Effect of Whats App Teaching Program Reminder on Mothers' Emotional Status Regarding Behavioral Changes among their Children with Autism

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Abstract

Background: Mothers of children with Autism Spectrum Disorder report high levels of stress and anxiety. Current Whats App teaching program reminder for ASD typically focuses on working with the child to support mothers and improve their emotional status regarding behavioral changes. **Aim**: The study was aimed to evaluate the effect of Whats App teaching program reminder on mothers' emotional status regarding behavioral changes among their children with autism. **Subjects and method:** A quasi-experimental research design was used in the current study. **Subjects**: A purposive sample of 300 mothers having children with autism residing at Menoufia Governorate, Egypt was participated. **Tools of data collection:** Five tools were used in the study: A self-administered questionnaire, the Adaptive Behavior Assessment System, The ASD behavior Inventory, The Short Sensory Profile, Depression, Anxiety, and Stress Scale to measure the mothers' emotional status symptoms, and mothers' evaluation toward WhatsApp teaching program reminder content. The link of the survey using the questionnaire, the scale, and the teaching program was sent to the mothers through Facebook and WhatsApp groups. **Results**: The study showed a decrease in repetitive and restricted behaviors in more than one-third of the mothers. Mothers' emotional status (stress, depression, and anxiety levels) were severe pre-implementation of the Whats App teaching program reminder and become lower post-Whats App teaching program reminder implementation. **Conclusion:** The result concluded that the use of Whats App teaching program reminder was effective in reducing mothers' emotional disturbance such as depression, anxiety, and stress concerning the behavioral changes among their children with autism. **Recommendations**: The result recommended that mothers should be trained about behavioral changes among their autistic children and psychological support through the Whats App education program should be implemented.

Keywords: Children with autism, emotional status, Whats App teaching program reminder, Mothers.

Introduction:

Autism is a pervasive neurodevelopmental condition marked by social communication difficulties and confined repetitive patterns of behavior, interests, or activities. The Autism and Developmental Disabilities Monitoring Network (ADDM) of the Centers for Disease Control and Prevention reported that 1 in 54 children in the United States has Autism Spectrum Disorder (ASD), which is a 10% rise from prior estimates. In 2016, roughly 1.85 percent of 8-year-old children in 11 localities were diagnosed with ASD, or 1 in 54 (**Center for Disease Control and Prevention**, **2020**).

Autistic children may have difficulty adapting to changes in their environment. Thus, the intrinsic characteristics of autism as disturbance of social communication and interaction, repetitive and restricted behaviors, interests, and the frequent co-existence of neurological, psychiatric, and medical co-morbidities make individuals with autism a more vulnerable population that needs maximum attention in the context of the prevention and control strategies (**Istituto Superiore di Sanità, 2020**).

Some children find it is difficult to articulate how they feel about unexpected changes. For others, communication impairments may be associated with problems

of receptive and expressive communication, limited verbal or nonverbal skills, and perspective and/or social communication deficits (**Logan et al., 2017**).

Autism affects children differently than it affects the general population. Autism has a considerable detrimental influence on families and parental well-being due to its basic characteristics, related symptoms, and behavior difficulties. Parents face a variety of obstacles as a result of their children's communication and social skills issues, as well as their behaviors. For parents, this results in a life of chronic melancholy and depression, as well as negative attitudes and self-blame (**Autism Awareness Centre, 2016**).

Emotional stress, the ongoing financial burden of expensive treatments and therapies, a significant strain on family relationships, changes in family roles, structure, and activities, and feelings of guilt and shame have all been documented in studies of individuals with autism and their families, as well as the impact on parental well-being regarding diagnosis and social stigma (**DePape**. **et al., 2016**).

Behavioral changes in autistic children include feeding patterns, sleep/wake rhythms, an increase in repetitive activities, an increase in irritability and agitation, and a decrease in self-care (**Hume et al., 2020**). Furthermore, autistic children utilize electronic devices such as television, tablet, and smartphone for extended amounts of time, making it difficult to transfer from one activity to another. Transitions can be particularly difficult for certain people with autism due to their rigidity and inflexibility (**ISS, 2020**).

For mothers, stress and anxiety about behavioral changes show a higher level of concern. Mothers are more concerned about their children, family members, or other people's health and safety. Mothers' experiences differ from country to country. Mothers of children with autism have poorer health and well-being than mothers of children with other disorders, according to an Australian study (**Hossain et al., 2017**). Autism was described by mothers in the United Kingdom as perplexing and complex, causing self-harm, harm to others, and broken households, as well

as persistent stress and isolation from friends, school, and the public (**Bessette et al., 2016**). Similarly, Canadian mothers shared heartfelt stories about raising autistic children. According to a Korean study, autistic mothers have trouble accepting their children's limits imposed by the disability's discouragement and suffering (**Kang et al., 2016**).

Parenting a child with autism is more stressful and difficult than parenting a child who is developing normally. The mother of a child diagnosed with autism frequently confronts significant obstacles as a result of the child's impairment, which can express in a variety of ways and generate stress for both the mother and the entire family. A sense of loss and despair, fewer opportunities for family time and outings, changes in connections leading to a lack of social support, and personal sacrifices are all frequent pressures. For moms, the period immediately following their child's diagnosis is intolerable, and they deny the diagnosis (**Kang et al., 2016**).

They felt befuddled, dejected, guilty, and possibly depressed. Furthermore, moms experience a profound sense of loss when they are forced to give up their hopes and plans for their children's future. Furthermore, in response to the child's socially undesirable behavior, mothers restrict themselves from participating in a variety of fun activities, resulting in isolation, a decline in social support, and the potential perpetuation of stress. Similarly, many parents are forced to leave their jobs to care for their children full-time, manage their treatment, and seek out quality resources (**Altiere & von, 2019**).

Autistic children benefit from rehabilitation programs that focus on moms' assistance to help them better manage their children's autism challenges and improve their communication and social skills. Pediatric nurses have a vital role as educators and advisors in teaching service users and caregivers, offering health education in the community, and assisting other multidisciplinary team members in their development. They should educate mothers about their autistic children's behavioral changes (**Chaturvedi, 2020**).

