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Ambivalent Manifestations in the Neurotic Symptom Etiology

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This article seeks to focus on the clinical richness arising from obsessive patients in a small health clinic. From the choice of a clinical case of obsessional neurosis, this article seeks to explore the experience resulting from this psychotherapy, analyzing the doubt symptom from the obsessional neurosis metapsychology legated by Freud. For this purpose, it refers to the many psychopathological texts in which the father of psychoanalysis approaches this neurosis, emphasizing the anal-sadistic phase importance for this symptom understanding. From the transferential relationship, the author points out that the aggressive and ambivalent movements should be highlighted in the uncertainties analysis. It is concluded that the ambivalence between love and hate (regarding the father figure) is of extreme relevance for the understanding of this symptom.

Keywords: obsessional neurosis, anal-sadistic phase, ambivalence, doubt symptom

Introduction

From the psychotherapeutic care with obsessive patients, this article aims to elucidate a reasoning about the doubt symptom in obsessional neurosis. In other words, does the doubt symptom have any relation with the anal-sadistic phase in the obsessional neurotic cared in a small public health center in the countryside of the State of São Paulo?

In order to answer this question, the author chose a patient that he considered to be an obsessional neurotic. This patient, who the author identified with the fictitious name of Paulo, seeked psychotherapy due to the ruminant thoughts of his father death (and his father had died two years before), and he also complained a lot of chest pains.

Material and Method

From a clinical data survey about Paulo history, a review on the Freudian work is prepared on the anal-sadistic phase concept for the further analysis of this symptom.

It should be highlighted that, as this article is from my thesis studies on the obsessional neurosis identificatory problematic, this case publishing was approved by PUC-SP (Pontificate Catholic University of São Paulo) Ethics Committee, by means of protocol 173/2011.

Results

During the author’s first contacts with this patient, the author seeked to understand his complaint. In the patient’s associations, he said that the chest pain and the ambulance sirens trigger compulsive thoughts of death, and this reminds him of the time he took his father to the doctor. Throughout his history narration, the
author realized that the paternal identification “permeated” all this patient complaints. The alleged heart attack pains give room for complaints of intestinal pains. According to the author’s “concealed” memories, since the early childhood he suffered of “trapped gases”, as he himself said.

From this symptomatic complaint, the author sought to listen a little more about his childhood. All and every analyst is, according to Freud (1937), “In the search of a portrait of the patient’s forgotten years that is equally trustworthy and, in all essential aspects, complete…” (p. 276). Thus, this “mind archeologist” service is essential for understanding Paulo libidinal and identificatory history. This reconstruction allows a better understanding of his symptomatic structuring.

Paulo, when addressing the relationship with his parents in childhood, shows a very interesting expression of how the relationship with the parental figures is structured, saying: “My brothers went away and it was left to me…”. About his childhood, he says: “I had a lot of contact with my mother and with my father who worked. My older brother never worked with him, but he is also a shopkeeper today. I did not have much contact with him, and the little that is told is that I fought a lot with my brothers when I was a kid…”. His other earliest memories also date back to the age of six. At this age he had a piggy bank where he kept the coins. Since that time, he went fishing with his gather, who was much older.

When he was seven, he already attended school and remembered his third sister flirts. At that time, between seven and eight years of age, the compulsive doubts arose in the school environment. According to Paulo: “I was not a bad student. This time, I did not understand Portuguese. I had to retake tests. I had a teacher who wrote with both hands. I had a Portuguese teacher named Sandra who marked me. She was very angry. I trembled in front of her”. In his associations, Paulo speaks about this teacher:

Connect her with my third sister? I think these are different situations. I was afraid of her. She ordered me to look in the dictionary and I was the first, but I never understood these proparoxytones…. Because of my doubts, I messed everything. The proparoxytones did not come to my mind. In mathematics, I was excellent. In Portuguese, I struggled and she failed me. This teacher insisted so much on the proparoxytones that until today I do not understand it. I did two years of the fifth grade. After that, I was always the best student…. Everything I have done in my whole life I was in doubt. I was always suspicious. I did things with doubt and it did not work…

The author noticed that the doubts referred to male and female figures, such as the boss, the teacher, the son and the psychotherapist, demonstrating the ambivalence stuck in his paternal and maternal imagos. For example, at the end of the sessions, he raises several questions, such as: “Do you think I did right or wrong, doctor?” So, the author always tried to return him the same question, not replying his demand.

Since the end of his childhood and early adolescence, he had many intestinal pains and problems with intestinal gases, which intensified at the age of seventeen. During the psychotherapy, he had several complaints due to abdominal pains caused by these gases. Every time that he could not verbalize any word that required certain tone of aggressiveness, the gases appeared. After mentioning, in several sessions, these pains, he said: “When I started putting out this volcano that was asleep through the mouth, the gases are better. Before I kept it, today I already can speak at the right time. The gases even disappeared …”.

Thus, it is worth noting the ambivalence movement that he shows due to these abdominal pains. When he started putting out these gases out, the author noticed that he was less contained, listened, and absorbed more the author’s interventions. In a session, in the first year of psychotherapy, he says: “... I am calm today. Everything was like I expected…”. When something goes beyond his control, he gets totally “contained”, as he said: “Last week I had a momentary relapse. The idea of heart attach returned and the chest pain… And these gases did
not pass. It did not go out up or under. I need to relieve myself and here is the only place I can place myself…”. Interestingly, the old heart attack fear, a thought that plagued him due to his father’s death by heart attack, begins to give room to abdominal pain. An expression that specifies this movement well is when he says: “If I cannot release my volcano underneath, today I can release it through the mouth. After I started talking about things that I think, these pains began to disappear…. Here is a place where I can calmly talk. You listen to me. But not at home. My son does not listen to me and I do not like it…”.

The issue of the time and people control is very strong in the dynamics of Paulo. In one session, he says: “I wonder if I am making mistakes monitoring my son? I am in a conflict. I protect my daughter-in-law, I protect her, I do not think it is right that women call my son. I checked the calls on his cell phone and there were a lot of women calls. Did I do the right thing?…”. Regarding the time, the author noticed that he never delayed in any session. Time is like “gold, a great gift” for Paulo, as he says: “I have the right to 30 minutes, and not 29 minutes…”.

Therefore, from these data brought by this patient, the author would resort to the anal-sadistic phase described by Freud, once the author finds support on it for the understanding of this patient’s uncertainties.

**The Anal-Sadistic Phase According to the Freudian Theory**

For Freud, the second pre-genital organization is the anal-sadistic which dominant erogenous zone is the anal. In this organization:

> The intestinal contents… have for the breastfeeding other important senses. It is obviously treated as a part of his own body, representing the first "gift". When disposing of it, the little creature can express docility to the environment surrounding him, and when refusing it, his stubbornness. (Freud, 1905, p. 176)

During the anal-sadistic organization, the faeces represent the first gift that the child can give someone that he likes, demonstrating his obedience. If he denies giving the faeces, he is expressing his stubbornness.

Freud (1905) explains that “The fecal mass retention, at first intentionally practiced to take advantage of the masturbatory stimulation of the anal zone… is, by the way, one of the constipation reasons, which is so frequent in neuropaths” (p. 176). The fecal mass retention during childhood may be related to masturbatory stimulation of anal zone, as he can also be demonstrating his pertinacity in the relationship with the people who take care of this child. And when growing, this game of retaining faeces may be symbolically present in the special scatological rituals, in ceremonial acts and similar acts which are carefully kept confidential by the neurotic individual.

According to Freud (1905):

> Intestinal catarrhs in the early age leave child “nervous”…. Children who take advantage of the anal zone erogenous stimulus are denounced by retaining the faeces until its accumulation causes violent muscular contractions and, on the passage through the anus, it may exercise an intense stimulation in the mucosa. With that, they might produce themselves voluptuousness sensations besides the painful sensations. (p. 175)

During the anal-sadistic organization, it is very common that intestinal disorders provoke intense excitations in the anal zone. In infant intestinal catarrhs, the boy can come to feel pleasure in erogenous stimulation while retaining the fecal mass. In the later neurotic illness, these catarrhs that caused the anal zone stimulation influence on neurosis somatic manifestation.

Freud (1917) states that, during the first years of life, “Faeces are the first gift of the child, a part of his
body that he only will give to someone he loves, to whom, in fact, he will make a spontaneous offer as a sign of affection” (p. 139). The act of defecating offers the first opportunity for the child to choose between a narcissistic attitude and an attitude of object love. In this way, or he shares his faeces in the name of his love or he retains it with the purpose of autoerotic satisfaction.

Freud (1918) still postulates that, “The act of ceding the faeces in favor of someone becomes a prototype of castration” (p. 89). That is, the act of providing the faeces to who he loves is the first moment in which the boy shares a piece of his own body with the purpose of obtaining the favors of anyone else.

According to Freud (1933), “The old interest in faeces becomes the great value granted to gold and money, but it also contributes to the baby and penis affective cathexis” (p. 103). The interest for the money is taken from anal-erotic sources, since the commitment on defecation disappears in later phases of adult life, emerging the interest in the money that was not present in childhood. The interest for the money enables the transfer of the primitive impulse to this new object. Therefore, the old libidinal interest for the faeces can move in adulthood, becoming the value granted to gold and money. And this same interest contributes to the baby and penis affective cathexis.

About the baby and penis affective cathexis, Freud (1917) still asserts:

In the unconscious products—spontaneous ideas, fantasies, and symptoms—the faeces concepts (money, gift), baby and penis then form a unity, an unconscious concept…. Throughout these association trails, the libidinal cathexis can become displaced or intensified. (p. 136)

The libido deposited in the faeces can displace to the penis and baby cathexis, because faeces, baby and penis “are three solid bodies; all three, forcing penetration or expulsion, stimulate a membranous passage…” (Freud, 1917, p. 141). That is, the libidinal cathexis of these three elements can displace or intensify, since they are symbolically equivalent and one replaces the other.

Freud (1913) points out that in anal-sadistic organization, “The genital zones primacy has not yet been established. On the contrary, the instinct components that dominate this pre-genital organization of sexual life are the anal-eroticism and the sadistic” (p. 345).

In a note added in 1915 to Three Essays, Freud (1905) recognizes that in this organization, “The division into opposites that pervades the sex life is already constituted, but they still cannot be called male and female, but rather active and passive” (p. 187). In the anal-sadistic organization, the present activity is the domination impulse through the body muscles and as a passive sexual target organ, the intestine erogenous mucosa is found. At this infantile psychosexuality constitution phase, the primacy of the genital zones is not established yet. The antithesis between male and female do not exist, but rather the opposition between active and passive.

About the anal eroticism present in the anal-sadistic organization, Freud (1913) states:

An accentuation of this anal eroticism in the pre-genital organization phase leaves behind a significant predisposition to homosexuality, in men, when the following phase of sexual function, the genital organs primacy, is reached. The manner in which this last phase is erected on the precedent, and the concomitant remodeling of libidinal cathexis, provide the analytical research the most interesting problems. (p. 346)

During this pre-genital organization, the active inclination is filled by the domain common instinct that Freud calls sadism and the passive inclination is fueled by the anal eroticism. A fortification of anal eroticism allows an inclination to homosexuality in males when the genitals primacy is achieved.

On Laplanche and Pontalis reading, the anal-sadistic phase “is the first phase in which the activity-passivity
polarity is constituted”. Freud (1967) makes the activity with sadism and passivity match with anal eroticism, and assigns to each of the corresponding partial impulses a different source: “anal muscles and mucosa” (p. 186).

In his book *Psychoanalytic Theory of Neurosis*, Fenichel (1981) declares that:

Anal eroticism always has bisexual character: The anus is, at the same time, the organ that actively expels and a hollow organ, possible to stimulate by any object that enters it…. The objective of female desires of male obsessive neurotic is… the desire that something is inserted or retained in his body. (p. 259).

On *New Conferences* published in 1932/1933, Freud (1933) highlights that, the attitude towards the libido organization phases has changed a little…. Whereas, previously, it was mainly emphasized the way how each phase passed before the next phase, our attention, now, is directed to the facts that shows how much of each prior phase still continues in the subsequent configurations…. (p. 102)

Namely, the predominance of one phase in relation to the other does not occur so suddenly, but gradually, since parts of the previous organization always coexist side by side with the latest. These sadistic impulses (which already begin during the emergence of the teeth in the oral phase) become common in anal-sadistic phase and for being the satisfaction sought in aggression and in the excretory function. During this phase, the aggressive impulses are present, because in sadism there is an instinctive fusion of libidinal and purely destructive impulses.

Freud explains that the anal-sadistic organization “can be preserved for the entire life and permanently attract for it a good portion of sexual activity…. It is proper in it that the impulses opposite pairs are developed in a roughly equal manner, in a state of things described by the convenient designation of ‘ambivalence’” (1905, p. 187). Thus, the ambivalence begins at the oral-sadistic state with the emergence of the teeth and the biting activity, becoming more frequent in the sadistic-anal phase. In this, the opposite pairs of impulses are already developed, but the subordination of these impulses aiming the reproduction will only occur in adult genital organization.

These opposite impulse pairs, the ambivalence between love and hate, are essential for understanding the doubt symptom. About the love-hate ambivalence, Freud (1915) always reports:

Love… almost does not distinguish hate in its attitude towards the object. Only after the genital organization establishment is that love becomes the opposite of hate…. Hate, as a relationship with the objects, is older than love. It results from the narcissistic ego primordial repudiation to the outside world… Love so often manifests as “ambivalent”, i.e., accompanied by impulses of hate against the same object. (p. 143)

In the adult genital organization, conscious love reaches a high degree of intensity in a way to be sufficiently strong to keep under repression its opponent. Love cannot annul hate, but only repress it in the unconscious system. And hate, in the unconscious, protected from the threat of being destroyed by the conscious operations, is able to persist and, even, to grow. This same hate can be reinforced by a regression from love to sadistic phase, because of love intensity directed towards the same object hides a hate of equal or greater intensity.

**Discussion**

Analyzing the excerpt taken from a clinical case with the problematic that he proposes to discuss, we can point out that the doubts presented by Paulo are related to love-hate ambivalence as a result of the libido fixation in his early childhood. The author stated this based on the transference relationship; since what is at stake is the paternal complex internalized at an early childhood of this patient; and also the movements of
retaining associations (of not symbolically giving the faeces to the analyst when this patient is more contained) or to freely associate it when not suffering of trapped gases; as he himself said. The author noticed that when this patient is more “relaxed” and less “contained”, he can capture better the psychotherapeutic interventions, replying: “I fully agree with you doctor…” But, in most of my interventions, when he is more contained, full of hate, he always replies: “I am going to disagree with you, I do not think that…” Thus, the giving and retaining faeces is manifested, in a symbolic way, expelling the associations or in the understanding (or not) of the interventions. Here comes the doubt as a symptomatic formation against the most primitive hate for the father figure embodied in the figure of the analyst. And it is this hate that moves this patient doubts against his progress under analysis. So, the doubt still is the ultimate resistance weapon of this patient.

The ruminant doubts also highlight the relationship of master and slave in this patient. When he is less contained, he behaves as a son submissive to the father; but when he is more contained, he puts himself in a relation of tremendous revolt, complaining about the injustices of his authoritarian boss. The author noticed that in the relationship with this boss, his sense of justice is a never-ending revolt, fed by his ambivalence. Currently he is suing the company, since they reduced his salary. Therefore, all his revolt acts are demonstrated in this “hate” related to his intestinal gases since childhood.

The fact of giving or not the faeces to the analyst is also related to the paternal sadist penis that left this patient handed over the homosexuality ghost. When expelling the memories in his associations, the equation faeces-penis works as a pleasant movement, referring to the former anal eroticism of passive pleasure with the father figure, and which ramifications are currently related to the pleasure that he feels about smells and odors. On the other hand, while retaining the associations, this act expresses the old childish sadism, symbolically manifested by hate in containing the father’s faeces, denoting the activity relationship with the external environment. Thus, the activity-passivity relations are manifested by providing or not the association, the faeces, to the psychotherapist.

In addition, the author noticed that he presents a rigid superego. This inflexibility perpetuates his doubts. And from the author’s observation, he began to ease this superego and sew it. So, the author was relieving the rigidity of this instance and, therefore, as he himself said, the gases began to loosen. In this “loosening”, the doubts emerged in the therapeutic setting. These doubts, which were already part of Paulo’s life story since the age of seven, are the resistance weapons of his own self in favor of the transfer; since they denote the ambivalence of love-hate in the transference relationship with the analyst. On the other hand, this ambivalence denotes the identification with the father figure permeated with unconscious hate; since this patient walked parallel paths to the paternal ways; but which is currently present in the infantile sadism ramifications that are manifested in the fact of promoting family meetings to reach collective decisions; because if someone requests an individual decision, that causes him much embarrassment. Therefore, the fact of promoting family meetings and exercising the control over his sons puts in evidence the unconscious sadistic aspects of this patient.

Conclusion

From the excerpt analyzed above, it might be pointed out that the doubt symptomatic formation of patient Paulo evidences all the unconscious hate against the father figure, and this hate is manifested in the transfer with the analyst figure. The ambivalence between the love towards the father, such as the hate related to him and repressed in his early childhood, serves as a propelling spring of this symptom, feeding this patient resistance; also favoring (or not) his free associations. Therefore, any study of this symptom, in this class of
neurosis, necessarily has to consider the ambivalent manifestations of anal-sadistic phase; because it is in this one that we find the ambivalent impulses (of love and hate, of activity and passivity) related to external objects, fomenting these patients’ uncertainties.

References


Autism Spectrum Traits in Adults Affect Mental Health Status via Early Maladaptive Schemas

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EMSs (early maladaptive schemas) may influence general health status and the development and maintenance of some psychiatric disorders. This study investigated whether early maladaptive schemas act as a mediator in the relationship between autistic traits and general health status in non-clinical adults. A cross-sectional questionnaire-based study was used. The AQ (Autism-Spectrum Quotient), YSQ (Young Schema Questionnaire), and GHQ (General Health Questionnaire) were administered to a non-clinical sample of 342 university students (N = 342, 238 women and 112 men; mean age = 21.36 years, SD = 5.17). We found a significant relationship between autism spectrum traits and mental health, completely mediated by EMSs. Thus, higher autism spectrum trait scores predicted higher EMSs scores, which in turn predicted poorer mental health. Early maladaptive schemas appear to account for the mental health problems suffered by adults with autism spectrum traits. There are no additional data available.

Keywords: Autism spectrum traits, EMSs (early maladaptive schemas), mental health problems, mediation analysis

Introduction

The term ASDs (autism spectrum disorders) refers to a range of conditions such as Asperger’s syndrome that are related to the core disorder of autism. These disorders are characterized by impaired social interaction, communication, and imagination, and individuals with these conditions often exhibit a rigid, repetitive pattern of behavior (Wing & Gould, 1979).

ASDs are typically thought to affect mainly children. However, there are currently many adults with ASDs who were not identified as such when they were children, meaning that such individuals did not have the opportunity to receive early specialized intervention. Furthermore, some reports have indicated that such adults, particularly around adolescence or early adulthood—when they become more independent and more actively engaged in deep personal relationships—come to be quite self-conscious of their differences from other people. This can lead to reduced self-efficacy and self-esteem, which in turn can lead to depression and anxiety (Gaus,
Some reports estimate that 70%-80% of adults with ASDs have comorbid mental problems such as mood, social anxiety, and obsessive compulsive disorders (Hamilton & Morgan, 2011; Hofvander et al., 2009; Uno, Uchiyam, & Osaka, 2009). Whereas many treatments for children with ASDs involve interventions that address particular autism spectrum traits, such as those interventions intended to improve recognition of social situations and social skills (Reichow, Barton, Boyd, & Hume, 2012), almost all of the treatments available for adults with ASDs address only the comorbid mental health problems that these adults often exhibit. Indeed, there are no systematic treatments for mental health problems in adults with ASDs that actually take into account the characteristics of ASDs per se. In order to develop effective therapies for adults with ASDs who have comorbid mental problems, it may be most useful to determine what ASDs characteristics might serve as pathogenic mechanisms underlying these disorders. In this study, we are attempting to seek out this potential mechanism so that it can be used to enhance the treatment of adults with ASDs in Japan.

**Theory of EMSs (Early Maladaptive Schemas)**

The cognitive model—originally outlined by Beck (1967)—has generated a vast body of empirical research on psychopathology (Beck, 1967/1970; Clark, 1999; Williams, Richardson, Berkman, & Tinetti, 1997). Research on the cognitive model in adults has recently experienced a revival through Young’s (1994) schema theory (Young & Klosko, 1994).

Schema theory is an alternative model that builds on Beck’s original cognitive model (Beck, 1979; Young, 1999; Young, Klosko, & Weishaar, 2003). Young proposed that a subset of schemas, called EMSs, form the core of longstanding psychological problems and personality disorders. Young’s original taxonomy outlines 18 different EMSs grouped within five domains (see Table 1). The current definition of EMS is “a broad, pervasive theme or pattern comprised of memories, emotions, cognitions, and body sensations, regarding oneself and one’s relationships with others, developed during childhood or elaborated throughout one’s lifetime and dysfunctional to a significant degree” (Young et al., 2003). EMSs, therefore, lie at the deepest level of cognition and are formed of memories, intense emotions, and other internal experiences, which also accompany their activation.

