Universidade do Minho
Escola de Psicologia

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Assessment of Suicide Risk and NonSuicidal Self-Injuries in College Students

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Professora Doutora Sónia Ferreira Gonçalves

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Universidade do Minho, 7 de junho de 2024



(Ana Rita Pimenta)

Avaliação do Risco de Suicídio e de Ferimentos AutoInfligidos em Estudantes Universitários

Resumo

O suicídio é a quarta principal causa de morte em indivíduos entre os 15 e os 29 anos. Um subgrupo desta população em particular risco são os estudantes universitários. O risco de suicídio tem sido associado a ferimentos autoinfligidos sem intenção suicida, a reatividade emocional, a sofrimento psicológico e a experiências académicas. Este estudo objetiva identificar os preditores do risco de suicídio em estudantes universitários e avaliar o papel mediador do sofrimento psicológico na associação entre reatividade emocional e risco de suicídio. Um total de 363 participantes, entre os 17 e os 29 anos, preencheram questionários de autorrelato para avaliar as variáveis em estudo. Para a análise de dados, recorremos a Regressão Hierárquica Múltipla e a Modelos de Equações Estruturais. Os sintomas depressivos e os ferimentos autoinfligidos assumiram-se como preditores do risco de suicídio e o sofrimento psicológico mediou totalmente a associação entre reatividade emocional e risco de suicídio. A identificação de fatores de risco para o suicídio relacionados com processos psicológicos alteráveis é relevante para melhorar a eficácia da prevenção e da intervenção em comportamentos suicidas. A satisfação com as experiências académicas pode ser um fator protetor para o risco de suicídio, tornando-a um alvo importante para as intervenções.

Palavras-chave: Estudantes Universitários, Ferimentos AutoInfligidos sem Intenção Suicida, Reatividade Emocional, Risco de Suicídio, Sofrimento Psicológico

Assessment of Suicide Risk and NonSuicidal Self-Injuries in College Students

Abstract

Suicide is the fourth leading cause of death among individuals aged 15-29 years old and a subgroup of this population that is in particular risk is college students. Suicide risk is consistently linked to NonSuicidal Self-Injuries, to emotional reactivity, to psychological distress, and to academic experiences. This research aims to identify the best predictors of suicide risk in college students and to evaluate the mediation role of psychological distress in the association between emotional reactivity and suicide risk. A total of 363 participants, aged between 17-29 years old, fulfilled self-report questionnaires assessing the variables under study. Hierarchical Multiple Regression and Structural Equation Modelling tools were used to the data analysis. Depressive symptoms and lifetime NonSuicidal Self-Injuries were the best predictors of suicide risk and psychological distress fully mediated the association between emotional reactivity and suicide risk. Identifying risk factors for suicide related to modifiable psychological processes may be relevant to improve the efficacy of prevention and treatment of suicidal behaviors. Moreover, satisfaction with the academic environment might act as a buffer against the impact of certain variables on suicide risk, making it a potential target for interventions.

Keywords: College Students, Emotional Reactivity, NonSuicidal Self-Injuries, Psychological Distress, Suicide Risk

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Assessment of Suicide Risk and NonSuicidal Self-Injuries in College Students

Suicide death is recognized as a significant global public health concern (Bachmann, 2018), and has been increasingly discussed in the literature. It is defined as the deliberate act of an individual aiming to end one's own life (Turecki et al., 2019). According to the World Health Organization (2021), over 700 thousand people die by suicide annually. In Portugal, the proportion of deaths due to suicide reached 0.7% in 2021 (PORDATA, 2024), which underscores its significance. Besides, suicide is the fourth leading cause of death among individuals aged 15-29 years old (World Health Organization, 2021), with college students forming a subgroup at notably elevated risk (O'Neill et al., 2018).

The prevalence of mental health problems among young people, namely young adults who are attending college, is a growing concern (Lei et al., 2016). Psychological distress can emerge earlier in an individual's life, with many students reporting pre-matriculation onsets of mental disorders (Auerbach et al., 2016). However, the transition to college can exacerbate this issue, potentially leading to adverse outcomes, including suicidal ideation (Garlow et al., 2008).

Given the prevalence and gravity of suicide death, it becomes urgent to fully understand this phenomenon and associated concepts, such as suicidal ideation, in order to grasp the full scope of the issue surrounding suicide (Nock et al., 2008; Turecki et al., 2019). Suicidal ideation is defined as thoughts about ending one's life and may or may not involve the elaboration of a plan to achieve this goal. However, reporting suicidal ideation does not necessarily indicate engagement in suicidal behaviors (Turecki et al., 2019).

Despite increased awareness raised upon suicidal ideation and the continuous growth of the research in this field, it still requires further investigation. Given the large amount of concepts within the spectrum of this phenomenon, suicide is difficult to understand, and it remains a persistent challenge (Turecki et al., 2019). Thus, it is urgent to evaluate and explore behaviors and characteristics that may elevate the likelihood of suicidal ideation. Furthermore, understanding which of these behaviors and characteristics are more prevalent among younger generations, specifically college students, who appear to be more prone to present suicidal ideation, is paramount in addressing this pressing public health issue (O'Neill et al., 2018).

Suicide risk is consistently linked to NonSuicidal Self-Injuries (NSSI; Bakken & Gunter, 2012; Kiekens et al., 2018), even though these two phenomena differ in their intent, purpose, severity, and function (American Psychiatric Association, 2013). NSSI involves deliberate, intentional and repetitive direct forms of self-harm without conscious suicidal intent (Turecki et al.,

2019). In fact, individuals involved in NSSI are more prone to experience suicidal ideation (Bakken, 2021). Therefore, engaging in such behaviors can be an antecedent to a suicide plan or an actual suicide attempt (Willoughby et al., 2015).