Estes et al., (2015) concluded that mothers' abilities to manage and reduce behavior problems are a critical target for interventions for young children with ASD to improve child functions and decrease parenting-related stress. So, mothers' teaching can act such as therapists, shaping behavior to reduce negative behaviors in daily life, also have a secondary target of improving their feelings and decreasing stress **(Johnston and Huang, 2018).**

The most important role of the nurse in autism recognition and diagnosis is education. The nurse must be able to familiarize the combination of symptoms associated with autism to the parents because they must be increased their knowledge, understanding, and support of the parents and children and facilitate development and learning, promote socialization, and reduce maladaptive behaviors. The nurse is the coordinator of therapies and interventions that meet the specific needs of individual children **(Symon, 2019).**

Significance of the study:

Due to the lack of resources for disabled children in Egypt, caring for such a child is also difficult for Egyptian mothers. As a result, children with autism and their mothers are at risk for poor health, social services, mental health services, rehabilitation, special education, and equal opportunity. Furthermore, children with autism receive little to no education since they either drop out of regular schools or their mothers cannot afford to send their children to the limited and expensive private institutions. Mothers, on the other hand, receive little help with their children who have ASD. As a result, mothers who have children with the autism spectrum are likely to face more difficulties **(Gobrial, 2018).**

Support and sufficient WhatsApp teaching program reminder for mothers of children with autism and rehabilitation programs may decrease their anxiety and stress level. Therefore, implementing the WhatsApp teaching program reminder for mothers of children with autism will help them acquire adequate knowledge and skills regarding behavioral changes of their autistic children that may relieve their stressors. Because WhatsApp teaching program reminder depends on repeating and remembering massages for mothers with autistic children through photos, videos, power points to enhance and develop their knowledge, practice and improve their emotional status toward behavioral changes of their autistic children.

Aim of the study

The study was aimed to evaluate the effect of Whats App teaching program reminder on mothers' emotional status regarding behavioral changes among their children with autism.

Research hypothesis:

Mothers of autistic children will have a low level of emotional disturbance as stress, anxiety, and depression regarding behavioral changes among their autistic children post-implementation of the WhatsApp educational program reminder compared to pre-implementation.

Subjects and Methods:

Research design:

A quasi-experimental research design (pre and post-test) was used in the current study.

Setting:

The study was conducted in Menoufia Governorate City, Egypt using an online self-administered questionnaire via Google Form.

Subjects:

The study comprised a purposive sample of 300 mothers having children with autism who was contacted via a Google form spreadsheet that was shared on Facebook and WhatsApp groups from the period of March 15, 2021which the online Google form spreadsheet was opened to March 31, 2021which it was closed

Inclusion criteria include all of the mothers in the study were educated, had no physical, mental, or chronic disease had no cognitive disorder, had no history of mental illness, was above the age of 20, lived in the same house as their children, and was willing to participate in the study. The autistic children

have to meet the following requirements: The autistic children ranged in age from 5 to 12 years old, were of both sexes, and were free of other chronic physical conditions.

Tools of data collection:

Five tools were used in the current study as the following:

Tool I: A self-administered questionnaire (pre and post-test format) was developed by the researchers after reviewing the related literature and research studies. It included the following two parts:

Part (1): Demographic characteristics of the studied subjects which included:

a- **Characteristics of the studied mothers:** This included age, educational level, residence, working status, family history of autism, and consanguinity.

b- **Characteristics of the studied children:** This involved age, gender, educational level, child's medical history which includes: the age when autism was discovered duration, and degree of disability.

Part (2): Mothers' knowledge about autism:

It included questions to assess the mothers' knowledge about autism. It was included 20 questions was developed following a review of the literature (**Logan et al., 2017**; **Christensen et al., 2018**; **Istituto Superiore di Sanità, 2020**; **Oti-Boadi et al., 2020; CDC,2020**); the meaning of autism and its causes, the common age of autism occurrence, the manifestation of autism and negative effect of autism on the child, diagnosis, duration of treatment, social needs of the child, treatment approaches, side effects of drugs, rehabilitation and how to deal with their children, that was introduced to mothers through the instructional guidelines by the What's App and Facebook groups.

Scoring system for mothers' knowledge about autism:

The total mothers' knowledge percentages were determined. Completely correct answers received two marks, incomplete correct answers received one mark, and incorrect or unknown answers received

zero marks. The scores of the items were added up for each area of knowledge, and the total answers were divided by the number of items, yielding a mean score for the knowledge, and the results then transformed into a percentage score. If a mothers' knowledge score was 60% or more, it was considered satisfactory; if it was less than 60%, it was considered unsatisfactory.

Tool II: The Adaptive Behavior Assessment System (ABAS):

The Adaptive Behavior Assessment System was utilized by the researchers to assess the adaptive behavior of autistic children. The adaptive skill domains are addressed in the mothers' report of the ABAS-II (**Harrison & Oakland, 2003**). The Second Edition of the Adaptive Behavior Assessment System (ABAS-II) (Ages 5–21) Parental Consent Form, The ABAS-II Parent Form (Ages 5–21; Harrison and Oakland 2003) is a multi-dimensional assessment of adaptive functioning in the home and community. It consists of 232 items, each of which is assessed on a scale of 0 to 30.

The Parent Form (Ages 3–21) consists of ten skill areas (Communication, Community Use, Functional Academics, Home Living, Health and Safety, Leisure, Self-Care, Self-Direction, Social, and Work [Work is only for individuals 17]) that are combined to form three composites: Conceptual (CON; Communication, Functional Academics, Self-Direction), Social (SOC; Leisure, Social), and Practical (PRAC; Self-Care, Home Living, Community (GAC). The norm-referenced M=100 (SD =15) for composite scores and the norm-referenced M=10 for skill area scores (SD03).

Internal consistency reliability estimates for composites range from.95 to.98, and for skill area scales from.86 to.93. All skill area scores and composites had corrected test-retest reliabilities of.87 for the 5–12 age groups. In age-difference sensitivities, validity is supported (i.e., increased scores for each skill area as age increases). Moderate-to-strong correlations with other measures of adaptive functioning suggest concurrent validity.