<table>
<thead>
<tr>
<th>Early maladaptive schema</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disconnection and rejection domain</td>
<td>Expectations that one’s needs for security, safety, stability, nurturance, empathy, sharing of feelings, acceptance and respect will not be met in a predictable manner</td>
</tr>
<tr>
<td>Emotional deprivation</td>
<td>The expectation that one’s desire for a normal degree of emotional support will not be adequately met by others</td>
</tr>
<tr>
<td>Mistrust/abuse</td>
<td>The expectation that others will hurt, abuse, humiliate, cheat, lie, manipulate or take advantage</td>
</tr>
<tr>
<td>Social isolation/alienation</td>
<td>The feeling that one is isolated from the rest of the world, different from other people, or not part of any group or community</td>
</tr>
<tr>
<td>Defectiveness/shame</td>
<td>The feeling that one is defective, bad, unwanted, inferior or invalid in important respects or that one would be unlovable to significant others if exposed</td>
</tr>
<tr>
<td>Abandonment</td>
<td>The perceived instability or unreliability of those available for support and connection</td>
</tr>
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### Table 1 (continued)

<table>
<thead>
<tr>
<th>Domain</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Early maladaptive schema</strong></td>
<td></td>
</tr>
<tr>
<td>Impaired autonomy and performance domain</td>
<td>Expectations about oneself and the environment that interfere with one’s perceived ability to separate, survive, function independently or perform successfully</td>
</tr>
<tr>
<td>Failure</td>
<td>The belief that one has failed, will inevitably fail, or is fundamentally inadequate relative to one’s peers in areas of achievement</td>
</tr>
<tr>
<td>Dependence/incompetence</td>
<td>The belief that one is unable to handle one’s everyday responsibilities in a competent manner without considerable help from others</td>
</tr>
<tr>
<td>Vulnerability to harm or illness</td>
<td>The exaggerated fear that an imminent and unpreventable catastrophe will strike at one’s identity</td>
</tr>
<tr>
<td>Enmeshment/undeveloped self</td>
<td>Emotional over-involvement with significant others and insufficient individuality</td>
</tr>
<tr>
<td>Impaired limits domain</td>
<td>Deficiency in internal limits, responsibility to others or long-term goal orientation; leads to difficulty respecting the rights of others, cooperating with others, making commitments or setting and meeting social interaction</td>
</tr>
<tr>
<td>Insufficient self-control/self-discipline</td>
<td>The pervasive difficulty or refusal to exercise sufficient self-control and frustration tolerance to achieve one’s personal goals, or control expression of one’s emotions</td>
</tr>
<tr>
<td>Entitlement/grandiosity</td>
<td>The belief that one is superior to other people and entitled to special rights and privileges</td>
</tr>
<tr>
<td>Other-directness domain</td>
<td>An excessive focus on the desires, feelings, and responses of others at the expense of one’s sense of connection or to avoid retaliation</td>
</tr>
<tr>
<td>Self-sacrifice</td>
<td>The excessive focus on voluntarily meeting the needs of others in daily situations at the expense of one’s own gratification</td>
</tr>
<tr>
<td>Subjugation</td>
<td>The excessive surrendering of control to others and subjugation of needs and emotions to avoid anger, retaliation, or abandonment</td>
</tr>
<tr>
<td>Approval-seeking/recognition-seeking</td>
<td>The excessive inhibition of the expression of spontaneous action, feeling, or communication</td>
</tr>
<tr>
<td>Excessive vigilance and inhibition domain</td>
<td>Excessive emphasis on suppressing one’s spontaneous feelings, impulses, and choices or on meeting rigid, internalized demands, often at the expense of happiness, self-expression, relaxation, close relationships or health</td>
</tr>
<tr>
<td>Negativity/pessimism</td>
<td>A pervasive, lifelong focus on the negative aspects of life</td>
</tr>
<tr>
<td>Emotional inhibition</td>
<td>The excessive inhibition of spontaneous action, feeling or communication, usually to avoid disapproval by others, feelings of shame or losing control of one’s impulses</td>
</tr>
<tr>
<td>Unrelenting standards/hypercriticalness</td>
<td>The underlying belief that one must strive to meet very high internalized standards of behavior and performance</td>
</tr>
<tr>
<td>Punitiveness</td>
<td>The belief that people who do not meet one’s standards and exceptions should be harshly punished</td>
</tr>
</tbody>
</table>

“Schema therapy” is an integrative approach to treatment that combines important aspects of cognitive-behavioral, experiential, interpersonal, and psychoanalytic therapies into one unified model. Schema therapy has shown remarkable results in helping people change EMSs that they have often lived with for many years (Masley, Gillanders, Simpson, & Taylor, 2011; Nadort et al., 2009). Schema therapy is becoming an increasingly popular psychological model for working with individuals who have a variety of mental health and personality difficulties (Masley et al., 2011).

### Are Autistic Traits Associated With EMSs?

EMSs and schema theory were originally applied to people with personality problems or full-blown personality disorders. However, some recent studies have indicated that EMSs mediate the relationships between parenting or attachment styles and psychiatric conditions (Roelofs, Lee, Ruijten, & Lobbestael, 2011; Roelofs, Onckels, & Muris, 2012; Turner, Rose, & Cooper, 2005; Wright, Crawford, & Del Castillo, 2009). Studies have suggested that highly active EMSs are a risk factor for various mental disorders such as
post-traumatic stress disorder, bipolar II disorder, and eating disorders (Cockram, Drummond, & Lee, 2010; Hawke & Provencher, 2011; Unoka, Tolgyes, & Czobar, 2007; Van Vliervangerhe, Braet, Bosmans, Rosseel, & Bögels, 2010). However, no study has examined whether EMSs play a role in mediating the relationship between mental health and autism spectrum traits.

The purpose of the present study was to verify whether EMSs mediate the association between autism spectrum traits and mental health status (see Figure 1), so that we might begin to understand the pathogenic mechanisms behind poor mental health in adults with ASD. We developed the following hypotheses: (1) higher scores on a measure of ASD traits will predict poor mental health; (2) higher scores on a measure of EMSs will predict poorer mental health; and (3) when controlling for EMSs, the relationship between ASD traits and mental health will become non-significant, such that the relationship between autism spectrum traits and mental health status is mediated by EMSs.

![Figure 1](image)

**Figure 1.** The hypothetical model examined in this study. The lower portion of this figure depicts the mediating role of early maladaptive schemas (as measured by the YSQ (Young Schema Questionnaire)) in the relationship between autism-spectrum traits (as measured by the AQ (Autism-Spectrum Quotient)) and mental health status (measured by GHQ-28 (the General Health Questionnaire)). The upper portion displays the relationship without the mediator.

**Method**

**Participants**

A total of 350 (238 women, 112 men) participants completed the study, recruited via an email invitation sent to student and staff mailing lists (undergraduate and master’s levels) in 2011. Participants ranged from 18 to 55 years of age ($M = 22.64$ years; $SD = 5.83$). The participants were selected according to the inclusion criterion of having no diagnosed psychiatric conditions for at least the past 12 months by their own self-report. Three participants who reported current histories of psychiatric disorders were excluded from analysis. Furthermore, five participants did not complete the questionnaires and so failed to provide data for analysis. This left a final sample of 342 participants (233 women, 109 men), between 18 and 55 years of age ($M = 21.36$ years, $SD = 5.17$).

Prior to the commencement of the study, all participants provided their written informed consent after receiving a full explanation of the nature of the study and the potential risks and benefits of participation. Participation was completely voluntary, and participants were informed that they could cease participation at any time. The study was approved by our ethics committee and was performed in accordance with the Declaration of Helsinki.
Measures

All of the scales used were the Japanese language versions.

**YSQ-S3J (YSQ-Short Form 3 Japanese version; Young et al., 2003, translated by Unehara et al., 2010, unpublished).** The YSQ-S3 is a 90-item self-report inventory designed to assess the 18 EMSs (see Table 1) outlined by Young (1998). Participants choose the answer that best describes them on a 6-point Likert scale (1 = “Completely untrue”, 6 = “This describes me perfectly”). Subscale scores are calculated by summing responses to the items for each specific EMS. Total YSQ-S3 scores are obtained by summing the scores of all subscales. The Japanese version of the YSQ-S3 translated by Umehara (11th Japanese Association for Cognitive Therapy Conference Proceedings, 2011) typically shows good to excellent internal consistency, with a Cronbach’s alpha of 0.81 reported previously for the total scale scores. This was the case for the present study, with a Cronbach’s alpha of 0.96.

**AQ (Baron-Cohen, Wheelwright, Skinner, & Clubley, 2001).** AQ is a 50-item self-report questionnaire that assesses autistic traits. Participants indicate how true each statement is for them—“Definitely true”, “Slightly true”, “Slightly untrue”, or “Definitely untrue”. Specific statements for which autistic responses would be true were given a score of 1 if they were marked as true to any extent, and a score of 0 if marked untrue to any extent. Scoring was reversed for statements for which an autistic response would be untrue. Thus, the total range of possible scores is 0-50, with higher scores indicating the presence of more autistic traits. The AQ contains five subscales: social skills, attention switching, attention to detail, communication, and imagination. The AQ has been shown to have reasonable face and construct validity (Baron-Cohen et al., 2001). Furthermore, it has been suggested that a cut-off of 32 or above serves to correctly identify people with autistic traits in the general population. Wakabayashi et al. (2004) adapted and standardized this questionnaire to apply to a Japanese population, and confirmed this version to be equivalent in terms of reliability and validity to the UK version (Wakabayashi, Tojo, Baron-Cohen, & Wheelwright, 2004).

**GHQ-28 (McDowell & Newell, 1996).** The GHQ-28 is typically used to assess psychiatric distress related to general medical illnesses. This 28-item self-report questionnaire is designed to assess four aspects of distress: depression, anxiety, social impairment, and hypochondriasis. Participants indicate whether their current state of health differs from their usual state, thereby assessing relatively recent changes rather than lifelong personality characteristics. Participants responded according to their health state over the past two weeks. Participants evaluate the occurrence of the various concerns on a 4-point response scale. The scale points were anchored as follows: “Less than usual”, “No more than usual”, “Rather more than usual”, and “Much more than usual”. The first two types of answer are scored as “0” (Positive) and the second pair as “1” (Negative). Possible scores range from 0 to 28, with higher scores indicating a greater probability of psychiatric distress. Total scores that exceeded 12 out of a possible 28 suggest probable distress (Chung, Preveza, Papandreou, & Prevezas, 2006).

Statistical Analysis

The hypothetical model that we created to examine the potential mediating role of EMSs is based on the statistical method for mediation analysis suggested by Baron and Kenny (1986). This method uses regression analysis to investigate the mediating effect of a variable. As described in Baron and Kenny (1986), four statistical criteria must be present for a variable to be considered a mediator:

1. The predictor variable must be significantly related to the mediator (Path A in Figure 1);
(2) The predictor variable must be significantly related to the outcome variable (Path C);

(3) When the outcome is regressed simultaneously onto the predictor and mediator, the mediator must be significantly related to the outcome (Path B);

(4) When the mediator is controlled for, the relationship between the predictor and the outcome variables in the regression equation (Path $C'$) must be significantly attenuated compared with when the predictor is regressed only onto the outcome (i.e., Path C).

Baron and Kenny (1986) also recommended using a significance test to assess the indirect effect of the predictor on the outcome via the mediator. Path $C'$ shows the direct effect of AQ on GHQ-28 scores—That is, the portion of the predictor’s influence on the outcome that is not mediated by EMSs. In contrast, the mediating or indirect effect is the portion of the influence of AQ on GHQ-28 scores that is mediated by EMSs; this is a synthetic index of Path A and Path B, and its confidence interval for the predictor can be estimated using the bootstrapping method. Thus, Path A represents the effect of AQ on EMSs, and Path B represents the effect of EMSs on GHQ-28 scores when controlling for the effect of AQ. If the indirect effect is statistically significant and satisfies the above criteria, then EMSs can be said to have a mediating effect on the relationship between AQ scores and GHQ-28 scores.

In summary, we used three regression equations to test the aforementioned hypotheses. In the first equation, GHQ-28 scores were regressed onto AQ scores (Path C). In the second equation, YSQ-SF3 scores were regressed onto AQ scores (Path A).

Finally, in the third equation, GHQ-28 scores were regressed onto AQ (Path $C'$) and YSQ-SF3 (Path B) scores simultaneously.

To evaluate the statistical significance of these effects, we also estimated quasi-Bayesian 95% confidence intervals using the bootstrapping method. The regression analyses for testing our hypothetical model were performed using the “mediation” package (Hirose, Tingley, Yamamoto, Keele, & Imai, 2013) for the statistical software R (Ihaka & Gentleman, 1996).

Results

Complete mediation analysis results are presented in Table 2. On the first equation (Path C), the regression coefficient indicated that AQ had a significant positive effect on GHQ-28 scores ($\beta = 0.144, t = 2.68, p = 0.008$). On the second equation (Path A), AQ had a significant positive effect on YSQ-SF3 scores ($\beta = 0.283, t = 5.44, p < 0.000$). On the third equation (Paths B and $C'$), YSQ-SF3 had a significant positive effect on GHQ-28 when controlling for AQ ($\beta = 0.511, t = 10.50, p < 0.000$). On the other hand, the effect of AQ on GHQ was no longer statistically significant after controlling for YSQ-SF3 ($\beta = 0.000, t = 0.000, p = 1.000$).

Table 2

<table>
<thead>
<tr>
<th>Equation</th>
<th>Path</th>
<th>IV</th>
<th>DV</th>
<th>$\beta$</th>
<th>SE</th>
<th>t</th>
<th>$p$</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C</td>
<td>AQ</td>
<td>GHQ-28</td>
<td>0.144</td>
<td>0.054</td>
<td>2.68</td>
<td>0.008</td>
<td>0.018</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>AQ</td>
<td>YSQ</td>
<td>0.283</td>
<td>0.052</td>
<td>5.44</td>
<td>&lt;0.001</td>
<td>0.077</td>
</tr>
<tr>
<td>3</td>
<td>B</td>
<td>YSQ</td>
<td>GHQ-28</td>
<td>0.511</td>
<td>0.049</td>
<td>10.50</td>
<td>&lt;0.001</td>
<td>0.257</td>
</tr>
<tr>
<td>C$'$</td>
<td>AQ</td>
<td>GHQ-28</td>
<td></td>
<td>0.000</td>
<td>0.047</td>
<td>0.00</td>
<td>1.000</td>
<td></td>
</tr>
</tbody>
</table>

Notes. IV: Independent variable; DV: Dependent variable; SE: standard error; AQ: Autism-Spectrum Quotient; YSQ: Young Schema Questionnaire (assessment of early maladaptive schemas); GHQ-28: General Health Questionnaire.
The decrease in the regression coefficient for the relationship between AQ and GHQ-28 scores when YSQ-SF3 was controlled for ($\beta = 0.114$ vs. $\beta = 0.000$) is one indication that YSQ-SF3 scores had a mediating effect. Indeed, the regression coefficient was statistically significant before YSQ-SF3 scores were added into the equation, but the $p$-value rose above $p < 0.05$ when YSQ-SF3 was added, with the relationship now becoming statistically insignificant. This condition is referred to as “full” or “complete mediation” (in contrast, partial mediation occurs when the path decreases but remains significant when controlling for the mediator). In addition, the amount of variance explained by GHQ-28 scores was larger in the third equation ($R^2 = 0.257$) than in the first equation ($R^2 = 0.018$). This can be regarded as another indicator of significant mediation.

Finally, we estimated the significance of the mediating and direct effects. The mediating effect of YSQ-SF3 on the relationship between AQ and GHQ-28 was 0.144 (95% CI = 0.090-0.210). On the other hand, the direct effect was 0.000 (95% CI = -0.103-0.100). Moreover, the total effect (mediation effect + indirect effect) was 0.144 (95% CI = 0.034-0.251). In general, we can regard an effect as statistically significant if the 95% confidence interval does not include zero, given that our null hypothesis for this mediation analysis was that there is no mediating effect. According to this criterion, both the mediating and total effects were statistically significant; however, the direct effect was not. Thus, because all of the criteria for mediation were present, we concluded that YSQ-SF3 scores serve as a mediator in the relationship between AQ and GHQ-28 scores.

**Discussion**

In this study, we investigated the mediating role of early maladaptive schemas or EMSs (as assessed by the Young Schema Questionnaire or YSQ-SF3) in the relationship between autism traits (as measured by the Autism Quotient or AQ) and general mental health (as measured by the GHQ-28 questionnaire). Our results show that EMSs fully mediate the relationship between autism-spectrum traits and mental health status, as we hypothesized on the basis of similar results in studies of other psychiatric disorders. That is, our results suggest that mental health status might deteriorate because of the negative effects of EMSs, rather than directly due to traits related to the autism spectrum.

Young et al. (2003) posited that EMSs are created through interactions between the environment experienced in the early stages of life and one’s innate emotional temperament. Although our results were unable to elucidate the specific relationships between environment and EMSs, they do appear to suggest that EMSs are related to people’s temperaments as per Young et al.’s (2003) theory. Furthermore, our results showed that people with autism spectrum traits tended to have no mental health problems when they had no or few EMSs. These results are consistent with the views of Baron-Cohen (2008) and Sugiyama (2011), who argue that ASD individuals in the absence of trauma or significant mental health problems can effectively no longer be considered to have ASD.

There thus appears to be little direct influence of autistic-spectrum traits on mental health status, with EMSs instead predicting later general and mental health difficulties in such individuals. Fortunately, however, EMSs are also subject to intervention. Gaus (2007) used CBT (cognitive behavior therapy) to treat mental health problems in patients with adult Asperger’s syndrome. She found that mental health problems were ameliorated and quality of life improved when CBT was used to amend the cognitions and behaviors, including maladaptive schemas, of people with adult Asperger’s syndrome. Furthermore, the core issue of adult Asperger syndrome did not disappear. Thus, although autism spectrum traits are likely a fairly permanent aspect of an individual’s psychological makeup, the negative effects on health of these traits—brought about by their impact
on EMSs—can be transformed by directly targeting the EMSs through schema therapy and CBT, with a corresponding improvement in individuals’ health.

The present results suggest that autism per se does not have to constitute a clinical problem for the individual concerned, with a greater clinical concern being whether people develop negative core beliefs about the self, in response to poor treatment or difficulties fitting in. ASD should be viewed as a human individual difference variable rather than a core pathology that requires aggressive treatment. Leading from this is the question of which individuals with ASD are likely to develop EMSs and hence significant psychopathology.

One limitation of this study was that it used a non-clinical participant sample. This places real limits on the generalizability of our results and this study should be replicated using a patient sample. Nevertheless, this study opens the door to a host of future studies examining the presence and role of EMSs among people diagnosed with ASD; ultimately, this will lead to further improvements in schema therapy as a treatment option for these individuals.

**Conclusion**

Our results showed that autism spectrum traits in typically developing adults affect mental health status via EMSs; we found a meaningful relationship between EMSs and autism spectrum traits, indicating that changes in EMSs predict changes in mental health problems in people with these traits.

**References**


Smoking Cessation During Pregnancy Among Roma and Non-Roma Women in Hungary’s Underdeveloped Regions*

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Debrecen-Nyíregyháza University, Nyíregyháza, Hungary

Davidson College, Davidson, USA

Lower socioeconomic status is correlated with higher tobacco use worldwide. Using a retrospective cohort design, we conducted in-person surveys among women living in Hungary’s underdeveloped regions to evaluate their smoking habits before, during, and after pregnancy. Forty-one percent (n = 6,351) of respondents with known smoking status and ethnicity (n = 15,592) smoked prior to pregnancy, 26.5% were self-identified Roma and 73.5% were non-Roma. During pregnancy, two third (65.8%) continued to smoke, although significant differences were observed across ethnicities. Roma women were nearly twice as likely to continue smoking as non-Roma women (98.3% vs. 50.5%, respectively). Using biometric and socioeconomic characteristics, we determined the associations of different factors with smoking habits separately for these two populations. We then assessed how these factors contributed to continued smoking during the pregnancy controlling for ethnicity. These results are essential while tailoring tobacco cessation programs for ethnic minorities who live in unfavorable socioeconomic circumstances.

Keywords: tobacco smoking and pregnancy, Roma ethnic minority, cessation during pregnancy

Introduction

The national smoking prevalence of the adult female population in Hungary was estimated between 23%-33% in 2012 (Forey, Hamling, Hamling, Thornton, & Lee, 2013). Deep poverty, limited formal education, weak economic activity, and social exclusion of ethnic minorities have a serious negative impact on smoking prevalence especially in the underdeveloped northeastern and southeastern regions of this country. The underdeveloped regions of Hungary are disproportionately Roma, the largest ethnic minority in the country. Among Roma women Kósa (2012) found heavy smoking prevalence with approximately 25% of women aged 8-29 years and 49% of women aged 30-44 years smoking at least one pack per day. As a result of multiple stress-inducing factors (such as social isolation), mental health of Roma is not only worse than that of the general population.
population but also worse than that of ethnic majority groups who live under similar socioeconomic conditions (Kósa, 2012).

A recent American study of pregnancy cohorts (Keyes, March, Link, Chilcoat, & Susser, 2013) demonstrated that gradients of socioeconomic position strongly emerge across these cohorts rather than time alone. In our present study, before controlling for poverty, the proportion of pre-pregnancy smoking was 40.7%, separately 56.1% in the Roma and 35.2% in the non-Roma, which exceeds the Hungarian national female average. When stratifying by poverty status, 57.4% of Roma women living in deep poverty were smokers.

Based on a large sample \( (n = 21,248) \), maternal smoking is clearly related to increased relative risk of LBW (low birth weight) and PTB (preterm birth) of babies (Ko et al. 2013). In Hungary, the average prevalence of LBW was 8.6% and that of PTB 8.8% in 2010-2012 (Statistical Yearbook of Hungary, 2012). In our comparably large initial sample of women with live-born babies without stratifying for ethnicity \( (n = 18,633) \), the prevalence of LBW was 9.3% that of PTB 8.6%. When controlled for continued smoking during pregnancy, the proportion of LBW was 16.6% and that of PTB 12.8%.

