

# Nonadherence to Immunosuppressants Among Transplant Recipients: Emotional Intelligence as a Predictive Factor During COVID-19 Pandemic

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**Purpose:** To evaluate the association between emotional intelligence and fear of COVID-19 on self-reported adherence, based on a cross-sectional design.

**Patients and Methods:** Transplants recipient of both sexes aged 23–75 years old were evaluated at the Organ Transplant Unit, University Hospital of Catania, Italy. Data were analyzed using frequency, descriptives, Spearman and Pearson correlations, Chi-square goodness of fit test, and linear regression. Self-reported adherence was estimated with the Basel Assessment of Adherence with Immunosuppressive Medication Scale (BAASIS). Emotional intelligence and fear of COVID were, respectively, measured with the Emotional Intelligence Scale (EIS) and Multidimensional Assessment of COVID-19 Related Fears Scale (MAC-RF). This was a cross-sectional study of kidney transplant recipients. In reporting this study the authors followed the STROBE guidelines.

**Results:** A correlation was found between EIS and MAC and between EIS and adherence but there was no correlation between MAC and adherence. A linear regression model was also conducted using a stepwise method, which indicated that EIS was a significant predictor of adherence ( $p < 0.05$ ).

**Conclusion:** This study was found that EIS is a predictor of adherence to treatment in transplant patients. Fear of COVID, while positively correlated to EIS, is not correlated to the adherence's outcome, possibly due to the proper follow-up performed to the patients. Indeed, according to these results, we suggest to provide good follow-ups with recipients, with interviews also based on self-regulation and awareness.

**Keywords:** adherence, kidney transplant, emotional intelligence, COVID-19

## Introduction

Adherence to therapy means the proficiency of the patient to follow medical doctors' prescriptions regarding the timing, doses, and frequency of taking the drug for the entire therapy's course.<sup>1</sup>

A major concern of adherence is being aware of the main reasons that lead patients to be non-adherent to treatment. Diverse studies have shown that patients with chronic diseases tend to have poor adherence.<sup>2</sup> Multifariousness aspects influence adherence, such as education, age, number of years since the transplant, income levels, the belief that the therapy is not necessary, social factors, drug regimen factors, and immune suppressants' side-effects.<sup>3–5</sup> Previous studies have shown that, among renal transplant patients, non-adherence can occur early after transplantation. This issue is increasing over time.<sup>6,7</sup> Preventing rejection and graft loss, adherence to medication is crucial in recipients. The literature also lists that 35.6% of renal transplant patients are non-adherent to immunosuppressant medication.<sup>8</sup> Other variables that influence adherence are psychological factors.<sup>9–13</sup> In this study, it has been hypothesized that emotional intelligence could be a factor in this. According to Goleman, every individual is endowed with emotion intelligence from birth. Five components distinguish emotional intelligence: self-awareness,

self-regulation, motivation, empathy, and social skills.<sup>14</sup> Emotional intelligence is also described as a person's belief about their emotions: being aware of our own emotions without repressing feelings (Goleman, Daniel. "The brain and emotional intelligence: New insights". *Regional Business* (2011): 94–95.). This kind of intelligence seems to be useful in various fields, in as much as being capable of identifying and managing emotions. In the literature, a close relationship between emotion and motivation is often underlined.<sup>15</sup> Indeed, emotional responses, among many components that characterize it, present a motivational aspect that can direct the individual to perform a certain kind of behaviour aimed at achieving a goal.<sup>16,17</sup> This study was conducted during the COVID-19 pandemic. In the pandemic period, adherence to treatment in patients with chronic illness was significantly reduced due to the tough situation regarding reaching hospitals, contacting physicians, or the unavailability of medication.<sup>18,19</sup> As mentioned before, many factors influence adherence, and some studies have discovered that the COVID-19 pandemic has impacted some of these factors.<sup>20</sup> Other studies have shown that the COVID-19 threats incited the patients to adhere to their care principles, but the restrictions resulting from the pandemic caused difficulties in being adherent to treatments.<sup>21</sup>

The aim of the study was to evaluate the association between emotional intelligence and fear of COVID-19 on self-reported adherence, based on a cross-sectional design.

