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Predicting Disordered Eating Behaviors in Women with Overweight and Obesity: Investigating the Role of Stigma, Shame, Guilt, Fear of Negative Evaluation and Self-Efficacy

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ABSTRACT

Introduction: Obesity is a health concern with complex dimensions. This study aimed to investigate the predictive roles of psychological factors, including weight self-stigma, weight- and body-related shame and guilt, eating self-efficacy, and fear of negative appearance evaluation, on disordered eating behaviors in Iranian women with overweight and obesity.

Methods: This descriptive cross-sectional research was carried out in 2020-2021 among 228 Iranian women, aged 18 to 70 years, with overweight and obesity who were selected by purposive sampling method. Data were collected through online standard questionnaires. SPSS-23 was used to analyze the data.

Results: All the predictor variables had significant associations with disordered eating behaviors ($P<0.05$, $P<0.01$). In addition, the results of multiple regression analysis showed that eating self-efficacy was a predictor of emotional eating behavior ($\beta = -0.534$, $P<0.001$). Additionally, fear of negative appearance evaluation and eating self-efficacy were predictors of external eating behavior ($\beta f = -0.416$, $\beta s\text{-}e = -0.416$, $P< 0.001$). Moreover, weight and body related guilt and eating self-efficacy were predictors of restrained eating behavior ($\beta g = 0.442$, $\beta s\text{-}e = 0.300$, $P< 0.001$).

Conclusions: These findings emphasize the importance of psychological variables in obesity. Specifically, self-efficacy, fear of negative evaluation, and guilt were important constructs in predicting disordered eating behaviors. Thus, in clinical weight loss programs, considering psychological treatments based on strengthening self-efficacy and self-compassion in this group is helpful to improve their healthy eating behaviors.

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Introduction

Obesity, a critical global health problem, is prevalent in both high- and low-income countries, with Iran reporting a 70% prevalence rate (1, 2). Women are particularly affected, experiencing higher rates of obesity compared to men (3). Obesity is linked to non-communicable diseases and psychosocial problems such as depression, anxiety, eating disorders, and low self-esteem, alongside societal pressures regarding body image. Additionally, sociocultural norms often favor thinness, leading to negative biases against individuals with overweight and obesity, particularly women (1, 4-6). Therefore, it seems necessary to investigate the relationships between psychosocial variables and obesity among women.

Disordered eating behaviors significantly contribute to the development and persistence of obesity. Beyond its survival purpose, eating is a rewarding activity tied to emotions and

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mood, influenced by physiological, psychological, and social factors (7). These behaviors encompass a range of abnormal patterns, including emotional eating, restrained eating, binge eating, skipping meals, and extreme methods like using diet pills, diuretics, and laxatives or inducing vomiting (5, 8). Disordered eating is strongly linked to psychological factors such as weight stigma, body dissatisfaction, perfectionism, depression, low self-esteem, and anxiety, particularly in individuals with overweight and obesity (9). These factors create a cycle of unhealthy eating habits that perpetuates weight gain and associated health risks, emphasizing the need for targeted interventions to address these behaviors.

Weight stigma, a significant psychosocial factor in obesity, is strongly associated with disordered eating behaviors. Individuals with obesity often face stereotypes labeling them as lazy or lacking willpower, and evidence shows that such stigma, rather than motivating weight loss, exacerbates psychological problems like stress, depression, anxiety, and low self-esteem, along with physical problems such as metabolic syndrome (10, 11). Internalizing weight stigma further degrades self-identity, fostering feelings of worthlessness and contributing to behaviors like restrictive eating, emotional eating, binge eating, and food addiction (6, 10). Understanding the link between weight stigma and eating behaviors, particularly in women with higher weights, is crucial for addressing obesity (11).

Additionally, Shame and guilt, as self-conscious emotions, play a significant role in obesity and eating behaviors. Shame involves global negative self-evaluation, while guilt focuses on specific actions (12-14). Weight-and body-related shame, driven by internalized cultural standards, leads to avoidance and public humiliation, whereas weight- and body-related guilt evokes remorse and reparative actions (15). These emotions often link with unhealthy eating behaviors among individuals with obesity or eating disorders, perpetuate disordered eating, and make effective weight management difficult (16-18). Addressing these emotions is critical for obesity and eating disorder interventions.