Indeed, over time, NSSI contributes to reduced pain sensitivity and a diminished fear of death, potentially preparing individuals for more lethal behaviors (Van Orden et al., 2010; Willoughby et al., 2015), thereby increasing suicide risk. Other authors suggest that engaging in NSSI is one of the most robust predictors of suicide risk (Klonsky et al., 2013), as it functions as a coping mechanism for managing intense negative emotions. This is one of the most cited reasons by young adults to engage in NSSI (Taylor et al., 2018), as it not only diminishes negative emotions but also enhances positive ones (Cipriano et al., 2017).

As mentioned, suicide risk seems to be common among college students (O'Neill et al., 2018). The transition into college is an important developmental period, characterized by an array of great opportunities, experiences and growth. Simultaneously, this period may create opportunities for experiencing psychological distress and elicit some risky behaviors, including NSSI (Bruffaerts et al., 2018) and suicide risk (Shapero et al., 2019). Notably, a considerable number of young adults report lifetime NSSI (Voss et al., 2020), which is particularly preoccupant considering that NSSI is a risk factor for several psychological disorders (Selby et al., 2015). Although these behaviors appear to peak during adolescence, recent research suggests a potential second peak that can occur near the age of 20 (Gandhi et al., 2018), coinciding with the college years. Moreover, it has been hypothesized that individuals attending college may be more susceptible to engage in this kind of behavior compared to their non-college peers (Swannell et al., 2014), which underscores the pressing need to attend to this population.

Suicide risk also seems to be related to emotional reactivity (Servaty-Seib et al., 2023), a component of temperament that aids in understanding how and why individuals respond to stimuli (Nock et al., 2008). This characteristic is negatively associated with well-being and quality of life (Grosse et al., 2020), and increases the likelihood of reporting suicidal ideation (Liu et al., 2020). This association possibly arises because individuals with heightened emotional reactivity are more prone to experience more frequent, intense and prolonged negative emotions when exposed to unpleasant situations. These individuals experience relatively more psychological pressure, which can lead to experiencing psychological distress (Linehan, 1993).

Those with greater emotional reactivity may resort to behaviors that rapidly distract them from the aversive experience (e.g., NSSI; Smith et al., 2017). However, such behaviors may hinder

the learning and practice of how to adaptatively regulate emotions (Nock & Mendes, 2008), further exacerbating psychological distress. Subsequently, the combination of these factors may contribute to suicidal ideation (Law et al., 2015). The psychological pressure inherent to this characteristic, associated with the psychological distress experienced, can contribute to an impairment in mental health, raising the risk of developing a mental disorder (Nock et al., 2008).

Recent literature has suggested a possible relation between emotional reactivity, general psychological distress, specifically symptoms of depression, anxiety, and stress (Ripper et al., 2018), and suicide risk. Individuals with heightened levels of emotional reactivity are more prone to develop symptoms of depression, and to exhibit increased suicidal behaviors and thoughts (Shapero et al., 2019).

Suicidal ideation is also closely related to mood disturbances, anxiety problems, and high levels of stress (Turecki et al., 2019). For instance, one of the strongest predictors of suicidal ideation is depressive symptoms (Bakken, 2021; Grant et al., 2023). The association between these symptoms and suicidal ideation is clarified when one acknowledges that people reporting depressive symptoms frequently articulate a desire for death, verbalize thoughts related to death, and sometimes attempt suicide (Borges & Werlang, 2006).

Concerning anxiety, some studies have highlighted the higher prevalence of anxiety among college students compared to the general population. It has also been hypothesized that these symptoms may be associated with suicidal ideation among college students (Grant et al., 2023; Paula et al., 2020). While anxiety is a natural emotional condition of humankind, its exaggerated manifestation in non-threatening situations can interfere with individuals' daily lives, and decrease their overall quality of life and well-being, eventually becoming pathologic (Andrade & Gorenstein, 1998). Given that this condition induces suffering and hopelessness, high levels of anxiety symptoms can be a risk factor for suicide, as individuals may feel the need to relieve their anxiety, leading to the contemplation of suicide as a means to escape this suffering (O'Neil Rodriguez & Kendall, 2014).

Similarly, stress appears to be positively related to suicidal ideation (Polanco-Roman et al., 2016), as young adults with difficulties dealing with discomfort are led to the adoption of inadequate coping strategies, and to the engagement in risky behaviors (Sunde et al., 2022), including suicidal behaviors. Consequently, it becomes urgent to comprehend and to attend to situations that may be particularly challenging for young adults. As mentioned before, an example of this kind of challenging situations may be the transition to college (Reddy et al., 2018).

The transition to college introduces numerous life changes, and some individuals may perceive these alterations as stressful. This can complexify the adaptation period, and make it more prone to create psychological implications for young adults (Lu, 1994; Sunde et al., 2022). A possible explanation for a high suicide risk is that young adults start college with unrealistic expectations of what they will encounter (Almeida & Soares, 2004). College life itself might be associated with many factors that increase the risk of reporting suicidal ideation, namely because of specific challenges associated with the new lifestyle (e.g., new evaluation, study and learning methods, discovery of professional identity, separation from family and friends, living in rented houses, loneliness, insufficient coping strategies; Carlotto et al., 2015; Sunde et al., 2022). The adaptation to college is not always successful, creating the possibility of leaving young adults susceptible to the experience of psychological distress. This can generate conflicts and elevate suicide risk (Sunde et al., 2022; Zanon et al., 2014).

Research has demonstrated that this phase of life is particularly defiant due to the intersection of maturing neurodevelopmental processes impacting young adults and the heightened risk for the development of psychopathology, including suicidal thoughts (Shapero et al., 2019). However, mental health services within academic institutions are not enough, and have been failing to offer the necessary support. Additionally, students do not always seek help, probably due to the stigma associated with mental health (O'Neill et al., 2018). Given these issues and taking into consideration that suicide risk continues to be a major challenge both to society and to clinicians, urgent attention and efforts are needed to understand which behaviors are more associated with it, acting accordingly.

