36%**	**36.18**	60%	60%	32.02	31.88
Whole part Relationship	0.48	0.28	0.31	15.16	**33%**		58%		22.31	
Visuo-spatial abilities	0.40	0.0015	0.36	0.0004	**17.02%**		41%		15.45	
Visual Discrimination	0.52	0.28	0.31	15.17	**28.15**		53.06 %		29.52	

Number of Cases (230); PROB > (0.001)

Multiple correlations between mean score of math achievement test as a dependent variable and mean score of total and different sub-items of cognitive skill battery as independent variables revealed that 36.18% of variation in math achievement scores is attributed to these tested cognitive skills collectively, with text reading comprehension having the highest contribution (36%) of these sub-items.

IV} Reassessment of the trainee after cognitive rehabilitation:

Table 8: Reassessment of Math cognitive skills of the Trainee sample (N=13):

Math Cog. Skills	Pre-Training	Post-Training	T	P. Value	CI 95%
	Mean ± Std	Mean ± Std			
Total Text Reading Comprehension	8.62 ±1.98	11.62 ±1.33	4.92	0.00	{1.67:4.33}
Audio-visual correspondence	2.31 ±0.75	3.08 ±1.19	2.03	0.065	{-0.055:1.59}
Problem solving	2.69 ±0.48	2.85 ±0.38	1.00	0.337	{-0.181:0.49}
Line of symmetry	2.15 ±0.99	2.92 ±0.28	2.74	0.018	{0.16:1.38}
Complete in the same pattern	1.46 ±1.33	2.77 ±0.83	3.58	0.004	{0.513:2.10}
Total Whole-Part relationship	29.15 ±5.61	33.62 ±4.15	3.50	0.004	{1.69:7.24}
Coloring geometric shapes	17.85 ±2.34	18.31 ±3.40	0.71	0.49	{-0.95:1.87}
Form the greatest number	3.92 ±1.71	4.62 ±01.12	1.90	0.082	{-0.103:1.49}
Select the greatest number	3.54 ±1.39	4.77 ±0.60	2.89	0.014	{0.30: 2.16}
Select the representative fraction	3.08 ±1.38	4.77 ±0.44	4.43	0.001	{0.86:2.53}
Select the correct number	0.77 ±0.73	1.15 ±0.38	2.13	0.054	{-0.01:0.78}
Total Visuo-Spatial abilities	8.31 ±1.49	9.15 ±1.14	1.47	0.17	{-0.41:2.10}
Adjusting time	1.54 ±0.66	1.92 ±0.28	1.81	0.096	{-0.079:0.85}
Choose the corresponding clock	2.62 ±0.65	2.92 ±0.28	1.48	0.16	{-0.15:0.76}
Directions and Relations	4.15 ±1.07	4.31 ±0.75	0.46	0.66	{-0.58:0.89}
Total visual discrimination	11.38 ±1.04	12.38 ±0.79	2.45	0.031	{0.11:1.89}
Comparisons	3.85 ±0.56	3.92 ±0.28	0.433	0.673	{-0.310:0.46}
Coloring identical shapes	2.77 ±0.60	3.46 ±0.66	2.92	0.013	{0.176:1.209}
Circle identical numbers	4.77 ±0.60	5.00 ±0.00	1.39	0.190	{-0.131:0.59}
Total Math Cog. Skills	61.92 ± 4.99	66.77 ± 4.99	3.69	0.003	{1.98:7.71}

Reassessment of Math Cognitive skills of the trainee sample revealed increase in all studied Math cognitive skills after training and this increase was statistically significant in total score and most studied skills.

Table 9: Reassessment of Math achievement level of the trainee sample (N=13):

Dyscalculia	Pre-Training	Post-Training	T	P . Value	CI 95%
	Mean ± Std	Mean ± Std			
First question	2.00±1.08	3.92±0.28	7.27	0.000	{2.50:1.35}
Second question	1.92±1.38	3.77±0.60	4.10	0.001	{2.83:0.86}
Third question	1.77±1.35	4.46±0.63	6.76	0.000	{3.56:1.82}
Fourth question	2.65±1.68	5.62±0.77	6.52	0.000	{3.95:1.97}
Fifth question	1.96±0.80	3.23±0.73	4.12	0.001	{1.94:0.60}
Sixth question	1.38±0.79	2.00±0.00	2.79	0.016	{1.10:0.14}
Total	11.69±3.68	22.96±1.66	10.34	0.000	{13.64:8.89}

Reassessment of Math achievement level of the trainee sample after training revealed significant increase in the total and all studied sub-skills.

In conclusion, dyscalculia is multifactorial and may result from failure of interaction in many cognitive skills. Improvements in grasping early math facts may provide the foundation necessary for later

proficiency in math. Further studies are needed to determine the actual size of the problem among students in primary schools as early detection and rehabilitation of these patients may help in management of the problem. More facilities and awareness about the problem of dyscalculia is needed as the training and rehabilitation of these patients is possible.

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A Case Study on Cognitive Behavioral Intervention of Widowed Elderly Woman

Qin An
School of Humanities and Social Sciences
Beijing Institute of Technology
Beijing, China
anqin@bit.edu.cn

Abstract *The study has investigated the effect of Cognitive Behavioral Therapy applied to the case work of a widowed elderly woman. The Client was the widowed elderly woman in a community of Beijing. She had many bereavement experiences. Her negative emotion came from some irrational beliefs such as her own destiny was unfortunate, which caused her relatives die, and It is meaningless to live because of old age. At the same time she was lack of constructive action in real life to promote happiness. According to Cognitive Behavioral Therapy model, 8 counseling sessions were implemented. The effect was evaluated by interviews before and after the intervention. The effect of Cognitive Behavioral Therapy for widowed elderly woman was proved, and its application advantages in China are discussed.*

Keywords *Cognitive Behavioral Therapy, widowed elderly woman, case study*

I. INTRODUCTION

The World Health Organization proposed that health was a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. The main tasks for aged service were solving pensions, improving medical conditions and establishing the old-age nursing system in China in the 20th century. In the 21st century, the needs of mental health for aged have been emerging with the great progress of material conditions[1]. How to provide social services scientifically to meet the spiritual demand of the elderly has become a problem worth exploring in the field of social work practice.

The death of spouse is the most stressful occurrence in the mental health of the elderly. The aging of an individual is a process of loss in itself, so the death of spouse is the most serious threat for an elderly. The death of spouse always means the loss of important object, which leads to the interruption of psychological contact between the client and his attachment figure. It makes the client experience strong sense of abandonment and helplessness, and sometimes ascribes the spouse's death to his own mistake. Furthermore some negative emotions such as sadness, anger and guilt are aroused. Chen Huafeng and other scholars used tracing data about the elderly health relating factors in China and found that marital status had a significant impact on the emotions of the elderly[2]. The negative emotions of the widowed elderly were obvious significantly, and their prominent manifestations were pessimism, anxiety, depression, loneliness, emptiness.

Because the average life expectancy of women is longer than that of men, older women are more likely to experience widowhood[3]. According to a survey of 292 elderly who had been widowed for one year or more, it suggested that the subjective well-being of widowed elderly women was significantly lower than that of widowed elderly men[4]. The above result was related to women's delicate emotion and strong dependence. By contrast, women devote more time and energy to their spouses and participate less in social interaction. Another study found that self-efficacy and social support were important factors affecting the subjective well-being of widowed elderly[5]. Sun Shujuan and Chen Jianhua conducted telephone counseling for a widowed elderly woman to help the client face reality and rebuild confidence by allowing her to express emotions, adjust cognition and behavior[6]. Therefore, it is of great significance to explore case intervention strategies to promote the mental health of widowed elderly women.

Rational Emotion Therapy is a kind of Cognitive Behavior Therapy, and its basic theory is the ABC theory about emotional distress. The emotional consequences are caused not by an activating event, but by false beliefs, that is, unreasonable interpretation and evaluation of events. To

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change cognition is the key to change emotional distress. In this study, the widowed elderly woman in a certain community of Beijing was selected as the client. Based on Cognitive Behavior Therapy model, an effective case intervention scheme was designed for case service. The study could also provide reference for related services.

II. METHOD

A. Participant

The client was 81 years old woman who lived in a community of Beijing. Her husband died when she was 72 years old. She was in good health except for mild cataracts. At that time, the client lived alone and took care of herself. The client appeared to be calm. She was not good at emotional expression.

B. Procedure

The action research method was adopted. The whole case intervention process can be divided into five stages: establishing professional relationship, collecting data and assessment, formulating goal and intervention plan, carrying out intervention, termination and evaluating.

III. RESULTS

According to Cognitive Behavioral Therapy model, 8 sessions were designed. The first four sessions aimed at building relationships, assessment, setting goals and plans. The last four sessions were focused on emotional, cognitive and behavioral intervention. The effect was evaluated by interviews before and after the case intervention.

A. Intake and establishing relationship

Social worker was introduced by community staff to visit the client's home. The social worker explained the purpose of the case work and clarified the client's concerns and questions.