Furthermore, fear of negative evaluation, including fear of negative appearance evaluation, plays a critical role in obesity-related eating behaviors. This fear, rooted in anxiety over others' judgments, predicts pressure to be thin, internalized thin ideals, negative emotions, and binge eating symptoms (19–21). Obesity is strongly associated with eating problems and anxiety linked to fear of appearance-based evaluations, which are key risk factors for social anxiety and eating disorders (22, 23). Studies also confirm a connection between fear of negative appearance evaluation and disordered eating in individuals with higher weight, emphasizing the need to address these concerns in obesity interventions (24).

Along with the variety of emotions, self-efficacy, the belief in one's ability to perform behaviors that influence outcomes, is crucial in regulating eating behaviors (25). Eating self-efficacy, a specific aspect of the general concept of self-efficacy, is defined as individuals' beliefs in self-regulation and management of their eating behaviors in challenging situations (26). Research indicates that higher eating self-efficacy improves self-regulation, helps individuals overcome dietary challenges, supports weight management, and promotes healthier food choices. Conversely, low eating self-efficacy predicts obesity and unhealthy eating habits, highlighting its role in enhancing or diminishing self-regulatory behaviors essential for weight control (27-32). Overall, obesity is a multifaceted problem influenced by individual and social factors, with significant implications for individuals and societies, particularly women. Understanding the interplay between obesity-related variables is essential for developing effective interventions. This study examines the relationships between weight self-stigma, weight-and body-related shame and guilt, fear of negative appearance evaluation, and eating self-efficacy with disordered eating behaviors in Iranian women with overweight and obesity, marking the first investigation of these variables in this context.

Materials & Methods

Study Design

This study was descriptive-analytical and cross-sectional.

Participants and Sampling

The participants were Iranian women aged 18 to 70 years with overweight or obesity. The sample size for multiple regression analysis

was determined based on guidelines recommending at least 15 cases per predictor variable. To enhance the effect size, 30 items per predictor variable were considered (33), resulting in a sample of 228 women recruited using purposive sampling.

Questionnaire Translation and Validation

The study utilized four questionnaires, which were translated to address weight self-stigma, weight- and body-related shame and guilt, weight efficacy lifestyle (short form), and fear of negative appearance evaluation. A bilingual individual translated these questionnaires from English to Persian. A panel of specialists in psychiatry and psychology reviewed the translations for content and formal validity, suggesting amendments where necessary. After implementing these corrections, a back-translation was performed by another bilingual individual. The original and translated versions were consistent. Preliminary testing was conducted with women visiting a nutrition clinic in Tehran. Internal consistency of the instruments was assessed using Cronbach's alpha and ordinal theta coefficients.

Data Collection Procedures

Due to COVID-19 restrictions and participant reluctance to attend in-person sessions, the research questionnaires were administered online. Inclusion criteria required participants to be female, Iranian nationals, aged 18 to 70 years, with a BMI ≥ 25, internet access, and literacy. Three questionnaires were excluded from the analysis as they were completed by individuals with a normal BMI. Participants completed the questionnaires through a structured Google Docs format. Demographic questions including height (m), weight (kg), age, education, employment and marital status were assessed. Then, the research questionnaires were raised. The questionnaire link sent to various groups whose user identities were known, and volunteers were invited to participate in the research. Moreover, other people also provided this link to other related groups so that people could cooperate if they were satisfied. The questionnaire ensured completeness by logging responses only upon clicking the "Finish" button, eliminating incomplete datasets.

Statistical Analysis

Data were analyzed using SPSS version 23. Descriptive indices (minimum, maximum, mean, standard deviation, skewness, and kurtosis) were calculated. Pearson's correlation coefficients were computed for the research variables. Multiple regression analysis was performed to test the hypotheses. The assumptions of normality (skewness and kurtosis), absence of multicollinearity (VIF and tolerance index), and independence of error sources (Durbin-Watson test) were assessed before conducting the regression analyses.