Unfortunately, there are no precise domestic demographic data about the Roma. The last census conducted in 2011 indicated a 315,000 minority population (Census National Data, 2011). However, the European Union Framework for National Roma Integration Strategies up to 2020 contains semi-officially estimated data (European Commission, 2011). Within the European Union, Hungary has the fourth largest estimated Roma population (7.05%) after Bulgaria (10.33%), the Slovak Republic (9.17%) and Romania (8.32%). According to this document, the average estimated number of Roma in Hungary is 700,000 (more than twice what was reported in the 2011 census). In the north-eastern region of the country, according to the estimates of the 2011 census, Roma comprise approximately 6.0%-8.5%, while in the south-eastern region approximately 1.5%-2.9%.

There are numerous studies concerning the poor health status of the European especially the Central European Roma population (Parekh & Tamsin, 2011; Fésüs, Östlin, McKee, & Ádány, 2012; Kolarcik, Madarasova, Orosova, van Dijk, & Reijnveld, 2009; Vokó et al., 2009; Kósa, Lénárt, & Ádány, 2002; Kósa et al., 2007; Hujová et al., 2010). Targeted studies were also published about the reproductive health of Roma women (Bobak, Dejmek, Solansky, & Sram, 2005; Rambouskova, Dlouchy, Krizova, Prochazka, Hrnčírova, & Andel, 2009; Foley, Balázs, Greczner, & Rákóczi, 2011). According to Bobak et al. (2005), 73% of pregnant Roma women were smoking prior to the pregnancy and 63% continued the habit during the full gestation period. Rambouskova et al. (2009) found in a relatively small sample (76 Roma versus 156 non-Roma women) 85.5% smoking prevalence among Roma and 57.9% continued smoking during the pregnancy.

Considerable differences in smoking prevalence between Roma and non-Roma women and the corresponding LBW and PTB differentials between the minority and majority ethnic groups emphasize the importance of properly adapted tobacco cessation programs in Hungary’s underdeveloped north-eastern and south-eastern counties. As a recent review of the concerning literature demonstrated, behavioral interventions to promote smoking cessation in ethnic minorities need to be culturally adapted to be more effective. Thus, more systematic studies are needed to gain insight in diverse populations for establishing the best cultural adaptations of cessation programs (Nierkens et al., 2013).

In Hungary, there is a special MCHC (maternity and child health care) service with precinct-based nurses for regions with an average population of 2,000 or greater. MCHC nurses are responsible for pre-pregnancy, prenatal and postnatal care of women during their reproductive years. They are also trained to provide minimal intervention for tobacco cessation for smoking women as soon as women register their pregnancy with the
MCHC service. The government is supporting this program primarily in underdeveloped regions. However, notable differences in PTB and LBW proportions among ethnic groups illustrate the need for more effective motivational interventionsto reduce tobacco use among the Roma minority population. The aim is rather complex as a recent comprehensive review of the literature indicated that there is no clear evidence of the effectiveness of culturally-adapted smoking cessation interventions in ethnic minority groups (Liu et al., 2013).

This study provides descriptive data on the obstetrical history, demographic, socioeconomic and sociocultural specialities and differences of smoking status among Roma and non-Roma pregnant women. Using these data, we assessed positive and negative factors for quitting when women learned they were pregnant. Given that pregnancy is a unique period in a woman’s life, one when they would be highly motivated to quit smoking, it is essential to understand the multiplicity of social, economic, and cultural factors that contribute to tobacco use during pregnancy.

**Materials and Methods**

Human subjects’ approval of our survey was provided by the ethics committee of Semmelweis University in Budapest, Hungary. We conducted a retrospective cohort study of women who delivered live born babies in 2009-2012. The target area was the underdeveloped northeastern and southeastern parts of the country in a former region with considerable Roma population. Local MCHC nurses while using their registers of pregnant and delivered women contacted the target population, which is a census of all births during the timeframe (n = 24,979). All contacts were made twice. Ultimately, 74.59% (n = 18,633) consented to participate in the study. Including women for whom smoking status and ethnicity were known, the sample was reduced to 15,592. Of these women, 6,351 (40.7%) smoked prior to the pregnancy and comprise our analytical sample.

Our research study consisted of two parts, with a total of 131 items in seven categories. The first part contained questions to be answered by the local MCHC nurses based on their own medical registers. These data include: age of mother, biometric data of mothers (weight in kg in the first trimester and height in cm) and basic data of obstetrical history. Among historical data, we collected information about the number of prior pregnancies, PTBs, and spontaneous and artificial abortions. Body mass index (BMI = kg/m\(^2\), i.e., body mass in kilogram divided by height in meters squared) was converted to a categorical variable (BMI underweight ≤ 18.49, normal weight = 18.5-24.9, overweight = 25-29.9, obese = 30 or greater). We dichotomized prior pregnancies as two or more versus zero or one.

Among socioeconomic and cultural variables, basic education means eight elementary school classes or less, non-married status is a comprehensive definition for contractual and non-contractual cohabitation and single mothers respectively. Participants without employment included all persons who receive different social benefits, disabled and students. There is no legal poverty level in Hungary, i.e., it is not a part of the legislation on the actual yearly budget of the central government. Instead, there is a statistical poverty level published annually by the Central Statistical Office of the country and is generally used as a proxy for economic status of the population. Based on the OECD standard, 50% (in the European Union 60%) of the median income equals the income poverty level. The median income/month/consumption unit increased from HUF 60,000 in 2009 to 84,000 in 2012 (TÁRKI Social Research Institute Inc., 2013). Deep poverty level was defined as < 50% of the average value. We defined housing without amenities as no connection to the water supply mains, to the sewage system, nor operational individual heating. Concerning dietary and lifestyle habits, only 0.9% of the whole sample (n = 18,633) admitted drinking alcohol (beer or wine) once a week or more often. ETS (environmental
tobacco smoke) was defined as noexposure, versus daily exposure by a husband or partner in confined spaces. Because our intent was to assess factors associated with quitting during pregnancy, we conducted all analyses only among women who indicated they smoked prior to pregnancy. We used t-probe for controlling ethnic distribution, ORs (odds ratios) with 95% confidence interval (95% CI) to show the relative importance of ethnicity in selected socioeconomic and cultural characteristics and binary logistic regression to assess factors associated with continuing versus quitting tobacco use during the pregnancy (significance level, \( p \leq 0.05 \)).

**Results**

In the analyzed sample of women who smoked prior to the pregnancy \((n = 6,351)\), there were 36.5% Roma and \((n = 2,321)\), 63.5% non-Roma \((n = 4,030)\). The overall proportion of smoking during pregnancy was 66.7%, but there were considerable ethnic differences; 89.3% of Roma were smoking during the pregnancy compared to 50.5% of non-Roma. Given the difference in smoking rates during pregnancy, we calculated bivariate associations biometric, obstetrical, demographic, socioeconomic, cultural, and lifestyle variables related to the Roma versus non-Roma ethnicity (see Table 1). Although all differences were significant at \( p < 0.05 \), divergences were the greatest between Roma and non-Roma in the following areas, with Roma being at a greater disadvantage: educational level \((OR = 21.2)\), being unemployed \((OR = 17.55)\) and living in deep poverty \((OR = 12.82)\) followed by housing without amenities. Concerning dietary habits, Roma had reduced consumption of fruit \((OR = 3.38)\), vegetables \((OR = 2.64)\), dairy products \((OR = 2.51)\), and meat \((2.51)\). Roma were twice as likely as non-Roma to be underweight. Being unmarried was more typical among pregnant Roma women \((OR = 3.07)\), as was being young \((OR = 5.73)\), and having a non-intended pregnancy \((OR = 3.28)\). ETS impact by husband or partner in confined spaces was nearly five times \((OR = 4.70)\) as likely among Roma versus non-Roma respondents. Finally, Roma respondents were more likely to have had a prior pregnancy \((OR = 2.34)\) and more likely to have had a previous PTB \((OR = 1.51)\), spontaneous abortion \((OR = 1.26)\) and artificial abortion \((OR = 1.43)\).

Table 1

**Bivariate Associations of Roma Versus Non-Roma Women Smoking Prior to the Pregnancy by Biometric, Socioeconomic, and Life-Style Variables \((n = 6,351)\)**

<table>
<thead>
<tr>
<th>Variables</th>
<th>OR</th>
<th>95% CI</th>
<th>( p )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roma vs. non-Roma (2,321/4,030)</td>
<td>5.73</td>
<td>4.12-7.97</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Age 17 or less vs. older (198/6,153)</td>
<td>2.04</td>
<td>1.74-2.39</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Roma vs. non-Roma (2,238/3,902)</td>
<td>3.28</td>
<td>2.94-3.65</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>BMI underweight vs. all others (752/6,905)</td>
<td>2.34</td>
<td>2.09-2.61</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Roma vs. non-Roma (2,278/3,940)</td>
<td>1.51</td>
<td>1.29-1.78</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Non-intended vs. intended pregnancy (2,620/3,598)</td>
<td>1.26</td>
<td>1.07-1.40</td>
<td>0.003</td>
</tr>
<tr>
<td>Roma vs. non-Roma (2,283/3,961)</td>
<td>1.43</td>
<td>1.27-1.60</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Prior pregnancies 2 or more vs. less (3,883/2,361)</td>
<td>21.2</td>
<td>18.43-24.50</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Roma vs. non-Roma (2,292/3,999)</td>
<td>3.07</td>
<td>2.74-3.45</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Prior PTB vs. at term birth (662/5,629)</td>
<td>1.103/5,232</td>
<td>1.07-1.40</td>
<td>0.003</td>
</tr>
<tr>
<td>Roma vs. non-Roma (2,315/4,020)</td>
<td>1.684/4,645</td>
<td>1.27-1.60</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Prior spontaneous abortion yes/no (1,103/5,232)</td>
<td>2.413/4,697</td>
<td>21.2</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Roma vs. non-Roma (2,309/4,011)</td>
<td>3.119/3,991</td>
<td>20.8</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Prior artificial abortion yes/no (1,684/4,645)</td>
<td>3.891/2,429</td>
<td>18.43-24.50</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>
The multivariable analysis (see Table 2) shows the contribution of the same variables (inclusive the Roma versus non-Roma ethnicity) in smoking cessation during the pregnancy. The dependent variable was defined as 1 = “Continued to smoke” or 0 = “Quit smoking”. Prior legal abortion, housing circumstances, dietary habits related to fruit, vegetable and meat consumption did not have any significant impact on smoking habit during the pregnancy. The strongest influence on continued smoking was indicated by the lack of more than basic education (OR = 3.05), the ETS generated by husband or partner of the pregnant woman (2.98), and drinking coffee at least every day (OR = 1.95). The strongest impact on smoking cessation was age \( \leq 17 \) years (OR = 0.10) and being underweight (OR = 0.55). Self-identified Roma women were twice as likely to continue smoking during pregnancy also (OR = 2.02). Related to obstetrical history, prior PTB (OR = 0.65) and spontaneous abortion (OR = 0.67) were associated with a reduced likelihood of continued smoking.

Table 2

*Binary logistic Regression of Biometric, Socioeconomic, and Life-Style Factors for Tobacco Smoking Cessation During the Pregnancy (n = 4,517)*

<table>
<thead>
<tr>
<th>Variables</th>
<th>OR</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roma vs. non-Roma</td>
<td>2.03</td>
<td>1.64-2.51</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Age 17 or less vs. older</td>
<td>0.10</td>
<td>0.08-0.14</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>BMI underweight vs. all others</td>
<td>0.55</td>
<td>0.44-0.70</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Non-intended vs. intended pregnancy</td>
<td>1.40</td>
<td>1.18-1.65</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Prior pregnancies 2 or more vs. less</td>
<td>1.53</td>
<td>1.27-1.85</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Prior PTB vs. at term birth (718/6,348)</td>
<td>0.65</td>
<td>0.52-0.83</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Prior spontaneous abortion yes/no (5,878/1,234)</td>
<td>0.67</td>
<td>0.55-0.82</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Prior legal abortion yes/no (1,805/5,302)</td>
<td>0.87</td>
<td>0.72-1.05</td>
<td>0.152</td>
</tr>
<tr>
<td>Basic education vs. higher (3,119/3,991)</td>
<td>3.05</td>
<td>2.49-3.74</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Non married vs. married (4,105/2,993)</td>
<td>1.48</td>
<td>1.25-1.74</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>No-employment vs. employed (4,434/2,668)</td>
<td>1.54</td>
<td>1.28-1.85</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Deep poverty vs. all others (3,507/3,371)</td>
<td>1.60</td>
<td>1.33-1.92</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Housing without amenities vs. all others (997/5,717)</td>
<td>1.07</td>
<td>0.82-1.39</td>
<td>0.610</td>
</tr>
<tr>
<td>Fruits every 3rd day or less vs. more often (1,671/5,423)</td>
<td>1.61</td>
<td>0.93-1.47</td>
<td>0.185</td>
</tr>
<tr>
<td>Vegetables every 3rd day or less vs. more often (1,943/5,148)</td>
<td>1.16</td>
<td>0.94-1.42</td>
<td>0.165</td>
</tr>
</tbody>
</table>
Discussion

This study proved striking differences in smoking habits between Roma and non-Roma women prior to and after pregnancy in Hungary’s underdeveloped regions. Concerning the serious negative impact of tobacco smoking not only on maternal but neonatal health, we assessed factors of cessation during the pregnancy as a formative step in designing effective interventions.

Age ≤ 17 years and BMI underweight proved to be strong protective factors. Among young girls, the success of cessation is most likely explained by a shorter duration of smoking. In addition, there is evidence that cessation results in body weight gain (Basterra-Gortari et al., 2010). Additionally, women are more prone to the belief that smoking controls weight (McKee, Nhean, Hinson, & Mase, 2006). BMI underweight (≤ 18.49) is not a desired condition for the well-being of the mother or baby; nevertheless, women who are underweight may be less concerned than normal or overweight women about pregnancy-related weight gain. Thus, they may be more likely to quit.

In our study, unintended pregnancy correlated significantly with continued smoking. In the USA, half of pregnancies are unintended and only half of all women who smoke cigarettes are able to quit during pregnancy (Chisolm, Cheng, & Terplan, 2014). Consequently, if cessation programs fail among fertile women, pregnancy intention must be a distinct indicator for cessation support during the pregnancy. Concerning the obstetrical history, prior legal abortion seems to have no significant impact on quitting tobacco smoking. However, prior PTB, and spontaneous abortion should be used as a powerful supportive factor in smoking cessation interventions timed to the pre- and early pregnancy care given that pregnant women want to ensure a successful pregnancy and healthy baby.

Limited education (eight or less elementary classes) with lower perceived risk to the fetus is a generally well-established predictor of continuing smoking during pregnancy. Yet, low levels of education have an important impact in the underdeveloped regions of Hungary. In our sample, the overall proportion of lower education was 47.6%; when stratified by ethnicity, however, clear disparities emerge. 87.5% and 24.7% of Roma and non-Roma women respectively have completed 8 grades or less of school. One could argue that keeping girls in school could be as (or more) important for ensuring the well-being of young girls (e.g., reducing unplanned pregnancies, reducing tobacco use, reducing maternal and neonatal health problems). It is also important to recognize the rise of non-marital childbearing and the growth of cohabitation. In the initial sample, the proportion of married women was 38.4% compared to cohabitant couples 61.6%. Thus, we agree with findings that continuing to smoke throughout the pregnancy is not a result of loneliness, but rather the lack of an intimate (marital) relationship (Kiernana & Pickett, 2006).

Concerning the socioeconomic status and contrasted to a recent study targeting African American women (Kendzor et al., 2012), our findings reaffirm previous research that unemployment and deep poverty are significant predictors of continued smoking during the pregnancy. However, because of the difference in samples between the Kendzor et al. (2012) study and ours, we can conclude that deep poverty among pregnant
women was definitely not associated with greater odds of quitting for economic reasons.

A specific study of smoking and non-smoking pregnant women’s dietary habits indicated significant differences to the smokers’ disadvantage in reduced intake only of milk product and vegetables (Ortega, Martines, Lopez-Sobaler, Andres, & Quintas, 1998). In our sample, reduced intake of dairy products was the only positive factor of smoking cessation. Considering the lack of data based on great samples in the literature correlating dietary and tobacco use behaviors during pregnancy, there is a clear need for surveys that address multiple lifestyle risk behaviors in a single project. Nevertheless, eating habits are for many reasons hardly comparable across nations and geographic regions thus related studies will only locally be relevant is smoking cessation interventions. Frequent coffee consumption was strongly interrelated with tobacco smoking. Among women who continued smoking, 76.6% drank coffee at least every other day.

ETS generated by partner was the second most important negative factor for not quitting during the pregnancy. It highlights the need to include smoking partners in studies hoping to reduce tobacco smoking during pregnancy (Ockene et al., 2002). Moreover, the lack of meaningful differences in the relationship between Roma and non-Roma and ETS exposure, suggests that family-based interventions are needed across all ethnic groups. The nature of this inclusion is critical because, e.g., only a booklet distributed for smoking partners about the commitment of the father to the pregnancy (quitting together would make a substantial positive impact on the health of the baby) had no effect on partners’ smoking (de Vries, Bakker, Dolan Mullen, & van Breukelen, 2006). Innovative techniques (telephone interviews, involving the participants’ local general practitioner and controlling carbon monoxide levels in the participants’ home) were effective and suggested to be more widely adopted (Stanton, Lowe, Moffatt, & Del Mar, 2004).

We are aware of limitations of our study for three main reasons. First, there was a relatively high percentage (10.0%) of pregnant women’s initial sample (n = 18,633) who did not self-identify their ethnicity. This might have biased the results of the study. Secondly, all pregnant women experienced a short minimal intervention for smoking cessation by their own MCHC nurses. Spontaneous cessation of smoking was reported by 28% in the USA among low-income pregnant women (Ockene et al., 2002). Without relevant data, we cannot estimate the potential for spontaneous cessation in our sample because all women received “something” (although the exact nature of the delivery of motivational interviewing was not measured). Third, outcomes of the multivariable analysis must be considered carefully because the individual decision for cessation is a result of numerous intellectual and emotional motivations based on past experiences. Additionally, each of our variables unifies many background factors in a simplified manner for practical reasons. It is true also for the ethnicity variable. Consequently, we believe that ethnicity should be part of the multiple factors that are considered when tailoring cessation interventions for pregnant women.

References


A Tool for Setting Therapeutic Goals by the Multidisciplinary Team for the Preschool Child With ASD (Autism Spectrum Disorder)*

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Day Centre for Children with Developmental Disorders, Messolonghi, Greece

The clinical profile of children with ASD (autism spectrum disorder) varies at the early stages of development. A variety of specific deficits may be observed, e.g., feeding difficulties, motor and verbal dyspraxia, sensory integration deficits, etc., therefore the need for multidisciplinary observation and assessment is necessary for setting realistic therapeutic goals. In 2007, the interdisciplinary team of the Day Centre developed a behavior observation tool (EDALFA—A tool of the Interdisciplinary Team for the evaluation of the level of functioning of the child with ASD) which provides a clinical profile of the child’s level of function and detailed targets for intervention. EDALFA consists of a developmental scale based on eight international scales and on systematic review of the recent literature. It includes the following observation measures: motor development, cognitive development, speech and language development, psychosocial development, everyday skills, play, other (joined attention, imitation, stereotypes). In every one of those functions, at each age level (1 month to 6 years) skills ranging from 0 to 9 are described, which the typically developing child is expected to master. Upon admission to the program, three therapists (psychologist, speech, occupational) observe systematically the child on a sufficient number of sessions and jointly complete the EDALFA protocol, which shows the developmental profile of the child compared to the typically developing child and the goals of therapy in a hierarchical way. To assess reliability of the tool, a study was carried out that compared the performance of 30 children (2 yrs to 5 yrs 11 mon) on the EDALFA and on Vineland questionnaires filled by the parents. Highly significant correlations were observed on the common measures of the two tools.

Keywords: Autism, multidisciplinary team, developmental scales, dyspraxia, sensory integration, feeding difficulties

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Introduction

Recent studies have shown that the diagnosis of autism can reliably be made by the 24th month of age (Ozonoff, Iosif, Baguio, & Hepburn, 2010; Georgiades, Szatmari, Zwaigenbaum, Bryson, & Brian, 2013) and that early intervention improves substantially the prognosis (Dawson et al., 2010; Helt et al., 2008). The clinical profile of children with ASD (autism spectrum disorder) varies considerably at these early stages of development. Besides the cardinal signs of autism, that is impairment in social communication, stereotypes and linguistic delay, a variety of specific deficits may be observed, e.g., difficulties in joined attention (Watson, Baranek, Crais, Reznick, Dykstra, & Perryman, 2007; Sullivan, Finelli, Marvin, Garrett-Mayer, Bauman, & Landa, 2007), feeding difficulties (Arvedson & Brodsky, 2002; Schreck, Williams, & Smith, 2004; Emond, Emmett, Steer, & Golding, 2010), sensory integration deficits (Ayres, 2005; Scott & Winnie, 2007) motor and verbal dyspraxia (Dziuk, Gidley, Apostu, Mahone, Denkia, & Mostofski, 2007; Tierney, Kurtz, & Souders, 2012), therefore, it is necessary for multidisciplinary observation and assessment for setting realistic therapeutic goals.