Tool III: The ASD Behavior Inventory (ASDBI):

The ASD Behavior Inventory was developed by (**Cohen & Sudhalter, 2005**). It is a standardized rating scale for parents. It was created with several subscales that address different types of maladaptive or adaptive behavior independently. The following maladaptive subscales were administered in this study: (a) Arousal Problems, which assessed self-care, hyperactivity, fears induced by new situations, and sleeping problems; and (b) Aggressiveness, which assessed both self and other-directed aggression, as well as general moodiness and irritability.

Tool IV: The Short Sensory Profile (SSP):

The Short Sensory Profile was developed by (**McIntosh et al., 1999**) to evaluate sensory symptoms across seven domains and 38 items to discover how the child controls sensory inputs through the sensory systems, as well as which behavioral and emotional responses are linked to sensory processing. Only the Taste/Smell Sensitivity subscale was used in this investigation. Mothers were asked how frequently their child displayed sensory behaviors.

Scoring system:

Scores are given on a five-point Likert scale, with "always" equaling 0 and "never" equaling 4. Low scores indicate a high likelihood of dysfunctional conduct.

Tool (V): Depression, Anxiety and Stress Scale (DASS-21):

The Depression, Anxiety, and Stress Scale, developed by **Lovibond & Lovibond**, were employed by the researchers (**1995**). The scale had 21 items and was made up of three self-report ratings that were aimed to measure the symptoms of depression, anxiety, and stress. There are seven items in each of the three DASS-21 subscales. Hopelessness, dysphoria, and devaluation of life, as well as lack of interest/involvement, self-deprecation, anhedonia, and lethargy, are all assessed on the depression scale. Autonomic arousal, skeletal muscle symptoms, subjective sensation of anxious affect, and situational anxiety are all measured on the anxiety scale. The stress scale is sensitive to non-specific arousal levels that have been present for a long time. It measures neurotic alertness, trouble relaxing, and being quickly irritated or agitated, as well as irritability/over-reactivity and impatience. The rating scale responses ranged from (3) applied to me very much or most of the time; (2) applied to me to a considerable degree or a good part of the time; (1) applied to me some of the time or to some degree; and (zero) did not apply to me at all.

Scoring system for Depression, Anxiety, and Stress Scale (DASS):

The responses were categorized with the cutoff point to categorize stress, anxiety, and depression. Thus, the level of symptoms (extremely severe, severe, moderate, mild, and no symptoms) was as follows:

Levels of DASS symptoms	Depression	Anxiety	Stress
Normal (no symptoms)	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely Severe	28+	20+	34+

Tool (IX): Mothers' evaluation toward WhatsApp teaching program reminder content: it included three statements, such as Whats-App teaching program answered all of their questions, useful in improving knowledge and behavioral changes among autistic children, and improves the emotional status.

Validity of the tools:

The content validity of the tools, its clarity, appropriateness, and relevance was

reviewed by five experts' professors, three experts' professors in the pediatric nursing field, and two experts' professor's psychiatry nursing field before using it with the responsive mothers in the study. No modifications were done according to the panel judgment to ensure clarity of sentences and appropriateness of the content.

Reliability of the tools:

The reliability of the tools was assessed through Cronbach's alpha test α= 0. 88. The tools' reliability was estimated by using the Pearson correlation coefficient test to compare variables. The Pearson correlation coefficient for the variables ranged between (P. < 0.5) and (P. < 0.001), which indicated a highly significant positive correlation between variables of the subjects.

Research process:

The study included three phases named by preparatory, implementation, and evaluation phase. It was designed to evaluate the effect of Whats App teaching program reminder on mothers' emotional status regarding behavioral changes among children with autism.

Preparatory phase:

The researchers reviewed the current and past available literature the available textbooks, articles, magazines, and internet searches to develop the tools for data collection and prepare the program.

A pilot study

A pilot study was conducted on 10% of the mothers (30 mothers) of children with autism to examine the clarity and feasibility of the research study. There were no changes made to the tools in its final version. Mothers who participated in the pilot were included in the study.

Administrative and Ethical consideration:

The Dean of the Faculty of Nursing at Menoufia University granted official approval to perform this study in the form of a letter. The purpose of the current study was told to the mothers in the first portion before they began filling out the questionnaire, which was painless and did not cause any harm. They also stated that the information would be kept private and utilized just for research purposes. The researcher reminded the participants that participation in the study is completely voluntary and that they have the freedom to withdraw at any moment.

Implementation:

The study was created with the help of an online Google form spreadsheet sent through Facebook and WhatsApp groups from the period of March 15, 2021which the online Google form spreadsheet was opened to March 31, 2021which was closed. They sent the participant mothers a link to collect data, which included an online questionnaire. This link was shared in groups on Facebook and WhatsApp. The mothers were informed about the study's background, aim, and expected outcomes on the first page of the questionnaire.

The online questionnaire used pre-teaching program to evaluate the effect of Whats App teaching program reminder on mothers' emotional status regarding behavioral changes among their children with autism. Then, repeated in other time during follow-up after one month to evaluate the effect of the Whats App teaching program. The online questionnaire was designed in English language and translated into Arabic language. All questions and items which included in Whats App teaching program reminder were introduced. The Whats App teaching program reminder included simple and clear information about autism.

It also included the preparation of education materials, i.e. Photos, videos about autism and presentation through PowerPoint about autism, and the health education Arabic brochure was designed by the researchers, including educational intervention regarding autism that was introduced to mothers of autistic children in whatsApp groups. This brochure contained all the information needed to know and apply about autism such as photos that clarified the information. The evaluation took place one month after the Whats App teaching program reminder, to evaluate the mothers' emotional status regarding behavioral changes among their children with autism using a pre-posttest online questionnaire.

The ABAS, ASDBI, SSP, and DASS were used twice, as were the online administered questionnaire and the ABAS, ASDBI, SSP, and DASS. These were utilized as a pre-test for the first time to measure mothers' understanding of autism and their emotional health. Then, one month later, similar tools were utilized again to assess the effect of a Whats App training program

reminder on mothers' emotional states regarding behavioral changes in children with autism.

The average time it took mothers to complete the online administered questionnaire, as well as the ABAS, ASDBI, SSP, and DASS, was around 25 minutes. The goal of the current study, the components of the tools, and how to complete the online questionnaire and scales were all explained to each mother who took part in the study. After explaining the purpose of the study and explaining how to utilize the Whats App teaching program reminder, the researchers disseminated it to the participant mothers in Whats App and Facebook groups. To help mothers comprehend autism, the researchers used relevant movies, PowerPoint presentations, and online posters.