Measures

The instruments for measuring the predictive variables included four questionnaires:

1. Dutch Eating Behavior Questionnaire (DEBQ) was used to measure disordered eating behaviors, which was the outcome variable of the present study. Van Strien et al. (36) developed it with 33 items and three subscales. The emotional eating subscale, which measures eating in response to emotional disturbance, consists of 13 items ("Do you get the desire to eat when you are anxious, worried, or tense?"). The subscale of external eating, which measures eating in response to external cues of food and not to the body's internal signals of satiety and hunger, has ten items ("If food smells and looks good, do you eat more than usual?"). Restrained eating subscale measures restriction of eating behavior and has ten items ("Do you try to eat less at mealtimes than you would like to eat?"). The items of this questionnaire are scored on a 5-point Likert scale from never = 0 to almost always = 5. Only question 21 of this questionnaire, related to the restrained eating subscale, is scored reversely. According to van Stein et al., the subscales of this questionnaire have high internal consistency and convergent and divergent validity (36). The internal consistency of subscales of emotional, external, and restrained eating in the Iranian study (37) and the present study was 0.89, 0.89, 0.87, 0.91, 0.67, and 0.87, respectively.
2. Weight Self-Stigma Questionnaire (WSSQ) contains 12 items designed to assess self-stigma associated with having obesity or overweight (34). This questionnaire includes two subscales: self-devaluation and fear of enacted stigma. A 5-point Likert scale ranged from completely disagree=1 to completely agree=5. A higher score indicates a higher level

of self-stigma (e.g., "I don't have enough self-control to maintain a healthy weight", "People think that I am to blame for my weight problems"). The overall internal consistency of the original version of this questionnaire has been reported as α = 0.88, with the self-devaluation subscale α = 0.81 and the fear of enacted stigma subscale α = 0.87 (32). In the Persian version, the internal consistency for the self-devaluation subscale is reported as α = 0.91, and the fear of enacted stigma subscale is α = 0.87 (35). In the present study, Cronbach's alpha for the total score of this questionnaire was α = 0.83, for the self-devaluation subscale α = 0.79, and for the fear of enacted stigma subscale α = 0.85.

3. Weight-and Body-Related Shame and Guilt Scale (WEB-SG) designed to measure the extent of shame and guilt associated with weight and body in individuals with obesity (14). It has two subscales for shame and guilt. Each item on this scale is rated on a 5-point Likert scale from never = 0 to always = 4 (e.g., " When I am in a situation where others can see my body (e.g., pool, changing room), I feel ashamed," "When I can't get a grip on my weight, I blame myself."). Conradt et al. (30) reported an internal consistency of α = 0.92 for the shame subscale and α = 0.87 for the guilt subscale. In this research, Cronbach's alpha for the shame subscale was α=0.87, and for the guilt subscale was α = 0.83.

4. Fear of Negative Appearance Evaluation Questionnaire (FNAES) was developed by Lundgren, Anderson & Thompson (21) to measure the level of fear that one's physical appearance is evaluated negatively by others. FNAES questionnaire has six items scored on a 5-point Likert scale from not at all = 1 to extremely = 5 ("I am concerned about what other people think of my appearance"). The internal consistency of the original version of the questionnaire was α=0.94. Cronbach's alpha of this questionnaire was α=0.93 in the present study.

5. Weight Efficacy Lifestyle Questionnaire-Short Form (WEL-SF) was developed from the original form of this instrument contained 20 items and was developed by Clark et al. (27) to measure individuals' belief in their ability to control eating behavior for weight management. The short form consists of eight items that correlate highly with the total score of the original form, explaining 94% of the variance of the total score of the full version. This questionnaire is scored on a 10-point Likert scale, from not confidence at all = 0 to very confidence = 10 (e.g., "I can resist binge eating when I am angry (or irritable)"). The internal consistency of this questionnaire has been reported as α=0.92 (31). A higher score indicates greater eating self-efficacy. In this study, Cronbach's alpha was α=0.84.

Results

Descriptive statistics

This study was conducted on 228 women with overweight and obesity (M_{age}=38.65, SD_{age}=11.06). In addition, 56.5% and 43.5% of participants were with overweight and obesity, respectively. About 10.1% of participants had a diploma and below degree, 6.6% had an associate, 38.2% had a bachelor, 25.9% had a master's, and 19.3% had a Ph.D. Regarding marital status, 36% were single, 55.7% were married, and 8.3% were divorced. The minimum, maximum, mean, standard deviation, skewness and kurtosis of the variables are reported in Table 1.