Until recently, most of the assessment tools of the level of functioning of children with ASD relied on parent reports (Vineland, Cars) or on short observations by one or two therapists usually psychologists or psychiatrists. Taking into consideration that a considerable number of children at this early age present with specific problems as those mentioned above, the need for multidisciplinary observation and assessment is necessary for placement of realistic therapeutic goals. In 2007, the interdisciplinary team of a Day Centre in Greece developed a tool of the multidisciplinary team for the assessment of the functional level of children with ASD-EDALFA (Kotsopoulos et al., 2010) which provides a clinical profile of the child’s level of function and detailed goals for the intervention.

Method Materials

Description of the Tool

EDALFA is not a test for the diagnosis of autism; it is a tool for the multidisciplinary team to assess the child on important psycholinguistic and motor functions, which would allow them to set joint realistic treatment aims and goals. It consists of: (1) manual with detailed descriptions of the tool’s usage; (2) answering forms or protocols; and (3) a scale of the levels of typically developing young children in various functions, with special emphasis in the first two years of life and on skills that are not usually included in other developmental scales.

The description of the stages of normal development is provided for every month for the first year of life, every two months until the age of two, and every six till the age of six. The developmental levels of the child with autism are compared with those of typically developing children in order to determine his/her profile, which would direct the treatment team to set realistic therapeutic goals for the intervention.

The developmental scale was based on five international scales (Zimmerman, Steiner, & Pond, 1992; Hindley, 1960; Bzoch & League, 2000; Mecham, 1958; Arverson, 2007; Fewell & Folio, 2000) and systematic review of the recent literature for inclusion of skills identified as important in the development of the child, e.g., joined attention, imitation, stereotypies etc.. The developmental scale includes detailed information on the development of the following functions: motor development (gross and fine movements), cognitive
development, speech and language development (comprehension and expression), psychosocial development (emotions-social skills), everyday skills (feeding, dressing, toilet training), play, and other (joined attention, imitation, stereotypes).

For each one of those functions, at each age level (one month to six years), there are from 0 to 9 skills that the typically developing child is supposed to have mastered. Table 1 presents an example of a table of the skills that a toddler 12 to 14 months has usually mastered.

In the answering forms of the tool, there are all the age levels from one month to six years and next to each one of them the number of skills that the typically developing child has mastered (see Table 2).

Table 1
An Example of Typical Development: The Child 12-14 Months of Age

<table>
<thead>
<tr>
<th>Typical Development</th>
<th>Age: 12-14 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor</td>
<td>Cognitive</td>
</tr>
<tr>
<td>Gross Motor</td>
<td>Fine</td>
</tr>
<tr>
<td>1. Walks five steps without support.</td>
<td>2. Climbs steps crawling.</td>
</tr>
<tr>
<td>1. Can put top on a bottle.</td>
<td>2. Holds two blocks.</td>
</tr>
<tr>
<td>1. Obeys simple verbal commands.</td>
<td>1. His vocabulary consists of approximately five words.</td>
</tr>
<tr>
<td>1. Can hold a medium size ball in his lap.</td>
<td>1. His vocabulary consists of approximately five words.</td>
</tr>
</tbody>
</table>

Table 2
Example of a Page of the Answering Form for 12 to 14 Months

<table>
<thead>
<tr>
<th>Age: 12-14 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor</td>
</tr>
<tr>
<td>Gross Motor</td>
</tr>
<tr>
<td>1 2 3 4 5 6</td>
</tr>
</tbody>
</table>
Completing the Answering Form of EDALFA

The multidisciplinary team at the Day Centre consists of child psychiatrists, speech language therapists, psychologists, occupational therapists, sociologists, social workers, and nursery school teachers. All therapists have received 180 hours of theoretical work and practical work on autism and have experience in the treatment of children with ASD. The diagnosis of autism is done in specialized hospitals with all the necessary neurological and clinical assessments. Furthermore at the Day Centre the Vineland, ADI-R and ADOS are given to every child along by clinical observation of the child by the child psychiatrists. When the diagnosis is completed, the particular case is assigned to three therapists of different disciplines. The therapists in two or alone (according to the severity of autism) have observation sessions with the child. The observation play therapy sessions last from 20 to 30 hour sessions. After the end of the observation period, the therapists involved complete together the Answering form of EDALFA.

The completion of the Answering form starts from the level of the chronological age of the child and progresses hierarchically to younger ages. For the mastering of a particular skill the symbol (O) is used (circling of the appropriate number). For the skills that are not yet mastered the symbol (X) is used (see Figure 1).

<table>
<thead>
<tr>
<th>Age: 12-14 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor:</td>
</tr>
<tr>
<td>Gross: 1 2 3 4 5 6</td>
</tr>
<tr>
<td>Fine: x x x x x x</td>
</tr>
<tr>
<td>Cognitive: x x x x x x</td>
</tr>
<tr>
<td>Language: x x x x</td>
</tr>
<tr>
<td>Receptive:</td>
</tr>
<tr>
<td>Expressive: x x</td>
</tr>
<tr>
<td>Psychosocial: 1 2</td>
</tr>
<tr>
<td>Skills of everyday life: x</td>
</tr>
<tr>
<td>Play: (2) (3)</td>
</tr>
<tr>
<td>Other: (Imitation, Joined attention, Stereotypes):</td>
</tr>
<tr>
<td>x x x</td>
</tr>
<tr>
<td>Commends:</td>
</tr>
</tbody>
</table>

A function is considered mastered if 60%+ of the corresponding skills have been mastered. In case that they have not, we go back to the immediately previous stage. Upon completion of the answering form the profile of the child is drawn. When the targets of therapy are achieved, a re-evaluation takes place and another EDALFA is completed. Below is the profile of a real case George, on first assessment.

**History Background**

George was the older boy in a family of two children, sibling’s development was typical. Pregnancy, delivery, and first months of development were uneventful. He walked at 13 months. He was assessed at the
age of two years nine months. At that time he had no speech, limited perception of verbal messages at home. Feeding difficulties: ate under pressure and vomited next. Not responding to his name. Appeared distant and indifferent to parents. Stereotypic, handling of toys watched the examiner but did not respond. Some interest in objects. Handled the telephone and pretended he talked. The diagnosis of autism was made on DSM-IV criteria. George was accepted at the Day Centre and his first EDALFA was completed at 38 months of age, nearly six months after his entrance into the program (see Figure 2).

A summary of the EDALFA assessment at the age of 38 months had as follow: gross and fine movements 36 months, cognitive skills 24 months, speech comprehension 16 months, speech expression of 16 months, psychokinetic skills 22 months, everyday skills 14 months, play 22, and other skills (joined attention, imitation) 22 months.

![Figure 2. Age of a child in months and his level of functioning on nine measures at the initial evaluation.](image)

As it was mentioned above for every function at each age level there are 1 to 9 skills that the typically developing child has mastered. Upon completion of the EDALFA the skills that have not been mastered, by the particular child that has been assessed, are identified and these become the therapy targets. The therapy targets are presented hierarchically from those of earlier stages to those of later.

**Therapy Targets (Two of Each Function) for George**

Therapy targets (two of each function) for George are as follows:

1. Gross motor: (a) to jump with two feet together from the first step of a ladder; and (b) to catch the ball in the air;
2. Fine motor: (a) to cut paper in the middle; and (b) to copy a circle and a cross;
3. Cognitive: (a) to start categorizing objects according to shape, color, and function; (b) to point with his
finger one or two pictures; (c) language Comprehension; (d) to understand words referred to simple space and quantity meanings; (e) to understand simple adjectives, and pronouns;

(4) Expressive language: (a) to use words rather than gestures to express needs; and (b) to name five members of his family;

(5) Psychosocial: (a) to show love and disagreement; and (b) to start feeling proud when achieving things;

(6) Skills of everyday life: (a) to start using a spoon even if most of the food will be spilled; and (b) to take his sock and shoes off;

(7) Play: (a) to make a tower with 4 blocks; and (b) to start parallel play with other children;

(6) Other: (a) to imitate house works. as well as two out of four words; (b) to develop further joined attention; and (c) the targets were given to parents for work at home.

After a year’s intervention the second EDALFA was completed at the age of 47 months (see Figure 3).

At 47 months, his Gross and fine motion were within the wider typical development range, his cognitive skills at 36 months, his comprehension of speech at 36 months, his expression of speech at 24 months, his psychokinetic skills at 24-30 months, his everyday skills at 24-30 months, his playing at 24-30 months, and other skills (joined attention, imitation) at 24 -30months.

New targets were made.

**Reliability of EDALFA and Usefulness in Clinical Practice**

To examine the reliability of EDALFA, and it is usefulness in clinical practice two studies were conducted.
that compared the EDALFA profiles of children with ASD with those of the Vineland questionnaires answered by the parents.

**Study 1**

The sample consisted of thirty children (30), 24 boys and 6 girls (2, 0 yrs to 5 yrs 11 months. mean: 3 yrs 9 months.) diagnosed with ASD (DSM-IV) and accepted at the Day Centre for therapy. For each one of them the Vineland questionnaire was answered by the parents and EDALFA was completed by the treatment team. The following seven measures were common to both tests. Gross and fine motor, communication receptive, and expressive, psychosocial, every day skills, play. A correlation analysis was made between measures shared by the two assessment tools (see Table 4).

**Table 4**

*Correlation Between EDALFA and Vineland: Initial Evaluation: 30 Subjects*

<table>
<thead>
<tr>
<th></th>
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</tr>
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<tbody>
<tr>
<td>Gross motor</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Fine motor</td>
<td></td>
<td>0.938**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commun. recept</td>
<td>0.935**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commun. expr.</td>
<td>0.885**</td>
<td>0.938**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychosocial</td>
<td></td>
<td></td>
<td>0.885**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Everyday skills</td>
<td>0.947**</td>
<td>0.896**</td>
<td></td>
<td>0.885**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Play</td>
<td></td>
<td>0.896**</td>
<td>0.947**</td>
<td>0.885**</td>
<td>0.938**</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note:* **p = 0.000.

**Table 5**

*Correlation Between EDALFA and Vineland: Follow-up Evaluation: Subjects 15*

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Gross motor</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Fine motor</td>
<td></td>
<td>0.938**</td>
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<tr>
<td>Commun. recept</td>
<td>0.935**</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Commun. expr.</td>
<td>0.885**</td>
<td>0.938**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychosocial</td>
<td></td>
<td></td>
<td>0.885**</td>
<td></td>
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</tr>
<tr>
<td>Everyday skills</td>
<td>0.947**</td>
<td>0.896**</td>
<td></td>
<td>0.885**</td>
<td>0.938**</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Play</td>
<td></td>
<td>0.896**</td>
<td>0.947**</td>
<td>0.885**</td>
<td>0.938**</td>
<td>0.896**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note:* **p = 0.000.

**Study 2**

Sample: 15 children of the 30 children of the first study were reassessed after completion of a treatment period, and Vineland questionnaires were filled again by the parents. The 15 children were those who remained in therapy for a period necessary for EDALFA re-assessment. To assess progress changes related to treatment a paired *t*-test was carried out between the EDALFA first assessment and re-assessment, as well as between the Vineland first and second questionnaires filled by the parents at the beginning and after a particular therapy period (see Tables 6 and 7). Furthermore, a correlation analysis was also carried out between the reassessments of the two tools EDALFA and Vineland (see Table 5).
Results

The correlations between measures of EDALFA and Vineland, on 30 children, were statistically significant (Pearson’s \( r \) ranging from 0.474 to 0.957) (see Table 4) in all corresponding variables of the two measures. Similarly, the correlation between EDALFA and VINELAND on the reassessment of the 15 children were statistically significant (Pearson’s \( r \) 0.885 to 0.947) on all 5 common measures (see Table 5). The observed changes on EDALFA and Vineland measures between initial and reassessment values, following a period of therapy, as assessed with the \( t \)-test were, with one exception, all highly significant (see Tables 6 and 7).

Table 6

<table>
<thead>
<tr>
<th>EDALFA first evaluation</th>
<th>EDALFA follow-up evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EDALFA follow-up evaluation</td>
</tr>
<tr>
<td>EDALFA first evaluation</td>
<td>EDALFA follow-up evaluation</td>
</tr>
<tr>
<td>Gross motor</td>
<td>( p = 0.096 )</td>
</tr>
<tr>
<td>Fine motor</td>
<td>( p = 0.004 )</td>
</tr>
<tr>
<td>Commun. recept</td>
<td>( p = 0.000 )</td>
</tr>
<tr>
<td>Commun. expr.</td>
<td>( p = 0.000 )</td>
</tr>
<tr>
<td>Psychosocial</td>
<td>( p = 0.000 )</td>
</tr>
<tr>
<td>Everyday skills</td>
<td>( p = 0.000 )</td>
</tr>
<tr>
<td>Play</td>
<td>( p = 0.000 )</td>
</tr>
</tbody>
</table>

Table 7

<table>
<thead>
<tr>
<th>Vineland first evaluation</th>
<th>Vineland reevaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vineland reevaluation</td>
</tr>
<tr>
<td>EDALFA first evaluation</td>
<td>EDALFA follow-up evaluation</td>
</tr>
<tr>
<td>Gross motor</td>
<td>( p = 0.000 )</td>
</tr>
<tr>
<td>Fine motor</td>
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<tr>
<td>Commun. recep</td>
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</tr>
<tr>
<td>Commun. expr</td>
<td>( p = 0.000 )</td>
</tr>
<tr>
<td>Psychosocial</td>
<td>( p = 0.000 )</td>
</tr>
<tr>
<td>Everyday skills</td>
<td>( p = 0.000 )</td>
</tr>
<tr>
<td>Play</td>
<td>( p = 0.000 )</td>
</tr>
</tbody>
</table>

Discussion

Objective of the present study was the presentation of a tool (EDALFA), developed by a team of therapists, for the clinical appraisal of the child with ASD on a number of variables. The clinical profile of the child and the detailed scale of deficits on each variable provide the steps the therapists will follow in a coordinated effort in the treatment. The profile provided by the scale addresses the problem of clinical variability observed among children with ASD particularly at the child’s preschool level. A variety of difficulties, e.g., attention, feeding, speech, etc., could not be dealt with by one professional discipline. The need for multidisciplinary involvement is necessary. The therapeutic goals may also be shared with parents and teachers involved. The absence of common therapy goals may make the therapeutic effort chaotic.

No doubt the clinical practice may lead to refinement and improvement of the steps which provide the
hierarchical targets by EDALFA that should be addressed. Essential part of EDALFA is the developmental scale of the typically developing child which offers norms and skills that the typical child at a particular age level is supposed to have mastered. These steps serve as mini milestone for the therapists to use and compare the child’s development level. This tool has been in use successfully at the Day Centre for Children with ASD for seven years now with minimal adjustments.

The comparison between the scores of EDALFA, and Vineland answered by the parents on measures with similar content in two different times, first with 30 and second on follow up with 15 subjects showed highly significant correlations. These associations indicate that EDALFA reliably assesses characteristics measured by Vineland.

**Limitations and Recommendations**

This paper is a pilot study. Further research with larger samples is needed.

**References**


Influence of Parenting Styles on In-School Adolescents
Achievement Goal Orientation and Academic Achievement

Obi Ifeoma E., Okeke Therese U.
Anambra State University, Uli, Nigeria

The aim of the study was to examine the influence of parenting styles on academic achievement and the extent to which the variable of goal orientation mediate the influence of parenting styles on academic achievement of in-school adolescents. Three research questions and three hypotheses guided the study. Eight hundred and thirteen in-school adolescents and their parents constituted the sample. Two sets of questionnaires were used to collect data for the study while hierarchical multiple regression analysis was used to analyze the data. The researchers found that authoritarian and authoritative parenting styles made significant contribution to students' academic achievement. While performance approach made significant positive contribution, performance avoidance had negative contribution to academic achievement. It was also found that achievement goal orientation partially mediated the influence of parenting style on academic achievement. The implications for practice were put forward.

Keywords: parenting styles, achievement goal orientation, academic achievement, adolescents, secondary education

Introduction

Academic achievement of adolescents has been one of the important concerns for societies, institutions and individuals. The prediction of academic achievement and the examination of factors relating to the academic achievement are topics of huge interest at different educational levels. As documented in research literature, adolescent achievement has been associated with several factors such as delinquency (Okorodudu, 2010); and educational and occupational attainment (Marjoribanks, 2005). Other important variables that can influence academic achievement of adolescents are achievement goal orientation and parenting styles.

Persistent poor academic performance of adolescents in the Nigerian secondary schools has been a source of worry to parents, teachers, educators, educational institutions, and the Nigerian government (Adeyegbe, 2002; Akinsolu, 2010; Asikhia, 2010; Adeyemi, 2011; Olorundare, 2011; Oluwatimilehin & Owoyele, 2012). This is so because success or failure at this level determines one’s chances of gaining admission into the university, a goal that is desired and sought after by most parents, teachers and schools. It is not surprising therefore that appalling strategies such as students’ patronage of “miracle centres” (examination malpractice syndicates), schools and teachers aiding and abetting students’ examination malpractice, among other similar practices are widespread (Ibrahim & Usman, 2008).

Increasing adolescents’ academic achievement has been one of the abiding interests of most Nigerian educators and researchers. Therefore, factors that positively or negatively impact on adolescents’ academic
Achievement goal orientation is the purpose that motivates students within the academic setting (Wolters, 2004). Elliot (1999) posited that adolescents respond to difficult and challenging situations with one of three different goal orientations: mastery, performance-approach, and performance-avoidance. Mastery orientation focuses on engaging in tasks for the sake of improvement in learning. Performance-approach orientation focuses on engaging in tasks for the sake of outperforming others while performance-avoidance focuses on avoiding tasks for the sake of preventing embarrassment or shame.

In addition to the influence of goal orientation on academic achievement of adolescents researchers have emphasized the impact of parenting styles on academic achievement. Baumrind (1967) developed a parenting style typology which consists of authoritarian, authoritative and permissive parenting styles. Authoritative parents are characterized as having a high degree of responsiveness and warmth. They combined mutual reciprocation toward their children in setting rules and limits as well as exhibit high level of control and demandingness. Authoritarian parents, on the other hand, are highly controlling and demanding in their use of authority. They do not condone disobedience and confrontation from their children with regards to set down rules, regulations and decisions. Authoritarian parents are also not responsive. Permissive parents are either indulgent or neglectful. Indulgent parents are characterized by a high degree of responsiveness and warmth, but exhibit low control or demandingness in setting rules or limits while neglectful parents do not exhibit any degree of either responsiveness or warmth nor do they exercise any degree of control or demandingness.

Parenting style has been examined in many international studies as a strong predictor of adolescent academic achievement (Star, 2011; Wintre & Yaffe, 2000). Some researchers found that the authoritative parenting is associated with higher academic achievement (Mattern, 2005; Aunola, Stattin, & Nurmi, 2000). However, reports across different findings have not been inconsistent across culture, suggesting a possible cultural difference (Spera, 2005; Hae-Seong & Bauer, 2002).

Consequently, research in a different cultural context would be relevant. In Nigeria, recent empirical studies on parenting styles focus on its influence on problem behaviour (Maliki & Inokoba, 2011; Tunde-Ayinmode & Adegunloye; 2011; Omolola, 2011; Akanbi & Oyewo, 2013; Umo, 2013) while a few that addressed its relationship with students’ academic achievement were done at the primary school level (Fakeye, 2008; Shobola, Omoregbe, & Olufemi, 2012). Although Ogunleye, Omirin, and Balogun (2013) examined the influence of parenting style on secondary school students’ academic achievement using a small sample of secondary school students in one school, there is need to not only extend this study but also ascertain whether the influence of parenting style on academic achievement is more direct or mediated by students’ achievement goal orientation. Therefore, this work seeks to examine the contribution of parenting styles to students’ goal orientation and academic achievement on one hand and the contribution of the students’ goal orientation to academic achievement on the other hand. It will also explore the mediating role of achievement goal orientation in the contribution of parenting styles to academic achievement.
Hypotheses

H1: Parenting styles will not significantly contribute to in-school adolescents’ goal orientation (mastery goal, performance approach and performance avoidance);

H2: Parenting styles will not significantly contribute to in-school adolescents’ academic achievement;

H3: Achievement goal orientation will not significantly contribute to in-school adolescents’ academic achievement;

H4: Achievement goal orientation (mastery, performance approach and performance-avoidance) will not mediate contribution of parenting styles to in-school adolescents’ academic achievement.

Theoretical Background

Evidence from research studies, most of which were international, indicate direct and indirect influences of parenting styles on students’ academic achievement and other factors associated with academic achievement such as goal orientation and motivation. These constituted the theoretical basis for this research.

Parenting Styles, Goal Orientations, and Academic Achievement

Parenting style is described as a combination of attitudes toward a child that are communicated to the child which create an emotional climate expressed by parents’ behaviour and which influences the child’s (Darling & Steinberg, 1993). Baumrind (1967) developed a typology of parenting styles which was used to examine the differential impact of authoritative, authoritarian and permissive parenting on academic achievement of adolescents. Authoritarian parents are highly controlling in their use of authority but are not responsive. They have high expectations of maturity and want to control their child’s behaviour and attitudes; and do not condone disobedience and confrontation from their children with regards to set down rules, regulation, traditions and decision. Authoritative parents are warm and communicate well with their children. They are both responsive to the needs of their children and demanding in that they set expectations for their children. This type of parenting style permits children enough freedom of expression so that they can develop a sense of independence without extending beyond reasonable limits. Permissive parents on the other hand are high in warmth but lack control towards their children. They are more responsive to the needs of their children but less demanding. Permissive parents are lenient, do not require mature behaviour, allow considerable self-regulation and avoid confrontation (Macoby & Martin, 1983).