Session 1: All researchers began with a discussion about the session's content then the learning outcomes of the next session. The session was performed by the researchers using the Arabic language that appropriate for mother's understanding regarding autism. Start assessed for mothers' knowledge and emotional status regarding behavioral changes among their children with autism (pretest).

Session 2: The theoretical part was contained knowledge about autism and such as d. It covered the mothers' understanding of autism, including the meaning of autism and its causes, the most common age for autism onset, the manifestation of autism and its effect on the child, diagnosis, treatment duration, child needs, treatment approaches, drug side effects, rehabilitation, and how to deal with their children. It was implemented through, Photos, videos, posters, power point presentations.

Session 3: It was contained information about rehabilitation, and how to deal with their children. It was implemented through lectures, posters, educational films.

The Evaluation phase:

After one month from implementing the effect of the Whats App teaching program reminder, evaluation of mothers' emotional status regarding behavioral changes among children with autism was done using the same format of tool that was used in the pre-test to evaluate the effect of the WhatsApp teaching program**.**

Statistical analysis:

Data entry and statistical analysis were performed using SPSS for Windows, version 20. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables and mean and SDs for quantitative variables. Differences between the two means tests (t-test) were used. Statistical significance was considered at P-value <0.05.

Results:

Table (1): clarified that 60% of the studied mothers were in the age group of 20 to less than 28 years, 35% had a Bachelor's degree, 70% were working and most of them (75%) were living in urban areas. There was consanguinity between 20% of them. And 85% of the studied mothers have a negative family history of autism.

Table (2): represented that the autistic children's age ranged from 5-to 12 years, with a mean of 5.34±2.26.years. Half of the autistic children (50%) were in the age group of 5 to less than 7 years, and (70%) of them were boys, and 55% of them were in nursery school. The table showed that when autism was discovered, the age of studied children was 2-5 in 70% of them, 60% of them have the disease from less than one year and 50% of them had a moderate degree of autism.

Table (3): Represented changes that occurred in autistic children that were reported by mothers of autistic children; they reported a decrease in restricted and repetitive behaviors, a decrease in mannerisms, a decrease in motor stereotypies, and a decrease in vocal stereotypes. Concerning behavioral changes in autistic children, changes in self-care autonomies, mothers mentioned changes in the autonomies regarding the use of the toilet, in washing and dressing (F = 213.156; p = .07) **(Table 3).** Maladaptive and sensory problems as shown in Table 3, the scores at the ASDBI subscales significantly decreased, thus indicating a decrease in arousal problems, specifically in hyperactive behaviors, such as motor restlessness, agitation, moving back and forth in the room (F = 49.00; p < .01), in fears induced by new situations (F = 12.678; p < .01), and in sleep regulation problems, such as difficulty falling asleep, nocturnal awakenings,

and difficulty in waking up (F = 14.634; p < .01).

Also, it revealed a significant decrease in aggressiveness, specifically in moodiness, the child gets less scared for no apparent reason, gets less angry or cries suddenly, changes his mood quickly, (F = 11.636; p < .01), in Irritability, the child has less a tantrum) (F = 25.485 ; p < .01). In contrast, significant changes were found in the Self- and other-directed aggression subscales (hitting, scratching, and biting themselves or others). Finally, parents perceive significant changes in their children in the Taste/Smell Sensitivity subscale of the Short Sensory Profile. Also, the same table showed significant improvement and a decrease of the autistic children's behavior was reported by their mothers post-Whats App teaching program reminder implementation (**Table 3).**

From **(Table 4),** showed that regarding the hyperactive subscale, the percentage of autistic children who "often" showed problems decreased significantly on all four items involved in the hyperactive subscale. Regarding fears that occurred by new situations and sleep regulation problems, the percentage of autistic children who "often" showed difficulties, both in falling asleep and awakening phase decreased significantly. Also, in the moodiness and irritability items, the percentage of autistic children who "often" showed difficulty decreased significantly, especially concerning becoming fearful for no reason and significantly changing one's mood.

Table (5) portrays the effect of Whats App teaching program reminder implementation on mothers' knowledge about autism. It was obvious that the majority of them have more knowledge about autism in all items post-Whats App teaching program reminder implementation than pre-implementation and there was a highly statistically significant difference between mothers' knowledge regarding autism pre and post-Whats App teaching program reminder implementation (P<0.001).

Table (6): It was found that pre the Whats App teaching program reminder implementation 75% of the mothers had unsatisfactory knowledge about autism while 95% of them had satisfactory knowledge after two months after Whats App teaching program reminder implementation. A significant improvement was observed in the knowledge of studied mothers (P>0.05).

Concerning the mothers' total scores of emotional status (depression, anxiety, and stress

regarding behavioral changes among autistic children, it was observed from **the table (7)** that, the total mothers' depression, anxiety, and stress scores were severe pre-Whats App teaching program reminder implementation and there were highly statistically significant improvements were observed in mothers' total scores of depression, anxiety, and stress scores regarding behavioral changes among autistic children at (P<0.001).

Figure (1) presents that, (60%) of the studied mothers pre-Whats App teaching program reminder implementation had a severe level of stress, (50 %) of them had severe anxiety, and (40%) of them had severe depression while these percentages decreased to be moderate in less than half of them post-Whats App teaching program reminder implementation

Table (8) showed that there was a significant relationship between the studied mothers' emotional status (depression, anxiety, and stress levels) and their total level of knowledge pre and post the Whats App teaching program reminder implementation (P< 0.05).

Table (9) reflected that there was an association between the demographic characteristics of studied mothers especially their age and residence and their total level of knowledge regarding behavioral changes among children with autism pre and post the Whats App teaching program reminder implementation.

Table (**10**): Represented that there was a highly statistically significant relationship observed between all demographic characteristics and their total mean scores of depression, anxiety, and stress among the studied mothers regarding behavioral changes among children with autism pre and post the Whats App teaching program reminder implementation (r= <0.05*). A significant decrease was found in the depression, anxiety, and stress levels among the studied mothers pre and post the Whats App teaching program reminder implementation.