Table 1. Descriptive indicators of research variables

Variable	Min	Max	Mean	SD
Weight self-stigma	16	55	35.14	7.97
Weight-and body-related guilt	0	24	11.97	5.56
Weight-and body-related shame	0	24	7.50	6.04
Eating self-efficacy	0	80	35.12	17.88
Fear of negative appearance evaluation	6	30	15.75	6.57
Emotional eating behavior	0	48	26.09	10.39
restrained eating behavior	3	39	19.98	6.42
external eating behavior	8	33	21.18	5.07

Table 2 reports the Pearson correlation coefficient matrix of research variables. Among the predictor variables, eating self-efficacy had the strongest association with emotional eating behavior (r = -0.625). Furthermore, eating self-efficacy was strongly associated with external

eating behavior (r = -0.498). Additionally, weight- and body-related guilt had the strongest association with restrained eating behavior (r = 0.293).

Table 2. Correlation matrix between research variables

		1	2	3	4	5	6	7	8
1	Weight self-stigma	1							
2	Weight-and body-related guilt	0.608**	1						
3	Weight-and body-related shame	0.653**	0.586**	1					
4	Eating self-efficacy	-0.437**	-0.230**	-0.209**	1				
5	Fear of negative appearance evaluation	0.675**	0.594**	0.725**	-0.211**	1			
6	Emotional eating behavior	0.481**	0.368**	0.370**	-0.625**	0.360**	1		
7	restrained eating behavior	0.019	0.293**	0.077	0.248**	0.126*	-0.071	1	
8	external eating behavior	0.384**	0.218**	0.184**	-0.498**	0.300**	0.551**	-0.254**	1

P<.05* P<.01**

Regression Analysis

Table 3 shows the regression analysis results of emotional eating behavior based on predictor variables. The R2 indicated that predictor variables can explain 46.9% (P < 0.001) of the emotional eating behavior variance. Precisely, with β = -0.534, eating self-efficacy significantly predicted emotional eating behavior. Other predictor variables did not contribute substantially to predict emotional eating behavior.

Table 3. Multiple regression results of emotional eating behavior based on predictor variables

	R	R^2	F(sig)	B	β	t	sig
Weight self-stigma	0.685	0.469	39.16 (.001)	0.100	0.077	0.967	0.335
Weight-and body-related guilt				0.188	0.101	1.52	0.128
Weight-and body-related shame				0.185	0.107	1.40	0.161
Eating self-efficacy				-0.310	-0.534	-9.72	0.001
Fear of negative appearance evaluation				0.092	0.058	0.739	0.460

Results related to the regression analysis of restrained eating behavior based on predictor variables are shown in Table 4. The R2 suggested that predictor variables can account for 20.3% (P < 0.001) of the restrained eating behavior variance. The results demonstrated that weight- and body-related guilt (β= 0.442) and eating self-efficacy (β= 0.300) significantly predicted restrained eating behavior. Other predictor variables did not have significant contributions in explaining restrained eating behavior.

Table 4. Multiple regression results of restrained eating behavior based on predictor variables

	R	R^2	F(sig)	B	β	t	sig
Weight self-stigma	0.450	0.203	11.28 (.001)	-0.077	-0.096	-0.986	0.325
Weight-and body-related guilt				0.510	0.442	5.45	0.001
Weight-and body-related shame				-0.112	-0.106	-1.12	0.261
Eating self-efficacy				0.108	0.300	4.45	0.001
Fear of negative appearance evaluation				0.067	0.068	0.710	0.479

Finally, results of the regression analysis of external eating behavior based on predictor variables are presented in Table 5. The R2 indicated that predictor variables could explain 30.6% (P < 0.001) of the external eating behavior variance. The results indicated that eating self-efficacy (β = -0.416) and fear of negative appearance evaluation (β = 0.235) significantly predicted external eating behavior.