To our knowledge, no previous research has comprehensively evaluated the interplay between suicide risk and NSSI, emotional reactivity, psychological distress, and satisfaction with academic experiences among college students. While some literature has examined suicide risk in college settings, few studies have simultaneously assessed its relationship with satisfaction with academic experiences. Additionally, the relationship between suicide risk and emotional reactivity has received limited attention, despite its potential significance. Besides, studies aiming to assess the relationship between suicide risk and anxiety symptoms are somehow inconsistent. Finally, this study is built on previous investigations that raised the hypothesis of emotional reactivity, psychological distress, and suicide risk being associated. Therefore, this study contributes to the literature by deepening the understanding of this relationship, trying to identify potential pathways through which the relation can be established.

This research aims to build upon existing research by:

1. Assessing frequency and characteristics of suicide risk and NSSI in college students;
2. Evaluating the association between suicide risk and lifetime NSSI, emotional reactivity, psychological distress, and satisfaction with academic experiences;
3. Identifying the best predictors of suicide risk among lifetime NSSI, emotional reactivity, psychological distress, and satisfaction with academic experiences;
4. Evaluating an atemporal mediation model based on the hypothesis that emotional reactivity is related to suicide risk through the mediation of psychological distress.

Method

Participants

A total of 601 participants completed the study, of which 238 failed to complete a greater part of all the study measures, and were therefore removed. The final sample was composed of 363 participants, aged 17-29 years old (M = 20.7; SD = 2.5). The majority were females (n = 310; 85.4%), with Portuguese nationality (n = 338; 93.4%), and were students at University of Minho (n = 322; 89%).

Measures

Sociodemographic Questionnaire

This questionnaire was purposely conducted for the present study, serving the purpose of collecting sociodemographic (age, gender and nationality) and academic (year, course and educational institution) information.

Suicidal Ideation Questionnaire (SIQ; Reynolds, 1988; Portuguese version Ferreira & Castela, 1999)

Self-report questionnaire that aims to assess the severity of suicidal thoughts. It consists of 30 items rated on a 0 ("Never had this thought") to 6 ("Almost every day") Likert scale. Total scores range from 0 to 180. Higher results indicate a greater frequency of suicidal thoughts. Reynolds (1988) suggested that a score equal to or greater than 41 points indicates significant psychopathology and potential risk of suicide. In the current study, there was a high internal consistency reliability, with a Cronbach's alpha of 0.97.

Self-Injury Questionnaire - Treatment Related - Short Version (SIQ-TR-SV; Claes & Vandereycken, 2007; Portuguese version Gonçalves, 2007)

Self-report questionnaire that consists of 60 items. Taking into consideration the objectives of the present study, only 10 items were used. This questionnaire aims to, initially, assess the

involvement of the participant in NSSI with a dichotomous question (Yes/No). If the answer is negative, the questionnaire ends. Otherwise, the participant should continue answering the questionnaire. The following questions refer to the type of injuries, how long ago and how often the participant was involved in this behavior, and what part(s) of the body was/were injured. The following questions refer to the attitudes towards these behaviors, and are rated on a 1 ("Never") to 4 ("Always") Likert scale.

Emotional Reactivity Scale (ERS; Nock et al., 2008; Portuguese version Santos et al., 2022)

Self-report instrument that aims to understand how individuals experience their emotions. The Portuguese version consists of seven items derived from the original version of 21 items. Each item is rated on a 0 ("Not at all like me) to 4 ("Completely like me") Likert scale. Total scores range from 0 to 28. In the current study, internal consistency reliability was high with a Cronbach's alpha of 0.91.

Depression, Anxiety, Stress Scales 21 (DASS-21; Lovibond & Lovibond, 1995; Portuguese version Ribeiro et al., 2004)

Self-report instrument that aims to assess symptoms associated with depression, anxiety and stress for individuals over the age of 17 years. This instrument of 21 items is a short form of the original scale with 42 items. It is organized into three subscales, with seven items each, and participants should answer whether the item applied to them in the past week. Each item is rated on a 0 ("Did not apply to me at all") to 3 ("Applied to me very much, or most of the time") Likert scale with one possible score for each subscale. These scores range from 0 to 21. Higher scores indicate more frequent symptomatology, and correspond to more negative affective states. In the current study, internal consistency reliability was high for each scale with a Cronbach's alpha of 0.92 for the Depression Subscale, 0.90 for the Anxiety Subscale, and 0.91 for the Stress Subscale.

Academic Experiences Questionnaire – Short Version (QVA-r; Almeida et al., 1999)

Self-report questionnaire that aims to evaluate the processes that university students experience when entering higher education. This questionnaire consists of 60 items, organized into five subscales. Each item is rated on a 1 ("Not at all in agreement with me, completely in disagreement") to 5 ("Always in agreement with me, completely in agreement") Likert scale. In the current study, internal consistency reliability was high for each subscale with a Cronbach's alpha of 0.91 for the Personal Subscale, 0.89 for the Interpersonal Subscale, 0.88 for the Career Subscale and for the Study Subscale, and 0.77 for the Institutional Subscale.

Procedure

The present study was approved by the Ethics Commission of the University of Minho (Process CEICSH 099/2023; see Appendix A). Participants were college students from Portuguese public and private universities, recruited online from September to early November 2023. At the University of Minho, a Qualtrics link was shared via institutional email. For Psychology students, the link was also available in the School's Crediting System, in which students receive course credits for participating in studies. For students from other universities, the link was shared via social networks (e.g., WhatsApp, Instagram, Academic groups, and chats), requesting the dissemination of the study among other colleagues. The inclusion criteria for this study stipulated that participants must be college students fluent in Portuguese, and aged 17-29 years old.

At first, participants read the informed consent, and decided if they wanted to continue with their participation. If so, self-report questionnaires were presented. At this point, they were informed about the research's aims, and data confidentiality and anonymity were assured. To serve this purpose, participants were asked to generate a code, using the first letter of their first and last names and the last three digits of their telephone number. In addition, the contact details of the investigators involved in the research were available to allow additional clarification about the study, and to assist any participant in case of discomfort that may had been caused by the questionnaires. In the end, the same contacts were available to ensure that participants had access to them in case of discomfort.

