Martino ML, Capasso M, Lemmo D, Donizzetti AR, Freda MF, Caso D. The Moderating Role of Emotion Regulation on the Relationship Between Cancer Fatalism and Intentions to Participate in Female Cancer Screening. *Health Psychology Research.* 2026;14(1):e81240049.
https://doi.org/10.14440/hpr.0371

Research Article

The Moderating Role of Emotion Regulation on the Relationship Between Cancer Fatalism and Intentions to Participate in Female Cancer Screening

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Keywords: Female cancer screening, Emotion regulation, Fatalism, Health promotion

Health Psychology Research

Vol. 14, 2026

Background

Despite their proven effectiveness in providing timely diagnoses and early treatments, participation in breast and cervical cancer screening remains low.

Objective

Given the variability of findings in the literature and the scarcity of studies that deepen understanding of emotion regulation strategies, conceptualized as a dispositional style of the individual, this study aims to examine the relationship between cancer fatalism and intention to participate in cancer screening by exploring the moderating role of emotion regulation strategies.

Methods

Two separate studies were conducted on large samples of Italian women: Study 1 focused on cervical screening (N = 1,493) and Study 2 on breast screening (N = 1,402). A double moderation model was then tested in both studies.

Results

Results for Study 1 (cervical) confirmed only a direct negative effect of fatalism on intention, with no significant moderation effects. In Study 2 (breast), however, the negative relationship between fatalism and intention was significantly buffered by cognitive reappraisal; the association was non-significant among women reporting high reappraisal.

Conclusion

These findings suggest that cognitive reappraisal acts as a protective buffer; however, this mechanism may be more evident in higher-salience contexts (e.g., among older women with more screening experience). Public health interventions should therefore consider promoting adaptive emotion regulation skills to improve screening uptake.

1. INTRODUCTION

1.1. BREAST AND CERVICAL CANCER SCREENING PROGRAMS

Public health breast and cervical cancer screening programs contribute to a significant reduction in mortality rates and cancer severity[1] by detecting early-stage disease or precancerous conditions in asymptomatic women, enabling timely diagnosis and treatment.[2] Breast cancer remains the leading cause of cancer diagnoses among women, followed by cervical cancer; approximately 30% of new cancer diagnoses

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derive from screening activities, significantly improving the five-year survival rates to 90% for breast cancer and 79% for cervical cancer.[3-5]

In Italy, cancer screening programs are public health services included in the essential levels of care to ensure citizens' right to safeguard their health. Within public healthcare, three types of cancer screening programs are offered to specific target populations: (i) women aged 50–69 are invited every two years to undergo a bilateral mammogram for breast cancer risk assessment; (ii) women between the ages of 25 and 64 are offered a Pap test for cervical cancer every three years; and (iii) for colorectal cancer, both men and women aged 50–74 are invited every two years to undergo a fecal occult blood test.

Despite their efficacy in providing timely diagnoses and treatments, participation rates remain low: only 41% of the eligible population participated in breast screening, 28% participated in cervical screening, and 30% participated in colorectal screening.[2] These data are consistent with the most recent cancer screening report in the European Union,[6] which confirms the low rates of participation across many European countries.

The literature points to several individual, emotional, and relational factors that can shape people's decisions and intentions to participate in cancer screening, as well as barriers and obstacles that make such decisions increasingly complex.[7-9] Within the literature focused on female cancer screening, attention has been directed primarily toward physical discomfort, such as experiencing pain during the exams, and psychological distress, such as experiencing concerns, fear, or embarrassment.[10] As demonstrated in recent reviews, the main theoretical models adopted in the literature for examining and improving engagement in cancer screening can be divided into behavioral, functioning and process, and health-cultural models.[11-13] On the one hand, a substantial body of research in this field has extensively explored the role of cognitive and social factors that predict intentions and subsequent behaviors (e.g., the theory of planned behavior).[14] On the other hand, fewer studies have investigated the role of emotions, mainly considering them as barriers, such as disgust, shame, embarrassment, discomfort, and fear[15-17] or mediators between intention and behavior. Emotions are primarily viewed as a representation of a disease or an evaluation of the affective costs associated with specific screening exams, such as the self-regulatory model, but not as a functioning and/or personal style that can moderate the intention to participate in screening practices.