The case intervention began with the informed consent of the client. The first contact between the social worker and the client was smooth, and the client showed strong willingness to establish professional relationship for help. The client had better material living conditions and harmonious family relations. She had four daughters and one son, and all of them raised their own children. In addition to the 300-yuan community old-age allowance per month, the client was supported by her son and daughters. Her average living cost was enough to keep her standard of living.

B. Data collection and assessment

The mental state and psychological need of the client were assessed by interviews and observation. Her emotional, cognitive and behavioral changes caused by bereavement were the focus of assessment.

1)The growth experience of the client

The client was very alienated from her parents in her childhood. She lost her father at the age of 9 and lost her mother at the age of 11. After the death of her parents, the client and her younger brother were brought up by her grandmother. Later her grandmother and brother died one after another. The client was impressed by a series of setbacks and traumatic experiences. The social worker listened to the client's life course and gave emotional support.

2)The bereavement experience of the client

As the client became more and more trusting the social worker, she began to tell about her bereavement. She married at the age of 17 but her husband's family did not accept her. Her husband suffered from cerebral embolism after his retirement, leading to hemiplegia. The client had cared for her husband for many years until he passed away ten years ago. The third daughter died of liver cancer and her granddaughter died of brain cancer. Compared with her husband's death, the client's grief was more evident in the face of the death of her affectionate daughter and granddaughter. The interruption of their emotional connection made the client unable to bear the shock. This time the client had a good chance to give vent to her negative emotions depressed many years.

3)Assessment

Social worker listened to the client's bereavement and expressed empathetic understanding. The client seemed to be strong and optimistic. In fact she evaded the grief of her loss repressed for many years. She had some unreasonable belief about herself and her destiny. Although the material condition of the client was good, the spiritual demand was not satisfied. She was not good at discovering the positive resources around her, and the subjective well-being was low relatively.

C. Development of work goal and plan

Based on the overall analysis of the situation, the social

worker and the client discussed together to formulated the work goal and the detailed plan to enhance the subjective well-being.

1)Short-term goal

- Relieve sadness and release a backlog of negative emotions including helpless, self-blame and anger.
- Clarify false irrational beliefs instead with positive thinking.

2)Long-term goal

- Encourage full self-expression, strengthen positive emotions and promote constructive behavior.
- Excavate advantage resource, enhance her passion for life and improve happiness experience.

3)Work plan

The intervention plan was focused on three aspects, including alleviating grief, correcting irrational beliefs and increasing construction behavior. The specific goal, plan and intervention strategies were listed in the table.

TABLE1. Case intervention plan for widowed elderly woman

Session	Goal	Plan	Technique/Skill
1	Intake	1.Make contact with the client	Home visit
		2.Informed consent and arrangement setting	Clarification
2	Collecting data	1.Know about environment and relationships of the client	Attending
		2.Listen to the life experience of the client	Listening
3	Assessment	1.Listen to the bereavement experiences of the client	Listening
		2.Assessment of the current mood of the client	Empathy
4	Goal and plan	1.Discuss the goal with the client	Perception checking
		2.Formulate the intervention scheme	Focusing
5	Emotional support	1.Encourage the client to express herself fully	Emotional reflection
		2.Give the client emotional support	Experience reflection
6	Cognitive correct	1.Help the client aware the influence of irrational belief	Challenge
		2.Guide the client to replace with positive thinking	Dispute
7	Behavioral change	1.Promote the client do some constructive action	Reinforcement
		2.Help the client discover the joys of life	Role-playing
8	Termination	1.Consolidate the positive changes made by the client	Positive regard
		2.Deal with the separation emotion	Emotional support

D. Implement intervention

Social workers provide services around three main aspects: emotion, cognition and behavior.

1)Grieving counseling

The most important thing was to create a safe conversation environment for the client. The social worker encouraged the client to express her feelings of loss. It was very important for the client to vent the negative emotion accumulated over the years. To express the missing of the dead and gain emotional support were very necessary.

2)Change unreasonable cognition

In the conversation, the social worker found that the client had some unreasonable beliefs that were too general and extremely bad. By questioning and arguing with the client on unreasonable beliefs, the original thinking mode of the client had been changing gradually. Then the social worker encouraged the client to replace with more positive thinking.

For example, one of her unreasonable beliefs was “My own destiny was unfortunate, which caused my relatives die”. The dialogue was as follow.

The client: Many relatives passed away in my lifetime. My mother-in-law pointed at my face and scolded me many times. She thought I was not clean and my fate was bad, which brought bad luck to my relatives!

Social worker: Because your mother-in-law said that at the time, do you think so?

The client: At that time, a lot of people were talking bad about me behind my back. Didn't think I didn't know!

Social worker: Did many people think so? How many

could you point out?

The client: That was a kind of feeling. I was really not sure how many people there were!

Social worker: Was there a lot of people really? Or just did you think so?

The client: My mother-in-law was very harsh. Our neighbors were always on my side and speak for me.

Social worker: So, you accepted her idea and imposed on yourself. You could only live with guilt and self-reproach. How could you live happily?

3)Promote constructive behavior

The social worker continued to affirm the positive feelings of the client. The client began to attach importance to the daily activities bit by bit, and her subjective well-being had a certain improvement in the progress of behavioral change. When the social worker found out that the client avoided getting along with her family, the dialogue was as follow.

Social worker: Did your son come to see you lately?

The client: He and my grandson visited me yesterday afternoon. I didn't leave them for dinner.

Social worker: Why not let them stay longer?

The client: My grandson was so naughty that I hated him to mess up my room. Anyway, they were too busy.

Social worker: Maybe you'll be happier if you talk more together.

E. Termination and evaluation

At the end stage, the social worker reconfirmed the progress made by the client and helped the client discover the resources around her. The social worker handled the separate emotion and informed the client of the follow-up arrangement.

1)Deal with the separation emotion

The social worker invited the client to express his feelings of closing professional relationship, in order to reduce the negative impact on the client. The social worker encouraged the client to keep positive life attitude.

2)Evaluation

Through the five stages of work, the social worker helped the client change her cognitive, emotional, and behavioral outcomes according to cognitive behavioral therapy model. They completed the service goal. The effect was evaluated by interview before and after the case intervention.

a)Cognitive aspects

There were some negative cognition in the past, such as " My own destiny was unfortunate, which caused my relatives die", "I'm useless now, I can't help the children", "It is meaningless to live because of old age, it will only bring trouble to children". In an atmosphere of security and trust, the social worker argued with the client about these irrational beliefs and encouraged her to think positively about herself. The client felt that "I am also very important, although my son sometimes wrangles with me, but he still value me".

b)Emotional and behavioral aspects

The client was very depressed before the intervention. She took an evasive attitude toward bereavement experience. The client had negative emotions and just not showed in front of others. After the intervention, the client felt more calm and relieved, at same time she engaged in more social contact. According to the client's neighbor, "She has become much better recently, not often curses others, and always smiles silently. Sometimes she will come to me, but she would not take the initiative before".

IV. Discussion

According to Cognitive Behavioral Therapy model, 8 sessions were designed to improve her cognitive, emotional and behavioral outcomes. The study have shown that such interventions are effective.

Establishing good professional relationship with the client is the basis of case service. From the professional perspective, widowed elderly need professional help. It is necessary for social worker providing the client respect and support through verbal and non-verbal communication especially in the initial stage of case service. The social worker must accept the client's negative emotions and thoughts in an empathetic attitude. The good professional relationship is the key to guide the client to awareness the contradiction between self-concept and self-experience.

In the process of carrying out case service for widowed

elderly woman, grief counseling, changing unreasonable beliefs and strengthening constructive behavior are the key points of intervention. What the most important root of the psychological distress of the client was that she did not really come out of the mourning of bereavement, and the superposition effect with the death of her spouse affected the emotional experience together. For older people with traditional ideas, it is challenging for social worker to discuss the unreasonable beliefs with her. It is important to make the client realize that the original intention of social worker is to help the client to solve the problem, so that the client would give up the defense to accept the new way of thinking. The social worker should guide the client to pay attention to the present life, instead of always immersing in the memory of the past.

Cognitive Behavioral Therapy applied in social work practice has some obvious advantages. First of all, Cognitive Behavioral Therapy focus on the current cognitive distortion and inappropriate behavior. Some initial changes would motivate client keep trying, which is particularly important in the field of social work. Secondly, Cognitive Behavioral Therapy model has specific goal and clear operating procedures, which is relatively easy to implement in the current training level of the social worker. Lastly, Cognitive Behavioral Therapy is favored by social workers for its short course of intervention, which is correspond with the shortage of social worker professionals. Therefore, Cognitive Behavior Therapy is an effective intervention model in social work practice in China.