Data Analysis

Statistical analyses were conducted using Jamovi version 2.4.8.0 for macOS. An exploratory data analysis was conducted to examine the normality of the data, considering acceptable asymmetry values between -3 and +3, and kurtosis between -10 and +10, including standard error values (Brown, 2006). All variables were within the recommended ranges. Then, descriptive statistics (e.g., frequencies, percentages, mean values, and standard deviations) examined the sociodemographic characteristics of the sample (gender, nationality, age, and educational institution), the presence of suicide risk and NSSI, and characteristics of NSSI. Moreover, Chi-Square tests (χ^2) were conducted to determine the distribution of lifetime NSSI across groups with and without current suicide risk. To investigate associations between suicide risk, presence of NSSI, emotional reactivity, psychological distress, and satisfaction with academic experiences, Pearson's and Spearman's correlation coefficients (r) were performed.

To analyze the predictors of suicide risk, a hierarchical multiple regression was performed with three blocks of variables. Age and gender (1 = Feminine, 2 = Masculine and 3 = Other) were entered in Step 1, lifetime NSSI (yes vs no) in Step 2, and emotional reactivity, psychological distress (depression, anxiety and stress), and satisfaction with academic experiences (personal, interpersonal, career, studies, and institution) in Step 3. To assess the multicollinearity and avoid problems in the analyses, variables with a Variance Inflation Factor (VIF) near 5 were excluded. In this case, a subscale measuring psychological distress, namely stress symptoms, was excluded in Step 3, because its VIF was near 5 (VIF = 4.77), which could indicate a high multicollinearity problem (Yu et al., 2015). Statistical significance was set at p values < .05.

Finally, Structural Equation Modelling (SEM) tools were used to test mediation models, in which first psychological distress and then depressive symptoms would be the mediating variable of the relationship between emotional reactivity and suicide risk. The SEM model was estimated using the *Lavaan* package (Rosseel, 2012). χ^2 statistic, Comparative Fit Index (CFI), Normed Fit Index (NFI), Tucker-Lewis Index (TLI), Standardized Root Mean Square Residual (SRMR), and Root Mean Square Error of Approximation (RMSEA) were used to assess the model fit as goodness-of-fit indexes. Estimates of CFI and TLI greater than 0.95 and estimates of NFI greater than 0.90 are indicators of an acceptable fit. Furthermore, estimates of RMSEA and SRMR between 0.05 and 0.08 are considered indicators of an adequate fit (Hooper et al., 2008; Schermelleh-Engel et al., 2003). As suggested by Winer et al. (2016), the term "atemporal" was used in this paper to emphasize that the mediation effects derived from a cross-sectional design, and, because of that, do not imply causation.

Results

Frequency and characteristics of suicide risk and NSSI

Based on the cut-off score suggested in the SIQ (Reynolds, 1988), 57 participants (17.1%) were currently at suicide risk. Moreover, 116 participants (32%) reported lifetime NSSI. Among those who had engaged in NSSI, the majority (n = 55; 47.8%) reported that they did so in the last year. Forty-three participants (37.4%) reported that they had engaged in this behavior within the previous months, nine (7.8%) that it happened within the past month, eight (7%) that it was within the past week, and one participant did not answer to this question. Regarding these prevalences, it is possible to state that 17 participants (14.8%) reported current NSSI (NSSI reported in the last month).

The majority of participants (n = 58; 50%) reported that the method used was cutting. Twenty-eight participants (24.1%) reported that it was scratching, and 13 (11.2%) stated it was bruising. Eight participants (6.9%) affirmed that they used other methods, while seven (6%) referred that the method used was biting, and two (1.7%) that it was burning.

Most of the NSSI (n = 78; 82.1%) occurred on average "1 to 5 days a month". Eleven participants (11.6%) reported that NSSI was performed "more than 15 days a month", four (4.2%) between "6 to 10 days a month", two (2.1%) within "11 to 15 days a month", and 21 participants did not answer to this question. The majority of times (n = 74; 71.2%), injuries occurred "less than once a day". For 28 participants (26.9%), NSSI was performed between "1 to 2 times a day", for two (1.9%) it occurred between "3 to 4 times a day", and 12 did not answer this question. For the majority of participants (n = 91; 78.4%), arms, hands, and/or nails were the most frequently injured body parts. Twelve participants (10.3%) stated that the body parts injured were the legs, feet and toes, eight (6.9%) affirmed it were the torso, belly and buttock, and five (4.3%) declared it were the head and neck.

Most participants (n = 72; 62.6%) admitted that their injuries were "never" planned, 35 (30.4%) that they were "sometimes" planned, six (5.2%) that they were "many times" planned, two (1.7%) that they were "always" planned, and one participant did not answer this question. Moreover, for the majority of these participants (n = 50; 43.1%), they "sometimes" understood why the behavior took place. Thirty-three participants (28.4%) understood it "many times", 27 (23.3%) "always", and six (5.2%) "never". The majority of participants, either "sometimes" took care of the wounds (n = 38; 32.8%) or "never" took care of them (n = 38; 32.8%). Twenty-six participants (22.4%) took care of the wounds "always" and 14 (12.1%) "many times". Finally, the majority (n = 78; 67.2%) hide their behavior from others "always", 21 (18.1%) "many times", 10 (8.6%) "never", and seven (6%) "sometimes".

Overall, 33 participants (9.9%) reported lifetime NSSI and presented current suicide risk, while 24 (7.2%) reported no lifetime NSSI but presented current suicide risk and 72 (21%) reported lifetime NSSI but did not present current suicide risk. A significant relationship was observed between current suicide risk and lifetime NSSI ($\chi^2(1) = 22.3$, $p < .001$). Specifically, participants with lifetime NSSI more frequently presented current suicide risk (n = 33; 57.9%) compared to those without lifetime NSSI (n = 24; 42.1%). Conversely, participants without lifetime NSSI more frequently presented no suicide risk (n = 205; 74%) compared to those with lifetime NSSI (n = 72; 26%).