The foregoing suggests that parenting styles may be linked to children’s motivational forces. Ginsburg and Bronstein (1993) observe that over- and under-controlling parenting styles were linked to extrinsic motivation, while parental encouragement in response to grades and autonomy-supporting family styles were linked to intrinsic motivation. Intrinsic motivation relates to the tendency for a student to engage in a task for the interest and desire to learn rather than external forces. Intrinsic motivation has been associated with mastery goal orientation while external motivation is associated with performance avoidance goal orientations (Ames, 1992; Church, Elliot, & Gable, 2001).

Baumrind’s (1971) proposition that certain parenting styles such as permissive parenting has the potentials for low social and cognitive competence among children have been subjected to empirical investigation. Considerable number shows a relationship between parenting styles and academic achievement. Several studies in the literature found that the authoritative parenting style was positively associated with higher academic achievement while authoritarian and permissive parenting styles were negatively associated with high academic
achievement (Aunola, Stattin, & Nurmi, 2000; Walker, 2010). These are likely because of the link between parenting styles and children’s motivational outcomes such as achievement goal orientations.

**Goal Orientations and Academic Achievement**

Goal Orientation emphasizes the purpose for which an individual participates in an activity or engages in a task. Goal orientations are regarded as integrated patterns of motivational beliefs that represent different ways of approaching, engaging in, and responding to achievement-related activities (Ames, 1992). Elliot (1999) posited three types of achievement goals orientation namely mastery orientation, performance-approach orientation and performance-avoidance orientation.

Mastery goal focused on the development of competence or the attainment of task mastery (Dweck, 2000). Adolescents who possess a mastery goal orientation seek to understand the material they are learning, master a skill, and increase their competence through their own effort. This type of goal orientation helps them to maintain their competence in the face of failure, to eliminate negative effect such as anxiety, to lessen the probability of distracting thoughts, and to free up cognitive capacity, which in turn leads to more cognitive engagement and higher achievement outcomes (Jewrell, 2006).

Adolescents possessing a performance approach or performance-avoidance focus on their ability rather than the task, are mainly concerned with high marks in tests and examinations as a demonstration of their ability. They work to maintain their position relative to others in the class and strive to gain favourable judgments of their competence and to avoid negative judgment (Dweck, 2000). Adolescents who possess performance approach goal are positively motivated to try to do better than others. While those who possess performance-avoidance goal are negatively motivated to try avoiding failure or appearing incompetent (Elliot, 2005).

Several studies in literature have indicated that different goal orientations can lead to different educational outcomes. Mastery goal orientation will lead to many positive outcomes such as attribution of success to effort (Ames & Archer, 1988), interest in school work (Pintrich, 2000), academic self-efficacy (Roeser, Midgley & Urden, 1996), persistence in challenging tasks (Dweck, 2000). Performance approach is also related to a number of positive outcomes such as use of cognitive strategies and high academic achievement (Pintrich, 2000; Church, Elliot, & Gable, 2001). Performance-avoidance goals are related to negative outcomes such as superficial learning strategies (Elliot & Church, 1997), threat-related effect while studying (Skaalvik, 1997), reluctance to seek academic assistance (Newman, 1998), withdrawal from effort in the face of failure (Dweck & Leggelt, 1998) and anxiety before and during examination (Elliot & Harackiewicz, 1996).

Despite the supportive evidence by researchers on the influence of achievement goals on academic achievement, there still remain some contradictions in the research literature. Some studies have indicated the negative effects of performance-approach goals on academic achievement despite previous findings that postulate the positive influence of performance-approach on academic achievement (Linnebrink, 2005; Sideridis, 2003).

A number of research evidence suggests that parenting styles and students’ goal orientation are predictors of academic achievement (Duff, Boyle, Dunleavy, & Ferguson, 2004; Elliot & McGregor, 2002). But these variables and their roles in determining academic achievement have not been sufficiently studied in Nigeria. Since the identification of factors which will influence students’ academic achievement is very important, it is necessary to investigate the influence of parenting styles on in-school adolescents’ academic achievement and how achievement goal orientation mediate the influence of parenting styles to academic achievement.
Method

Participants

The participants were 813 in school adolescents and their parents. These students are at the senior level in secondary schools in Awka Education Zone of Anambra State of Nigeria. The sample of students consisted of 440 males and 373 females and had mean age of 17 years in a range of 14 to 20 years. Their parents consisted of 468 males and 345 females. Greater proportion (517) of the parents’ educational qualification was below first degree.

Instrument

Two sets of questionnaires were used for data collection - the parenting style index and Students’ Goal Orientation Questionnaire. Parenting style index that was used to measure parenting styles was adapted from Parenting Practices by Robinson, Mandleco, Olsen, and Hart (1995). The original instrument of 62 items had 27 items relating to authoritative parenting style, 20 items relating to authoritarian parenting style and 15 items relating to permissive parenting styles. The questionnaire used for this study was 50-item with 15 relating to authoritative parenting style, 24 relating to authoritative parenting style and 11 items relating to permissive parenting style. The response format was modified from five to a four-point Likert format of: “Strong disagree” (1), “Disagree” (2), “Agree” (3), and “Strongly agree” (4). Some of the words used in the questionnaire were changed for better understanding for the target population. For example, instead of “I bribe my child to bring about compliance”; the word “obedience” was used. The expression, “I am ‘unsure’” was substituted for “I appear unsure” and instead of “I emphasize the reasons for rules”, “I explain the reasons for obeying rules” were used. Considering the cultural differences, the researchers decided to establish the reliability of the instrument using a sample of 40 parents from the same education zone. Good reliability was recorded as the results of internal consistency reliability coefficients of 0.81 for authoritative parenting style, 0.78 for authoritarian parenting style, and 0.76 for permissive parenting style was obtained.

The students’ goal orientation questionnaire was adapted from previously used scales developed by Midgley et al. (1998). It comprises three sub-scales; mastery, performance approach and performance avoidance with six items for each sub-scale. Its response pattern was based on a five-point Likert format ranging from 5 (“Strongly agree”) to 1 (“Strongly disagree”). Its reliability was also tested using sample of 30 students in one of the secondary schools in the Awka education zone. The analysis yielded internal consistency reliability coefficients of 0.80 for mastery, 0.82 for performance approach, and 0.75 for performance avoidance. These were regarded as high enough for the study.

The cumulative annual average of the students’ results were used to measure their academic achievement. Cumulative results are the overall academic performance of all courses completed by the students. The cumulative results were used as this would portray their annual performance in the three academic terms during the previous year.

Data Collection Procedure

Instruments for data collection were distributed by the two researchers assisted by two assistants. To assure the participants of confidentiality, no names were used, instead the questionnaires for the students and their parents were coded using the classes A, B, C, and serial numbers on the class score sheets. The questionnaire on parenting practices meant for the parents were enclosed each in an envelope. Student A1 on the score sheet collected questionnaire A1 on goal orientation meant for students and collected his/her parent’s (mother or father) questionnaire A1 on parenting style meant only for parents. The questionnaire for the parents already coded were
taken home by the students during their one month vacation and brought back by the students at the end of the vacation. The need to be honest and objective in filling the questionnaire was explained to the students while assuring them that there were no correct or wrong answers. The students filled their own questionnaire at the end of which they were collected by the researchers and their assistants. The cumulative results of the students were released to the researchers by the Deans of Studies of the respective schools.

**Method of Data Analysis**

Hierarchical multiple regression was used to analyze the data. This method involves entering the predictors and mediating variable in steps to determine both the main effects of parenting styles and mediating role of achievement goal orientation in the relationship between parenting styles and academic achievement. The multiple correlation ($R$) and the ($R^2$) was used to evaluate the strength of the joint contribution of both the three parenting styles (authoritative, authoritarian and permissive) and the mediating variable (achievement goals). The regression coefficients or Beta weights ($\beta$) will be used to judge the strength of the contribution of each of the predictors.

**Results**

**Preliminary Analysis**

Table 1 presents the mean scores and standard deviation of predictors, mediating and outcome variable. Respondents’ mean score of 36.39 on authoritarian parenting style on a measure that ranged between 15 and 60 shows a moderate use of this style. The mean score of 20.84 on permissive style on a scale ranging between 11 and 44 indicates that their use of this style is below average while mean score of 69.66 on authoritative parenting style on a scale ranging between 24 and 96 shows relative high use of this method.

In terms of Students Goal Orientation, mean scores of 26.02, 22.88, and 19.06 on a scale ranging from 6-30 that all are above the theoretical mean (18) and that students adopt multiple goal orientation even though they seem to adopt master goal orientation more than the others.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Means and Standard Deviations of Parenting Styles, Achievement Goal Orientation, and Academic Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$N$</td>
</tr>
<tr>
<td>Authoritarian parenting style</td>
<td>813</td>
</tr>
<tr>
<td>Permissive parenting style</td>
<td>813</td>
</tr>
<tr>
<td>Authoritative parenting style</td>
<td>813</td>
</tr>
<tr>
<td>Mastery goal</td>
<td>813</td>
</tr>
<tr>
<td>Performance approach goal</td>
<td>813</td>
</tr>
<tr>
<td>Performance avoidance goal</td>
<td>813</td>
</tr>
<tr>
<td>Academic achievement</td>
<td>813</td>
</tr>
</tbody>
</table>

As shown by the Table 2, there was no risk of multicollinearity as most of the variables were not highly correlated with each other. As would be expected, authoritarian parenting style was negatively correlated with authoritative ($r = -0.24$) while authoritative was negatively correlated with permissive parenting style. Authoritarian style had significant positive correlation with performance approach ($r = 0.35$) and academic achievement ($r = 0.30$) and a significant negative correlation with performance avoidance ($r = -0.17$). On the other hand, authoritative style had significant negative correlation with performance approach ($r = 0.10$) and academic achievement ($r = 0.16$).

Regarding the correlation between goal orientations and academic achievement, mastery approach had no
significant correlation with academic achievement \((r = 0.04)\), performance approach had significant positive correlation with academic achievement \((r = 0.42)\) while performance avoidance had significant negative correlation with academic achievement \((r = -0.27)\).

Table 2

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Authoritarian</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Permissive</td>
<td>0.02</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Authoritative</td>
<td>-0.24*</td>
<td>-0.42*</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Mastery</td>
<td>-0.03</td>
<td>0.03</td>
<td>0.02</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Performance approach</td>
<td>0.35*</td>
<td>-0.02</td>
<td>-0.10*</td>
<td>0.00</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Performance avoidance</td>
<td>-0.17*</td>
<td>-0.13*</td>
<td>0.35*</td>
<td>-0.03</td>
<td>-0.09*</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>7. Academic achievement</td>
<td>0.30*</td>
<td>0.02</td>
<td>-0.16*</td>
<td>0.04</td>
<td>0.42*</td>
<td>-0.27*</td>
<td>-</td>
</tr>
</tbody>
</table>

Substantive Analysis

H1: Parenting style will not significantly contribute to in-school adolescents’ goal orientation (mastery goal, performance approach and performance avoidance).

Parenting styles (authoritarian, permissive and authoritative) had joint significant contribution to the variance in performance approach \((R = 0.35, R^2 = 0.12, F = 29.62)\) and performance avoidance \((R = 0.36, R^2 = 0.13, F = 41.00)\) but made no significant contribution to mastery goal orientation. In terms of individual contribution of parenting styles to performance approach and performance avoidance, only authoritarian parenting style made significant positive contribution \((\beta = 0.34)\) whereas it made significant but negative contribution to performance avoidance \((\beta = -0.09)\), authoritative parenting styles had significant positive contribution to performance avoidance \((\beta = 0.31)\).

Table 3

<table>
<thead>
<tr>
<th>Variables entered as predictors</th>
<th>Mastery goal</th>
<th>Performance approach</th>
<th>Performance avoidance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
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</tr>
<tr>
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</tr>
<tr>
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<td>0.01</td>
<td>-0.02</td>
</tr>
<tr>
<td>Permissive</td>
<td>0.02</td>
<td>0.01</td>
<td>0.04</td>
</tr>
<tr>
<td>Authoritative</td>
<td>0.01</td>
<td>0.01</td>
<td>0.04</td>
</tr>
<tr>
<td>R</td>
<td>0.05</td>
<td>0.95</td>
<td>0.35</td>
</tr>
<tr>
<td>R^2</td>
<td>0.00</td>
<td>0.00</td>
<td>0.3721*</td>
</tr>
<tr>
<td>F</td>
<td>0.73</td>
<td>0.73</td>
<td>37.21*</td>
</tr>
</tbody>
</table>

Note: *Significant.

H2: Parenting styles will not significantly contribute to in-school adolescents’ academic achievement.

As shown in the Table 3, parenting styles (authoritarian, permissive and authoritative) made significant joint contribution to the variance in academic achievement \((R = 0.32, R^2 = 0.10, F = 29.62)\). The \(R^2\) showed that parenting style explained 10% of the variance in academic achievement. It was therefore concluded that parenting style made significant contribution to in-school adolescents’ academic achievement. In terms of individual contribution of the different parenting styles, Authoritarian style made the highest positive contribution \((\beta = 0.27)\), followed by authoritative style \((\beta = -0.11)\) which made negative contribution to
academic achievement. Permissive parenting styles did not make significant contribution.

H3: Achievement goal orientation will not significantly contribute to in-school adolescents’ academic achievement.

Step 2 of the hierarchical multiple regression analysis shown in Table 3, indicates that achievement goal orientation (mastery goal, performance approach and performance avoidance) made significant joint contribution to the variance in academic achievement ($R = 0.48$, $R^2 = 0.23$, $F = 81.85$). The $R^2$ shows that achievement goal orientation explained 23% of the variance in academic achievement. It was therefore concluded that achievement goal orientation made significant contribution to in-school adolescents’ academic achievement. Regarding the unique/individual contribution of each of the goal orientation, performance approach made the highest contribution as shown by its standardized beta weights ($\beta = 0.40$), followed by performance avoidance ($\beta = -0.23$) that made significant negative contribution to academic achievement. Mastery goal did not make significant contribution ($\beta = 0.03$).

H4: Achievement goal orientation (mastery, performance approach and performance avoidance) will not mediate contribution of parenting style to in-school adolescents’ academic achievement.

As shown in Step 3 of the hierarchical multiple regression analysis in Table 3, achievement goal orientation jointly made an incremental variance of 15% as shown by the change ($R^2 = 0.15$). In terms of its unique mediating effect on each of the parenting styles, when achievement goal orientation was added to the model, the contribution of authoritarian parenting styles to academic achievement changed from $\beta = 0.27$ to $\beta = 0.14$ (0.13 decrease) while the contribution of authoritative parenting styles changed from -0.11 to -0.03 (-0.8 decrease). Although the contribution of authoritarian style was still significant, authoritative style was statistically non-significant. It was concluded that achievement goal orientation mediated the relationship between parenting styles and academic achievement (See Table 4).

Table 4
Hierarchical Multiple Regression of Academic Achievement on Parenting Style and Achievement Goal Orientation

<table>
<thead>
<tr>
<th>Variables entered as predictors</th>
<th>B</th>
<th>SE B</th>
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<td>0.27*</td>
<td></td>
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<tr>
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<td>0.13</td>
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<td>0.25</td>
<td>0.15</td>
<td>44.93</td>
<td>54.37*</td>
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</table>

*Significant.
Discussion of Findings

The results of this study show that authoritarian and authoritative parenting styles made significant positive contribution to two of the three goal orientations—performance approach and performance avoidance. This is consistent with the propositions made by Ginsburg and Bronstein (1993) which suggests that the level of parental control influences a child’s adoption of intrinsic or extrinsic motivations to tasks and activities.

Another interesting finding reveals that parenting styles made significant contribution to in-school adolescents’ academic achievement. The result of the present study did not support the work of Jewrell (2006) who found that parenting styles were not significantly related to academic achievement. In terms of individual contribution of different parenting styles, the study found that authoritarian style made the highest positive contribution, authoritative style made negative contribution, while permissive style did not make significant contribution.

Results of the present study was inconsistent with the findings by Jones, Forehand, and Beach, (2000), Walker (2010) who found that authoritative parenting contribute to higher academic achievement; whereas authoritarian and permissive parenting lead to lower academic achievement. One of the plausible reasons for this situation is that parenting style may be mediated by other individual factors that may strengthen or contribute to its explanation of academic achievement (Fang, Xiong, & Guo, 2003). Moreover, several researchers contended that the effect of parenting style on academic achievement was not consistent across cultures, ethnicity or socioeconomic status (Spera, 2005; Hae-song & Baucer, 2002).

The study also found that among the three goal orientations, two (performance-approach, performance-avoidance) made significant contribution to academic achievement while mastery goal did not. This finding failed to support previous research results (e.g., Pintrich, 2000) which suggest that mastery goal contributes to higher academic achievement. One reason for this finding may be that in-school adolescents are positively motivated to do better than their classmates so that they will be recognized as being competent by their parents.

The study also revealed that goal orientation jointly made an incremental variance to parenting styles in explaining academic achievement. Significant changes in $R^2$ occurred when goal orientation was added to parenting styles in the regression model. In terms of its unique mediating effect on each of the parenting styles, the contribution of authoritative parenting to academic achievement was fully mediated while authoritarian parenting was partially mediated. This is an indication that authoritarian parenting still contributes positively to academic achievement even when the influence of goal orientation was accounted for. This is inconsistent with Sideridis’ (2003) research finding indicating that performance approach has negative effective on academic achievement but consistent with the finding reported by Church, Elliot, and Gable (2001) which found that the performance approach orientation was positively related to actual performance at least in terms of final course grades for college students. A possible explanation for this could be due to much emphasis on obedience and strictness orientation of most in the Nigerian culture.

Implications for Practice

It is possible that the capacity of parenting styles to elicit either positive or negative outcome depends on the culture and the adolescent’s characteristics. It is important that parents approach their parenting practices with this in mind. Parents should therefore engage in parenting skills that works best for them and their
Since parenting styles have positive relationship with educational outcomes such as goal orientation and academic achievement, schools, teachers and school counsellors should create a platform for developing parenting skills. This could be achieved by creating parental skills development centres in their schools. This practice has not been given much attention in Nigeria.

Counsellors should seek and keep information on students’ parenting styles. This will enable them to help students develop and/or change goal orientation that would facilitate the positive learning outcome.

**Limitations of Study**

The measure of parenting style was derived from either students’ mother or father. This may not give a balanced view of the parenting style. It is possible that there may be gender differences in parenting styles. Further study may derive this measure from both parents. Parents of relatively low education constituted the greater proportion of sample; this may have influenced the result. Further study may need to incorporate as control variable or moderator to eliminate possible confounding effects. Despite these limitations, this study has contributed to our understanding of the dynamics of parenting styles, goal orientation and academic achievement of adolescents at the secondary school level.

**References**


Simulation and Virtual Learning Environments: Tools for Teaching Psychology in Higher Education

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Universidad Alas Peruanas, Lima, Perú

This article provides a description of the simulation and virtual learning environments, applied in psychology. The existing literature has been reviewed: the precedents, definitions, uses, and advantages from diverse perspectives of different authors, who have applied this support tools on education. Although there are not enough studies in the psychological area, the importance of the topic suggests it is necessary to continue with this kind of investigations, which may assist as a referent to psychologists immersed in the teaching field.

Keywords: virtual environments, simulation, learning, teaching in psychology

Background

At present, the information and communication technologies have changed dramatically, especially in the teaching field. All the different options we have today in higher education, such as traditional classroom education, blended and online education, or distance learning, use these technologies. They have been changing and transforming themselves to provide students new spaces and ways of learning, virtual spaces supported by the wide range of tools that these technologies offer. In addition, our students think and process information in a different way we used to. We are dealing with digital natives, since they were born and are being raised using the internet, and the social networking websites. Chiercher, Donolo, and Corica (2013) state that these digital natives, who are now part of our classrooms, spend their lives within these two spaces: the physical and the virtual world, having a real and a digital identity. Regarding this aspect, Cabero (2010) states that technology is becoming one of the most crucial variables in the education of this knowledge society, since it allows the creation of more flexible learning environments, as well as it provides an endless amount of information. At the same time, these technologies influence our ways of understanding, processing and analyzing the world around us, and simulating and recreating real-like scenarios. Consequently, they become significant tools for training, since they enhance cognitive skills and facilitate a cognitive unity between the attitudes and skills of the individual.

McLoughlin and Lee (2007) state that the new digital tools and their technological capabilities demand a new conceptualization of teaching, since they allow to develop skills and technological resources, whose main purposes are making students participate in learning networks, personalizing learning tasks, and producing knowledge; and abilities that students nowadays should have. Regarding this aspect, Arbeláez (2010) says it is necessary to explore new techniques intended to facilitate learning and the acquisition of knowledge. In order...
to achieve this, there is a possibility to apply these technologies through three-dimensional virtual worlds, in which technology, content, and opportunities for interaction with other people, combines with recreational and instructional designs that make the immersion and simulation a suitable learning environment.

In the same way, Fernández (2009, p. 34) affirms that, “Virtual refers to everything that not even existing physically, has similar characteristics to its real reference and it even causes the actual effects this would produce”. From this perspective, simulation and virtual learning environments, as learning tools in teaching, are the new training scenarios that demand pedagogical and technological challenges. Teachers and students should be able to cope with these changes, since it is another way to learn and develop the skills required in different careers. It is important to consider that this “New training system breaks the trilogy: time, space, and activity in physical locations (real)”; as a consequence, according to Chiecher et al. (2013), this leads to a change from a linear learning to learning in virtual environments, discarding the content-centered teaching, changing it by a teaching focused on personal and professional development of the student.