Regarding mothers' evaluation of prepared WhatsApp teaching program reminder content, **Figure (2)** revealed that approximately (98%) of them reported that the teaching program answered all of their questions, and (96%) of them reported that the teaching program was useful in improving their knowledge and behavioral changes among autistic children, the majority (88%) of them reported that teaching program improves the emotional status of them.

Table (1): Frequency and percentage distribution of the studied mothers regarding their demographic characteristics and family history (n=300)

Mothers' demographic characteristics	No	%
Age(years):		
20->28	180	60.0
28-38	105	35.0
>38	15	5.0
Mean and SD(23.2±7.3)		
-Educational level:		
Postgraduate	15	5.00
Bachelor's degree	105	35.00
Technical Institute	90	30.00
Secondary school diploma	90	30.00
- Working status:		
Working	210	70.00
Not working	90	30.00
-Residence		
Urban	225	75.00
Rural	75	25.00
Consanguinity		
Yes	60	20.0
No	240	80.0
Family history of Autism		
Positive	45	15.0
Negative	255	85.0

Table (2): Frequency and percentage distribution of the studied autistic children regarding their demographic characteristics and medical history (n=300)

Autistic children demographic characteristics	No	%
Age		
• 5->7	150	50.0
• 7-> 10	117	39.0
• 10 -12	33	11.0
Mean± SD 5.34±2.26		
Gender		
• Boys	210	70.0
• Girls	90	30.0
Educational class		
• Nursery	165	55.0
• School-age	135	45.0
Age (in years) when autism discovered		
• 1	60	20.0
• 2->5	210	70.0
• >5	30	10.0
Duration of disease (in years)		
• <1	180	60.0
• 1-5	90	30.0
• >5	30	10.0
Degree of autism		
• Mild	90	30.0
• Moderate	150	50.0
• Sever	60	20.0

Table (3): Relation between the scores averages of the ABAS-II self-care subscale, the ASDBI subscales, and the SSP

Test	Subscale	Pre	Post	F	P
ABAS-II	Self-Care	2.5	1.2	13.156	<0.01
	Hyperactivity	2.5	2.1	49.00	<0.01
	Fear of New situations	0.7	0.5	12.678	<0.01
	Sleep Regulation Problems	0.8	0.3	14.634	<0.01
ASDBI	Moodiness	0.8	0.6	11.636	<0.01
	Irritability	1.9	0.7	25.485	<0.01
	Self-Directed Aggression	2.8	1.6	13.216	<0.01
	Other-Directed Aggression	0.9	0.4	33.186	<0.01
SSP	Taste/Smell Sensitivity	4.7	2.3	23.257	<0.01

Table (4): Relation between response rates to the ASDBI subscales

Subscale	Item	Answer	Pre	Post	Chi-square	P-value
Hyperactivity	Restless	N/A	62.8	38.3	22.61	.001
		S/t	37.6	24.5		
		Oft	36.7	1.8		
	Fidgets	N/A	64.6	35.8	12.53	.01
		S/t	37.7	35.8		
		Oft	32.4	0.0		
	Climbs on furniture	N/A	72.3	67.6	48.13	.001
		S/t	18.4	15.2		
		Oft	18.0	12.3		
	Wanders around room	N/A	62.4	48.3	43.64	.001
		S/t	35.7	28.2		
		Oft	25.7	4.8		
Fear of New Situations	Becomes upset when things don't occur at their usual times	N/A	88.8	82.7	34.62	.001
		S/t	11.2	9.4		
		Oft	6.2	2.7		
	Resists changing from one activity to another	N/A	57.2	46.1	63.34	.001
		S/t	37.3	33.6		
		Oft	18	7.2		
	Becomes upset when owning schedule or order of the routine is changed	N/A	79.5	68.4	62.22	.001
		S/t	20.7	15.8		
		Oft	11.3	4.7		
	Resists changing own location in the room	N/A	82	69.7	60.72	.001
		S/t	19	12.6		
		Oft	11.2	6.4		
Sleep Difficulty regulation	Falling problems asleep	N/A	88.7	68.3	29.23	.001
		S/t	14.2	9.6		
		Oft	17.4	1.7		
	Awakens one or more times at night	N/A	81.1	68.3	43.44	.001
		S/t	15.8	12.6		
		Oft	15.8	6.4		
	Awakens unusually and stays awake early the rest of the day	N/A	87.2	76.3	61.36	.001
		S/t	12.6	7.8		
		Oft	11.3	4.6		
	Difficulty awakening in the morning	N/A	96.6	87.2	13.28	.01
		S/t	7.5	3.4		
		Oft	4.7	0		
Moodiness	Becomes fearful for no reason	N/A	90.3	84.2	37.56	.001
		S/t	11.2	9.3		
		Oft	4.6	0		
	Cries for no reason	N/A	98.5	93.3	Ns	
		S/t	4.7	1.4		
		Oft	1.5	0		

Subscale	Item	Answer	Pre	Post	Chi-square	P-value
	Angry for no reason	N/A	87.2	85.5		
		S/t	7.6	6.2		Ns
		Oft	7.8	4.6		
	The shift in the mood quick	N/A	76.3	66.6	53.16	.001
		S/t	18	18		
		Oft	14.2	4.7		
	Cranky	N/A	63.4	38.3	33.22	.001
		S/t	36.7	30.4		
		Oft	25.6	6.6		
	Difficult to please	N/A	79.5	69.7	43.20	.001
		S/t	15.8	15.7		
Irritability		Oft	14.4	4.7		
	Takes a long time to calm down when upset	N/A	77.7	71.3	57.03	.001
		S/t	15.8	15.7		
		Oft	12.6	6.2		
	Easily frustrated	N/A	64	50.7	30.21	.001
		S/t	30.4	28.3		
		Oft	20.5	4.7		

Note: ASDBI: Autism Spectrum Disorder Behavior Inventory; N/A: Never/Almost Never; S/t: Sometimes; Oft: Often.