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STUDY OF SELF CONCEPT AS A PREDICTOR OF SUICIDAL IDEATION AMONG ENGINEERING COLLEGE STUDENTS

Amar Damle*
Asst. Professor (Dept of Psychology)
Smt.Binzani Mahila Mahavidyalaya,
Mahal, Nagpur-32
Email: amardamle0@gmail.com

Sneha Dabir**
PhD Scholar
PGTD Campus, Dept. of Psychology,
RTMNagpur University, Nagpur
Email: damlesneha@yahoo.com

ABSTRACT:

With rising expectations, and reduced demand for Engineering Graduate, there is a lot of stress and anxiety among Indian students who are pursuing engineering. The entry in the professional colleges is not easy and economic. Even after the entry, the problems in day-to- day education are stressful. Academic reasons like too extended syllabus, the difficulty of the curriculum, studying hours, rigid authoritative and non-encouraging faculty, and Personal factors like Level of Intelligence, Personality, Self-concept, Emotional Intelligence, Achievement Motivation Levels, and Environmental factors such as peer pressure, tough competition, home sickness, financial issues, uncertainty about future, are some of them. Higher levels of stress may cause because, the ability and expectation do not match. Cumulatively, this may lead to increased suicidal ideation among engineering college students.

The suicidal tendency would depend on many factors of personality; this behaviour begins with emotional turmoil, and ideation. Another factor playing an important role during this phase is low Self-Concept, which leads to isolation, negative thoughts, and depression. Opposite to this, higher self-concept is associated with high levels of motivation, a greater emotional control, lesser levels of anxiety and capacity to cope with internal and external stress. The Engineering students are at high risk, with increased stress about future. The present research was aimed at studying the Self-Concept as predictor of Suicidal Ideation among the Engineering Colleges of Nagpur region. Sample size comprised of 450 undergraduate students of engineering colleges from different branches of Nagpur Region. This being a co-relational study, the hypotheses were tested using Pearson's Product Moment Correlation 'r'. Two tests were used for the research; Self-Concept Questionnaire (SCQ) standardized by Saraswat Raj Kumar (1984), and Suicide Probability Scale (SPS) prepared by John G. Cull & Wayne S. Gill (1989). The outcome of the study revealed that: There is a strong and negative correlation between Self-Concept and Suicidal Ideation among Engineering College Students **(r = -0.753).** Indicating that lower the levels of Self-Concept, higher are the students at risk of suicidal ideation.

Out of the various self-concept areas, the Moral Self-Concept **(r= -0.92)**, Social Self-Concept **(r= -0.94)**, and Temperamental Self-Concept **(r= -0.96)** have a negative and very strong relationship with the Suicidal Ideation of students. However, the Intellectual Self-Concept **(r= -0.34)**, Educational Self-Concept **(r= -0.32)**, and Physical Self-Concept **(r= -0.29)** have a weak correlation. This indicates that even if the Physical, Educational, and Intellectual development of self-concept is not strong, risk of suicidal ideation is low, but development of the Moral, Social, and Temperamental self-concept is very vital even in the students of higher professional and technical education like Engineering. This signifies the importance and role of parents, and teachers in the social and moral development of students, at an early stage of life.

Key Words: Self-Concept, Suicidal Ideation, Engineering Students, Co-relational Study.

INTRODUCTION:

Engineering students are a special group of people that are enduring a critical transitory period in which they are moving from Non-technical to Technical Education, making many major life decisions. Prevalence of depression among young adults seems to be increasing annually as mentioned by Kessler RC, Walters EE. (1998) [12]. This can lead to impairment of professional, academic, and social skills. Henderson P, Johnson MH (2002) [8] identified that Academic burden can be a source of depression. In most of the cases, the

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first onset of lifetime mental disorders is in this stage where the students are of the age 18-23. This is a crucial age of turmoil and change, where the students find themselves fixed with major decisions of life. The primary aim of the present study was to study the relationship of Self-Concept & Suicidal Ideation amongst engineering college students.

According to a WHO report, every year in India more than 14,000 students commit suicide. It is surprising to note that 70% of students are under stress. The youngsters can also be the victim of stress and it is one of the most potential causes of students' suicidal deaths. No doubt, it has become a worldwide health epidemic (Mallet, et al., 2012) [17]. There can be many reasons for suicidal ideation, suicidal attempts and suicidal deaths. The personality and its related aspects like Self-Concept are among the potential determinants of suicide and suicidality.

SELF-CONCEPT:

Carl Rogers (1959,1961) [24] studied Self-Concept and identified three different components;

a. Self-image: How one views oneself.
b. Self-Esteem: How much value one places on himself.
c. Ideal-Self: What one wishes himself to be really like (Ideal self)

Self-Concept can be defined as the sum total of a person's perceptions about his /her physical, social, temperamental and academic competence. This includes the beliefs, convictions, moral and values the person holds. It also comprises of his/her worth of making own decisions. In fact, Self-Concept comprises of various factors including self-esteem, self-worth, ego, and self-efficacy.

The Self-Concept is the individual's view, feeling, and thinking about himself in the various aspects as given by Roger's. The six dimensions are given below:

1. **Physical Self-Concept:** Individuals view of their body, health, physical appearance and strength.
2. **Social Self-Concept:** Individuals sense of worth in social interactions
3. **Temperamental Self-Concept:** Individuals view of their prevailing emotional state or predominance of a particular kind of emotional action.
4. **Educational Self-Concept:** Individuals view of themselves in relation to school, teachers and extracurricular activities.
5. **Moral Self-Concept:** Individuals estimation of their moral worth, right and wrong activities.
6. **Intellectual Self-Concept:** Individuals perception about his/her intellect

A person who has an adequate Self-Concept is likely to follow the problem solving approach and tends to be spontaneous, creative and original. He normally trusts himself and is free to accept others without any negative feelings. Inversely, a person with distorted or inadequate Self-Concept is unable to overcome with the problems of life. He views himself as the most unwanted, unaccepted, incompetent, more anxious and less adjusted person. This individual is less effective in groups and develops inferiority complex, he is also likely to exhibit a large extent of anxiety in his behaviour. Due to poor Self-Concepts, such people have lack of confidence and leads to academic failures. Personality of an individual is moulded by many factors like; socialization, training, life experiences, social perception and education. The structure in which person acquires education also have strong impact on the development of the individual's personality. Self-Concept can also be referred to Self-Esteem that reflects a person's overall subjective emotional evaluation of his or her own worth. It is a judgment of oneself as well as an attitude towards the self. Self-esteem encompasses beliefs about oneself, as well as emotional states, such as triumph, despair, pride, and shame (Hewitt, 2009) [9]. Self-esteem is an attractive social psychological construct because researchers have conceptualized it as an influential predictor of certain outcomes, such as academic achievement (Yagual, 2015; Orth & Robbins, 2014). [28]

In this study, the investigator has tried to understand whether Self-concept affects the Suicidal Ideation of Engineering College students and to what extent. It also studies the various sub-factors of Self Concept that affect the suicidal Ideation of the students.

SUICIDAL IDEATION:

Suicidal behaviour is a general term which includes Emotional Turmoil, suicidal ideation, suicide planning, and suicide attempt that may lead to suicide. As regards suicidal ideation, it may be defined as the thoughts of suicide that can

range in severity from a vague wish to be dead to active suicidal ideation with a specific plan and intent. It is a potential precursor to later attempted and completed suicide (Brent, Johnson, Bartle et al., 1993). [4] People who are emotionally disturbed tend to often feel that life isn't worth living, this leads to ideation. The intensity ranges from feeble multiple thoughts to concrete, well thought-out plans for killing oneself, or a complete determination of self-destruction or self-harm. Favazza (1989) [29] states that suicidal ideation is a useful indicator of identifying at population level, its prevalence in the suicide rates among adolescents.

It is characterized as a personality disorder or with the character of emotional blackmail (Ahmad et al. 2014). [2] Due attention must be given to these suicidal ideation thoughts by the parents, and other related person, immediately with the first symptom. These symptoms can be threatening to hurt him-self or discussions about suicide, looking for ways to commit suicide e.g. seeking access to pills, weapons, or other means, deliberately hurting him-self i.e. by scratching, cutting, or burning. talking or writing about death, dying or suicide, hopelessness, rage, anger, seeking revenge, acting recklessly or engaging in risky activities, seemingly without thinking, feeling trapped. These people would always think like there's no way out, increasing alcohol or drug use, withdrawing from friends, family or society, anxiety, agitation, changes in sleep or appetite, dramatic changes in mood, no reason for living, and no sense of purpose in life etc. (Silva et al.,2014 [26]; Schweitzer et al., 1995)[30]

Suicidal Ideation seems to have associations with many psychiatric disorders, life events, and family events, all of which may increase the risk of suicidal ideation. Nevertheless, it is generally associated with depression. However, every individual who attempts not necessarily succeeds. The process of suicide comprises of various stages i.e. ideation, contemplation, planning and preparation, attempt, and consummation. In-fact, Suicide ideators are defined as those who consider ending their lives, but have not yet fully implemented a suicide plan or performed any potentially lethal act to destroy themselves. Suicide is a unique epidemiological characteristic, which makes it an important public concern. Frequent incidences of Suicide among Engineering College students has become a serious public health problem, and the rise in the student suicide rate has led to an increasing number of studies on the factors that explain suicidal behaviour of these youngsters.