Correlations between suicide risk, lifetime NSSI, emotional reactivity, psychological distress, and satisfaction with academic experiences

Correlations between the study's variables are indicated in Table 1. Suicide risk was positively correlated with lifetime NSSI (r = .40, p < .001), emotional reactivity (r = .40, p < .001), depression (r = .73, p < .001), anxiety (r = .49, p < .001), and stress (r = .44, p < .001). Conversely, suicide risk was negatively correlated with satisfaction with personal (r = -.58, p < .001), interpersonal (r = -.35, p < .001), career (r = -.31, p < .001), study (r = -.29, p < .001), and institutional (r = -.23, p < .001) academic experiences.

Predictors of suicide risk

Table 2 presents a hierarchical multiple regression conducted using suicide risk (total score of SIQ) as a dependent variable, and age, gender, lifetime NSSI, emotional reactivity, psychological distress, and satisfaction with academic experiences as independent variables. To conduct these analyses, suicide risk and emotional reactivity were loaded by their total scores and lifetime NSSI was loaded by its respective measurement item. Psychological distress and satisfaction with academic experiences were loaded by their subscales.

In the first step, gender and age coefficients were not significant, showing that they do not predict suicide risk. The addition of lifetime NSSI in Step 2 resulted in a significant model (F(3,290) = 18,347, p < .001), and accounted for 16% of the final variance in suicide risk (R^2aj = .151). This means that lifetime NSSI was associated with suicide risk (β = .399, t = 7.402, p < .001). This second model showed significant improvement from the first model (ΔF(1,290) = 54.8, p < .001, ΔR^2 = .159). In Step 3, the addition of emotional reactivity, depression, anxiety, and satisfaction with personal, interpersonal, career, study, and institutional academic experiences also resulted in a significant model (F(11,282) = 31.372, p < .001), and accounted for 55% of the final variance in suicide risk (R^2aj = .533). In this final model, lifetime NSSI remained significant, which means that the involvement in these behaviors was associated with suicide risk (β = .175, t = 3.909, p < .001). Moreover, depressive symptoms were also associated with suicide risk (β = .575, t = 8.545, p < .001). Overall, this last model showed improvement from the second model (ΔF(8,282) = 30.6, p < .001, ΔR^2 = .391).

Table 1

Correlational Matrix of Study's Variables.

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Suicide Risk	-										
2. Lifetime NSSI [a]	.40***	-									
3. Emotional Reactivity	.40***	.30***	-								
4. Depression	.73***	.27***	.46***	-							
5. Anxiety	.49***	.39***	.55***	.63***	-						
6. Stress	.44***	.31***	.67***	.70***	.80***	-					
7. Satisfaction with Personal Academic Experiences	-.58***	-.23***	-.57***	-.75***	-.58***	-.72***	-				
8. Satisfaction with Interpersonal Academic Experiences	-.35***	-.05	-.16**	-.40***	-.21***	-.23***	.44***	-			
9. Satisfaction with Career Academic Experiences	-.31***	-.13*	-.15**	-.32***	-.11*	-.15**	.40***	.36***	-		
10. Satisfaction with Study Academic Experiences	-.29***	-.12*	-.13*	-.34***	-.13**	-.15**	.44***	.25***	.46***	-	
11. Satisfaction with Institutional Academic Experiences	-.23***	-.10	-.14**	-.24***	-.12*	-.16**	.32***	.38***	.57***	.38***	-

Note. Suicide Risk = Total score of Suicidal Ideation Questionnaire; Lifetime NSSI = Score of the first question of the Self-Injurie Questionnaire – Treatment Related – Short Version; Emotional Reactivity = Total score of Emotional Reactivity Scale; Depression, Anxiety and Stress = Subscales of Depression, Anxiety, Stress Scales; Satisfaction with Personal Academic Experiences, Satisfaction with Interpersonal Academic Experiences, Satisfaction with Career Academic Experiences, Satisfaction with Study Academic Experiences, and Satisfaction with Institutional Academic Experiences = Subscales of Academic Experiences Questionnaire – Short Version.

[a] Spearman's correlation coefficients were used considering that Lifetime NSSI is a categorical variable. The remain analyses used Pearson's correlation coefficients.

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$

Table 2

Hierarchical Multiple Regression with Suicide Risk as Dependent Variable and Lifetime NSSI, Emotional Reactivity, Psychological Distress, and Satisfaction with Academic Experiences as Independent Variables.

	Suicide Risk					
Variable	R^2 $(Adj.R^2)$	F	Estimate	SE	β (95% CI)	t
Step 1	.0007 (-.006)	(2,291) 0.541				
Gender			0.104	3.159	.001 [-.080; .083]	0.033
Age			-0.016	0.501	-.001 [-.083; .080]	-0.033
Step 2	.160 (.151)	(3,290) 18.347***				
Lifetime NSSI			11.146	2.851	.175 [.087; .264]	3.909***
Step 3	.550 (.533)	(11,282) 31.372***				
Emotional Reactivity			0.396	0.228	.093 [-.013; .200]	1.732
Depression			2.977	0.348	.575 [.443; .708]	8.545***
Anxiety			-0.042	0.317	-.008 [-.127; .111]	-0.134
Satisfaction with Personal Academic Experiences			0.083	0.219	.029 [-.120; .177]	0.381
Satisfaction with Interpersonal Academic Experiences			-0.251	0.144	-.082 [-.175; .011]	-1.743
Satisfaction with Career Academic Experiences			-0.226	0.179	-.067 [-.171; .038]	-1.259
Satisfaction with Study Academic Experiences			-0.024	0.153	-.008 [-.106; .090]	-0.158
Satisfaction with Institutional Academic Experiences			-0.112	0.291	-.019 [-.119; .080]	-0.386

Note. Suicide Risk = Total score of Suicidal Ideation Questionnaire; Lifetime NSSI = Score of the first question of Self-Injurie Questionnaire – Treatment Related – Short Version; Emotional Reactivity = Total score of Emotional Reactivity Scale; Depression and Anxiety = Subscales of Depression, Anxiety, Stress Scales; Satisfaction with Personal Academic Experiences, Satisfaction with Interpersonal Academic Experiences, Satisfaction with Career Academic Experiences, Satisfaction with Study Academic Experiences, and Satisfaction with Institutional Academic Experiences = Subscales for the Academic Experiences Questionnaire – Short Version.