Table (5): Percentage distribution of the studied mothers' knowledge about autism pre and post-Whats App teaching program reminder implementation

Mothers' knowledge	No =(300)		X^2	P-value
	Pre Whats App teaching program reminder implementation No (%)	Post-Whats App teaching program reminder implementation No (%)		
Meaning of autism	75(25.0)	282(94.0)	34.56	<0.001*
Causes of autism	90(30.0)	270(90.0)	45.67	<0.001*
Common age of autism occurrence	105(35.0)	288(96.0)	33.45	<0.001*
Manifestation of autism	114(38.0)	288 (96.0)	52.23	<0.001*
Diagnosis of autism	60 (20.0)	285(95.0)	46.34	<0.001*
Duration of treatment	72 (24.0)	276(92.0)	39.22	<0.001*
Needs of autistic child	96(32.0)	255(85.0)	36.78	<0.001*
Treatment approaches for autistic child	114 (38.0)	267(89.0)	42.33	<0.001*
Side effects of drugs	60 (20.0)	276 (92.0)	54.89	<0.001*
Rehabilitation and how to deal with autistic children	90(30.0)	255 (85.0)	44.33	<0.001*

*Significance at 0.001 levels

Table (6): Percentage distribution of the total mothers' knowledge level regarding autism

Total mothers Knowledge	No =(300)				X^2	p-value
	Pre		Post			
	No	%	No	%		
Unsatisfactory	225	75.0	15	5.0	92.32	<0.05*
Satisfactory	75	25.0	285	95.0		

Significance at <0.05 levels

Table (7): Total mean scores of mothers' emotional status (depression, anxiety, and stress) regarding behavioral changes among autistic children pre and post Whats App teaching program reminder implementation

DASS	No =(300)		X^2	P-value
	Pre Mean± SD	Post Mean± SD		
Depression	25.40 ± 2.30	13.70 ± 1.50		
Anxiety	18.50 ± 1.13	11.74 ± 1.14	18.89	<0.001*
Stress	33.20 ± 2.70	22.32 ± 3.45		

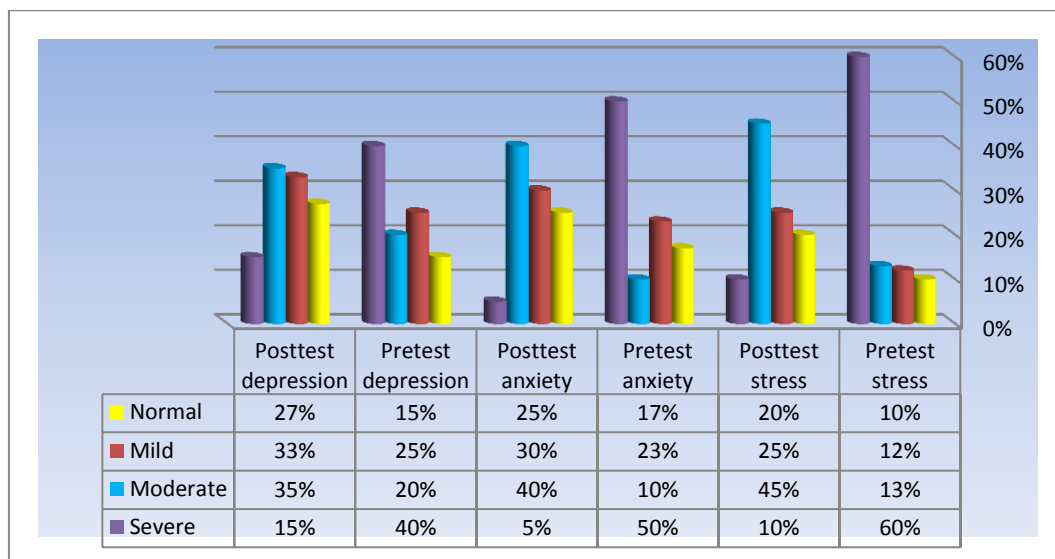|	Posttest depression	Pretest depression	Posttest anxiety	Pretest anxiety	Posttest stress	Pretest stress
■ Normal	27%	15%	25%	17%	20%	10%
■ Mild	33%	25%	30%	23%	25%	12%
■ Moderate	35%	20%	40%	10%	45%	13%
■ Severe	15%	40%	5%	50%	10%	60%

Figure (1): Percentage distribution of the studied mothers emotional status (depression, anxiety, and stress level) regarding behavioral changes among autistic children (n=300) pre and post-Whats App teaching program reminder implementation

Table (8): Association between mothers' level of depression, anxiety, and stress and their total level of knowledge regarding behavioral changes among children with autism pre and post-Whats App teaching program reminder implementation
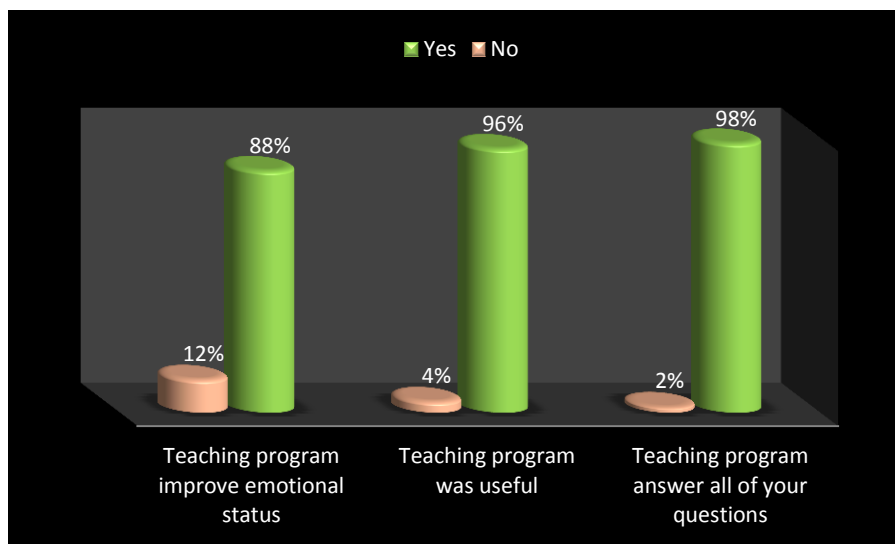
DASS	Pre Whats App teaching program reminder implementation				Post-Whats App teaching program reminder implementation				X^2	P-value
	Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory			
	No=75	%	No=225	%	No=285	%	No=15	%		
Depression	24	32.0	74	33.0	94	33.0	5	33.3		
Anxiety	26	35.0	81	36.0	100	35.0	5	33.4	96.37	<0.0001*
Stress	25	33.0	70	31.0	91	32.0	5	33.3		