Suicidal Ideation among students can be defined as the wish, thought or desires to take one's own life violently due to a variety of internal and external causes, such as personality, undesirable emotions and school life and many more. (O'Carroll, P.W.; Berman et al. 1996) [18]

Information on Suicidal Ideation of students is helpful in predicting suicide amongst a particular group and can act as a guide for prevention of suicide.

According to AICTE's report, the total intake for Engineering in 2014-15 was 17.2 Lakh, the highest in 20 years, but has fallen down in 2017-18 to 14.9 Lakh. In-fact, in the four the enrolments have drastically gone down from 8.8 Lakh in 2014-15 to 7.9 Lakh in 2016-17. This is an indicator of tremendous competition the young students are facing in today, and the downfall perhaps shows the uncertainty among the general population about securing a job.

This unlimited pressure on these youngsters from parents, society & self, is developed at this stage. Not necessarily, everyone is able to manage this pressure. Although the personality seem to be developed at early age, but the overall grooming happens during the college years. Obviously, reasons can be attributed for increase in suicidal rates of college students such as unwanted responsibility, family pressure, low Self-Concept, parenting styles, emotional intelligence etc. are few of them. There are changes in the personality of students after higher secondary education to graduation level (Hurlock E.B, 2004). [10] He further states that suicide or attempts of suicide are becoming increasingly common among today's youths, because of negative personality changes.

Hence, this study of Self-Concept and Suicidal Ideation is relevant in the present scenario, where the young, dynamic, and working population in India are committing suicides.

REVIEW OF LITERATURE:

To understand the various aspects related to the Suicidal Ideation and Self-Concept of engineering student's review of literature was done. Those individuals who have a Maladjusted Background, Low Self-Concept, they are emotionally disturbed, and have poor Social Achievement levels cannot contribute in the society. As per National Crime Records Bureau

(2015), Maharashtra has the highest number of student's suicide across India, which is definitely a matter of concern. Furthermore, negative self-evaluations were associated with increased suicidal tendencies, number of suicidal gestures, seriousness of suicidal intent, and medical lethality of the attempt in a study of 64 adolescent psychiatric inpatients. (Robbins and Alessi, 1985). [22]

Brent et al., (1986) [4] studied that the presence and severity of suicidal ideation in adolescents with affective disorders has been related to low self esteem. Low self–esteem has been found to be important in the prediction of suicidal ideation among high school students (Dukes and Lorch, 1989). [31]

Larson and Chastain (1990) [16] defined the concept of self-concealment as, "predisposition to actively conceal from others personal information that one perceives as distressing or negative". Among college students, greater level of self-concealment was found to be correlated significantly to self-reported anxiety, emotional distress, depression, shyness, and low self-esteem. Low self-esteem is also implicated in suicide attempts made by adolescents (Kienhorst et al., 1990). [15]

Brown and Dutton (1995) [6] conducted a study and concluded that lower self-respect leads to an over-generalization of inference, of rejection and failure. A higher level of self-respect seems as an important factor permit a person to preserve a healthy and confident attitude in his or her negative conditions.

For developing self-concept, family is equally responsible, as it develops at an early stage of life. Pillay and Wassenaar (1997) [20] reported that having conflicting relationship between parents and an adolescent shows a more occurrence of self-destructive behaviour. Further research done by Wagner (2003) [32] reported that family disorganization and disturbance items as an antecedent to suicide and suicidal behaviour. Stressed relationships among parents and youngsters have been recognized as causing substantial expanses of tension in youths.

Researchers say that, high expectation to secure a seat in the prestigious institutes is one of the main reasons for driving a student to the edge. They also blame the increasing communication gap between children and parents, which adds more pressure to the students. No single reason could be attributed to the question of students' suicide. 'The varied reasons can be pressure, competition, societal expectations and anxiety, possibly a lot of emotional disturbance, which is high among the young', says Dr Bhatia, Head of psychiatry department at St Stephen's Hospital. Bhatia says one must try to understand suicide in "different dimensions".

Thus, lower self-concept appears to be directly related to suicidal tendencies, including both suicidal ideation and suicide attempts in students. All of these reviews of literature suggest a study to be conducted to understand the relationship between Self-Concept and Suicidal Ideation in Engineering College Students.

OBJECTIVES:

1. To study the Self-Concept of Engineering College Students.
2. To study Suicidal Ideation of Engineering College students.
3. To study the relationship between Self-Concept & Suicidal Ideation.

HYPOTHESES:

H_0: There is no relationship between the Self-Concept and Suicidal Ideation of Engineering College Students.

H_1: There is no significant relationship between the six major areas of self-concept (Physical, Social, Temperamental, Moral, Educational and Intellectual Self-Concept) with the suicidal ideation of Engineering College Students.

METHODOLOGY:

This study was conducted in Nagpur District in Maharashtra, India. Sample comprised of male undergraduate students of engineering colleges from different branches. Purposive sampling was done for the study. Students from 18 years to 22 years of age studying in all academic years were included. Data was collected from July 2016 to November 2018. Sample size comprised of total 500 Male Engineering College students.

TOOLS USED:

1. **Suicide probability scale (SPS)** Constructed and standardized by John G. Cull & Wayne S. Gill [12] was used to assess Suicidal Ideation. The Suicide Probability Scale (SPS) is a crisp, accurate and empirically validated measure of suicide risk in individuals over 13 years of age. The scale is

composed of 36 items that describe particular feelings and behaviours.

2. **The self-concept questionnaire (SCQ)** constructed and standardized by Dr. Raj Kumar Saraswat [25] was used to assess self-concept of the participants. It consists of 48 items and six dimensions. Each item is provided with five alternatives. Test is available in Hindi and English. This test measures six major areas of an individual i.e. Physical, Social, Temperamental, Moral, Educational and Intellectual Self-Concept. High score in this inventory indicates a higher self-concept, while a low score shows low self-concept.

Data thus generated was tabulated, categorized and analysis was done. Suitable statistical analyses i.e. mean, standard deviation was calculated, and the data was treated with Pearson's Product Moment Correlation (r) to understand the extent and direction of the correlation.

RESULTS & DISCUSSION:

The present study was conducted to study the self-concept and suicidal ideation Engineering College Students of Nagpur region. For testing the hypothesis, the data was treated with Pearson's Product Moment Correlation (r) to understand the direction and strength of the correlation. The calculations were done with the help of Microsoft Excel and Data tool-pack was used for statistical analysis. The following results were obtained.

Table No. 1

Pearson's Product Moment correlation **'r'** value for SELF-CONCEPT and SUICIDAL IDEATION of Engineering College Students

Variables	N	Mean	S.D.	"r"
Self Concept	**450**	**170**	**16.16**	**- 0.753**
Suicidal Ideation		**62.6**	**12.88**	

Table No.1 Shows the value of 'r', this 'r' value of - 0.753 indicates that there is negative and strong relationship between the two variables. We can conclude from the statistical analysis that as Lower the Self-Concept, higher will be the Suicidal Ideation.

Hence, H_0 was rejected, that 'there is no relationship between self-concept and suicidal ideation among engineering college students'.

In fact the various researches done worldwide indicate the same, and support the findings. Further to understand the importance of various sub-scales of the self-concept the data was treated again with Pearson's product moment correlation for understanding, which type of self-concept impacts the suicidal ideation.

Table No. 2

Pearson's Product Moment correlation **'r'** value for sub scales of SELF-CONCEPT and SUICIDAL IDEATION of Engineering College Students

Sub Scales of Self-Concept and Suicidal Ideation	N	Mean	S.D.	"r"
Physical Self-Concept	**450**	**22.53**	**6.02**	**-0.29*** **
Suicidal Ideation		62.6	12.886	
Social Self-Concept	**450**	**29.08**	**4.29**	**-0.94***
Suicidal Ideation		62.6	12.886	
Temperamental Self-Concept	**450**	**29.21**	**4.29**	**-0.92***
Suicidal Ideation		62.6	12.886	
Educational Self-Concept	**450**	**23.24**	**5.95**	**-0.32*** **
Suicidal Ideation		62.6	12.886	
Moral Self-Concept	**450**	**30.02**	**5.24**	**-0.92***
Suicidal Ideation		62.6	12.886	
Intellectual Self-Concept	**450**	**22.2**	**6.85**	**-0.34*** **
Suicidal Ideation		62.6	12.886	

***High, **Moderate, ***Low**

Table No.2 Shows the value of 'r'. This 'r' value indicates Low, Moderate and High strength of relationship between various types of Self-Concept and Suicidal Ideation. All the Sub-Factors indicate a negative co-relation with Suicidal Ideation.

Hence, a hypothesis H_1 was also rejected.

The 'r' values of Physical Self-Concept (r= -0.29), the Educational Self-Concept (r= -0.32), and the Intellectual Self-Concept (-0.34) indicates that there is negative and weak correlation between Suicidal Ideation and the three types of self-concept. This indicates that even if the Physical, Educational, and Intellectual development of self-concept is not strong, risk of suicidal ideation is low.