1.2. THE INTENTION TO PARTICIPATE IN FEMALE CANCER SCREENING: THE ROLE OF FATALISM AND EMOTION REGULATION

In the last 20 years, fatalism has been considered a key factor influencing healthy behaviors and screening participation.[18] Studies have shown that fatalistic beliefs are associated with lower participation in medical examinations and healthy behaviors, particularly in the context of cancer screening.[19,20]

Within the cancer context, studies have defined fatalism as the perception that the onset of cancer is a certain death sentence, entailing the belief that health events are unavoidable and beyond personal control.[18,21] Another aspect of cancer fatalism is the belief that health is determined by God's will, fate, or luck, and is therefore beyond an individual's control.[22] These beliefs have often been found to be linked to perceptions that screening for early detection of cancer is unnecessary, as the outcome is seen as inevitably fatal, and women's efforts are seen as unable to alter their fate.[23,24] Thus, cancer fatalism acts as a barrier to screening.[25] Studies reported that higher levels of cancer fatalism were associated with lower screening attendance rates for breast cancer[26] and cervical cancer.[27] Research on emotions in relation to fatalism has mostly focused on specific screening-related emotions, such as fear, anxiety, and embarrassment,[28] often viewing negative emotions as an outcome of fatalism[18] but not as functioning and/or personal style (such as emotion regulation strategies) that can promote or inhibit the intention to participate in screening practices.[19] Emotion regulation appears to play a moderating role in this context, as intense and difficult-to-manage emotions can hinder screening intention. Emotion regulation enables individuals to manage these emotions, reducing their interference and facilitating more rational and adaptive decision-making.[29]

Emotion regulation, particularly cognitive reappraisal, enables individuals to respond adaptively to affective events, maintain a state of internal balance during stressful experiences, build resilience, and resist maladaptive impulses. Reappraisal appears to be highly effective in regulating affect and physiological arousal, without the cognitive and physiological costs associated with expressive suppression strategies (strategies focused on emotional response), and with longer-lasting effects than attention-focused strategies, such as distraction.[30] Cognitive reappraisal leads to increased levels of positive emotion and decreased levels of negative emotion. Research suggests that cognitive reappraisal is generally associated with more adaptive outcomes than suppression in terms of health outcomes and decisions.[30] Cognitive reappraisal, unlike expressive suppression, a strategy that involves consciously hiding or withholding the outward expression of an emotion, is associated with greater health benefits and more adaptive choices. This strategy involves a flexible cognitive effort to reframe a critical or negative experience, thereby transforming its meaning and reducing its negative emotional impact.[30]

Negative emotions such as fear, anxiety, and stress, often associated with the possibility of developing cancer, can act as significant barriers, for instance, by amplifying fatalistic beliefs. The adaptive regulation of these emotions can promote preventive behaviors. Indeed, maladaptive emotion regulation strategies, such as emotional avoidance, are related to increased adherence to fatalism and reduced screening adherence.[31]

Conversely, interventions aimed at improving emotion regulation, such as cognitive restructuring and emotional awareness, can reduce fatalistic beliefs and promote participation in cancer screening. Consedine and colleagues[32] demonstrated that reducing fear and managing negative emotions are associated with greater engagement in preventive practices. Furthermore, the ability to modulate one's emotions facilitates better coping with uncertainty and perceived risk, key factors in adherence to screening.

While some studies have explored emotion regulation as a mediator, such as by reducing fear and anxiety, which in turn predict intention,[32] its role as a moderator remains less clear. Adaptive strategies, such as cognitive reappraisal, may not only reduce negative emotions but also alter an individual's response to cognitive barriers, like fatalism. Conversely, maladaptive strategies such as emotional suppression or avoidance are associated with reduced intention and adherence.[33] However, research conceptualizing

emotion regulation as a stable dispositional style—one that can buffer or amplify the effects of pre-existing health beliefs—remains scarce. Therefore, the present study aims to address this gap by investigating whether habitual emotion regulation strategies moderate the relationship between cancer fatalism and screening intention.

The present study was conducted within the framework of the MIRIADE project (An Innovative Model of Research-Intervention for Identifying Adherence Profiles to Cancer Screening), a comprehensive action-research initiative funded by the Italian Ministry of Health through the Regional Prevention Plan of Campania (PRP 2020–2025). The overarching goal of the MIRIADE project is to increase participation in cancer screening programs in the Campania region by developing and applying evidence-based psychological interventions.