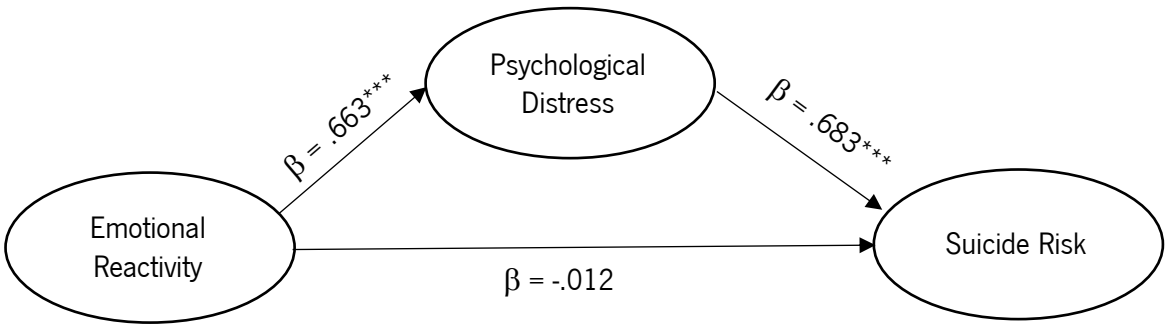
***$p < .001$

The mediation role of psychological distress in the association between emotional reactivity and suicide risk

Figure 1 presents the first structural model under study and its standardized coefficients. This mediation model produced goodness-of-fit indexes that suggested that the model fit is approaching a reasonable level ($\chi^2(1592) = 5201$, $p < .001$; CFI = 0.987; NFI = 0.981; TLI = 0.987; SRMR = 0.08 (95% CI [0.08, 0.087]); RMSEA = 0.08 (95% CI [0.08, 0.087])). Furthermore, the model presented satisfactory values of explained variance, more specifically 45.6% of the variability of suicide risk scores ($r^2 = .456$) and 43.9% of the variability of psychological distress scores ($r^2 = .439$).

Figure 1

The mediating role of psychological distress in the relation between emotional reactivity and suicide risk.



Note. Estimated standardized coefficients are presented.

***$p < .001$

Table 3 presents direct, indirect, and total effects of the mediation model. The indirect effect of the path from emotional reactivity to suicide risk through psychological distress was significant ($\beta = .453$, $p < .001$), as well as the direct effect of emotional reactivity on psychological distress ($\beta = .663$, $p < .001$), and the direct effect of psychological distress on suicide risk ($\beta =$

.683, $p < .001$). However, the direct effect of emotional reactivity on suicide risk was not significant ($\beta = -.012$, $p = .837$). The total effect of emotional reactivity on suicide risk was significant ($\beta = .441$, $p < .001$). These results suggest that psychological distress fully mediated the association between emotional reactivity and suicide risk.

Table 3

Path Analysis: Direct, Indirect, and Total Effects.

Path	Estimate	SE	β	z	*p*	95% CI
Direct Effects (Y ⇐ X)						
SR <- PD	0.829	0.069	.683	11.955	<.001	[0.693, 0.965]
SR <- ER	-0.014	0.067	-.012	-0.206	.837	[-0.144, 0.117]
PD <- ER	0.641	0.056	.663	11.403	<.001	[0.530, 0.751]
Indirect Effects (Y ⇐ M ⇐ X)						
SR <- PD <- ER	0.531	0.058	.453	9.191	<.001	[0.418, 0.644]
Total Effects (Y ⇐ X + [Y ⇐ m ⇐ X])						
SR <- ER + (SR <- PD <- ER)	0.517	0.061	.441	8.465	<.001	[0.398, 0.637]

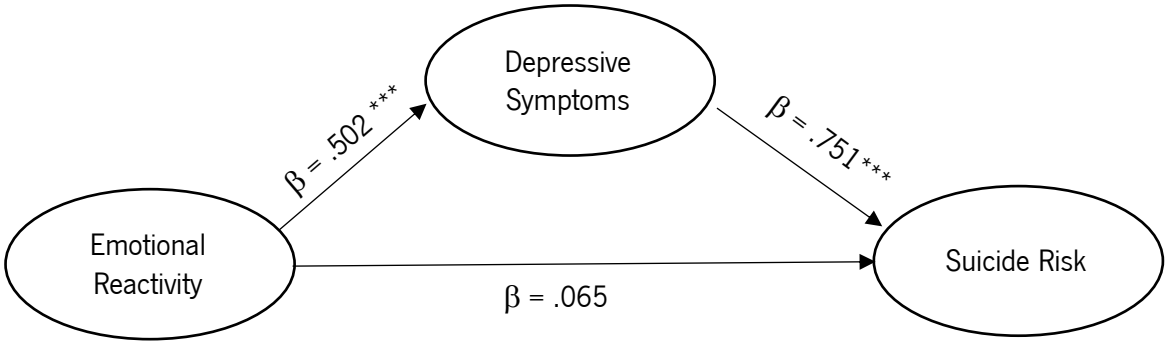
Note. SR = Suicide Risk, PD = Psychological Distress, ER = Emotional Reactivity.

Furthermore, to understand which psychological symptoms of distress played a larger role in the mediation between emotional reactivity and suicide risk, three other models were analyzed, in which depression, anxiety and stress were separately tested as the mediator in the relationship between emotional reactivity and suicide risk. Even though all structural models presented an acceptable fit to the data, the most significant was the one with depression symptoms as the mediator.