This does not mean that these types of self-concepts are not required but, the 'r' values of

Social Self-Concept (-0.94), Temperamental Self-Concept (-0.92), and Moral Self-Concept (-0.92), indicates a negative and strong relationship with suicidal ideation. This signifies that development of the Moral, Social, and Temperamental self-concept is very vital, even in the students of higher professional and technical education like Engineering.

Actually it helps us to understand the role of parents, and teachers in the social and moral development of students, at an early stage of life.

CONCLUSION:

In the present study, hypothesis No.1 that, 'there is no relationship between self-concept and suicidal ideation among engineering college students' is **rejected** (r= -0.753). This indicates that, there is negative and strong relationship between Self-Concept and Suicidal Ideation among Engineering College students. Higher the Self Concept lower are the chances of Suicidal Ideation and vice-versa.

The probable reason for this result could be identified with the development of Self-Concept at a very early stage of life (Rogers1961). [23] Those students with higher self-concept have a balanced personality, and thereby chances of any self-harm are less.

Moreover, rejection of Hypothesis No 2 indicates that Social Self-Concept (r = -0.94), Temperamental Self-Concept (r = -0.92), and Moral Self-Concept (r = -0.92), have a negative and very strong relationship with suicidal ideation. This is vital for developing a better personality. In-fact higher technical education never talks about the Moralities, the Social angle of technical education, and even the temperament. The present study suggests that the role of parents and teachers in the social and moral development of students is very vital for developing a higher self-concept and a balanced personality. In-fact this study represents that self-concept is a strong predictor of suicidal ideation, and that its study even at the school and college level is very important. Training of Parents and Teachers on how to develop a positive and high self-Concept is essential.

RECOMMENDATIONS & SUGGESTIONS:

The study was limited to a particular region, considering availability of time, & money. Although the sample was statistically large, as compared to the overall Engineering College Students population it is still small. Further study could be done with a spectrum of students from various states. Moreover, the various other traits of Personality, Emotional Intelligence, Perceived Parenting Styles, may be studied to understand the underlined cause of Suicidal Ideation in Engineering College Students.

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Behavioral Study on Gambler's Fallacy in Standardized Test

Ngai Chun Hau
Department of Psychology
University of California, Santa Cruz
Santa Cruz, United States
chngai@ucsc.edu

***Abstract*—In a multiple-choice test, there is a constant fear of getting the same answer three times in a row. Sometimes, we are even willing to alter our erstwhile correct answer to a wrong answer, simply because of the discomfort of seeing a repeating set of answers. The purpose of this experiment is to study how the trend of decisions lowers ones' cognitive ability on the next decision in a classroom setting. This experiment used standardized multiple-choice tests on undergraduates to evaluate the tendency of inferring to previous results. We observed possible occurrences of committing gambler's fallacy.**

Keywords—behavioral economic; rationality; behavioral psychology; gambler's fallacy; decision making

I. INTRODUCTION

Gambler's fallacy is embedded in our daily lives, and a lot of people may have even heard of it. Yet, many people cannot help but subjectively assume a streak of the event is more likely to end (Fisher and Savranevski, 2015). This fallacy is a cognitive preference bias that is significantly stronger in sequences of a binary outcome (Barron and Leider, 2008). In simpler words, subjects assume that previous pattern of events is correlated to future events. In many cases, these events are independent and do not correlate with each other. Additionally, subjects have a tendency of searching for patterns that do not exist. In a lab experiment, the participant is more likely to perceive the chances of getting heads-heads-heads-tails lower than heads-tails-heads-heads although their chances are equally the same (Chen, Moskowitz, and Shen, 2014). Another well-known example of gambler's fallacy is the cognitive impression that a set of consecutive numbers are less likely to win the lottery than a set of random numbers, when in fact, the pattern of numbers does not relate to the probability of winning the lottery. The two sets of numbers are equally likely to win the lottery. Subjects showed mistaken preferences in their cognition of probability. Many experiments have been done regarding gambler's fallacy. DellaVigna shed light on the growing evidence in the field of psychology and economics that patients are deviating from the standard model (2007). Although economics and psychology are two different fields of studies, they work on very similar subjects and explain human behavior in a different framework. Gambler's fallacy is one of the main topics of study in the field of behavioral economics. Experts in economics are interested in consumer's behavior and pattern. Similar to game theory, economists assume individuals will make the optimal decision. In the field of economics, the belief that individuals make the optimal decision based on their interest is identified as the standard model (Thaler and Mullainathan, 2008). In many cases, this model is very useful in predicting future behaviors. Further research in cognition bias generates the question of revising existing theories of the standard classical model (DellaVigna, 2007). Additionally, this misbelief does not limit itself to a casino setting. Under certain circumstances, this misbelief could have enormous consequences on someone else's life. In the case of an asylum judge, the decision to grant or deny asylum has severe consequences (Chen, Moskowitz, and Shen, 2014). It could mean life or death for the applicant. The study carefully controlled the variable of the time gap between cases, judges' mood, case variability, and other confounding variables. From the empirical data, they concluded judges are 2.1% less likely to grant asylum after a streak of two grants (Chen, Moskowitz, and Shen, 2014). Furthermore, Chen, Moskowitz, and Shen found that judges are 1.5% more likely to grant asylum following a denial (2014). Vice versa, applicants are 2.2% more likely to receive an approval when the previously approved application has the same nationality (Chen, Moskowitz, and Shen, 2014). The results showed that even the best-trained judges would commit gambler's fallacy. Although the percentage does not seem significant, judges handle thousands of cases a year. There is a possibility that hundreds of applicants were wrongfully denied. The results displayed a need for revision in the asylum application. Additionally, it showed that gambler's fallacy could have severe consequences if left ignored. On the other hand, an experiment has been done in testing setting. Kiss and Selei studied the likelihood of changing to an answer incorrectly based on the pattern in the previous answers (2013). The experimenter held five sessions with undergraduate students. Their exams were on the subject of international economics. They used a mix of essay questions and multiple-choice questions. The order of the questions was

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carefully manipulated. They changed their pattern of correct answers in different sessions. Although it showed no clear significant effect, students were 1%-2% likely to mark a different answer on a consistent basis when there were more identical answers. The experimenter combined their results with a field study of five exams. They interpreted the results as students are using their previous experiences with multiple-choice questions as a guide and mark a different answer when a streak of answers was discovered. In hopes of revising the experiment, I have replicated the experiment in a similar fashion. Would a more salient pattern of repeating answers when compared to an inconspicuous pattern of repeating answers yield significantly different test performance? In order to test the effect of gambler's fallacy, I have conducted a laboratory experiment on this topic. It is commonly known that multiple choice and true/false questions are used to examine students. Open exams like Suite of Assessment (SAT) are composed of multiple-choice questions, students are subjected to gambler's fallacy. Since questions are split into sections, students are more likely to identify questions in clusters. In that case, multiple-choice and true/false questions are not an unbiased way to test the knowledge of students. The goal of this experiment is to prove that students are more likely to alter their answers to a wrong answer simply because of the arrangement of answers. In order to test the hypothesis, I had set up an experiment to measure the influence of arrangement in a test on students' ability to choose the correct answers. I predicted the pattern of the test does not correlate with the test performance. However, there should be a negative correlation between the pattern of the test and self-reported level of certainty in the likelihood of changing the answers. I assume that the longer the streak, the strong the effect that gambler's fallacy has on students. Since the participants were only given ten minutes to complete the test, participants were unlikely to revise the answers. The results should be an accurate depiction of their true selection.

II. Methods

A. Participants

The participants are forty-six subjects from the University of California, Santa Cruz in a research psychology class with written consent received from participants. They range from 19 to 22 years old with one participant aged 27. The pool of subjects includes thirty females, sixteen males. Twenty-three subjects are assigned to test condition with varying answers. Twenty-five subjects are assigned to test condition of repeating patterns of answer. Since all the subjects were attending the research psychology class, the participants are subjected to demand characteristics.

B. Design

In both conditions, subjects were issued a 10-questions multiple choice test. The answers were limited to A, B, C, and D. All questions and answer options across condition were identical and are in the same order across conditions. The variation of the correct answers on the ten-question psychology test was carefully manipulated. The test was composed of questions that were in the previous research psychology exams and study guides. Condition one was a multiple-choice test with varying answers (A, C, B, A, D, C, B, A, D, A). Condition two was a multiple-choice test with repeating answers (A, C, C, C, C, D, C, C, C, C). Twenty-five participants were assigned to Condition one. The remaining twenty-three participants were assigned to Condition two. Participants were requested to self-report the certainty of each answers and measured based on their performance on the test. The certainty of their answers was rated on a 1-5 Likert scale indicating how likely the subjects are to alternate their answers if they were given the option. One was being uncertain about their answers being correct and five being absolutely certain that their answers were correct. Test performance was rated by the percentage of correct answers.