## Materials and Methods

### Study Participants

Data collection took place in period the between March 2021 and July 2022. Eighty kidney transplant recipients of both sexes, aged 23–75 years old, were evaluated while attending the Organ Transplant Unit, University Hospital of Catania, Italy. Participants were reached by telephone, using the follow-up list containing patients' contact number, to explain the main objectives of the study and to ask for their willingness to participate. If so, they were given an appointment to fill in the required questionnaires. Before proceeding with the questionnaires, each participant had the opportunity to read all the information regarding the study and give their informed consent. The selection was based on the following criteria: age greater than 18 years, having had a kidney transplant at least 18 months earlier, because, according to the literature on the topic, in the first period after the transplant recipients are more adherent, while non-adherence problems tend to increase 12 months after the transplant,<sup>6,7</sup> a kidney transplant from a deceased or living donor, and having no psychiatric disorders that could have influenced cognitive or emotional issues. The exclusion criteria were as follows: recipients with psychiatric disorders and recipients with rejection or adverse events, because these affect adherence.

Baseline psychiatric assessment was performed using two cross-sectional symptom rating scales, DSM 5 level 1 and 2, to examine any critical psychopathological domains. All recipients included in the study were receiving standardized immunosuppressive therapy: Tacrolimus, Mycophenolate, Mofetil and Steroids; and none of them were taking psychiatric drugs such as antipsychotics and/or antidepressants.

The present study was approved by the ethics committee of University of Catania (Section of Psychology) and carried out according to the Declaration of Helsinki (World Medical Association, 2013). Prior to inclusion in the study, we received written informed consent from all participants.

All organs were donated voluntarily with written informed consent and this was conducted in accordance with the Declaration of Istanbul.

### Measures

The tests administered were the following: Emotional Intelligence Scale (EIS) to evaluate emotional intelligence, Multidimensional Assessment of COVID-19 Related Fears Scale (MAC-RF) to evaluate the fears of COVID-19, and Basel Assessment of Adherence to Immunosuppressive Medications Scale (BAASIS) for the analysis of therapeutic adherence.

### EIS Scale

The EIS is a tool consisting of 33 items, three of which are expressed in a negative form, which can be evaluated on a scale of five intervals (0 = strongly disagree, 5 = strongly agree). The scale measures the individual perception of one's emotional

abilities by tracing them to three macro-dimensions: F1, evaluation and expression of emotions in relation to others (eg, “I know when it’s time to talk about my personal problems”); F2, evaluation and expression emotions in relation to oneself (eg, “I am aware of the emotions I feel”); and F3, regulation and use of emotions (eg, “I use a good mood to face obstacles”). The internal consistency values of each scale are satisfactory for factor 1, Evaluation of the emotions of others ( $\alpha = 0.68$ ), and factor 2, Evaluation and expression of one’s emotions ( $\alpha = 0.64$ ), and good for factor 3, Regulation and use of emotions/mood ( $\alpha = 0.71$ ).

## MAC Scale

The MAC-RF is a self-report questionnaire consisting of eight items, assessable on a five-interval scale (0 = very different from me, 4 = very similar to me), each of which identifies eight forms of fear related to the COVID-19 pandemic. The total score (from 0 to 32) makes it possible to ascertain the presence of psychological suffering and/or pathological fears: higher scores in specific items indicate higher levels of the type of fear corresponding to that item. In addition, the scale analyzes four dimensions: bodily domain (items 1–2); interpersonal domain (items 3–4); cognitive domain (items 5–6); and behavioral domain (items 7–8). Scores of the MAC-RF can range from 0 to 32, with higher scores indicating higher COVID-19 related fears. The MAC-RF showed a good internal consistency (Cronbach’s alpha = 0.84).