Building on this framework, we conducted two separate studies on cancer screening: Study 1 focused on cervical cancer screening and Study 2 on breast cancer screening. The primary aim of this research was to examine the relationship between cancer fatalism and intention to participate in cancer screening by exploring the moderating role of emotion regulation strategies. Specifically, we proposed the following hypotheses (H):

(i) H1: Cancer fatalism is negatively associated with the intention to participate in screening.
(ii) H2: The negative relationship between cancer fatalism and screening intention is weaker for individuals with higher use of cognitive reappraisal.
(iii) H3: The negative relationship between fatalism and screening intention is stronger for individuals with higher use of expressive suppression.

2. MATERIALS AND METHODS

2.1. ETHICAL CONSIDERATIONS

The present research received ethical approval from the Ethics Committee for Psychological Research of the Department of Humanities at the University of Naples Federico II (protocol number 17/2022). Data were collected by a professional survey company (Astra Research, Italy). The company utilized a quota sampling method to ensure the sample was representative of the female population of the Campania region (Italy) in terms of age and geographical distribution. All participants were informed of the study's anonymous nature and provided informed consent prior to participation.

2.2 PARTICIPANTS

For the purpose of this research, two distinct subsamples were extracted based on specific inclusion criteria. The criteria applied to both studies were: (i) being assigned female at birth, (ii) having no personal diagnosis of any cancer within the past five years, and (iii) residing in the Campania region of Italy. The two subsamples were then defined by the specific age ranges for each national screening program: 25–64 years for Study 1 (cervical cancer screening) and 50–69 years for Study 2 (breast cancer screening). The online questionnaire required a response for all items, resulting in a final dataset with no missing values.

2.3. MEASURES

Participants provided demographic information, including their age, gender identity, educational level, self-perceived socioeconomic status, marital status, occupation, and religious orientation. Additionally, they answered questions regarding their awareness of the specific screening program, whether they had ever received an official invitation, their general familiarity with cancer, and any vicarious experience with the specific cancer. Past screening behavior was assessed using a single item that categorized their adherence as "never," "rather irregularly," "fairly regularly," or "regularly," according to the recommended schedule.

The intention to participate in cancer screening was measured with two items (e.g., "I intend to undergo cervical/breast cancer screening"[34,35]) using a five-point Likert scale, showing excellent inter-item correlation (Study 1: r = 0.84; Study 2: r = 0.89).

Cancer fatalism was assessed using a single-item measure adapted from the scale by Straughan and Seow[36] and selected for its high face validity in capturing the core of the construct: "If you are destined to get cancer, you will get it; there is nothing you can do to change your fate". Participants responded on an eight-point Likert scale, with higher scores indicating stronger fatalistic beliefs.

Emotion regulation strategies were measured using two items for cognitive reappraisal and two items for expressive suppression, adapted from Straughan and Seow.[36] The two dimensions demonstrated acceptable to good internal consistency across the two studies (Reappraisal: r = 0.56 in Study 1, r = 0.70 in Study 2; Suppression: r = 0.60 in Study 1, r = 0.74 in Study 2).

2.3. DATA ANALYSIS

An a priori power analysis was conducted using G*Power (version 3.1.9.7) to determine the minimum required sample size for the planned multiple regression analyses. The calculation was set to detect a small effect size (f^2 = 0.02), with a standard alpha level of α = 0.05 and a desired power of 0.80. The model included five predictors (fatalism, reappraisal, suppression, and the two interaction terms). The results indicated that a minimum total sample size of 647 participants was required for each study to achieve adequate statistical power. The sample sizes obtained for both Study 1 (N = 1,493) and Study 2 (N = 1,402) exceeded this conservative requirement, ensuring excellent statistical power to detect even subtle effects.

For Study 1 participants, the average age was 45.9 years (standard deviation [SD] = 11.4). Regarding socioeconomic status, 56.7% of participants perceived their financial resources as adequate or excellent. In terms of employment, 56.0% were employed (either self-employed or as employees), 24.2% were homemakers, and the remaining were retired or unemployed. The majority (66.6%) were married or in a committed relationship. Educationally, 91.9% held a high school diploma or a higher degree. Regarding religious affiliation, 81.4% identified as Catholic, of whom 30.5% described themselves as practicing. Regarding screening awareness and experience, 59.1% of participants were aware of the national cervical screening program; however, only 29.9% had ever received an official invitation to participate in it. Overall, 58.2% reported familiarity with cancer in general. A quarter of the sample (25.7%) had vicarious

experience with cervical cancer, knowing a friend, family member, or acquaintance who had been diagnosed. Regarding past screening behavior, 43.7% had never undergone cervical screening, 18.4% had done so irregularly, 17.1% fairly regularly, and only 20.8% adhered to the recommended schedule of every three years.