C. Procedure

The experiment was a derivative of "Gambler's fallacy in the classroom" (Kiss and Selei, 2013). The class participants were greeted by the researcher who informed them that they were being tested on previous research psychology materials. The participants were not told of the experiment before the questionnaires were collected. This guaranteed that subjects were equally unfamiliar with the material. Participants could freely choose any seat and were assigned to different conditions based on their seats. Students sitting on the left side of the room were assigned to Condition one and vice versa. Before starting the experiment, subjects were told the top ten performing subjects would be given a piece of chocolate to ensure participants were motivated to answer the questions to their best ability. After that, Subjects were given ten minutes to finish the test. Participants who finished early were free to walk up to the researcher and hand in their copy. After ten minutes, the first tests were collected. Questionnaires on the certainty of their answers were administered shortly after. Subjects were requested to complete the questionnaires within five minutes. Subjects were not allowed to communicate nor use any material and were carefully monitored within this duration. Participants were not asked to fill in their personal information on the test for this experiment in order to avoid subjects from being uncomfortable with their performances. Subjects were lied to and told that the top ten performing subjects were given a piece of chocolate. This was done in hopes of getting authentic results. Subjects were blinded at this point about the likelihood of changing their answers. Once subjects handed in their tests, subjects in both conditions were asked how confident they are of their answers. It would be immoral to gift subjects chocolate based on their results. After the experiment, all subjects were given a piece of chocolate. The test might cause minor stress or discomfort to subjects. To minimize the discomfort, experimenters have stressed that their result in this test does not affect their grade in their research psychology class right after. Subjects are free to leave any time of the experiment. To eliminate guessing, participants had to get at least thirty percent of their answers correct in order to be recorded as a valid participant.

III. Results

Here is the descriptive statistics of their self-reported certainty and the subjects' performance. Since a small number of subjects participated in this experiment (forty-eight), a detailed statistical analysis was performed.

The observation obtained in secessions were reorganized in a comprehensive analysis. The number of subjects throughout a row remained consistent. Twenty-three subjects were assigned to Condition one. Twenty-five subjects were assigned to Condition two. Since the median did not show any meaningful difference, only the mean and the standard deviation will be focused. Subjects that were given tests with repeating patterns of answers have a slightly higher overall mean than subjects with tests having varying answers in their test performance. Yet, subjects that were given tests with varying answer have a higher standard deviation in their test performance than the other group.

TABLE I shows the different performance-related statistics in various conditions whereas TABLE II shows the different statistics of certainty in various conditions. From these results, I fail to reject the null hypothesis. There is no significant difference in performance when comparing Condition one (M = 69.13, SD = 18.32) than Condition two (M = 74, SD = 13.54), $t(47)$ = -1.05, $p < 0.01$, d = -0.3. Subjects that were given tests with varying answers have a lower mean self-reported certainty point but higher standard deviation than the subjects that were given tests with repeating patterns of answer. Similarly, there is no significant difference in certainty between Condition one (M = 4.36, SD = 0.94) than Condition two (M = 2.76, SD = 1.05), $t(47)$ = -2.03, $p < 0.01$, d =-0.59.

TABLE I. Test Performance

	Mean	***Standard Deviation***
Varying	69.13 %	18.32 %
Repeating	74 %	13.54 %

TABLE II. Certainty

	Mean	***Standard Deviation***
Varying	4.36	0.94
Repeating	2.76	1.05

IV. Discussion

Although the overall results were inconclusive, it seemed like subtle interactions were observed. It was not surprising that repeating answers in a test encourage subjects to guess the correct answer while the addition of test performance did not correlate with the class. As a result of a more salient repeating pattern, participants were capable of capitalizing on recognizing the trend to answers and yielded higher test performance. This tendency of guessing lowers the internal validity of the experiment. Nonetheless, the group with repeating answers have a slightly better average performance but a smaller standard deviation. My prediction would be subjects were more inclined to guess the correct answers rather than making a rational judgment. In a test with repeating patterns of answer, the ability to recognize a trend is rewarded. Hence, the group with repeating answers have a slightly higher mean in test performance than the group with varying answers. Since the effect of guessing is mixed into the experiment, it is hard to distinguish which effect plays a bigger role. On the other hand, subjects in Condition one have a less conspicuous pattern to refer to. Condition one provides a better depiction of their ability. Therefore, Condition one has a lower average performance and greater standard deviation in performance.

The measurement of certainty point showed that subjects with varying answers are more convinced of their answers. When certainty points and test performance is viewed side by side, it showed that low self-reported certainty was associated with better test performance. Although it was not the interest of the experiment, subjects' realization of pattern in their answers was rewarded and generated an overall better performance observed in treatment one. From the results, I conclude that further investigation could be conducted. To improve upon the experiment, third variables such as the effect of guessing and different levels of similarity to the material should be noted and viewed as a control variable. It is possible that subjects that are more familiar with the material are possibly less likely to commit gambler's fallacy. Well prepared subjects are making better decisions since they are inferring their knowledge not the overall pattern of the answers. Test performance should correlate with their class grade. To add to that, longer tests should convince subjects that patterns are more obvious. These improved designs should produce more meaningful results with higher internal validity. Additionally, the sample size should not be limited to students in a certain class at a particular campus. Many experiments about gambler's fallacy particular in standardized test limit their subject pool to undergraduate students. As in Explaining the gambler's fallacy: testing a gestalt explanation versus the "law of small numbers" (2015), subjects are limited to undergraduate students in a certain psychology class. Since gambler's fallacy applies to everyone, the subject pools should not be limited to undergraduate students. The subject pool should be diverse in occupation, age and geographical location in order to better generalize the findings to the population.

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Remediation -Oriented diagnosis of visual processing skills in children with Specific Learning Disability

Wafaa M.A. Farghaly
Department of Neurology and psychiatry- Faculty of Medicine
Assiut University
Assiut-egypt
profwafaa002@gmail.com

Nabiel A. E. Metwally
Department of Neurology and psychiatry- Faculty of Medicine
Azhar University- Assiut
Assiut-egypt
profmetwally003@gmail.com

Taha A. H. Elmestikawy
Department of Psychology - Faculty of Arts
Assiut University
Assiut-egypt
profelmestikawy@gmail.com

Mohamed Sh. Farghaly
Department of Educational PsychologyFaculty of Education
Assiut University Assiut-egypt
proffarghaly@gmail.com

Montasar S.O. Soliman
Department of EducationalPsychology
AssiutUniversity
Assiut-Egypt
profmontasersalah@gmail.com

Yasser Hamed
Department of Neurology and psychiatry- Faculty of Medicine
Azhar University- Assiut
Assiut-Egypt
dryasserhamed22@gmail.com

Islaam Shaaban
Department of Neurology and psychiatry- Faculty of Medicine
Assiut University
Assiut-Egypt
drislamshaban@gmail.com

Amr S. Ramadan
Department of Hearing disability
Faculty of Sciences of Special NeedsBeni-Sueif University
Beni-Sueif-Egypt
amr.sayed@ssn.bsu.edu.eg

Mohammed A. Abdel -Hameed
Department of Neurology and psychiatry Faculty of Medicine
AssiutUniversity
Assiut-Egypt
They_a@yahoo.com

Ali F. El Hadad
Department of Neurology and psychiatry- Faculty of Medicine
Azhar University- Assiut
Assiut-Egypt
Dralihadad30@yahoo.com

Mohamed S. Bakar
Department of ENT
Faculty of Medicine
Assiut University
Assiut-Egypt
drmohamedbakar@hotmail.com

Hamdy N.A. El-Tallawy
Department of Neurology and psychiatry Faculty of Medicine
AssiutUniversity
Assiut-Egypt
profeltellawy@yahoo.com

***Abstract*—Objectives of the work: studying the cognitive profile of students with Specific Learning Disability (SLD) to identify the weakness in their Visual Cognitive Skills (VCS), and rehabilitation using a specifically constructed computerized training program for the enhancement of VCS. Subjects & Methods: The sample was selected from Primary schools; Fourth grade (N=660 students). The study has five stages: (1) Identification of students with SLD. (2) studying the visual cognitive skill profile. (3) Construction of a computerized training battery for the suspected visual cognitive skills. (4) Implementation of the constructed training program. (5) Re-evaluation of visual cognitive skills. Results: The prevalence of SLD among 4th grade public school students were 16.1% (n=106/660), that of dyslexia was 5.3% (n=35/66), prevalence of dysgraphia was 5.8% (n=38/660).), and dyscalculia was 11.4% (n=75/660). Students with SLD have significantly lower scores than their normally achieving peers, on all VCS, particularly those with dyslexia and dysgraphia (P<o.oo1), and this necessitate well-tailored cognitive training. Post training re-evaluation revealed that computer - based cognitive enhancing programs have positive impact on the improvement in post-training visual cognitive abilities as well as post-training achievement scores.**

Conclusion: The computer - based cognitive training programs have significant impact on cognitive skill enhancement.