## BAASIS Scale

The BAASIS is a self-report instrument to assess medication nonadherence in transplantation developed by the Leuven-Basel Research Group (LBARG). The BAASIS follows the recently published taxonomy of medication adherence (Vrijens et al, 2012<sup>22</sup>). As a measure of medication adherence, the BAASIS is considered a valuable tool for assessing medication adherence in clinical practice and in research with transplant recipients (Cleemput et al, 2007<sup>23</sup>; Dobbels et al, 2010<sup>24</sup>; De Bleser et al, 2011<sup>25</sup>). Several studies provide evidence on its psychometric properties (Marsicano et al, 2013<sup>26</sup>; Tielen, 2014<sup>27</sup>). The BAASIS instrument measures adherence over the last 4 weeks: the scale consists in/on five questions based on adherence’s implementation and persistence: patients’ taking, skipping, timing ( $\pm 2$  h from the prescribed time, TM), and persistence to treatment. The general interpretation of the BAASIS scale consists of verifying if the patient is taking the medications as prescribed or if they are missing a dose (could be 2 or more), if the treatment has been interrupted or changed, the time of deviation or the discontinuation of the therapy without physician’s consent.

## Statistical Analysis

Data were analyzed using SPSS software, version 29.0. Frequency analysis was conducted to describe and identify patient’s characteristics. Descriptive statistics were performed to identify the mean, standard deviation, median, and variables’ normality. Chi-square goodness of fit test of BAASIS was used to assess the adherence to treatment. Bivariate correlation of Rho di Spearman was performed among adherence and EIS. Then a bivariate correlation of Pearson was conducted to assess the relationship between MAC and EIS. Last, a linear regression analysis method stepwise was used to determine EIS as a predictive factor to adherence.

## Results

### Participants and Procedures

Of the 80 interviewed patients (sample size calculation = 67, 95% CI =  $\pm 5\%$ ), 52.9% were women, 47.1% were men, 55.7% were from south Italy, and 44.3% were from north Italy. Patients ages ranged from 23 to 75 years and most of the sample were in the age group 45–55 years (43%). Regarding education, 55.7% finished high school, 25.7% had just the secondary school, and the rest of the sample was divided between primary school and college or higher degree. Most of the sample (64.3%) had received dialysis treatment in a range between 0–5 years (Table 1). Others demographic variables and tests of proportion are shown in Table 1.

Table 2 shows the mean, standard deviation, median, and variables’ normality of scales measures used in our study. Results indicate that distribution is normal because critical values do not exceed the range between +2.00 and –2.00, with acceptable skewness and kurtosis values.

**Table 1** Participants Demographic Characteristics

Demographics	Level	Frequency	Total	Proportion	$\chi^2/H_a^*$
Sex	Male	33	70	0.471	0.720
	Female	37	70	0.529	
Age	23–33	4	70	0.057	<.001
	34–44	18	70	0.257	
	45–55	30	70	0.429	
	56–66	14	70	0.200	
	>67	4	70	0.057	
Italys' areas	North	31	70	0.443	0.403
	South	39	70	0.557	
Education	Primary school	2	70	0.029	<.001
	Secondary school	18	70	0.257	
	High school	39	70	0.557	
	College, University or post-doctoral degree	11	70	0.157	
Professions	Unemployed	23	70	0.329	0.002
	Employed	26	70	0.371	
	Retired	5	70	0.071	
	Housewife	16	70	0.229	
Marital status	Unmarried (never married)	28	70	0.400	0.120
	Married	28	70	0.400	
	Widow	9	70	0.129	
	Divorced	5	70	0.071	
Transplant history	Pre-emptive kidney transplant (no previous dialysis or at first transplant)	1	70	0.014	<.001
	Two or more transplants	3	70	0.043	
	Living kidney transplant	16	70	0.229	
	Kidney transplant	50	70	0.714	
Good adherence * Transplant history	Living kidney transplant	4	70	0.129	<.001
	Deceased kidney transplant	27	70	0.871	
Dialysis	No dialysis	9	70	0.129	<.001
	0–5 years	45	70	0.643	
	5–10 years	14	70	0.200	
	>10	2	70	0.029	
Transplant	No transplant	2	70	0.029	<.001
	0–5 years	29	70	0.414	
	5–10 years	23	70	0.329	
	>10	16	70	0.229	
Good adherence * Transplant	No transplant	1	39	0.323	0.031
	0–5 years	17	39	0.387	
	5–10 years	13	39	0.322	
	10	8	39	0.358	

Notes: \* $\chi^2$ =chi square (multiple level of variables);  $H_a$  = Binomial test (two level).