For Study 2 participants, the mean age was 58.6 years (SD = 5.8). The majority (60.2%) considered their socioeconomic resources to be adequate or excellent. Regarding employment, 44% were working, 39.6% were homemakers, and the rest were retired or unemployed. Most participants (72.8%) were married or in a relationship. A significant portion (73.3%) had obtained a high school diploma or a higher educational qualification. In terms of religion, 91.7% identified as Catholic, with 45.4% of them practicing the faith. Regarding experience with breast screening, 86.9% were aware of the program, and 55.5% had received an official invitation to participate. General familiarity with cancer was reported by 62.8% of the sample, while a substantial 61.1% had a vicarious experience with breast cancer through friends, family, or acquaintances. Finally, regarding past screening behavior, 12.5% had never undergone a breast screening, 23.0% had done so irregularly, 33.0% had done so fairly regularly, and 31.5% had regularly adhered to the biennial schedule.

Preliminary analyses were conducted to compare the two independent study samples on the key psychological and screening-related variables. Independent samples *t*-tests were used to compare the mean levels of intention, fatalism, cognitive reappraisal, and expressive suppression. Chi-square tests were used to compare the groups on variables related to screening experience (e.g., program awareness, receipt of an official invitation, cancer familiarity, vicarious experience with cancer, & past screening behavior). This initial step aimed to identify baseline differences that could help contextualize the main findings.

The primary hypotheses were then tested using two separate double moderation analyses (one for each study) with the PROCESS macro (Model 2) by Hayes.[37,38] In each model, the single-item measure of fatalism was the independent variable, intention to screen was the dependent variable, and cognitive reappraisal and expressive suppression were the moderators. All continuous predictor and moderator variables were mean-centered prior to the analysis. Significant interaction effects were probed using simple slopes analysis,[39] which examined the conditional effect of fatalism at low (−1 SD), mean, and high (+1 SD) levels of the significant moderator.

3. RESULTS

3.1. PRELIMINARY ANALYSES

Preliminary analyses were conducted to compare the two study samples on key psychological and screening-related variables.

Significant differences emerged between the groups in their screening experiences. The breast screening group (Study 2) reported significantly higher awareness of the screening program compared to the cervical group (Study 1) ($\chi^2(1) = 281.05$, $p < 0.001$) and were significantly more likely to have received an official invitation ($\chi^2(1) = 194.46$, $p < 0.001$). Furthermore, women in the breast screening group reported higher general familiarity with cancer ($\chi^2(2) = 14.03$, $p = 0.001$), as well as significantly more vicarious experience ($\chi^2(2) = 377.53$, $p < 0.001$). Finally, the two groups exhibited distinct patterns of past screening behavior, with the cervical screening group reporting higher rates of never screened ($\chi^2(3) = 359.37$, $p < 0.001$).

Independent samples *t*-tests were used to compare the mean levels of the psychological variables (Table 1). The results indicated that, compared to the cervical screening group (Study 1), the breast screening group (Study 2) reported significantly higher screening intention, higher use of reappraisal, and also higher levels of cancer fatalism. No significant difference was found in the use of suppression.

Bivariate correlations among the key psychological variables were computed separately for each sample, as displayed in Table 2.

In the cervical screening sample (Study 1), higher screening intention was significantly associated with lower cancer

Table 1. Descriptive statistics and *t*-test comparisons for psychological variables across study samples

Variable	Study 1 (mean ± standard deviation)	Study 2 (mean ± standard deviation)	*t* (2,893)	*p*
Intention	3.76 ± 0.99	4.25 ± 0.88	−13.95	<0.001
Cancer fatalism	3.66 ± 2.30	4.16 ± 2.41	−5.65	<0.001
Reappraisal	4.93 ± 1.36	5.12 ± 1.41	−3.85	<0.001
Suppression	4.08 ± 1.59	4.11 ± 1.77	−0.59	0.557