Table (9): Association between demographic characteristics of the studied mothers and their total level of knowledge regarding behavioral changes among children with autism pre and post the Whats App teaching program reminder implementation

Mothers' demographic characteristics	Total level of Mothers' knowledge								X2	p-value
	Pre Whats App teaching program reminder implementation				Post-Whats App teaching program reminder implementation					
	Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory			
	No=75	%	No=225	%	No=285	%	No=15	%		
Mother age:										
- 18->28	33	44.0	101	45.0	114	40.0	4	25.5	0.946	<0.001*
- 28-38	27	36.0	90	40.0	108	38.0	7	49.0		
- >38	15	20.0	34	15.0	63	22.0	4	25.5		
-Educational level:										
- Postgraduate	21	28.00	79	35.00	103	36.00	4	25.00	0.542	0.009
- Bachelor's degree	25	33.00	65	29.00	85	30.00	2	15.00		
- Technical Institute	5	7.00	63	28.00	37	13.00	4	25.00		
- Secondary school	24	32.00	18	8.00	60	21.00	5	35.00		
- Working status:										
- Not Working	20	27.00	180	80.00	217	76.00	11	74.00	0.522	0.004
- Working	55	73.00	45	20.00	68	24.00	4	26.00		
- Residence										
- Urban	52	70.00	169	75.00	180	63.00	11	74.00	0.604	<0.001*
- Rural	23	30.00	65	25.00	105	37.00	4	26.00		

Table (10): Association between demographic characteristics of the studied mothers and their mean scores of emotional status (depression, anxiety, and stress) pre and post the Whats App teaching program reminder implementation

Mothers' characteristics	DASS						p-value
	Depression		Anxiety		Stress		
	Pre	Post	Pre	Post	Pre	Post	
Mother age: - 18->28 - 28-38 - >38	22.44 ± 3.52 23.60 ± 3.34 24.56 ± 3.23	11.43 ± 2.64 13.60 ± 1.40 12.66 ± 1.48	15.59± 3.64 16.60± 3.60 17.89 ± 1.13	10.16± 1.62 12.83 ± 1.13 11.86 ± 1.15	30.42± 3.63 31.54± 2.65 32.76 ± 3.67	23.22 ± 3.63 22.34± 3.65 24.46 ± 3.77	**<0.001***
-Educational level: - Postgraduate - Bachelor's degree - Technical Institute - Secondary school	23.23 ± 3.67 22.45± 3.78 21.64 ± 2.46 24.30 ± 3.40	13.60 ± 1.42 11.45 ± 2.63 12.50± 2.64 12.60 ± 1.45	16.80 ± 1.12 15.55± 3.63 16.60± 3.64 17.80 ± 1.15	12.83 ± 1.16 10.12± 1.67 10.12± 1.68 11.83 ± 1.19	33.70 ± 3.67 30.45± 3.66 31.50± 2.65 32.70 ± 3.64	24.40 ± 3.73 21.25 ± 3.62 22.30± 3.65 23.40 ± 3.72	**0.008**
- Working status: - Not Working - Working	21.65 ± 2.34 24.72 ± 3.63	12.53± 2.64 12.64 ± 1.45	16.70± 3.42 17.86 ± 1.14	10.32± 1.57 11.87 ± 1.16	31.56± 2.69 32.74 ± 3.69	22.32± 3.68 23.45 ± 3.73	**0.004**
- Residence - Urban - Rural	22.62 ± 3.63 24.79 ± 3.68	11.54± 2.65 12.68 ± 1.47	15.66± 3.67 17.86 ± 1.16	10.18± 2.69 11.85 ± 1.14	30.56± 3.63 32.73 ± 3.62	21.34± 3.64 23.44 ± 3.75	**<0.001***

Figure (2): Distribution of mothers' evaluation toward WhatsApp teaching program reminder content regarding behavioral changes among autistic children

Discussion:

The results of the current study reflected that Whats App teaching program reminder were effective in reducing mothers' emotional disturbance regarding behavioral changes among autistic children after Whats App teaching program reminder implementation which supported the hypothesis of the current study.

Regarding demographic data, the current study results revealed that less than two-thirds of the studied mothers were in the age group of 20 to less than 28 years. This may be the cause of the presence of more psychological disturbance as depression, anxiety, and stress among mothers because they were not old enough and did not have enough knowledge.

Regarding demographic data, the current study results illustrated that nearly three-quarters were working. This may be attributed to children with ASD's need for special care so that their mothers need to spend more time with them to manage their needs and not prefer to work which causes emotional disturbances for them.

The present study findings revealed that more than two-thirds of children with autism were boys. This result is supported by, **Hassan, (2018**) who studied "Caregiver's awareness regarding autistic children" and found that majority of autistic children in the study were boys.

Concerning when autism was discovered, the present study indicated that the majority of the studied children's autism was discovered in age 2-5. This finding is similar to **Mohamed et al.**, **(2016)** who "Effect of educational training on mothers' competency level for managing the children with autism" and stated the same result.

In addition, the study supports **Wong's (2017)** conclusion that autism typically manifests itself in the first three years of life. This could be as a result of failure to meet this milestone is linked to autism, as it is the defining feature of autism by the age of three, and it plays an important role in social self-regulation milestones and early language development, as well as children's ability to regulate their behavior and emotions in response to social cues (**National Research Council, 2019).**

This could also be due to a delay in autism diagnosis, as suggested by **Elsheikh (2016),** who concluded that delayed psychiatric consultations among Egyptians could be attributed to a lack of access to services (either due to cost or availability) and a lack of

awareness of autistic children among the general Egyptian population.

The current study results showed significant behavioral changes among the autistic children were reported by their mothers post-Whats App teaching program reminder implementation and reflected improvement and a decrease in restricted and repetitive behaviors, a decrease in mannerisms, a decrease in motor stereotypies, and a decrease in vocal stereotypes. Also, noticed improvements in self-care autonomies, regarding the autonomies as the use of the toilet, washing, or dressing, maladaptive and sensory problems, and maladaptive, sleep regulation, and sensory problems. This may be due to the positive effect of mothers teaching program which reflected on autistic routine activities and helped them manage the conduct of their children.