This new conceptualization of education has not only influenced the training of future psychologists, but also health sciences in general; in this regard, Juanes (2011) states that the technological revolution is transforming educational systems related to health sciences, since they provide useful tools for university education, allowing the creation of artificial situations, close to the real ones. Botella, Baños, García, Quero, Guillen, and Marco (2007) indicates that the use of technology and the progress it has been through, related to its application in the field of clinical psychology, will facilitate the job of health professionals, since they now have a large number of virtual tools.

**Simulation and Virtual Learning Environments**

Taking into account this technology-based environments, which are not new, considering that in the 20th century in 1965, Ivan Sutherland was the first to refer a computer-generated illusion. He said that a display connected to a computer gives us the chance to become familiar with concepts not realizable in the physical world. This creates a new vision to the application of technologies in a three-dimensional virtual world that simulates reality, allowing human-computer interaction. Whether this relationship occurs or not, it is important to answer to the following question: What are the simulation and virtual 3D learning environments?

In this regard, there are various definitions from different perspectives; some authors define them as virtual reality, such as Carmona (2012) who defines them as a virtual reality environment. This environment may be real or imaginary, and it can be visually experienced in three dimensions (width, height, and depth). Roy, Klinger, Légeron, Lauer, Chemin, and Nugues (2003) goes further, he indicates that these environments provide an interactive visual experience in real time with sound and with the possibility to add other types of feedback, such as tactile sensations. Chiecher et al. (2013) defines them as the artificial reproduction of the real world, in which students acquire psychomotor skills and knowledge, in a safe environment. Fonseca, Valdés, and Mestre (2007) define simulation and virtual learning environments as a group of computer and telematic facilities that boost communication and exchange of information in the teaching-learning process. For Salinas (2011), virtual environments are hosted educational web spaces that contain a set of tools that allow learning interaction. On the other hand, Ruiz (2012), who works in the clinical field, says that simulated environments are learning tools, whose main goal is the acquisition of skills, by training in an environment, as close as possible to a real context. This allows the students to perform activities as many times as they need in order to master a technique, without causing any harm to the patient. In this way, the margin for human error will be
reduced, providing the students with more confidence when actually dealing with the patient. He also states that simulated environments are adequate and appropriate for the training and education of students in medical areas.

Coll (2003) points out that virtual environments are based on symbolic aspects that help boosting learning. However, they must follow the formal steps in the teaching-learning process, which are anticipating and planning of actions to be taken, emphasizing the interactivity, which allows a more active and contingent relation to information. This facilitates adaptation to different learning rhythms, and dynamism when giving the opportunity to interact with virtual realities, enabling students to explore, reflect, and experiment. García, Pericot, Gutiérrez, and Ferrer (2009) in their study about the use of technology for the treatment of smoking, defined it as the computer-based technology that generates three-dimensional environments with which the subject interacts in real time, thus producing a sense of immersion, similar to that in the real world. Fonseca et al. (2007) indicates that virtual teaching and learning environments are spaces where conditions are created so that students can get new knowledge and experiences; in other words, new elements that generate the processes of analysis, reflection, and acquisition.

Whether these environments are defined as virtual reality, simulation and learning environments or clinical simulation, the truth is that they have changed the view of the teaching-learning process in health sciences, and therefore in psychology. The implementation and use of these tools in the students training is becoming more generalized due to the benefits it provides and because they enable the development of professional skills. Bearing this in mind, it is worth noting that, as mentioned by Alvites (2012, p. 40), “The psychologist as any other professional who is involved in the teaching area, is forced to change, adapt and readjust their skills and experience to the new requirements and educational needs of these prospective professionals living in this digital generation; encouraging autonomy, and teaching them how to develop and build their own interpretations, and to rebuild culture and knowledge”. In addition, we already have empirical research in psychology, applying these technologies for assessment, diagnosis, and treatment of psychological disorders; including anxiety, depression, smoking, among others. However, there is still rejection from academic psychologists to incorporate these technologies in their class sessions, as Gonzales, Montero, Pérez, and Balbuena (n. d.) corroborates, the main drawback in the use of technology for research in psychology is the resistance of the academics to simulation and the lack of preparation of psychologists in computer-related topics.

**Use of Simulation and Virtual Learning Environments**

The use of technology for psychological treatments dates back to 1980. At first, they were used for the treatment of phobic disorders. Regarding this, Carmona (2012) indicates that the use of virtual simulation environments offers an opportunity to study the different types of specific reactions that students may have, when they are immersed in risk situations, since they allow to recreate real-like scenarios, getting responses similar to those in real life, but in a virtual world. Therefore, there is a real possibility that these modeled scenarios, virtually simulate any circumstance similar to real life. This provides an interactive visual experience in real time, allowing the person to see, hear, and feel sensations, and believe that he is actually “there”. In order to use simulation and virtual learning environments, Mestre, Fonseca, and Valdés (2007) mention that it is mandatory that these environments have telepresence, understood as the sensations result of interactions, according to the level of realism provided by the display of content in the environment. Gonzales, Montero,
Pérez, and Balbuena (n. d.) report that a three-dimensional world created by a computer, allow us to experience the feeling of being there, which means that the brain, all the body systems, as well as the emotions react as if the invented environment was real.

Osorio, Ángel, and Franco (2012) emphasize that the use of technology through the implementation of simulated virtual environment allows the development of skills and competencies, making the students learning to do and learning to know through simulations, as well as permitting them to interact with other users’ personalized identities (avatars) and three-dimensional objects. This brings students close to real-like situations, similar to the ones occurring in real context. Riofrío (2012) mentions that these environments or virtual worlds were created to train their users, since they not only increase the attention and participation of the students, but also encourage them to keep interacting with the proposed contents. Regarding this, Botella et al. (2012) indicates that these settings offer the possibility to use virtual environments as therapeutic tools in psychology since they are flexible enough to allow the design of various tailor-made scenarios for each type of disorder, in which the patient finds out that feared situations and obstacles can be overcome through confrontation and effort. Quero, Botella, Guillen, Moles, Nebot, and García-Palacios (2012) emphasize that technology is useful for treating post traumatic stress disorder, adaptive disorders and pathological grief. Botella, Quero, Serrano, Baños, and García (2009) also mention that within the field of psychology, these technologies have been applied in experimental, clinical, educational, and social psychology as well as in psychological evaluation.

**Advantages of Simulation and Virtual Learning Environments**

There are multiple advantages offered by these new learning environments. As Gonzales et al. (n. d.) says, virtual scenarios have a high visual quality, and allow us to use modeling and animation techniques, making the spaces and characters, that are part of the simulation, seem more realistic to the user. Arbeláez (2010) states that simulation virtual environments allow the practice and acquisition of knowledge through the implementation of case studies or real situations (which are frequently applied in psychology). In this way, students would be able to diagnose and follow good practices in the assessment, diagnosis, and treatment of patients. In the same way, he says that virtual environments facilitate learning because they are used to recreate a specific situation, allowing the design of humanizing interactive processes with educational purposes. (Johnson & Patterson, 2007, as cited in Arbeláez, 2010) indicate that students can make mistakes in these environments and they can practice as much as they need in order to achieve the desired competencies, without harming any human being. Meanwhile, O. Tatli and Z. Tatli (2010) mentions that simulation through virtual environments allows students to follow appropriate procedures, taking into consideration the theory acquired in formal classes; and at the same time, it enhances higher levels of interpersonal confidence in the students. Aguirre (2012) points out that simulation allows the students to acquire competencies in certain procedures and skills, in a way that when dealing with their patients, they already have a real expertise. In these environments, students might be wrong when making a diagnosis. However, they are able to go over it repeatedly. Despite it is human to make mistakes, we cannot make one in health sciences, since a mistake may be fatal for the patient. Juanes (2011) remarks that simulation environments bring students close to real situations. In this way, they are far more motivated to study and learn. They also achieve satisfaction levels, evaluating the use of technology positively in their training. Another advantage, according to Ziv and Bekenstadt (2008), is that simulation environments allow the student to maximize their autonomy and ability to make decisions, making them active agents of their own learning. Moreover, they help to minimize ethical conflict. Therefore, it is imperative to use
these environments in psychology. Quero et al. (2012) mention that clinical psychologists should have a clear understanding of the opportunities and challenges that technology offers. Virtual environments not only provide valuable opportunities related to training and self-training, but they also allow the possibility of continuing practice in a variety of contexts. This makes the user feeling he is actually “there”, conceiving the situation as real. Virtual environments are also a source of personal effectiveness, since the user experience himself as a competent and effective person. They also allow the design of different scenarios in which the user can feel he is capable of performing from easy to more complex tasks. Chiecher et al. (2013) mention that these environment characteristics allow spontaneity, since learning arises at the time when it is needed. These environments are autonomous because it is the user who explores and looks for solutions. They are fast since we have immediate access to unlimited sources of information and approaches. Virtual environments are unstructured because you learn depending on the user’s needs and they are specific, since they address to a specific question or problem. Another remarkable advantage of using these environments in psychological therapies, is that they allow to simulate the desired scenario when determined by the therapist. This helps to expose the user to clinically meaningful contexts as often as needed, in order to make the patient recall events and also to feedback him. In this virtual environment, the therapist can control the stimuli and events, in accordance to the type, number and intensity of the events presented. García, Pericot, Gutiérrez, and Ferrer (2009) points out the advantages of using these environments in psychological treatments, since they have two key properties such as presence and interaction. By presence we mean the feeling of “being there” in the virtual environment, in this way the patient feels he is part of this scenario. On the other hand, they recreate situations impossible to implement in the real world, with a high degree of control over the exposure techniques parameters and a high level of precision that is not possible in real contexts. In this sense, overlearning is facilitated. Thus, we can handle unwanted or threatening stimuli when presented to the patient. In this way, he would be highly motivated and involved in the therapy.

In conclusion, we can say that professional psychologists dedicated to education must be prepared to handle these technologies and apply them as a part of their class sessions, or in addition to them. Therefore, it is necessary to ensure that the contents provided in the simulation and virtual learning environment meet the basic psycho-pedagogical principles, and at the same time this information facilitates the acquisition of meaningful knowledge. Virtual environments imply a redefinition of the educational purpose and new ways to access to knowledge, enabling the development of academic programs that incorporate these simulated and virtual processes. Despite they are being used in psychotherapy, not everybody realizes its importance as a tool in the teaching-learning process. Thus, it is necessary to guide the use and application of these technologies when teaching psychology since they provide a number of advantages getting the students involved in similar scenarios that in the future they must face as prospective psychologists.

References


Correlation Between Performance in Memory Tasks, Working Activity, and Years of School in a Mexican Sample of Elderly Health Adults

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Dementia has become an actual concern considering the increasing number of elderly adults. The cost for families and society has become a real problem for the public policies in Mexico, where there is not an effective system of cognitive prevention. The objectives of this investigation were: (1) Recognize if there is a direct relation between the educational level and the maintenance of memory; and (2) Determine the presence of relations between the development of different kinds of activity in life of the adult and their influence into memory. A battery of memory tasks (immediate, mediatized, auditory-verbal, tactile, visuospatial) was applied to a sample of 80 elderly adults (40 males and 40 females) with different educational level (more than six years of education and less than 6 years). All the adults got more than 27 points in Mini Mental State Examination and had less than 10 points in the Geriatric Depression Scale. The findings of this study suggest that education is the principal factor of protection in adults; it has an outcome to compensate the effects of retirement and changing of lifestyle. Therefore, the systems of activity, which consist of what the person did during their life, also have a real effect in the possibility of older adults to pay more attention in usual activities detect their mistakes and have a better chance to recover information in their different modalities.

Keywords: aging, memory, education, activity, work

Introduction

In Mexico, as in the world, exist an increasing number of adults that are beginning to have certain cognitive deficits and there is not a usual intervention to be performed due to a lack of information about aging. It seems normal to begin to have memory complaints when people is getting older, which is wrongly understood into general population and families. Also, in Mexico there are not enough programs to attend this group of people, leaving the responsibilities to families that do not have a real training in the effects of aging and how to understand the inevitable changes reflected in everyday activities. One of the first signs of cognitive impairment comes in the domain of memory; where there are different manifestations according with the type of activity older adults have been performing during their life. According to this, it is important, to know if there exists differences between groups of education which is the objective of this investigation. Some studies (Marx, 2005; Scarmeas & Stern, 2003) have reported that with the
increasing of years of education, the risk to develop Alzheimer reduces and also it has a protective effect increasing the cognitive reserve of the adult.

Also, it is not the only way of protection, according to the systems of activity that a person develop in their working years, besides education, hobbies and social networks, all these elements play a role in the compensation that occurs in the speed of processing, memory and cognitive function in general (Helmut, 2003; Verghese et al., 2006). Activity could play a role according to the development and the existence of a way to prepare the adult to compensate the effects of age in an adaptative brain.

The importance of the neuropsychological research (Luria, 1980; Sereda, 2011) allowed us to analyze and determine how are established the strategies that elderly adults have to solve the tasks we proposed, that could allow us to have glimpse into their performance in daily activities. This could be achieved understanding the differences in the years of school and kind of activities they have done ina non-conscious waywith their implications in the present.

Valenzuela (2008) showed that life experiences and participation in complex mental experiences have a direct influence in the brain anatomy promoting the resistance to pathology by the functional reorganization of complex mental activity and this promotes the possibility to establish a better aging prognosis and to reduce dementia risk.

It is well known that diverse working occupations modify the maps of different cortical areas, for example, taxi drivers (Woollet & Maguire, 2008) or musicians (Münte, Altenmüller, & Jäncke, 2002) have a different configuration of the structures related to the continue training and the developing of strategies (Wan & Schlaug, 2010) that will consume less resources than when they started learning the activity.

Another important concept to take in consideration is brain plasticity; Park and Reuter-Lorenz (2009) suggest that the brain is a dynamic organism seeking to maintain homeostatic cognitive function. So we are talking about the possibility that the brain has to respond to the demands of the environment (Snowdon, 2003), therefore, we are considering the possibility of the persons to reorganize the neural activity, which is related with the role of cognitive reserve in the prevention of dementia.

In this paper, we present an statistical analysis between groups of education according to their outcome in a battery of memory tasks in a group of adults that had more than 60 years of age and were living in Mexico, having as inclusion criteria Mini Mental of more than 27 points and less than 10 points in the Geriatric Scale of Depression.

Materials and Methods

Participants

A total of 80 elderly adults participated in this research; they were divided in two groups: 60 to 65 and 66 to 70 years old, both genders from Puebla, Mexico. And they were subdivided in another four groups according to the time they went to school:

Group 1 was integrated by 20 women that have less than six years of school and scored more than 27 points in Mini Mental and less than 10 points in Geriatric Depression Scale. Group 2 had the same criteria, but it was integrated by men.

Group 3 was integrated by 20 women that have less than six years of school and scored more than 27 points in Mini Mental and less than 10 points in Geriatric Depression Scale. Group 4 had the same criteria as group 3, but it was integrated by men.
Procedure

Before the application of the battery of memory tasks, every adult sign an Informed Consent Form Authorizing the participation in the study after we corroborated if they fulfill the inclusion criteria by points in MMSE and GDS. After this, every adult was assessed in a period of 80 minutes.

The study was exploratory with equivalent groups of comparison, of transversal character. We only had one measure of the four groups.

Construction of Battery of Memory Tasks

The test that we applied was composed by the next tasks:

1. Immediate memory and mediatized (pictograms) from “Experimental Study of Memory” (Solovieva, Quintanar, & Hernández, 2001);
2. Audio-verbal memory, tactile memory, visuomotor memory from “Neuropsychological Assessment for Adults” (Quintanar & Solovieva, 2009);
3. Visuospatial working memory from “Battery of Executive Functions and Frontal Lobe, Spanish” (Flores, Ostrosky-Solis, & Lozano, 2008).

The scores were obtained by a qualitative and quantitative analysis observing in each task how it was performed according to the time and the number of mistakes.

Data Analysis

For statistical analysis, we employed the SPSS (Statistical Package for Social Sciences) version 18.0. It was applied one-way analysis of variance ANOVA, adjusted by Bonferroni correction with 0.05 of significance to identify the groups that were different.

Results

Table 1

<table>
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<th>Significant Tasks Between Groups of Education</th>
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<th>df</th>
<th>Mean square</th>
<th>F</th>
<th>Sig.</th>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Number of words reminded after repetition</td>
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<td>6.450</td>
<td>4.514</td>
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</tr>
<tr>
<td>Qualitative differences of the pictograms</td>
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<td>5.400</td>
<td>7.743</td>
<td>0.000</td>
</tr>
<tr>
<td>Total of words reminded after observing pictograms</td>
<td>99.750</td>
<td>3</td>
<td>33.250</td>
<td>5.929</td>
<td>0.001</td>
</tr>
<tr>
<td>Tactile Memory</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right hand position recovery</td>
<td>2.650</td>
<td>3</td>
<td>0.883</td>
<td>5.048</td>
<td>0.003</td>
</tr>
<tr>
<td>Visuospatial working memory</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Images recovered in level 2 (5 objects)</td>
<td>13.938</td>
<td>3</td>
<td>4.646</td>
<td>3.738</td>
<td>0.015</td>
</tr>
<tr>
<td>Images recovered in level 3 (6 objects)</td>
<td>22.452</td>
<td>3</td>
<td>7.484</td>
<td>4.821</td>
<td>0.004</td>
</tr>
<tr>
<td>Audio-verbal memory</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involuntary repetition of series 1</td>
<td>0.700</td>
<td>3</td>
<td>0.233</td>
<td>2.728</td>
<td>0.050</td>
</tr>
<tr>
<td>Voluntary repetition of series</td>
<td>8.138</td>
<td>3</td>
<td>2.713</td>
<td>2.700</td>
<td>0.052</td>
</tr>
<tr>
<td>Visuomotor memory</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total of errors in copy, reproduction and evocation series 1</td>
<td>31.538</td>
<td>3</td>
<td>10.513</td>
<td>4.428</td>
<td>0.006</td>
</tr>
<tr>
<td>Total of errors in copy, reproduction and evocation series 2</td>
<td>23.726</td>
<td>3</td>
<td>7.909</td>
<td>3.508</td>
<td>0.019</td>
</tr>
</tbody>
</table>

All (80 adults were included) according to the years of school (see Table 1) were indicated the significant tasks in the statistical analysis. A one-way analysis of variance revealed significant differences between groups.
presented in Table 1. We observe that the groups of education play an important role in the outcome in the results of every task.

Post hoc comparisons using the Bonferroni correction test revealed that the highest number of significant tasks between groups were by years of school (See Figure 1).

![Figure 1. Comparison of significant tasks between groups by gender and years of school.](image)

Additionally, we observed that the groups of working activity (see Table 2) revealed significant differences between groups in some of the tasks analyzed by years of school, but not in all of them, which makes us think of differences in the configuration of the memory system according to the kind of activities done in their life by the adults.

Table 2

<table>
<thead>
<tr>
<th>Significant Tasks Between Groups of Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task</td>
</tr>
<tr>
<td>Pictograms</td>
</tr>
<tr>
<td>Number of pictograms produced</td>
</tr>
<tr>
<td>Qualitative differences of the pictograms</td>
</tr>
<tr>
<td>Tactile memory</td>
</tr>
<tr>
<td>Right hand position recovery</td>
</tr>
<tr>
<td>Visuospatial working memory</td>
</tr>
<tr>
<td>Images recovered in level 3 (6 objects)</td>
</tr>
<tr>
<td>Audio-verbal memory</td>
</tr>
<tr>
<td>Evocation of series 1 and 2 with interference</td>
</tr>
<tr>
<td>Total of errors in both series</td>
</tr>
<tr>
<td>Visuomotor memory</td>
</tr>
<tr>
<td>Total of errors in copy, reproduction and evocation series 1</td>
</tr>
<tr>
<td>Total of errors in copy, reproduction and evocation series 2</td>
</tr>
</tbody>
</table>
Discussion

The present study supports the idea that education is the variable most important between groups of elderly adults. Neuropsychological assessment provide results to observe differences in each one of the tasks provided, most of them take into consideration the group of men with less than six years of school comparing them with the others (Wang et al., 2005; Hall et al., 2007).

It is proposed that this effect as also a psychological effect into the cognitive configuration. A good example in the case of Mexican men is that when they are retired from work, in most of the cases, there is not an equal activity when they can structure their life to have a fulfilling sense of being, and the memory performance is decreased. It is important to consider that the group of population that we selected corresponds to certain parameters of successful aging.

It is possible to remark the differences that we find between genders, what makes us believe that the differences of the type of work that the groups and the requirements of those changed the way the information is functionally processed. Thus, the effect is not presented if we compare the groups by gender with more than six years of school.

According to the data of the working activity, it can be said that each one of the three groups were generated by a formula that allowed us to include the years of work, time of retirement, hobbies, current activity, and school years. Three groups were obtained, lower activity, medium and high, and we observed that in the comparison there are better performances in the higher group according to the diversity of their life, this can be observed in other studies (Polidori, Nelles, & Pientka, 2010; Boyle, Buchman, Wildon, Yu, Schneider, & Benett, 2012; Garret, Grady, & Lynn, 2010).

However, it is important to consider that in this study we focus our analysis in persons that have a healthy aging, which has to ponder areas like psychological, social, and cultural. We believe that in further studies, we need to compare our sample to another with different socioeconomic status and different geographical location.

References


Effects of Nonpharmacological Therapies for Diseases of the Elderly

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Yoshio Kano
Kibi International University, Takahashi, Japan

Adverse events are a concerning issue related to pharmacotherapy for the elderly. Therefore, we investigated nonpharmacological therapy for diseases of the elderly, which cause fewer adverse events compared with those caused by appropriate pharmacotherapy. The effects of each treatment were examined using the PC12m3 cell line before clinical study. This cell line comprises mutant cells of the PC12 model neuronal cell line. Treatments from which an effect was expected were clinically studied. VAT (vibroacoustic therapy) provided relaxation effects for elderly nursing home residents and improved depressive symptoms. Steam foot spa treatment resulted in improved cognitive function in geriatric inpatients and a temporary decrease in high blood pressure. The effect of bright light therapy was assessed using PC12m3 cells, and the results were promising for clinical study. However, we did not conduct clinical research because ultraviolet rays were considered to be one of the factors causing the effect.