Table 5. Multiple regression results of external eating behavior based on predictor variables

	R	R^2	F(sig)	B	β	t	sig
Weight self-stigma	0.553	0.306	19.60 (.001)	0.106	0.167	1.84	0.066
Weight-and body-related guilt				-0.017	-0.019	-0.246	0.806
Weight-and body-related shame				-0.143	-0.171	-1.95	0.052
Eating self-efficacy				-0.118	-0.416	-6.62	.001
Fear of negative appearance evaluation				0.181	0.235	2.61	0.010

Discussion

This study aimed to evaluate associations, as well as predictions, between five predictive variables, including weight self-stigma, eating self-efficacy, fear of negative appearance evaluation, and weight- and body-related shame and guilt, with three outcome variables including emotional eating behavior, external eating behavior and restrained eating behavior (disordered eating behaviors) in women with overweight and obesity. Considering that obesity is evident in a person's appearance, all of the research predictor variables are psychological variables that emphasize weight and body aspects of women. Results demonstrated correlational and predictive relationships between predictor and outcome variables, which are explained in more detail below. Moreover, considering that, no research was found that examined all the assumed variables of this research simultaneously, some evidence nearly related to this study was considered.

Our findings showed that weight self-stigma, weight- and body-related shame and guilt, and fear of negative appearance evaluation are positively correlated with emotional eating behavior. In addition, eating self-efficacy has a negative association with emotional eating behavior. These results were consistent with the findings of other studies (38, 39). These findings mean that when women with overweight and obesity internalize society's obesity biases and feel more worthless, ashamed and guilty about their body and weight, and more afraid of others' negative evaluations about their appearance, their eating behaviors will be more based on emotions. Meanwhile, when they assume that they cannot manage their eating behaviors in challenging situations and feel less competent, they are still more likely to engage in emotional eating behaviors. Further, according to the escape theory (40), one of the mechanisms people use when experiencing negative emotions is to escape from them and tend to eat food. Therefore, when some people experience negative emotions, instead of paying attention to those emotions and adopting appropriate strategies, they show emotional eating behavior. Emotional eating behavior is one of the unhealthy strategies for dealing with stressful internal or situational states and situations. Therefore, the simultaneous existence of negative emotions towards body size and shape, along with feeling worthless and believing in incompetence in regulating one's eating behaviors, is associated with an unhealthy strategy such as emotional eating. The regression analysis results showed that only eating self-efficacy predicted emotional eating behavior, which explains nearly half of the prediction variance. This finding is also consistent with the findings of previous studies (41). Due to the high importance of self-efficacy in behaviors, despite having other variables, only eating self-efficacy had a predictive role and affected other research variables. Self-efficacy is a person's belief in his ability to influence the environment despite all negative feelings (25). Therefore, if people do not believe in their competence to manage their eating behaviors in such situations, they may act unconstructive (28).

The results also indicated that weight self-stigma, weight- and body-related shame and guilt, and fear of negative appearance evaluation positively correlate with external eating behaviors. In addition, eating self-efficacy had a negative significant relationship with external eating behavior. These findings are entirely consistent with those related to emotional eating behaviors in this study. Evidence has suggested that emotional and external eating behaviors often occur concurrently (42). The escape from self-awareness theory can explain this simultaneous occurrence of these two disordered eating behaviors (40). It postulates that when individuals experience negative emotions, they focus on the immediate environment, such as food cues, to escape from these emotions, displaying external eating behavior. Negative emotions and food cues simultaneously increase binge eating in women with obesity (43). Moreover, results from functional neuroimaging studies among chronic dieters have shown that the same brain regions activated by appealing food cues are involved during the induction of negative emotions (44). Thus, both behaviors are associated with low self-control in individuals. Furthermore, consistent with previous research, the findings of this study showed that eating self-efficacy and fear of negative appearance evaluation are significant