***Keywords*— visual processing skills, Visual Cognitive Skills, dyslexia, dyscalculia dysgraphia, Specific Learning Disability**

I. Introduction

The term "learning disabilities" describes a group of disorders characterized by inadequate development of specific academic, language, and speech skills. Students with pervasive developmental disabilities are sometimes, not infrequently, described as having learning disabilities [1]

However, consensus has not been reached within and across countries for definitions of Specific Learning Disabilities (SLDs), in general, or those affecting written language acquisition in particular. Regrettably, neither the researchers, nor policy makers and government regulators can agree on definition for various SLDs. The plural suffix of SLDs implies that not all LD are the same. The term specific, in SLDs, has been put intendedly to mean that the student

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struggles with reading, or other academic skill, despite having otherwise normal development [2]. Regardless of definitions used, about 20% of school age children and youth in US probably have some kinds of LD that may interfere with school learning and, at some time, in their education [3,4].Several learning disabilities often occur with reading disability (dyslexia), as writing disabilities (dysgraphia) and/or mathematical disabilities (dyscalculia), but it is unclear whether these learning disabilities share common underlying neurological causes with dyslexia or not [5]. Earlier researches have argued that early remediation can greatly reduce the number of children meeting diagnostic criteria for learning disabilities [6]. So appropriate implementation of scientifically based instruction programs to dyslexic children will make reading possible [7].

II. Methods:

a) Subjects and selection criteria:

All students (N=858) of the 4th grade of the randomly selected geographically distributed 6 schools were interviewed personally except those who were absent during their school visits (N=142) or those who refused to participate in this study (N=56). The rest of the sample (660 students) have completed the test battery and included in the current study among whom we searched for those with SLD.

Inclusion criteria: According to the discrepancy model, students were diagnosed to have SLD when they have:

- Normal intelligence (IQ > 90 using WISC-R).

- Poor achievement according to their performance on Standardized achievement tests of reading, writing and math (obtaining < mean - SD).

-No gross neurological, psychiatric, auditory or visual impairment.

Control group: Age and sex matched peers of students with SLD were chosen from the 4th grade of the same schools. They were included as a control group when they had:

- Normal intelligence: IQ > 90.

- Good achievement on Standardized achievement tests for reading, writing and math (obtaining > mean +SD).

-No gross neurological, psychiatric, auditory or visual impairment

b) Methedology

The current study passed through five stages as follow:

Stage I: Identification of students with SLD according to the discrepancy model through:

1-1 Evaluation of students' intelligence level (IQ) using Wechsler Intelligence Scale for Children (WISC-R).

1-2 Evaluation of students' achievement on:

- **Reading:** by Arabic reading test "ART"[8].

-**Mathematic:** Specifically designed for this study.

-**Writing:** by "Visuo-motor integration test' which was specifically designed for this study in addition to the Spelling subset of ART [8].

After application of these two tests, students with IQ > 90, (N=323), were classified into:

Group I: poor achievers were considered students with SLD (N=106) (having achievement scores < mean -SD).

- Group II: Average achievers (having achievement scores = mean + SD).

-Group III: Good achievers were considered a control group (having achievement scores > mean +SD).

Students with SLD were then subjected to:

I.3 Complete neurological assessment with specific emphasis on soft neurologic signs using Cambridge Neurological inventory.

I.4 Psychological assessments: To assess co-morbid depression using the translated Arabic version of Children Depression Inventory (CDI) [9] .

- Anxiety: using the Arabic version of State-Trait Anxiety Inventory (STAI) [10].

And Attention-Deficit/Hyperactivity Disorder(ADHD) (using Arabic version of Conner's scale, [11] and DSM-V diagnostic criteria.

I.5-Basic Audiological and Ophthalmological assessments by: Basic audiological evaluation (Tympanometry and Pure tone audiometry) and assessment of visual acuity, for exclusion of those with peripheral hearing or visual deficits.

Stage II: Detailed study of the visual cognitive skill profile of students with SLD:

Using the specifically prepared and standardized diagnostic computerized battery of visual cognitive skills that are supposed to contribute mostly in the process of learning[12].

Stage III: Construction of a computerized training program for the suspected visual cognitive skills mostly contributing in the process of leaning;

The domains of the training battery include:

I-Visual closure.

2-Visuo-spatial relation.

3-Visual memory.

4- Whole -part relationship.

5-Visual discrimination.

6- Visual comprehension.

7- Visuo-motor integration.

Stage IV: Implementation of the constructed computerized training program for enhancing cognitive abilities of students

with SLD, each tailored according to the areas of deficits in his/her visual cognitive profile, as diagnosed by the constructed diagnostic standardized battery. Each student attended 30 sessions, 3 sessions per week, each session lasted for 90-120 minutes.

- The training program has many extended levels of training, with no time limits. After mastering one level the student could pass to the next one.
- The training program was presented in an attractive game like manner that helps to capture students, attention and encourage them to acquire knowledge.
- Along the training program, children should be relaxed and encouraged by a supervisor who should make rapport with them to complete the sessions and could benefit from the program

Stage V: Re-valuation

At the end of the training sessions, reassessment of those students was carried to evaluate the impact of the training program on the visual cognitive skill profile using the constructed computerized diagnostic battery, and on academic achievement level of the students using achievement tests in Reading, writing, and Mathematics

C. Statistics:

Collected data was coded and verified prior to computerized data entry. The statistical package for social science (SPSS), version (16) was used for data entry and analysis. Descriptive statistics was calculated (e.g. frequency, percentage, mean and standard deviation (SD). Quantitative continuous data was compared using Z-test in case of comparison (Non-parametric tests). P was considered significant if $P < 0.05$.

RESULTS

Table I shows that the prevalence of SLD was 16.1% (N=106/660), with the highest prevalence for dyscalculia (11.4% N=75/660) followed by dysgraphia (5.8% N=38/660) and then dyslexia (5.3% N=35/660).

Table II illustrates detailed study of visual cognitive skill profile of students with SLD. It was found that students with dyslexia, dysgraphia and dyscalculia had significantly lower mean scores than good achievers on all visual cognitive skills except on visual comprehension, as well as Visuo-motor skills and Visuo-spatial relations in case of dyscalculia where the difference was statistically insignificant.

Re-evaluation of post-training visual cognitive abilities;

a)-For the total trainee sample N=19.

b)-For trainee with dyslexia N=3.

c)-For trainee with dyscalculia N=14.

d)-For trainee with dysgraphia N=8.

Table III: revealed increase of post training mean scores of all visual cognitive skills of the total trainee sample, and the difference between basic and post-training mean scores was statistically significant particularly with the total sample of SLD (n=l9), and was least manifest with those of dyslexia group (N=3).

Table IV: shows that there is a statistically highly significant increase of post training mean scores of achievement tests among students with SLD.

Table 1: Prevalence of SLD and its different types among 4th grade students of Assiut city.

Items	Prevalence of SLD and CI		
	Number	***Prevalence of SLD /100***	***Confidence Interval (CI95%)***
Total SLD	106	16.1 %	***13.4 -19.2***
Dyscalculia	75	11.4 %	***9.1- 14.1***
Dysgraphia	38	5.8 %	***4.2 – 7.9***
Dyslexia	35	5.3 %	***3.4 – 7.4***

N.B. Some students had more than one deficit

Table II: Mean scores of visual cognitive abilities of students with dyslexia, dysgraphia and dyscalculia in comparison to good readers, writers and mathematics respectively.

Visual cognitive abilities	Mean scores of visual cognitive abilities of students with dyslexia, dysgraphia and dyscalculia					
	Students with dyslexia (n=35) Mean+SD	*Control group (n=70) Mean+SD*	*Students with dysgraphia (n=38) Mean+SD*	*Control group (n=58) Mean+SD*	*Students with dyscalculia (n=75) Mean+SD*	*Control group (n=79) Mean+SD*
Total visual closure	21.5+4.2	24.1+1.8***	22.6+3.8	24.2+0.9**	22.8+2.9	24+1.2**
Total spatial relations	20.2+5.1	23+5.4*	20.9+5.2	23.3+4.6*	22.4+4.5	23+4.3
Total visual memory	61.5+11.2	70.5+6.1***	63.3+11.6	70.4+6.7***	63.9+11.5	68.9+6.6**
Total whole part relationships	12.8+5.3	15.9+4.1**	13.3+5.1	16.3+3.9***	14.4+4.2	15.9+3.5*
Total visual discrimination	106.4+16.7	115.9+5.5***	107.4+14.5	116.2+4.4***	112.4+10.6	115.5+4.5*
Visual comprehension	3.5+1.6	3.9+1.3	3.4+1.5	3.8+1.4	3.7+1.3	3.8+1.2
Visual-motor	45.2+18.7	61.4+15.1***	27.9+13.4	71.8+4.7***	57.5+17.2	57.2+17.1
Total visual	270.9+47	314.0+25.8***	257.95+39.2	325.66+17.8***	296.9+35.1	308.3+22.4*

N.B. *p<0.05 **P<0.01 ***P<0.001

Table III: Basic and post training mean scores of visual cognitive abilities of a sample of students with SLD.