Regarding the ASD Behavior Inventory, the findings of the current study revealed that the percentage of autistic children who "often" showed problems, decreased significantly on all four items involved in the ASD Behavior Inventory. From the researchers' point of view, this clarifies the importance of introducing the Whats App teaching program reminder implementation to the mothers their children have behavioral changes regarding autism.

The present study result indicated regarding mothers' knowledge about autism that post-Whats App teaching program reminder implementation, a highly statistically significant improvement was observed in mothers' knowledge about autism in all items (P<0.001). This reflected the positive effects of the Whats App teaching program reminder on the knowledge of mothers having autistic children.

The finding of the present study reveals that three-quarters of mothers had unsatisfactory knowledge level pre-Whats App teaching program reminder implementation but post the Whats App teaching program reminder implementation, a highly statistically significant improvement was observed in mothers' knowledge (*P*<0.001). This may be related to deficiency of knowledge which affected their children's behaviors. This confirms the importance of providing a Whats

App teaching program reminder. This result matched with the study by **Fan et al**., **(2020)** about the "KAP theory" and stated that, a health behavior change when gaining the right knowledge and adopting the practice**.** Also**,** a recent study by **Rana et al., (2020)** illustrated that sufficient individual knowledge is associated with effective disease control and promotion of children's health**.** A study by **Ricardo et al., (2018)** supported that; knowledge deficit is associated with poor health and maladaptive disease behavior**.**

Robles and Romero (2011) conducted a meta-analysis of studies published over 20 years to assess the effectiveness of the parental training program and found that daily interactions between parents and children have been improved, parental behavior, and attitudes, improved communication and problem-solving, and reduced parental stress **(Guevara and González 2012).**

Educational support for mothers of children with ASD, whether formal or informal can help reduce their stress**.** It can also help in demonstrating the greatest potential for coordinating and streamlining care, lowering logistical barriers to seeking help, and improving child and family outcomes **(Mcintyre and Brown 2018).**

Concerning mothers' total scores of emotional status**,** there were highly statistically significant improvements were observed in mothers' total scores of depression, anxiety, and stress scores regarding behavioral changes among autistic children at (P<0.001) post-Whats App teaching program reminder implementation. These results explained by knowledge deficit causes increasing emotional disturbances level.

The results of the current study revealed an improvement in the stress, anxiety, and depression levels of the studied mothers regarding behavioral changes among their autistic children post-Whats App teaching program reminder implementation. These findings are similar to those of **Walsh et al. (2013)** who conducted a study about "Predictors of parent stress in a sample of children with ASD: pain, problem behavior, and parental coping" and found that a stress intervention program was effective for mothers

of autistic children and leading to improvements in their stress levels. Also, providing educational support for mothers of children with ASD can help in reducing their stress (**McIntyre and Brown 2018**).

Findings of the present study highlighted that there was a significant relationship between the studied mothers' emotional status (depression, anxiety, and stress levels) and their total level of knowledge pre and post the Whats App teaching program reminder implementation (P< 0.05). These reflect that the improvement in mothers' knowledge level is associated with decreasing levels of depression, anxiety, and stress about their autistic children. This result also emphasized the benefit of administering the Whats App teaching program reminder, which met the mothers' needs and provide them with sufficient knowledge to deal with their children.

The current study finding revealed that there is a statistically significant association between the examined mothers' demographic characteristics and their total level of knowledge about behavioral changes in their autistic children, particularly their age and residence. This could explain why mothers of children had little understanding of the disease, causing them more anxiety over their children. This could be due to mothers' lack of understanding about the sickness, how to care for their children, and how to deal with them, which is the primary cause of their psychological distress.

The present study reflected that there is a highly statistically significant association observed between all sociodemographic characteristics and their total emotional disturbance (depression, anxiety, and stress) mean scores ± SD among the studied mothers regarding behavioral changes among autistic children with a significant decrease was found in their (depression, anxiety, and stress) level among the studied mothers after the Whats App teaching program reminder implementation. Regarding the residence of the studied mothers in rural areas is associated with high mean scores of their stress level before the implementation of the guideline. This could explain why rural and urban areas have distinct

values, cultures, and beliefs, and moms in rural areas are more worried due to a lack of social media awareness and the difficulty of communicating through WhatsApp groups. In addition, the mothers' working was strongly associated with their stress levels. This could be because working women left their children with ASD unattended for a long period while at work, and they also require special care, raising their worry levels concerning their children who are left alone at home.

As regarding mothers' evaluation of prepared WhatsApp teaching program reminder content, the majority of them reported that the teaching program answered all of their questions and was useful in improving their knowledge and behavioral changes among autistic children, these findings may be due to that WhatsApp teaching program reminder was prepared with simple Arabic language and had proper photos, videos for clarification and done with a nowadays favorite and easily methods o by using smartphones and WhatsApp.

Conclusions:

Based on the results of the current study, it was concluded that; the WhatsApp teaching program reminder was effective in reducing mothers' anxiety, stress, and depression regarding behavioral changes among autistic children. There was a highly significant association between mothers' knowledge and their anxiety level regarding behavioral changes among children with autism post-implementation of the WhatsApp teaching program reminder.

Recommendations:

The following recommendations were suggested based on the results of the present study:

- Mothers should be trained about behavioral changes in their children should be held for educated and non-educated mothers.

- Psychological support should be carried out through the media to help mothers become more coping with their autistic children.

- Booklets and brochures containing sufficient knowledge about autism should be printed and kept in clinics and schools and given to

all mothers and caregivers of young children.

- Pediatric nurses should be enrolled children with autism in the intervention program and provide them with information about mothers' need to have contact with professional support, online if not accessible by face to face during the counseling and rehabilitation sessions with mothers.

- The study can be replicated on a large sample in a different setting so that the findings can be generalized to a large population.

- Pay more attention to mothers' emotional status to identify the mental disorders of these mothers to help them to deal with their autistic children.

- A further research study is recommended to explore the factors increasing mothers' emotional disturbances whose children with autism.

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