Table 2. Bivariate correlations for Study 1 and Study 2

Variable	Intention	Fatalism	Reappraisal	Suppression
Intention	-	−0.06*[b]	0.13**[b]	0.01[b]
Fatalism	−0.14**[a]	-	−0.04[b]	0.09**[b]
Reappraisal	0.22**[a]	0.04[a]	-	0.21**[b]
Suppression	0.01[a]	0.21**[a]	0.20**[a]	-

Notes: Statistical significance determined at * $p < 0.05$, ** $p < 0.01$. [a]Correlation coefficients of Study 1 (cervical cancer screening); [b]correlation coefficients of Study 2 (breast cancer screening).

fatalism and higher use of reappraisal. A similar pattern, albeit with smaller coefficients, was observed in the breast screening sample (Study 2), where intention was negatively correlated with fatalism and positively correlated with reappraisal. In both samples, suppression was not significantly related to intention. Notably, fatalism and suppression were positively correlated in both the cervical and breast screening groups, suggesting that a more fatalistic outlook is associated with a greater tendency to suppress emotions.

3.2 MODERATION ANALYSES

To test the study hypotheses, a double moderation analysis was conducted separately for the cervical screening sample (Study 1) and the breast screening sample (Study 2).

In Study 1, the overall regression model was highly significant (F [5, 1,487] = 22.09, $p < 0.001$), accounting for 6.9% of the variance in screening intention ($R^2 = 0.069$). In line with H1, fatalism was a significant negative predictor (b = −0.07, standard error [SE] = 0.01, $p < 0.001$) and reappraisal was a significant positive predictor of intention (b = 0.16, SE = 0.02, $p < 0.001$), while the main effect of suppression was not significant ($p = 0.921$).

However, contrary to H2 and H3, neither the interaction with reappraisal ($p = 0.639$) nor with suppression ($p = 0.946$) was significant. Thus, the relationship between fatalism and screening intention appears to be direct and not moderated by emotion regulation strategies in this sample.

Similarly, in Study 2, the overall model was statistically significant (F [5, 1,396] = 7.23, $p < 0.001$), accounting for 2.5% of the variance in screening intention ($R^2 = 0.025$). Additionally, the analysis showed a significant negative main effect for fatalism (b = −0.02, SE = 0.01, $p = 0.016$) and a significant positive main effect for reappraisal (b = 0.09, SE = 0.02, $p < 0.001$), supporting H1. However, the main effect for suppression was not significant ($p = 0.436$).

Confirming H2, the analysis revealed a significant interaction between fatalism and reappraisal (b = 0.02, SE = 0.01, $p = 0.017$). Probing this interaction revealed that the negative relationship between fatalism and intention was significant at low levels of reappraisal (−1 SD; effect = −0.05, $p <$ 0.001) but was not significant at high levels of reappraisal (+1 SD; effect = −0.001, $p = 0.945$), indicating a buffering effect. The interaction with expressive suppression was not significant ($p = 0.548$); therefore, H3 was not supported.

4. DISCUSSION

This study aimed to examine the relationship between cancer fatalism and intention to participate in breast and cervical cancer screening by exploring the moderating role of emotion regulation strategies. The following hypotheses were investigated: (i) H1: Cancer fatalism is negatively associated with the intention to participate in screening; (ii) H2: The negative relationship between cancer fatalism and screening intention is weaker for individuals with higher use of cognitive reappraisal; and (iii) H3: The negative relationship between fatalism and screening intention is stronger for individuals with higher use of expressive suppression.

Regarding the results of the breast cancer screening study, only H2 was confirmed, demonstrating a significant moderating effect of cognitive reappraisal on the negative relationship between cancer fatalism and screening intention. This result shows that cognitive reappraisal acts as a "buffer" that mitigates the negative effect of fatalism on the intention to participate in cancer screening by recognizing and reinterpreting negative emotions, thereby reducing their impact on decision-making.[29] In turn, affect and physiological arousal are regulated, thereby reducing their interference and facilitating healthier and more adaptive decisions.[30] These findings are consistent with the possibility that reappraisal changes how individuals construe the situation, neutralizing the potential negative impact of fatalism rather than allowing it to act as a barrier.