Visual cognitive abilities	Basic and post training mean scores of visual cognitive abilities of a sample of students with SLD.							
	Students with SLD Mean scores (total sample n=19)		*Students with dyslexia Mean scores (N=3)*		*Students with dyscalculia Mean scores (N=14)*		*Students with dysgraphia Mean scores (N=8)*	
	Basic	*Post training*	*Basic*	*Post training*	*Basic*	*Post training*	*Basic*	*Post training*
Total visual closure	24+1.2	24.9+0.3***	24.3+0.6	24.7+0.6	24+0.8	24.9+0.3**	24+0.8	24.9+0.4*
Total spatial relations	21.4+1	25.9+1.3***	20+4	25.3+1.5	20.9+6.7	25.9+1.5**	21.6+3.2	26+0.8**
Total visual memory	65.5+2	76.5+3.5***	62.7+5.9	75+3.6*	65.6+8.6	76.3+3.9**	63.9+6.6	76+3.5**
Total whole part relationships	12.8+2.3	18.1+2.1***	10+3.5	14.7+15*	12.4+5	17.9+2.3**	12.5+4.4	17.6+2.5*
Total visual discrimination	111.6+6.9	119.7+2.1***	109+6.6	118.3+3.1	112.9+5.8	120.1+1.8***	109.5+7.5	119.1+2.2**
Visual comprehension	3.5+1.6	5+0***	3+2	5+0	3.5+1.6	5 + 0***	3.1+1.6	5+0**
Visual-motor	50.8+19.8	78.2+0.6***	49.3+4	78.3+1.2*	60.8+12.3	78.1+0.7***	31+17.4	78.3+0.7**
Total visual	289.5+31.5	348.3+8.9***	278.3+14.0	342.2+9.8*	300.1+25.4	348.2+9.4***	265.6+25.6	346.9+7.7**

N.B.*P<0.5 **P<0.1 ***p<0.001

Table IV: Basic and post training mean scores of achievement tests of students with SLD:

Visual skills	Mean scores	
	Basic (n=19)	*Post training (n=19)*
Math	3.9+4.6	18.7+2.2**
Writing	60.7+24.6	111.9+3.6***
Reading test	43.6+20.7	56.2+2.7***

N.B.*P<0.5 **P<0.1 ***p<0.001

Discussion:

The importance of visual cognitive skills in learning at any age has been widely recognized [13], and the best solution to the problem of reading failure is to allocate resources for early identification and prevention [14]. The present study reported that the prevalence of students diagnosed with SLD was 16.1 % of 4th grade governmental school children (table I). This result is consistent with that reported by Hanaa et al., [15] who found that the prevalence of SLD was 15.7%, and nearly similar to a study conducted by Vijayalaxmi et al., [16] in a South Indian city (15.1 %) among 1ry school children aged 8-11 years.

On the other hand, our results were higher than that found in the United States where only 5% of students were diagnosed with SLD [17]. It was found that children perform more poorly in noisy situations (overcrowded, distracting classrooms) than do adults, because the ability to listen in noise is not completely developed until adolescence or adulthood [18]. Furthermore, in London it was found that small classes of approximately 8 to 15 students have been beneficial for proper education of younger children [19]. So, overcrowdings in classrooms (mean 44 students/classroom) might have a contributing effect on scholastic backwardness of children.

Although dyslexia is the most widely studied type of SLD, the most common type of SLD reported in the current study was dyscalculia (11.4%), followed by dysgraphia (5.8 %) and lastly dyslexia (5.4 %). This is consistent with the prevalence of dyslexia in the United States 5% [7], and nearly similar to the Spanish sample where 6% of children were diagnosed to have dyslexia [20].

Regarding the visual cognitive skill profile of students with SLD:

In the present study, dyslexic students scored significantly lower scores than good readers on all visual cognitive skills except on visual comprehension where the difference was statistically insignificant (table II). These significant poor visual skills, particularly poor visual discrimination, and visuo-spatial skills may explain deficits in identification of similar letters especially dotted letters (e.g. ق ف د ذ, خ ج, ت ث,) .

Our results are consistent with that recorded by Reza, A. B., Mohammad R. B., Mahnaz, A. R [21]. who found an association between dyslexia and deficits in visual closure, visual discrimination, visuo-spatial skills and visual motor coordination. On the other hand, the significantly poor visual memory makes dyslexic students to forget parts of the sentence before it has been completely understood.

Thus, poor short-term visual memory leads to poor reading comprehension, and this poor comprehension necessitates re-reading more and more leading subsequently to slow rate of reading. Similarly, in a trial to analyze the patho-physiology of some common difficulties, encountered by training disabled students, the inability of dyslexics to identify words during reading and the spelling errors in their writing were attributed to poor visual memory, while their inability to differentiate between similar letters, similar words or numbers were attributed to poor visual discrimination [22].

In case of dysgraphia, the difference between good writers and students with dysgraphia was highly significant in all main visual cognitive skill tests except in visual comprehension. The significantly lower scores of students with dysgraphia in comparison to good writers on visuo-spatial relations and whole-part relationship could explain and underlie some characteristic deficits in the writing of those students as misalignment, reversal of letters within the word, and spelling defects.

The defective whole-part relationship might underlie the deficit in grasping that a word consists of elementary separate graphemes, and collectively, they can form a distinct word e.g. (Left) or in other sequence (due to deficit in sequential visual memory, or whole-part relationship) they can form another word (Felt). Also, the relationship between different words to form a meaningful sentence necessitates all these cognitive functions collectively (whole- part relationship, visual sequential memory as well as visual comprehension or reading comprehension).

The significantly poor performance of students with dysgraphia in comparison to good writers on the visuo-motor task of the battery might indicate the importance of visuo-motor deficits in the pathogenesis of dysgraphia. Similarly, Herr, C. M., Bateman, B. D [22]. referred to impairment of eye/hand coordination mastering as a cause of difficulties with handwriting.

Furthermore, it was found that treatment approaches that include visual-motor, spelling and handwriting instructions could be used efficiently in treatment interventions of students with dysgraphia [23,24].

In case of dyscalculia, differences between the students with dyscalculia and good mathematical achievers were significant in all main visual cognitive skill tests except in visual comprehension, visuo-motor and total visuo-spatial relations where the difference did not reach a statistically significant level (table II).

Despite the importance of reading comprehension in decoding written problems into mathematical symbols, in

understanding mathematical terms, operations or concepts as well as in recognizing unreasonable results, the difference between dyscalculic students and good math achievers on reading comprehension test was also statistically insignificant.

Regarding Re-evaluation of post-training visual cognitive abilities: In the present study there was statistically significant increase in post- training mean scores of all studied cognitive skills for the total trainee sample (N=l9), for student with dyscalculia (N=l4) and for students with dysgraphia (N=8). This is consistent with previous studies on computer- based cognitive skill training, which proved to have an enhancing effect on cognitive abilities of students with disabilities [25,26]

On the other hand, dyslexic students, increment of post-training mean scores of some sub items of the studied cognitive skills did not reach a statistically significant level, probably due to the small sample size included, where only 3 dyslexic students accepted to participate in the training program.

From another point of view, this lack of significant improvement is consistent with Thorell's et al., [27].who asserted that some cognitive skills can be improved through stimulation and training, while other areas can be more difficult to develop even with repetitive training. The significant increase in post-training mean scores of visuo-motor sub-test which was consequently reflected in post-training increase in writing achievement of all trainee, was consistent with earlier studies [28] which found that there was improvement in the performance of writing skills of children following the visuo-motor rehabilitation program. Also, Georgia [29] stated that writing skills are developed through practice and feedback mechanisms. Therefore, intervention therapy program is of utmost importance in dealing with visuo-motor integration (VMI) deficit in learning disabled children.

Moreover, the current study proved that implementation of training by the tailored cognitive rehabilitation program showed that the previously recorded improvement in cognitive skills was reflected in the form of a statistically significant increase in the total scores of all items of academic achievement tests (Reading, writing and math) of the trainee sample with SLD, (Table IV).

These finding are consistent with Flanagan, D. P., Ortiz, S. O., & Alfonso, V. C [30] who suggested that students who have received the neuroscience cognitive skill training should achieve higher academic performance once they have a chance to utilize their strengthened cognitive skill processes. This necessitates planning for treatment of students with specific learning disability, by a blend of neuroscience-based cognitive skill training with evidence-based instructional strategies. Therefore oriented-remediation tailored according to the previously identified domains of deficits in cognitive abilities is expected to be a fruitful field for successful remediation of students with SLD

Conclusion

- The magnitude of the problem of SLD, at least in our country, (prevalence 16.1%) really, deserves attention of all authorities.

- Students with SLD have significantly lower scores than their normally achieving peers, on some visual cognitive skills which necessitates implementation of well-tailored cognitive training programs according to the diagnosed domains of cognitive deficits.

- Computer-based cognitive enhancing programs have significant positive impact on improvement of post-training visual cognitive skills as well as post-training academic achievement.

Recommendations

1-Encouragement of early surveys of all grades of primary schools for early detection of those struggling with the early stages of literacy development, instead of waiting for definite failure.

2-Detailed study of the cognitive profile of students having any difficulty in the early stages of learning to identify areas of weakness of their cognitive abilities.

3-Early intervention with well-tailored cognitive rehabilitation using computerized programs might succeed in decreasing the problem of SLD.

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