BAASIS results are shown in [Table 3](#), calculated with Chi-square goodness of fit test.

[Table 3](#) shows the results of adherence: first we investigated the sample proportion and the frequency. The results revealed that 39 patients were adherent to the therapy (“NO” means “I never skipped or changed the therapy”) and 31 were not adherent. The levels are shown in the [Table 3](#) indicate how many times the patient interfered with the medications.

[Table 4](#) shows the relationship between EIS and adherence. Adherence showed a significant correlation between EIS factors: adherence positively correlates with EIS total score ( $r=0.32$ ,  $p<0.01$ ), factor 1 ( $r=0.32$ ,  $p<0.01$ ), factor 2 ( $r=0.39$ ,  $p<0.01$ ), and factor 3 ( $r=0.33$ ,  $p<0.01$ ). Spearman correlation was performed.

Regarding bivariate correlation results between the EIS scale and MAC scale, [Table 5](#) shows that total EIS score positively correlates with interpersonal domain ( $r=0.25$ ,  $p<0.05$ ) and the behavioral domain ( $r=0.27$ ,  $p<0.01$ ). Also,

**Table 2** Mean, Standard Deviation, Median, and Variables' Normality

Descriptive Statistics	Bodily	Interpersonal	Cognitive	Behavioral	MaC-Rf TOT	Factor 1	Factor 2	Factor 3	EIS TOT	Adherence
N	70	70	70	70	70	70	70	70	70	70
Mean	4.13	4.31	2.73	2.74	13.9	38.4	14.4	32.5	118	0.443
Median	4.00	4.00	2.50	3.00	15.0	40.5	15.0	34.0	123	0.00
Standard Deviation	2.13	2.18	2.10	2.22	6.93	7.57	3.66	7.32	23.2	0.50
Skewness	-0.08	-0.27	0.26	0.51	0.11	-0.87	-1.13	-1.18	-1.21	0.23
Std. Error skewness	0.28	0.28	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
Kurtosis	-0.59	-0.89	-0.67	-0.42	-0.331	0.20	0.916	1.55	1.60	-2.00
Std. Error Kurtosis	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
Shapiro-Wilk p	0.02	0.00	<0.001	<0.001	0.05	<0.001	<0.001	<0.001	<0.001	<0.001

**Abbreviations:** MAC-RF TOT, Multidimensional Assessment of COVID-19 Related Fears Scale total score; EIS TOT, Emotional Intelligence Scale total score.

**Table 3** Chi Square Goodness of Fit Test of BAASIS

	Level	Frequency	Proportion	Chi Square Goodness of fit Test
<b>Adherence TOT</b>	NO	39	0.55	$\chi^2=0.91$ , gdl=1, $p<0.339$ , ns
	SI	31	0.44	
<b>Taking</b>	0	51	0.73	$\chi^2=129$ , gdl=4, $p<0.001$
	2	13	0.19	
	3	1	0.01	
	4	4	0.06	
	6	1	0.01	
<b>Timing</b>	0	55	0.79	$\chi^2=64.7$ , gdl=2, $p<0.001$
	2	9	0.13	
	3	6	0.09	
<b>Reduction</b>	0	68	0.97	$\chi^2=62.2$ , gdl=1, $p<0.001$
	1	2	0.03	