When faced with the fatalistic belief that cancer is uncontrollable, individuals can reframe this as a reason to take control through screening. This mechanism neutralizes the negative impact of fatalism, preventing it from acting as a barrier to screening. A similar mechanism has been observed in the context of breast cancer therapeutic choices, where cognitive reappraisal plays an important moderating role in decisions and intentions regarding treatment uptake.[40]

Regarding the results of the cervical cancer screening study, only H1 was confirmed. In contrast to the literature, the results showed a direct effect of fatalism on the intention, unmoderated by emotional strategies. To enrich the interpretation of these findings, a comparison of the examined variables between the two samples, breast cancer screening and cervical cancer screening, was conducted. The results revealed that the breast cancer screening sample reported greater vicarious experience, greater awareness of screening, and higher average levels of fatalism, reappraisal, and intention. The breast cancer screening sample operates in a context of high psychological salience, in which the threat is more concrete; this context may elicit both fatalism and the resources to manage it, such as cognitive reappraisal.

In contrast, the cervical cancer screening sample, which is composed of younger women with less screening experience, perceives a lower salience of threat. Consequently, the psychological functioning appears less complex and more direct, without the moderating effect being activated. Thus, this difference could be in line with the different age ranges of the cancer screening programs: breast cancer screening targets women over 50 years, whereas cervical cancer screening targets women from the age of 25 onwards. In addition, in line with our previous study,[41] we believe that this difference may also lie in the distinction between the external and visible organ (breast) and the non-visible internal organs (uterus/cervix), as well as the greater attention of health campaigns (media, social media, advertising) paid to breast cancer screening.

The present study has several limitations that should be acknowledged. First, the reliance on abbreviated measures, particularly the single-item assessment for cancer fatalism and two-item scales for emotion regulation and screening intention, limits the comprehensive capture of these complex constructs. However, these measures were strategically selected to balance high face validity with the need to minimize participant burden, thereby ensuring feasibility within a large-scale survey that assesses multiple variables. Furthermore, the two-item scales demonstrated acceptable to good inter-item correlations across both studies (ranging from r = 0.56 to 0.89), supporting their internal consistency despite their brevity. Second, the employed cross-sectional design prevents the establishment of causality, and future longitudinal research is needed to confirm the directionality of the proposed model. Third, the study measured screening intention rather than actual behavior, which means the "intention–behavior gap" is not accounted for. Finally, the use of self-report data may be susceptible to

social desirability bias, and although the sample is large, it was drawn from a single Italian region, which may limit the generalizability of the findings to other cultural or healthcare contexts. Future research should aim to replicate these findings using comprehensive, validated scales and objective behavioral outcomes, as well as exploring the role of additional variables, such as women's level of health literacy, specific knowledge regarding screening effectiveness, age, socio-cultural level, and familiarity.

5. CONCLUSION

The results discussed in this study highlight emotion regulation functioning style as a buffer between fatalism and intention for breast cancer screening, but not for cervical cancer screening. Specifically, women who can effectively manage their negative emotions through cognitive reappraisal are less likely to let fatalism hinder their intention to undergo screening.

Consequently, research suggests that public health interventions should not only counteract fatalism with accurate information but also promote adaptive emotion regulation strategies to increase participation in screening. Furthermore, our findings on the difference between the two screening contexts highlight the importance of tailored communication. Motivational counseling, particularly for the higher-risk and higher-salience breast screening group, should be designed to build and support adaptive emotional competencies, such as cognitive reappraisal, as a key tool to buffer fatalistic beliefs.

ACKNOWLEDGMENTS

None.

CONFLICT OF INTEREST

The authors declare they have no competing interests.

FUNDING

The publication of this manuscript was supported by the Federico II University of Naples, the San Paolo Company Foundation, the FRA project, and MEMO-PRO.

AUTHOR CONTRIBUTIONS

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Formal analysis: Maria Luisa Martino, Miriam Capasso
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ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The present study received ethical approval from the Ethics Committee for Psychological Research of the Department of Humanities at the University of Naples Federico II (protocol number 17/2022). All participants were informed of the study's anonymous nature and provided informed consent prior to participation.

CONSENT FOR PUBLICATION

All participants were informed of the study's anonymous nature and that the analyses were conducted in an aggregate manner. All participants provided informed consent to publish their data.

DATA AVAILABILITY STATEMENT

The raw data can be made available upon request by email to the corresponding author.

Submitted: 10 November 2025; Revision received: 03 December 2025; Accepted: 11 December 2025; Published: 31 March 2026

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