predictors of external eating behavior (45, 46). Predicting this type of disordered eating behavior, reliant on external food cues, involves the variable of fear of negative appearance evaluation, which itself depends on the environmental assessment of the appearance of an individual with obesity or overweight. In other words, when an individual is concerned about environmental evaluation and feels incompetent in regulating their dietary behaviors, their behavior is also based on environmental cues related to food rather than on internal hunger and satiety cues. This association has also influenced the predictive role of other variables in the research. Finally, the research findings showed that eating self-efficacy, fear of negative appearance evaluation, and weight and body-related guilt are positively associated with restrained eating behavior. Moreover, eating self-efficacy, weight, and body-related guilt were predictors of restrained eating behavior. These findings align with other research (24, 41). These findings mean that the more women with higher weight are afraid of others' negative evaluations about their appearance, blame themselves for their weight and body condition, and feel competent in managing their eating behaviors in challenging situations, the more likely they restrict their food intake. Simultaneously, this group's high eating self-efficacy and weight-and body-related guilt will predict restrained eating behavior. Restrained eating refers to restricting calorie intake or dieting to maintain or reduce weight. This behavior pays attention to dieting rules rather than internal satiety and hunger cues. Additionally, weight and body-related guilt creates regret and leads people to engage in unhealthy weight and body-related behaviors. This emotion can manifest through increased motivation for intense exercise or restricting caloric intake (47, 48). Also, when individuals believe in their self-efficacy in managing eating behaviors in challenging situations, they may control and reduce their weight by limiting their eating behaviors (28). It should be noted that preventing and restricting eating behavior alone will not be a successful path to weight loss and control, and, in many cases, eating restraint will concurrently be associated with dietary disinhibition (49). The power of these variables in predicting restrained eating behavior also influenced the potential predictability of other research variables.

Overall, eating behaviors in women with overweight and obesity are related to various psychological aspects. Variables related to the women's self (self-stigma and self-efficacy) and emotions (Self-conscious: shame and guilt, basic: fear) can play an essential role in the quality and type of their eating behaviors. Weight self-stigma affects people's social identity and will have multiple psychological and behavioral consequences (6). Self-efficacy is a cognitive structure and one of the determinants of the "self" and is essential in predicting health behaviors (25). The presence of high self-efficacy in women with higher weights can help them manage their eating behaviors despite the presence of various barriers. At the same time, the low self-efficacy belief in this group can provide the basis for behaviors that rely on emotions and the environment. On the other hand, body/weight-related emotions, such as guilt, shame, and fear, are also involved in determining people's unhealthy eating behaviors. Therefore, the internalization of weight stigma and the subsequent feeling of worthlessness in these women, along with the negative emotions of shame, guilt, and fear of others' negative evaluations, change people's beliefs about their abilities to manage their eating behaviors in various situations can create a combination that provides a path to disordered eating behaviors and increase their weight (50). This research had several limitations. Firstly, the study participants only consisted of women, recruited via a purposive sampling method that limited the generalizability of the findings to the entire population. So, a more diverse sample and random sampling methods are recommended for greater generalizability. Additionally, data were collected through online surveys and self-report instruments (including BMI), which may be influenced by social desirability bias. Thus, future research could benefit from in-person assessment, and incorporating methods based on objective criteria or observational data to enhance the validity of findings. Furthermore, the study's cross-sectional design should be cautious about causal inferences. Therefore, longitudinal and/or interventional studies are necessary in the future to determine the sequence and

potential causal relationships between variables.

Conclusion

Overall, the findings from this research provide valuable insights into previously unexplored associations between psychological variables and disordered eating behaviors in women with overweight and obesity. The significant correlational and predictive relationships identified in this study highlight the necessity of considering these factors to better understand the eating behaviors of this population. It is recommended that clinical weight management programs focus on enhancing self-efficacy beliefs among these women. Moreover, self-compassion-based therapies could play a crucial role in helping value themselves and adopt healthier behaviors for effective weight management. Finally, further research is recomended to investigate these findings and explore the potential mechanisms underlying these relationships.

Declarations

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Conflicts of Interest

The authors declare that they have no competing interests.

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Ethical Considerations

The study assessed informed consent of participants, mentioned the research purpose, emphasized confidentiality and anonymity of question page, and expressed gratitude for participation. It received ethical approval from the Research Vice-Chancellor of the Islamic Azad University of Karaj, Iran (Code: IR.IAU.K.REC.1398.082).

Authors Contribution

Nazli Tavakoli: writing – original draft, Writing – review & editing. **Mehdi Manouchehri:** Writing – review & editing, Supervision, Conceptualization. **MohammadReza Seyrafi:** Writing –review & editing, Supervision, Conceptualization. **AbdolReza Norouzy:** Writing – review & editing, Supervision, Resources. **GholamReza Sarami:** Supervision.

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