Keywords: PC12m3 cell, VAT (vibroacoustic therapy), steam foot spa treatment, BLT (bright light therapy)

Effects of VAT (Vibroacoustic Therapy)

Effects on PC12m3 cells

The PC12m3 cell line is a mutant cell line derived from the neuronal model cell line, PC12, developed by Greene (1977). PC12m3 cells exhibit poor neurite outgrowth in response to NGF (nerve growth factor). Cells treated with NGF show enhanced neurite outgrowth in response to various stimuli such as calcium ionophore, the FK506 immunosuppressant, and heat shock (Kano et al., 2002).

Results. In our study (Koike, 2004), PC12m3 cells were exposed to vibratory sound stimuli at frequencies of 10-200 Hz for 30 min, followed by treatment with NGF. The results showed that low-frequency vibratory sounds of 20-100 Hz enhanced neurite outgrowth. The frequency of neurite outgrowth induced by 40-Hz, low-frequency, vibratory sound stimuli was approximately three-fold greater than that induced by NGF alone. Activation of p38 MAPK (mitogen-activated protein kinase) plays an important role in neuronal differentiation of PC12m3 cells. Therefore, we examined whether the ability of a low-frequency vibratory sound stimulus to induce neurite outgrowth of PC12m3 cells is a reflection of its effect on p38 MAPK activity. The results showed that vibratory sound induced neurite outgrowth via the p38 MAPK signaling pathway in PC12m3 cells.

VAT

VAT, which was proposed by Skill (1989) in 1989, is attracting increasing attention for its therapeutic
effects. VAT may be a professional challenge for music therapy. Most of its effects are found in the 40-80-Hz range, which is the range in the very center of the vibroacoustic area. In VAT, vibrations are applied directly to the body in the form of low-frequency sinusoid tones in combination with selected music.

Standly (1991) reported that VAT, which combines listening to music with vibrotactile stimulation, results in deeper relaxation effects compared with listening to music alone. In addition, Lundquist, Anderson, and Viding (2009) reported that VAT effectively decreases self-injurious, stereotypic, and destructive behavior among individuals with developmental disabilities.

**Clinical Use of VAT**

In our study (Koike, Hoshitani, Tabata, Seki, Nishimura, & Kano, 2012), VAT provided relaxation effects for elderly nursing home residents and improved depressive symptoms.

**Subjects and methods.** Fifteen elderly NH (nursing home) residents (five men, 10 women; 86.3 ± 7.8 years) with surface psychological symptoms of depression were included. All 15 subjects underwent VAT for 30 min daily for two consecutive weeks, except Saturdays and Sundays.

**Results.** Depression was significantly ameliorated, as assessed by the DMAS (Dementia Mood Assessment Scale; \( p < 0.05 \)). In addition, depression and sadness were significantly ameliorated, as assessed by items 1–17 of the DMAS (\( p < 0.05 \)). Significant decreases (\( p < 0.001 \)) in tympanic temperature and pulse rate were observed after VAT (see Table 1). The mean total sleep duration in the second week decreased significantly compared with that during the first week (\( p < 0.05 \)). Furthermore, a significant increase in mean wake time was observed during the second week compared with that during the first week (\( p < 0.05 \)) (see Table 2).

**Table 1**

<table>
<thead>
<tr>
<th>Effect of VAT on Cognitive Function, Behavioral Symptoms, and Psychological Symptoms</th>
<th>Before VAT (mean ± SD)</th>
<th>After VAT (mean ± SD)</th>
<th>( p )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMSE</td>
<td>19.4 ± 7.21</td>
<td>19 ± 7.58</td>
<td>0.577</td>
</tr>
<tr>
<td>DBD</td>
<td>25.93 ± 10.45</td>
<td>25.26 ± 13.51</td>
<td>0.554</td>
</tr>
<tr>
<td>DMAS (total on 24 items)</td>
<td>49.66 ± 16.17</td>
<td>43.8 ± 17.93*</td>
<td>0.021</td>
</tr>
<tr>
<td>Overall dementia severity (DMAS; items 1-17)</td>
<td>36.66 ± 11.13</td>
<td>32.93 ± 14.05*</td>
<td>0.011</td>
</tr>
<tr>
<td>Depression and sadness (DMAS; items 18-24)</td>
<td>12.33 ± 7.22</td>
<td>10.86 ± 7.68</td>
<td>0.247</td>
</tr>
</tbody>
</table>

**Table 2**

<table>
<thead>
<tr>
<th>Effect of VAT on Physiological Responses</th>
<th>Before VAT (mean ± SD)</th>
<th>After VAT (mean ± SD)</th>
<th>( p )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tympanic temperature (°C)</td>
<td>36.46 ± 0.47</td>
<td>36.31 ± 0.53***</td>
<td>0.00000134</td>
</tr>
<tr>
<td>SpO2 (%)</td>
<td>95.3 ± 2.5</td>
<td>95.08 ± 2.77</td>
<td>0.166</td>
</tr>
<tr>
<td>Pulse (beats/min)</td>
<td>72.28 ± 9.88</td>
<td>70.66 ± 9.44***</td>
<td>0.0000725</td>
</tr>
<tr>
<td>Blood pressure (systolic) (mmHg)</td>
<td>139.16 ± 24.96</td>
<td>138.56 ± 24.17</td>
<td>0.844</td>
</tr>
<tr>
<td>Blood pressure (diastolic) (mmHg)</td>
<td>73.04 ± 14.43</td>
<td>73.29 ± 14.81</td>
<td>0.751</td>
</tr>
</tbody>
</table>

**Note.** \( n = 15 \), *\( p < 0.05 \).

**Discussion.** Blumenthal reported that aerobic exercise is an effective treatment for depression in the...
elderly, with effects comparable to those of antidepressant drugs (Blumenthal, 1999). In studies on intracellular transduction pathways during aerobic exercise using mouse muscle cells, Akimoto reported that MKK3/MKK6 is activated in the MAPKK (mitogen-activated protein kinases kinase) pathway by aerobic exercise, leading to activation of downstream p38 MAPK and, eventually, mitochondrial biosynthesis (Akimoto, 2005). In our previous studies in which the effects of low-frequency vibratory sound were investigated using the PC12m3 cell line, we found that MKK3/MKK6 in the MAPKK pathway was activated by low-frequency vibratory sounds of 20-100 Hz, leading to activation of p38 MAPK downstream in the MAPK pathway (Koike, 2004). Overall, these reports suggest that VAT stimulation has an effect similar to that of aerobic exercise by activating p38MAPK.

Falempin and In-Albon (1999) suggested that tendon vibration (120 Hz) in the rat soleus muscle can be used as a paradigm to counteract the atrophic process observed after hindlimb unloading. In addition, Skill reported that vibroacoustic music (40-80 Hz) decreases muscle tone and spasms (Skill, 1989). It is possible that the mitigation of depression by VAT in elderly NH residents in this study was caused by vibrotactile stimuli, which represents passive aerobic exercise.

Future well-controlled studies are required to confirm these findings.

Effect of a Steam Foot Spa

Effect on PC12m3 Cells

We investigated the role of the p38 MAPK pathway in heat shock-induced neurite outgrowth of PC12 mutant cells with impaired NGF-induced neurite outgrowth (Kano, 2002; Kano, 2001). When cultures of PC12m3 cells were exposed to heat stress at 44°C for 10 min, p38 MAPK activity increased and neurite outgrowth was enhanced (Kano, 2004). Neurite extension was inhibited by the p38 MAPK inhibitor BS203580. Longer heat treatment of PC12m3 cells provoked cell death, which was enhanced by SB203580. These findings suggest that heat-induced activation of p38 MAPK is responsible for neurite outgrowth and survival of PC12m3 cells.

In this study, the p38 MAPK pathway induced differentiation of PC12m3 cells because p38 MAPK was activated by heat shock at 44°C for 10 min; however, ERK and JNK were not activated under the same heat conditions. Furthermore, PC12m3 cells have poor neurite outgrowth despite normal sustained activation of ERK following NGF treatment. Cells respond to elevated temperature by activating p38 MAPK and JNK and by increasing the production of HSP (heat shock proteins) such as HSP27 and 70 as well as Akt (Mearow, Dodge, Rahimtula, & Yegappan, 2002; Quigney, Gorman, & Samali, 2003). One target of p38 MAPK is MAPKAP-K2, which phosphorylates HSP27. This, in turn, modulates both the chaperone activity and anti-apoptotic effects of HSP27 (Mearow et al., 2002). HSP70 protects cells from a number of apoptotic stimuli through its chaperone functions of protein folding and assembly (Samali & Cotter, 1996; J. S. Lee, J. J. Lee, & Seo, 2005). HSP70 also modulates stress-activated signaling by direct binding to JNK (Park, Lee, Huh, Seo, & Choi, 2001). Apoptosis was not observed when PC12m3 cells were exposed to heat shock at 44°C for 10 min, whereas cell death had already initiated under the same heat conditions in PC12 parental cells. These phenomena may depend on the strong activation of p38 MAPK and HSP following heat-shock treatment of PC12m3 cells.

Clinical Effect of Waon Therapy

Waon ("Wa" means soothing and "On" means warmth) therapy using an evenly maintained dry sauna
system at 60°C, which differs from a traditional sauna, has been studied exclusively by Tei in Japan (Miyauchi et al., 2012; Kuwahata, 2011; Matsushita, Masuda, & Tei, 2007). Waon therapy warms the entire body in a uniformly heated chamber (60°C) for 15 min and maintains the soothing effect outside the sauna for an additional 30 min. Waon therapy is administered once a day (one session) for five days a week and is recommended for more than two weeks or as desired thereafter. Waon therapy has beneficial effects on peripheral arterial disease and is safe, beneficial, and well tolerated by patients with heart failure.

The vasodilator response due to direct heat is lost immediately during Waon therapy. However, cardiac output increases to increase peripheral blood flow, and shear stress occurs repeatedly in the peripheral vascular endothelium. This results in an increase in endothelial NO (nitric oxide) expression.

**Waon Therapy for Hamsters**

Fujita et al. (2011) examined the effects of a dry sauna on improvement in cardiac function using TO-2 cardiomyopathic hamsters. These hamsters were treated in a dry sauna system at 39°C for 15 min, and the soothing effect was maintained outside the sauna for an additional 20 min (30°C).

The results suggest that Waon therapy activated the p38 MAPK signaling pathway, leading to the induction HSP27, manganese superoxide dismutase, and HSP32. This induction decreased oxidative stress (4-hydroxy-2-nonenal) and led to improved cardiac function.

**Steam Foot Bath in a Patient With CHF (Chronic Heart Failure)**

Higashi, Komamura, and Oda (2009) provided 15-min steam foot baths and gloves heated to 42°C for two weeks to a 21-year-old male with severe CHF who required a left ventricular assist device, followed by 30 min of rest and heat retention in bed. They reported that appendicular thermal therapy was safe in this patient, who was waiting for a heart transplant, and that the procedure may be beneficial for patients with end-stage heart failure.

**Clinical Effects of a Steam Foot Spa Treatment**

The results of a VAT pilot study suggest that steam foot spas mitigate cognitive impairment in geriatric inpatients (Koike, H. Kondo, S. Kondo, Takagi, & Kano, 2013).

**Subjects and methods.** Geriatric inpatients (13 participants; age, 82.69 ± 6.53 years) with cognitive impairment (MMSE score: 18.38 ± 3.69) were given a 20-min steam foot spa treatment at 42°C for two weeks, five days a week. Physiological indicators such as blood pressure, percutaneous oxygen saturation, pulse, tympanic temperature, and sleep time and efficiency were assessed.

Cognitive function and behavioral and psychological symptoms of dementia were assessed using the MMSE (Mental State Examination), DMAS (Dementia Mood Assessment Scale), and Dementia Behavior Disturbance Scale.

**Results.** Systolic ($p < 0.01$) and diastolic blood pressure ($p < 0.05$) significantly decreased while tympanic temperature ($p < 0.01$) significantly increased after the steam foot spa compared with those before treatment. A significant improvement was observed in the MMSE score ($p < 0.01$) and in the overall scores for the dementia severity items on the DMAS ($p < 0.05$) (see Table 3).

**Discussion.** The cholinergic nervous system, which projects from the NBM (nucleus basalis of Meynert) in the basal forebrain to the cerebral cortex and from the septal region to the hippocampus, dilates the blood vessels in the cerebral cortex and hippocampus (Sato & Sato, 1992; Lacombe, Sercombe, Verrecchia, Philipson, MacKenzie, & Seylaz, 1989). Piché, Uchida, Hara, Aikawa, and Hotta (2010) increased NBM nerve activity
with somatosensory stimulation and found that acetylcholine is released and blood flow increases within the cerebral cortex. Activation of the nicotinic acetylcholine nervous system enhances the neuroprotective effect to promote increased NGF secretion (Hotta, Kagitani, Kond, & Uchida, 2009).

In this study, cerebral blood flow increased in geriatric inpatients with an increase in tympanic temperature caused by the steam foot spa treatments. A significant change in the MMSE was observed after the steam foot spa treatment. These results suggest that changes in the MMSE following steam foot spa treatments occurred because of vasodilation of cholinergic neurons.

Table 3

Effect of VAT on Sleep-Wake Rhythm

<table>
<thead>
<tr>
<th></th>
<th>First week</th>
<th>Second week</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Mean ± SD)</td>
<td>(Mean ± SD)</td>
<td></td>
</tr>
<tr>
<td>Total sleep time (min)</td>
<td>626.54 ± 221.35</td>
<td>599.61 ± 216.55</td>
<td>0.0309</td>
</tr>
<tr>
<td>Nighttime sleep (min)</td>
<td>346.41 ± 174.21</td>
<td>347.8 ± 172.28</td>
<td>0.707</td>
</tr>
<tr>
<td>Nighttime sleep efficiency (%)</td>
<td>88.64 ± 8.33</td>
<td>89.28 ± 9.76</td>
<td>0.702</td>
</tr>
<tr>
<td>Wake time (min)</td>
<td>813.45 ± 221.35</td>
<td>838.06 ± 217.48</td>
<td>0.0442</td>
</tr>
</tbody>
</table>

Note. n = 75, *p < 0.05.

A significant antihypertensive effect was observed in this pilot study. Although blood pressure decreased significantly after 20 min of treatment, heart rate did not change. Cholinergic nerves cause vasodilation; however, there was no sustained excitability of these nerves. Therefore, no change in heart rate variability was observed.

The vasodilator response to direct heat is lost immediately during Waon therapy. However, cardiac output increased to increase the peripheral blood flow, and shear stress occurred repeatedly in the peripheral vascular endothelium. As a result, the expression of NO in the endothelium increased.

These results suggest that steam foot spa treatments at an ideal setting of 42°C for 20 min potentially improve cognitive function in elderly hospitalized patients with mild to moderate cognitive impairment. In addition, it may lead to improved cardiac function.

BLT (Bright Light Therapy)

BLT

An obvious initial candidate for BLT is a patient with seasonal affective disorder (winter depression) (Rosenthal, 1984; James, Wehr, Sack, Parry, & Rosenthal, 1985). The efficacy of BLT has been supported across a range of mood disorders, including nonseasonal depression and chronic depression (Golden et al., 2005; Kripke, 1998; Goel, Terman, Terman, Macchi, & Stewart, 2005), manic-depressive psychosis (Deltito, Moline, Pollak, Martin, & Maremmani, 1991; Sit, Wisner, & Hanusa, 2007), antepartum and postpartum depression (Oren, Wisner, & Spinelli, 2002; Wirz-Justice, 2011). Moreover, BLT improves disturbances and insomnia caused by Alzheimer’s disease (Ancoli-Israel, Martin, Kripke, Marler, & Klauber, 2002; Nowak & Davis, 2011). BLT is usually administered at ≥ 2500 lux. Although no direct studies comparing different light intensities have been conducted, longer exposure (approximately 2-3 hours) at 2,500 lux or shorter exposure (about 30 min) at higher intensities such as 10,000 lux is recommended (Young, 2011).

Effects of UVC Irradiation on PC12m3 Cells

We have previously investigated cellular damage and differentiation of PC12m3 cells caused by UVC
irradiation (Koike et al., 2006). When PC12m3 cells are exposed to UVC irradiation, the frequency of neurite outgrowth rapidly increases in a dose-dependent manner. The frequency of neurite outgrowth was maximized at 40 J/m² of UVC irradiation. The frequency of neurite outgrowth induced by 40 J/m² of UVC irradiation was approximately 25-fold greater than that of neurite outgrowth induced by NGF alone. However, PC12m3 cell survival was inversely proportional to the dose of UVC irradiation.

We examined whether a UVC irradiation stimulus to induce neurite outgrowth of PC12m3 cells is a reflection of its effect on p38 MAPK activity. The results showed that p38 MAPK was strongly activated, whereas JNK and ERK were only weakly activated in PC12m3 cells exposed to UVC. Furthermore, UVC irradiation rapidly and strongly activated cAMP response element-binding in PC12m3 cells.

**Bright Light Energy**

Fluorescent light provides a source of UVC. UVC usually does not pass through glass, except quartz glass. However, a very small quantity of UVC leaks from a fluorescent tube.

In our preliminary research (date not shown), PC12m3 cells were exposed to a 15,000-lux bright light device at a distance of approximately 15 cm for 10 min. Then, one group of cells was removed from the UVC and another group of cells was continually exposed. The result showed that when PC12m3 cells were exposed to UVC irradiation, the frequency of neurite outgrowth was significantly higher than that in the group that was not exposed to UVC \( (p < 0.05) \).

**Conclusions**

This was a preliminary study, and we did not conduct a clinical study because UVC is considered to be a factor that affects the BLT effect.

**Future Directions**

With regard to the effectiveness of these nonpharmacological treatments presented on this occasion, these researches itself have not gone beyond the scope of preparatory researches, and the effectiveness of these treatments have not yet reached the stage where it can be guaranteed. Thus, it is necessary to acquire further proof of effectiveness through clinical trials.

**References**


Impact of Analogical Images on Solving Scientific and Environmental Problems Creatively

Mohammed Talib Alkiyumi
Ministry of Education, Muscat, Sultanate of Oman

This study investigates the impact of analogical images on students’ creative abilities of novelty and feasibility, through solving scientific and environmental problems. There are eight problems: four scientific and four environmental derived from content-text of science and social studies curricula which were provided to the students. The experiment was implemented over 4 weeks. Analogical images were provided to the experimental groups, whereas control groups were asked to solve the problems abstractly. The experiment was based on the activation of the cerebellum by analogical images to improve creative abilities. A 2 × 2 factorial design was used. A total of 112 sixth-grade students (45 males & 67 females) from two government schools in Muscat governorate participated in this study. The sample was classified into four classes: two experimental and two control. The findings show that: (a) the experimental group performed better on problem-solving than the control group did; (b) design not gender has the most effect on an linear combination of novelty and feasibility; and (c) gender and design have the most effect on an linear combination of scientific and environmental problems.

Keywords: analogy, images, problem-solving, creativity

Introduction

Creativity researchers face a mysterious question of how the mind processes creative thinking. The newest approach focuses on studying this potential physically by using an euro imaging scan, which is a feasible approach of studying creativity that provides valid information on processing this potential. The neuro-psychological data provided by neuroimaging techniques such as PET (positron emission tomography), fMRI (functional magnetic resonance imaging), and EEG (electro encephalo graphy) present substantial evidence of how creativity could be activated. Experimental evidence shows that brains of creative and intelligent people differ in the density of synaptic connections (Duch, 2007). Therefore, as much as creative complexity, a highly coordinated interplay of different neural networks is needed (Fink, Benedek, Grabner, Stoudt, & Neubauer, 2007). The question of how creativity can be activated is still unresolved although numerous techniques for activating creativity have been provided through various studies. Visualization is a practical method that studies (e.g., Kosslyn & Ochsner, 1994; Ronald & Gulyas, 1994; Sakai & Miyashita, 1994) have shown to have an impact on imagery. Clearly, this empirical evidence support the views that individual differences in visual perception affect the richness of their imagery. Kosslyn (1994), and Miyashita (1995) report that visual imagery seems to evoke activity in the primary visual cortex. It is consistently seen that visual imagery is essential in stimulating the reactive mind, as shown in studies by Finke (1990), Gillian

Mohammed Talib Alkiyumi, Ph.D., Ministry of Education.
Vandervert, Schimpf, and Liu (2003, p. 1) provide a theory of how the continuously repetitive process of working memory that is learned as cognitive control models in the cerebellum results in creativity and innovation. They state that “the cerebellar control models consist of multiple-paired predictor (forward) models within MOSAIC (the Modular selection and identification for control) and HMOSAIC (hierarchical MOSAIC) cerebellar architecture that explore and test problem-solving requirements”.

Vandervert et al.’s (2003) theory is consistent with Dietrich’s (2004) model, which emphasizes that creativity requires a variety of classic front all obe-demanding cognitive abilities such as working memory, sustained attention, and cognitive flexibility. Additionally, Vandervert et al.’s (2003) theory is based on Mandler’s continuous studies (1977; 1978; 1984) on image schemas, which claim that a metaphor of the image schemas is a basic for imagery conceptualization through the thought process. In particular, this perspective is related to the theory because of providing the bottom-up meaning basis for the visuospatial sketch padina foundation allayer of HMOSAIC.