**Notes:**  $\chi^2$ =chi square (multiple level of variables).

**Abbreviation:** Adherence TOT, total score of adherence.

**Table 4** Spearman’s Rho Correlations Among EIS and Adherence\*

EIS	Spearman’s rho Correlations and p-value	Adherence
Factor 1	Spearman’s rho correlations	-0.317**
	p-value	0.008
Factor 2	Spearman’s rho correlations	-0.385**
	p-value	0.001
Factor 3	Spearman’s rho correlations	-0.325**
	p-value	0.006
EIS TOT	Spearman’s rho correlations	-0.324**
	p-value	0.006

**Note:** \*The correlation is significant at level 0.05; \*\*The correlation is significant at level 0.01.

**Abbreviations:** EIS, emotional intelligence scale; EIS TOT, emotional intelligence scale total score.

**Table 5** Pearson’s r Correlations Among MAC-RF Domains, MAC-RF Total Score, EIS Factors, and EIS Total Score\*

MAC-RF	Pearson’s r	Factor 1	Factor 2	Factor 3	EIS TOT
Bodily Domain	Pearson’s r	0.153	0.076	0.197	0.148
	p-value	0.205	0.531	0.103	0.223
Interpersonal Domain	Pearson’s r	0.236*	0.148	0.274*	0.249*
	p-value	0.049	0.222	0.022	0.038
Cognitive Domain	Pearson’s r	-0.067	-0.016	0.047	-0.033
	p-value	0.581	0.899	0.702	0.784
Behavioral Domain	Pearson’s r	0.160	0.320**	0.311**	0.271*
	p-value	0.185	0.007	0.009	0.023
MAC-RF TOT	Pearson’s r	0.161	0.167	0.264*	0.205
	p-value	0.184	0.167	0.027	0.089

**Note:**\*The correlation is significant at level 0.05; \*\*The correlation is significant at level 0.01.

**Abbreviations:** MAC-RF, Multidimensional Assessment of COVID-19 Related Fears Scale; EIS TOT, Emotional intelligence scale total score.

**Table 6** Linear Regression Analysis Stepwise Method with Adherence as the Dependent Variable

Independent Variables	R <sup>2</sup>	Beta	F	t	p
EIS TOT	0.121	-0.35	9.37	-3.06	0.003
MAC TOT	7.03 e-4	0.47	0.04	0.40	0.70

**Abbreviations:** EIS TOT, emotional intelligence scale total score, MAC-RF TOT, Multidimensional Assessment of COVID-19 Related Fears Scale.

factors 1 and 3 positively correlate with the interpersonal domain ( $r=0.24, p<0.05$ ;  $r=0.27, p<0.05$ , respectively). The Behavioural domain positively correlates with factor 2 ( $r=0.32, p<0.01$ ) and with factor 3 ( $r=0.31, p<0.01$ ). Total Mac score positively correlates with factor 3 ( $r=0.27, p<0.05$ ). Pearson correlations were performed.

The linear regression analysis stepwise method is shown in Table 6. Dependent variables are adherence, while independent variables are the total score of MAC scale, and the total score of EIS scale. The stepwise linear regression showed that the variable that influences adherence is EIS, in particular we have a variance proportion of  $R^2=0.12$  ( $R^2$  change=0.08,  $p<0.05$ ) and the value of Beta indicates that EIS predict negatively the adherence ( $R^2=0.12$ , Beta=-0.35,  $p=0.003$ ). According to the results, our sample with high levels of EIS presents good adherence.