Figure 2 presents the second structural model under study and its standardized coefficients. This mediation model produced goodness-of-fit indexes that suggested that the model fit is approaching a good level ($\chi^2(899) = 2154$, $p < .001$; CFI = 0.994; NFI = 0.990; TLI = 0.994; SRMR = 0.066 (95% CI [0.063, 0.070]); RMSEA = 0.066 (95% CI [0.063, 0.070])). Furthermore, the model presented satisfactory values of explained variance, more specifically 61.7% of the variability of suicide risk scores ($r^2 = .617$) and 25.2% of depression symptoms scores ($r^2 = .252$).

Figure 2

The mediating role of depressive symptoms in the relation between emotional reactivity and suicide risk.



Note. Estimated standardized coefficients are presented.

****p* < .001

Table 4 presents direct, indirect, and total effects of the mediation model. Depressive symptoms fully mediated the association between emotional reactivity and suicide risk (direct effect of emotional reactivity on suicide risk: β = .065, *p* = .133). The indirect effect of the path from emotional reactivity to suicide risk through depression symptoms was significant (β = .377, *p* <.001), as well as the direct effect of emotional reactivity on depression symptoms (β = .502, *p* < .001), and the direct effect of depression symptoms on suicide risk (β = .751, *p* < .001). Finally, the total effect of emotional reactivity on suicide risk was significant (β = .442, *p* < .001).

Table 4

Path Analysis: Direct, Indirect, and Total Effects.

Path	Estimate	SE	β	z	*p*	95% CI
Direct Effects (Y ⇐ X)						
SR <- DS	0.833	0.048	.751	17.360	<.001	[0.739, 0.927]
SR <- ER	0.078	0.052	.065	1.500	.133	[-0.024, 0.179]
DS <- ER	0.544	0.064	.502	8.500	<.001	[0.419, 0.670]
Indirect Effects (Y ⇐ M ⇐ X)						
SR <- DS <- ER	0.453	0.054	.377	8.437	<.001	[0.348, 0.559]
Total Effects (Y ⇐ X + [Y ⇐ m ⇐ X])						
SR <- ER + (SR <- DS <- ER)	0.531	0.063	.442	8.444	<.001	[0.408, 0.654]

Note. SR = Suicide Risk, DS = Depressive Symptoms, ER = Emotional Reactivity.

Discussion

Despite the existence of research aiming to assess suicide risk and NSSI on clinical samples, there is considerably less understanding of this phenomenon in college settings. In this regard, this study sought to investigate the frequency of suicide risk and lifetime NSSI in college students from Portugal. Moreover, it aimed to elucidate the differences between those reporting and not reporting suicide risk regarding lifetime NSSI, and to explore the associations between suicide risk, lifetime NSSI, emotional reactivity, psychological distress, and satisfaction with academic experiences. Furthermore, this study sought to identify which variables, from those mentioned above, were the most reliable predictors of suicide risk. Finally, an examination was conducted on the mediation role of general psychological distress and then, specifically, the mediation role of depressive symptoms, anxiety symptoms and stress in the association between emotional reactivity and suicide risk.

Approximately 17% of the participants presented current suicide risk, which proves that this phenomenon is a significant concern among college students and aligns with previous researches globally (Hamza & Willoughby, 2016; Oh et al., 2021; Wu et al., 2021). Additionally, 32% of the participants reported lifetime NSSI and almost 15% current NSSI. The frequency of participants reporting lifetime NSSI falls within the higher range of prevalence estimates from previous studies, with reported prevalences ranging from 11.5% to 33.8% (Mannekote et al., 2021). These high rates of lifetime NSSI among college students are alarming, given that NSSI is associated with significant clinical impairment among young adults, and is prone to increase the risk of suicide (Selby et al., 2015).

Among participants reporting lifetime NSSI, almost half (47.8%) indicated engaging in such behavior for more than a year prior, while the remaining ones reported engaging in NSSI between "several prior months" and "in the prior week", highlighting the comprehensive nature of the results. These findings align with previous works (Xiao et al., 2022), and reinforce the urgency of addressing this issue. Regardless the amount of time that has passed since the last engagement in NSSI, recent research (Kiekens et al., 2018) indicates that individuals with past NSSI or even with prior history of thinking about NSSI are significantly more prone to report suicidal thoughts and behaviors. Regarding the methods of NSSI most commonly used, cutting and scratching were the most mentioned in this study, supporting prior evidence (Braga & Gonçalves, 2014; Klonsky, 2011).

Considering the hypothesis that individuals with lifetime NSSI may be at greater risk of reporting suicidal ideation (Hamza & Willoughby, 2016; Kiekens et al., 2018; Voss et al., 2020), this study also revealed that participants with lifetime NSSI are more frequently at suicide risk. There are various theories attempting to explain why this happens. According to Van Orden et al. (2010), the more frequent the self-injury, the greater the habituation to the pain, and the lower the fear of death. Consequently, as the behavior becomes more frequent, individuals may become more courageous and prepared to engage in more painful and lethal methods (Van Orden et al., 2010), potentially reinforcing suicidal ideation and, ultimately, the action towards suicide (Willoughby et al., 2015). Other works suggest that the scars from past NSSI may serve as reminders of the pain felt when they were initially made, leaving the individual more vulnerable (Burke et al., 2016) and increasing suicide risk.

The results of the present study also provide crucial insights into psychological (emotional reactivity and psychological distress) and environmental (satisfaction with academic experiences) factors associated with suicide risk. All of these variables were significantly correlated with suicide risk, confirming previous independent findings (Servaty-Seib et al., 2023; Tang et al., 2018). Depression symptoms exhibited the strongest positive correlation with suicide risk, which is consistent with previous research. This finding reinforces the well-documented empirical linkage between depression symptoms and suicide risk (Bakken, 2021) because, even in the presence of other variables, this association continues to be verified. Moreover, all dimensions of satisfaction with academic experiences were negatively associated with suicide risk, indicating that higher satisfaction with academic experiences among college students is linked to a lower suicide risk. These findings align with previous research indicating that overall satisfaction with academic experiences, particularly fostered by positive social relations with peers and teachers, can be a protective factor against suicidal ideation and attempts (Sunde et al., 2022). On the contrary, dissatisfaction with the college experience poses a significant risk factor for suicidal ideation and suicide attempts among students. Feelings of social disconnection (Hirsch et al., 2021), difficulties in relating to peers, interpersonal and academic conflicts, and a sense of hopelessness can all contribute to considerable distress, potentially culminating in suicidal behaviors and thoughts (Sunde et al., 2022). Interventions targeting these issues can profoundly impact college students' mental health and well-being, leading to improvement (Machado et al., 2020). Considering this hypothesis is crucial, as enhancing satisfaction with academic experiences can serve as a critical avenue for mitigating suicidal thoughts and self-harm behaviors, thereby reducing the risk of attempting suicide. Consequently, efforts should be made to improve peers' relationships and facilitate the adaptation to the college environment. College