Moreover, Vandervert et al.’s (2003) theory also relies on the perspective of Einstein’s creative work. Einstein stated how the central executive is guided by using signs and images that can be manipulated in the visuospatial sketchpad, while the conventional word comes as a secondary stage. Vandervert et al.’s (2003) theory emphasizes two concerns: First, the role played by analogy in solving problems; second, the complete absence of long-term memory in idea generation (Jalil, 2007). Furthermore, Vandervert et al.’s (2003) state that creative thought involves forecasts of actions that are forecast based on images and hypotheses. The images are consistent with the model of Vandervertetal which implies forecasting future outcomes of action. Moreover, these forecasts are based on images or hypotheses which provide generation of new ideas (Mumford & Caughron, 2007).

**Visual Images**

According to Barry (1997), the term “image” implies two meanings: mental image (image on the brain) and exteriorized image. Arneheim (1969) and Gardner (1983:1993) emphasized through their creative thinking studies the salient role of images in thinking. This is because imagination, which is a basic element of generating new idea relies on the ability to read and build visual images. Visual imagery and visual stimulus may share some commoncortical processing areas. Neuro imaging studies report that at least some higher-order visual areas in the temporal and parietal lobes participate not only in visual perception, but also in visual imagery (D’Esposito et al., 1997; Kosslyn & Ochsner, 1994; Moscovitch, Wincour, & Behrmann, 1997; Roland & Gulyas, 1994; Sakai & Miyashita, 1994). Consequently, studies by other researchers (Ishai & Sagie, 1995; Kosslyn & Oschsner, 1994; Le Bihan, Turner, Zeffiro, Cuenod, Jezzard, & Bonnerot, 1993; Menon, Ogawa, Tank, Ellermann, Merkele, & Ugurbil, 1993; Miyashita, 1995) demonstrate that visual imagery evokes activity in the primary visual cortex, but some studies (Pylyshyn, 2002, 2003; Kosslyn & Thompson, 2003) do not demonstrate that impact.

Kosslyn (2005, p. 334) provides a “theory of mental imagery”, which focuses on the dual role of the early visual cortex on perception and imagery. He states that visual perception occurs while a stimulus is being viewed, and it includes visual recognition and identification. On the other hand, “Visual mental imagery is a set of representations that give rise to the experience of viewing astimulus in the absence of appropriate sensoryinput”.

A study by Choi and Kim (2007) shows that the interaction between internal organizations and spatial
forms in the physical environment categories leads to differences in perceived creative potential. Light and color categories do not seem to contribute to these differences. Another study by Choi and Kim (2005) used visual images of interior design elements. Nakakoji, Yamamoto, and Ohira (1999) also used visual images, but to develop creative computer system design. Meanwhile, a study by McCoy and Evans (2002) used physical environment images that enhanced creativity. A study by Harland and Coren (2001) consistently, found that poor visual acuity and stereopsis may reduce creative task-solving because the effectiveness of imagery in achieving novel solutions is reduced when stored images are lacking in detail. A study by Smith, Susan, and Edward (1995) found a positive relationship between colorful and dynamic images on the other hand, and problem-solving on the other. Also, this study showed that creative students were better at describing images in more detail.

The integrative function of visual/spatial is connected with thinking and creativity (Marshall, 2007). This connection between creative thinking and visual/spatial thinking has been investigated by Gardner (1983) who argues in his theory of spatial intelligence about the power of visual images in enabling the mind to transform.

The experimental evidence demonstrates that visual images assist in providing the ability to recognize the connection between two situations and their solution methods, which is called analogy. Miller (2007, p. 48) provides a network thinking model which emphasizes the role of mental images and metaphor in creating novel ideas. He states, “The urge to solve a problem serves to ‘hold’ it in the unconscious where concepts from apparently disparate disciplines are combined by proper choice of mental image or metaphor to catalyze the nascent moment of creativity”.

Using images for creative thought helps the brain to perceive, fantasize, transit, and experience hypnapogia. These cognitive states imply motoric connotations which interact with images as a problem to visually image a solution. Visual imagery is important for inciting new circuits from the brain whenever it encounters an ill-defined problem. This state is called “insight” (Duch, 2007). Clearly, visual images enable students to read and think over a problem and divine the reasons behind it. This state makes them imagine the solution by analogizing the problem with related phenomena. Einstein asserted the importance of visual imagery in his creative thinking, which Vandervert et al.’s (2003) note (Thomas, Place, & Hillyard, 2008).

**Analogy**

The basic element of Vandervert et al.’s (2003) theory is extension of the analogy to create novel solutions to intellectual problems (Marshall, 2007). “Analogy, of course is more than association. Analogical thinking involves some more or less sustained comparison between the internal and structure of the two ideas concerned” (Boden, 1999, p. 354). Analogical reasoning is a method of solving problems creatively. Analogy enables the individual to transfer ideas across domains (Gomes, Seco, Pereira, Paiva, Carreiro, & Ferreira, 2006). These creative acts created by the imagination, and such analogies could be considered as the result of a relation established in the mind through a process of selective emphasis (Bonnardel, 2000). Studies by Brown and Kane (1988), and Goswami (1991) found that children need hints from the source problem solution to solve the target problem. Siegler (2006), and Tuntoler and Resing (2007) insist that children spontaneously use analogical images while solving problems.

Analogue images were a strategy used by Darwin while constructing his outstanding theory of evolution. He mapped the findings of natural pictures in the form of a tree. Perceiving and forming the relations between them is a cognitive model that has deep metaphorical roots (Marshall, 2007). Gardner (1983) insists on
metaphorical thinking about visual images in spatial thinking. Moreover, West (1997), based on Gardner’s and Arnheim’s work, argues that visual thinking in the integrative mental modality enables us to grasp the big picture simultaneously and instantly.

Miller (1996-2001), when he developed the theory of construction on science examined the imaginative insight which evoked the most physics break throughs. “A truly new insight, however, often requires a conceptual leap that is not based on rationality alone. This leap occurs through metaphor and metaphorical images” (Marshall, 2007, p. 31). Most studies (e.g., Brown, 1989; Goswami, 1991) agree that children are more competent at generating analogous solutions to related problems than was previously believed (Tuntoler & Resing, 2007).

Bonnardel (2000) uses design activities to test how analogical reasoning evokes creativity in graphic design. In his experiment, students dealt with specific problems to see whether the solutions referred to similar problems for which a solution already existed. He found that the designers who analogue the stated problem with solutions of related problems were significantly more spontaneous and creative in their solutions than the designers from the free group. A study by Antonietti (2000) showed that using analogies through a teaching process affected students’ creative abilities significantly. Furthermore, a study By Novick and Holyoak (1991) showed the significant impact of analogy on solving mathematical problems. Gomes et al. (2006) conducted six experiments for choosing the most effective strategy for use through analogy. They used are trieval process to study thecor relation between analogical retrieval strategies and creative properties of generated diagrams in the soft ware design domain. A study by Keane (1996) found that adaptability played a crucial role in selecting mapping while using analogy to solve problems. In addition astudy by Tuntoler and Resing (2007) shows that students who had prior assistance in using analogies were significantly better at analogical problem-solving than others. The study proves the importance of using analogical reasoning in the learning process while solving problems. Researchers (e.g., Brown & Kane, 1988; Brown, Kane, & Echols, 1986; Chen, 1996; Chen & Daehler, 1992) have used the analogy process to solve genuine problems faced in the real world of students after learning the solutions of related problems.

**Purposes of the Study**

Broadening the cognitive approach of studying creativity focusing on mind activation involved two united activators: images and analogy (analogical images). The study is based on Vandervert et al.’s (2003) theory, which states that activation of the cerebellum positively affect creative abilities. Analogical and visual images are combined in this study to investigate whether they positively affect creative abilities according to the study’s limitations. The first goal of the study is to investigate whether using analogical images has positive effect on creative abilities. The second goal is to investigate whether gender and type of manipulation have different effects on the creative abilities: novelty and feasibility. The third goal is to identify whether there are different effects from gender and manipulation on solving scientific and environmental problems. The study’s findings will contribute to the scope of the cognitive approach and the consideration of the theory of Vandervert et al.’s (2003).

**Methods**

A $2 \times 2$ factorial design was used in this study due to two independent variables being included: gender (male & female), and manipulation (experiment & control) groups. The dependent variables are abilities of
problem-solving: novelty, which refers to creating new ideas disregarding conventional or routine ideas; and feasibility, which refers to execution capabilities. Participants were 112 sixth-grade students from the Governorate of Muscat (45 male & 67 female) divided into four classes: two male-female experimental groups, and two male-female control group classes. In the experimental group, the investigator used the analogical visuo images technique for encouraging students to generate creative solutions to a problem, while in the control group, a researcher asked the students to solve problem abstractly.

Measures

**Analogical visual images.** All the participants were asked to solve eight problems: four scientific problems and four environmental problems derived from content texts of science and social studies curricula. The experimental groups were provided with two visual images that represented the core of the problem. The first image was oriented towards expressing the problem, and enabled the students to read the problem and comprehend it (original image). The second image was an analogical image which expressed the analogical solved problem. The analogical images hinted to the students how problem had been solved, and, or enabled them to conceive the association between the two images. Responses were recorded concerning the assessment tool for solving problems, which was divided into two sub-abilities: novelty and feasibility. Scores ranked from 0 to 4 on each ability.

**Environmental problems.**

1. How can we retain the flowing water of the valleys instead of draining it into the sea?

   Analogical images representing the methods of some desert trees that adapt to the lack of water (see Figure 1).

   ![Figure 1](image)

   **Figure 1.** Analogical images of flowing water of the valleys and some desert trees that adopt to the lack of water.

2. How can we solve the overgrazing problem? Analogical image of substituting players during a football match (see Figure 2).

   ![Figure 2](image)

   **Figure 2.** Analogical images of overgazing problem and substituting players during a football match.
(3) What are your inferences when comparing a camel with a giraffe and a donkey with a zebra when you know that the area has valleys and trees? Analogical image of car models (see Figure 3).

![Figure 3. Analogical images of animals in a different areas and different cars’ models.](image)

(4) How could we prevent the salination problem? Analogical image of some diets elements (see Figure 4).

![Figure 4. Analogical images of salination problem and some diet elements.](image)

**Scientific problems.** (1) How could we get rid of industrial smoke? Analogical image of water draining (see Figure 5).

![Figure 5. Analogical images of industrial smoke problem and water draining.](image)

(2) What is the alternative to wires in buildings and houses? Analogical image of mobile phones (see Figure 6).
(3) Design a model of a plain based on the drag on fly’s movement. Analogical image of drag on fly (see Figure 7).

(4) Based on the spider’s web, design a model to solve the problem of traffic congestion in Muscat (see Figure 8).

The validity of this assessment tool was tested by eight teachers who teach Science and Social Studies. The inter-judge reliability provided a satisfactory consistency of three raters.

**Procedures**

Multi-stage cluster sampling was used to identify the study’s sample. Two schools from Muscat governorate were assigned (Shojabin Assad and Aseelabint Qais). Using the students’ achievements and consultations with teachers, two equal classes were selected in both schools.
Experimental Manipulation

This study was implemented over four weeks. Two problems, one environmental and one scientific were presented in one period for each group, with four periods assigned for the experimental group, and four periods assigned for the control group in each school. The students were asked to write their new solutions immediately on an answer sheet. In the experimental groups, students used analogical visuo images to generate solutions, as opposed to the control groups, who thought abstractly and used their imagination to generate solutions.

Main Questions

Q1: Are there any significant differences between experimental and control groups in problem-solving achievement?

Q2: Are there any significant differences between novelty and feasibility with regard to gender and way of manipulation?

Q3: Do students who differ in gender and way of manipulation differ on a linear combination of achievement on scientific and environmental problems?

A T-test was used to answer Q1, Q2, and Q3 were answered by using two-way MANOVA (multivariate analysis of variance).

Findings

A T-test for independent samples was used to check whether there were significant differences between experimental and control groups on problem-solving achievement. Table 1 shows that the control group significantly differed from the experimental group ($\leq 0.005$).

Table 1

<table>
<thead>
<tr>
<th>T-test for Experimental and Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>T-test for equality of means</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
| \begin{tabular}{l|c|c|c|c|c|c}
| Problems       & df & Sig. (2-tailed) & Mean difference & Std. error difference & Lower & Upper \\
| Equal variances assumed         | 2.846 | 108         | 0.005          | 3.85180          | 1.35364 | 1.16865          | 6.53495          |
| Equal variances not assumed     | 2.846 | 107.904    | 0.005          | 3.85180          | 1.35364 | 1.16863          | 6.53498          |
| Multi variate analysis of variance (2-way MANOVA) was used to test whether there were significant differences between novelty and feasibility with regard to gender and way of manipulation. Table 3 shows that Wilks' Lambda indicates that design has a significant main effect on a linear combination of novelty and feasibility.
feasibility ($F(5.568), df = 105, P = 0.005$). On the other hand, Wilks’ Lambda indicates that the main effect of gender on novelty and feasibility was not significant ($F(3.228), df = 105, P = 0.055$). The interaction between gender and experiment was not significant ($F(1.207), df = 105, P = 0.303$).

Table 3

**Multivariate Tests of Novelty and Feasibility With Regard to Gender and Way of Manipulation**

<table>
<thead>
<tr>
<th>Effect</th>
<th>Wilks’ Lambda</th>
<th>Value</th>
<th>$F$</th>
<th>Hypothesis $df$</th>
<th>Error $df$</th>
<th>Sig.</th>
<th>Partial eta squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>0.942</td>
<td>3.228</td>
<td>2.000</td>
<td>105.000</td>
<td>0.055</td>
<td>0.058</td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td>0.904</td>
<td>5.568</td>
<td>2.000</td>
<td>105.000</td>
<td>0.005</td>
<td>0.096</td>
<td></td>
</tr>
<tr>
<td>Gender*design</td>
<td>0.978</td>
<td>1.207</td>
<td>2.000</td>
<td>105.000</td>
<td>0.303</td>
<td>0.022</td>
<td></td>
</tr>
</tbody>
</table>

Table 4 shows that tests of between-subject effects indicate that the means and standard deviations of the group design have a major effect on novelty ($P = 0.001$) with effect size ($\eta^2 = 30$), and on feasibility ($P = 0.012$, $\eta^2 = 0.24$). The main effect of gender on feasibility was significant ($P = 0.013$, with $\eta^2 = 23.8$), but was not significant on novelty ($P = 0.076$, $\eta^2 = 0.17$, multivariate $\eta^2 = 0.96$). This means that the linear combination of novelty and feasibility differed regarding the control and experimental groups. Multivariate $\eta^2 = 0.58$ shows that the linear combination of novelty and feasibility did not differ with regard to male and female.

Table 4

**Tests of Between-Subjects Effects of Novelty and Originality Based on Gender and Design**

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Type III sum of squares</th>
<th>$df$</th>
<th>Mean square</th>
<th>$F$</th>
<th>Sig.</th>
<th>Partial eta squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Total novelty</td>
<td>34.148</td>
<td>1</td>
<td>34.148</td>
<td>3.204</td>
<td>0.076</td>
</tr>
<tr>
<td></td>
<td>Total feasibility</td>
<td>108.250</td>
<td>1</td>
<td>108.250</td>
<td>6.452</td>
<td>0.013</td>
</tr>
<tr>
<td>Design</td>
<td>Total novelty</td>
<td>119.790</td>
<td>1</td>
<td>119.790</td>
<td>11.241</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Total feasibility</td>
<td>110.741</td>
<td>1</td>
<td>110.741</td>
<td>6.600</td>
<td>0.012</td>
</tr>
</tbody>
</table>

Multivariate analysis of variance (2-way MANOVA) was used to test whether the students who differ in gender and way of manipulation differ on a linear combination of achievement on scientific and environmental problems. Table 5 shows that Wilks’ Lambda indicates that gender has significant main effects on a linear combination of scientific and environmental problem ($F(3.583), df = 105, P = 0.031$, multivariate $\eta^2 = 0.064$). Moreover, Wilks’ Lambda indicates that the main effect of design on scientific and environmental problems was significant ($F(6.756), df = 105, P = 0.002$, multivariate $\eta^2 = 0.114$).

Table 5

**Multivariate Tests of Achievement in Solving Scientific and Environmental Problems With Regard to Gender and Method of Manipulation**

<table>
<thead>
<tr>
<th>Effect</th>
<th>Wilks’ Lambda</th>
<th>Value</th>
<th>$F$</th>
<th>Hypothesis $df$</th>
<th>Error $df$</th>
<th>Sig.</th>
<th>$\eta^2$</th>
<th>Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>0.936</td>
<td>3.583</td>
<td>2.000</td>
<td>105.000</td>
<td>0.031</td>
<td>0.064</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td>0.886</td>
<td>6.736</td>
<td>2.000</td>
<td>105.000</td>
<td>0.002</td>
<td>0.114</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6 shows the test of between-subject effects indicating the means and standard deviation of the groups. Gender has a significant main effect on environment ($P = 0.009$), with effect size ($\eta^2 = 0.25$), but not on scientific problems ($P = 0.213$) with small effect size ($\eta^2 = 0.12$). The main effect of design on scientific problems was significant ($P = 0.000$) with effect size ($\eta^2 = 0.33$), but not on environmental problems ($P =
0.152) with small effect size ($\eta = 0.13$).

Table 6 
Tests of Between-Subject Effects of Achievement on Scientific and Environmental Problems Based on Gender and Design 

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Type III sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial $\eta$ squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total scientific</td>
<td>28.045</td>
<td>1</td>
<td>28.045</td>
<td>1.572</td>
<td>0.213</td>
<td>0.015</td>
</tr>
<tr>
<td>Total environment</td>
<td>119.950</td>
<td>1</td>
<td>119.950</td>
<td>7.184</td>
<td>0.009</td>
<td>0.063</td>
</tr>
<tr>
<td>Design</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total scientific</td>
<td>242.619</td>
<td>1</td>
<td>242.619</td>
<td>13.599</td>
<td>0.000</td>
<td>0.114</td>
</tr>
<tr>
<td>Total environment</td>
<td>34.715</td>
<td>1</td>
<td>34.715</td>
<td>2.079</td>
<td>0.152</td>
<td>0.019</td>
</tr>
</tbody>
</table>

Discussion of Findings

The most important finding of this study was the effect of analogical images on activating the mind to solve problems creatively. The images that were provided to the experimental groups made it easier for the students’ minds to associate between two situations, and a connection happened between visual (images) and spatial (perception). Trying to proceed and get relationship between the methods of solving the two situations gives them a great opportunity for rich imagination (visualimagery). Kosslyn (1994) and Miyashita (1995) report that visual imagery seems to evoke activity in the primary visual cortex. The power of the analogy is in transforming the ideas between two situations which facilitate catalyzing anascent momentof creativity. Visual images have a power which makes the mind transform one situation into another (Gardner, 1983). Leaps of the mind occur through the metaphors that are presented to the students. Bonnardle (2000) insisted that analogy should be accompanied by an appropriate element that enables the creator to construct through creative process. Clearly combining analogy and visual images contributed significantly to the experimental group performing the leap from one structure to another and devising better creative solutions. In this context, the process of transforming the information of the images creates a new job for the mind which expands the imagery and deepens the thought process. Vandervert et al.’s (2003) theory states that the mind conceptualizes the imagination through the thought process, and this is the result of the metaphor of the image schemas. This perspective is related to the theory because it provides the bottom-up meaning basis for the visuos patial sketch padina foundational layer of HMOSAIC.

One possible reason for this finding is that visual areas in the temporal and parietal lobes participate in visual imagery (D’Esposito et al., 1997). The stimulus (images) activate visual perception (Kossyln, 2005). This finding is consistent with findings of studies by Choi and Kim (2005), and McCoy and Evans (2002). Moreover, the images reflected real problems, so that students appreciate them naturally, and feel the importance of solving them. Harland and Cornen (2001) found that acuity and stereops is visual images reduced creative problem-solving. Visual thinking, instead of abstract thought, provides a good opportunity to the mind to transfer ideas across domains. Therefore, this enables students to tackle the problems from different perspectives, and this helps to verify the solutions. The original image gives the students a clue that they use to solve the targeted problem. The importance of visual images and metaphors in activating the students’ imagery and perception leads to these confinding, that the experimental group was better than the control group in students’ responses of novelty and originality. The most interesting finding is that the effect of gender on novelty and feasibility was not significant. The one possible of the result refers to the similar manipulation that was used among the groups, and to the same learning environment that provided to the
both groups. Moreover, teachers were used same instructional strategies that may lack of aims towards enhancing creative abilities. Another possible explanation is that the problems that were provided to the students derived from the content of students’ curricula which are the same for both girls and boys. Mostly, there are no differences between the learning environments of male and female schools. In contrast, manipulation had significant effect on the experimental groups because the researcher evoked creative abilities by visual images that had an analogy which differed from solving the problems abstractly in the control groups.

**Limitations and Future Research**

There were limitations to this study that are worth noting. The data were collected from government schools. Consequently, the results may not be generalized to private schools. Moreover, the subjects were in grade six (elementary school). Therefore, results should not be generalized about other grades. Another potential limitation was the type of problems which were scientific and environmental problems. Consequently, the findings should not be assumed to be the same for other curricula. Recognizing of this study’s limitations and its findings, there are still many possibilities for future research that may use other techniques and variables. Research that considers other problems such as linguistic or mathematical problems are highly recognized. Moreover, future research may explore other creative abilities such as originality, fluency, and elaboration. The significant effect of analogical images should encourage researchers to compare the effect of analogy and visual images on creative abilities.

**References**


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