## Discussion

Patients with chronic illness, especially during the COVID-19 pandemic, have experienced difficulties in taking medication and prescribed due to the unavailability of health care professionals caused by isolation measures and the interruption of services. These stressful measures mostly impacted chronically ill patients in fact, and recipients need to frequently visit the hospital due to the routine follow-up. Despite all, health care systems handled the situation in various way to ensure the care's endurance.<sup>28-31</sup> To achieve good adherence, previous studies showed that patients need to be well-informed about medication regimen, indeed patients that are knowledgeable are highly motivated to be adherent.<sup>32,33</sup> Motivation and self-regulation in psychology has been already correlated to adherence behaviour.<sup>34-36</sup> In various studies it was found that good adherence is associated with a good understanding of the consequences of not taking the medications as prescribed.<sup>37</sup> Other studies also showed that compliance declines over the course of time not just in patients who suffer from renal disease, but also on all types of organ transplantation. Patient compliance is greater in the early post-transplant period. Thus, in the early post-transplant period recipients are more compliant.<sup>38</sup> Also a proper follow-up is a main factor that leads the patient to be adherent to treatment,<sup>39,40</sup> indeed the follow-up's purpose is to assure the patient is remaining healthy while identifying problems that could arise, and intervene to mitigate complications.<sup>41,42</sup>

The main objective of our study was to see if the pandemic could impact vulnerability in transplant patients with respect to their adherence treatment and if emotional intelligence had played a fundamental role in the management of the latter. The results, albeit limited by a cross-sectional study, provide us with interesting consideration regarding the management of transplant patient compliance. First, MAC, or fear of COVID-19, has no positive correlation with adherence, while several significant and positive correlations emerge between its domains and EIS total score and its factors. Particularly interesting is the interpersonal domain which correlates with all the factors and with the total score except for the factor 2 (which concerns the relationship with oneself). The same can be said of the domain relating to behavior towards others. Regarding adherence to treatment, there are strong significant correlations with all factors of emotional intelligence with adherence. This result is then confirmed by the regression. We can therefore state that, while the fear of the COVID-19 pandemic does not prove to be fundamental in relation to therapeutic adherence, the impact of emotional intelligence is particularly important in our study. Emotional intelligence, often underestimated, in fact becomes the fundamental engine for effectively managing the intervention protocol for the patient and his management after the transplant. Adherence is in fact the result of what is a path of awareness, and adherence to the effectiveness of the intervention and the medical protocol.<sup>6,43,44</sup> The practical implications of the study are to give indications on the importance of emotional intelligence in the management of the transplant patient. Emotional intelligence includes a set of skills including the person's ability to be aware of their emotions, but also to know how to express them adequately. According to literature, the central element of emotional intelligence is self-awareness. This can be defined as the ability to recognize an

emotion when it manifests itself.<sup>16–18</sup> Transplant patients may have difficulty identifying their emotional experience and expressing it adequately. It is clear that one of the fundamental objectives of post-transplant follow-up can be the development of a good level of self-awareness, a basic element for good adaptation and effective adherence to treatment. Knowing how to control one's emotions seems to be the basis of psychological well-being and emotional stability, especially when it comes to extremely intense or long-lasting emotional states, often present in our patients. Achieving a good level of competence on an emotional level is one of the primary objectives of a psychotherapeutic path with transplant patients, within which the person is supported in developing the ability to recognize and accept the emotional experiences experienced, thus becoming capable of coping with stress and negative emotions with more functional and adaptive strategies.<sup>16–18</sup>

In this study no patient randomization was performed, also generalizing the results was difficult due to the low number of participants. The limitations mainly concern the research design: as a cross-sectional type, it was not possible to draw inferences about the post-COVID period or to verify if there was a longitudinal effect of the pandemic, especially regarding the fear of contracting the virus and the therapeutic adherence. To strengthen the effect of the pandemic, it would have been necessary to compare it with a pre-pandemic group, and the lack of objective measures of adherence is another limitation of this study. Moreover, the design required patients to go to the clinic. Thus, there is selection bias, as nonadherent people are less likely to attend clinic appointments. Also, if the patients had high levels of fear related to COVID-19 they may not come to the clinic. Further, people with psychiatric disorders were excluded.

## Conclusion

This study found that EIS is a predictor of adherence to treatment in transplant patients. Fear of COVID, while positively correlated to EIS, is not correlated to the adherence's outcome, possibly due to the proper follow-up performed to the patients. Indeed, according to these results, we suggest to provide good follow-ups with recipients, with interviews also based on self-regulation and awareness.

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## Disclosure

The authors report no conflicts of interest in this work.

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