campuses should invest in and promote a healthier and nurturing atmosphere that fosters collaboration and heightened awareness among college students and faculty alike (Sunde et al., 2022).

Along with previous lines, our findings suggest that depressive symptoms were the strongest predictor of suicide risk among college students. Students reporting higher levels of depressive symptoms were more prone to be at suicide risk, which is consistent with previous research demonstrating that individuals diagnosed with depression are more prone to report suicidal outcomes (Bakken & Gunter, 2012; Li et al., 2020). Furthermore, these results confirm the idea that depressive symptoms are one of the most robust predictors of suicide risk (Borges & Werlang, 2006; Lew et al., 2019), maintaining its strength even in the presence of other variables. Thus, it is vital to pay attention to depressive symptoms, even if there is only a history of them, as a past diagnosis of depression can elevate the odds of suicidal ideation as well (Casey et al., 2022). Lifetime NSSI also emerged as another strong predictor of suicide risk, with students reporting this behavior being more prone to be at suicide risk. Existing literature supports NSSI as a strong marker of suicidal ideation (Bakken, 2021; Hamza & Willoughby, 2016; Kiekens et al., 2018). These findings taken together also support the linkage between depression, NSSI and suicidal ideation. As noted by Bakken (2019), students with depressive symptoms are more prone to report NSSI and, in turn, are more likely to report suicidal ideation. NSSI can be viewed as a maladaptive strategy, serving as a mean to escape the suffering experienced by the individual and to cope with threatening emotions (Xavier et al., 2017). However, as mentioned earlier, lifetime NSSI increases the probability of reporting suicidal ideation (Hamza & Willoughby, 2016).

The present study's finding showing that psychological distress fully mediates the relationship between emotional reactivity and suicide risk is a valuable addition to the literature. Previously, there was some uncertainty regarding the mediator in the relationship with some researches suggesting emotional reactivity as a mediator between psychological distress and suicide risk, proposing that emotional reactivity results from psychopathology (Kleiman et al., 2014). Conversely, other researches stated that psychological distress is the mediator in the relationship between emotional reactivity and suicide risk, suggesting that emotional reactivity causes psychopathology (Polanco-Roman et al., 2018). The findings of the present study have made a strong argument for the last hypothesis, suggesting that the possible influence of emotional reactivity on suicide risk is explained by psychological distress. This implies that individuals with heightened emotional reactivity are at higher risk of experiencing increased psychological distress, which, in turn, may exacerbate the probability of being at suicide risk. Thus, individuals experiencing more intense emotions for prolonged periods of time may develop emotional symptoms (Gökdağ, 2023). Moreover, findings emphasize that psychological distress cannot be disregarded in its

impact on suicide risk. These are consistent with previous research stating a strong association between psychological distress and both suicidal ideation and suicidal behaviors (Tang et al., 2018).

Furthermore, there was an interest in determining which psychological symptom of distress could best elucidate the relationship between emotional reactivity and suicide risk. Our findings supported the idea that depressive symptoms were the most robust factor explaining the association. The mediation model in which depressive symptoms entered alone explained more of the variability of suicide risk (61.7%) compared to the mediation model encompassing all psychological distress symptoms together (45.6%). In accordance, Polanco-Roman et al. (2018) and Wu et al. (2021) found that depressive symptoms mediate the relationship between emotional reactivity and suicide risk. Collectively, these findings suggest that depressive symptoms can explain the process through which emotional reactivity is related to suicide risk. Elevated emotional reactivity is associated with higher levels of depressive symptoms, providing insight into why some individuals develop these symptoms while others do not (Shapero et al., 2019). Moreover, this study's findings reinforce the previously mentioned association between depressive symptoms and suicide risk, corroborating these well-documented association (Bakken, 2021).

This study has some limitations. Firstly, the data relied on self-report questionnaires, being possible that individuals interpretated the questions differently, some individuals may have chosen not to respond to certain questions or may have responded negatively due to the stigma associated with suicide risk, NSSI, and psychological distress. Interview techniques could be an alternative approach to extract information and could be considered in future research. Additionally, the fact that participants were mostly females and from the same university limits the generalizability of the results. In the future, it would be advantageous to include a more balanced representation of men and women from various universities and courses to enhance generalization. Furthermore, due to the cross-sectional design of the present study, predictions or causal relationships cannot be established. In this regard, although we found the mediation role of psychological distress, and more specifically of depressive symptoms, in the mentioned association, this suggested model should be further assessed in a prospective longitudinal study. It is crucial to clarify the directionality of the observed relationships and the temporal sequence of the variables.

Despite these limitations, the current study's findings provide noteworthy information for interventions with college students, particularly because this research may help to better inform the assessment of suicide risk by identifying potential risk factors for this phenomenon. Results highlight the importance of college's mental health professionals to carefully consider lifetime NSSI, heightened

emotional reactivity, and psychological distress when identifying indicators of potential suicidal ideation, and assessing students at higher risk of suicide. Identifying risk factors for suicide related to modifiable psychological processes, as those mentioned, may be relevant to improve the efficacy of prevention and treatment of suicidal behaviors. All these domains alone and their combination must be simultaneously assessed in clinical university settings. Moreover, these findings raise awareness for a potential protective factor for suicide risk among college students. Satisfaction with the academic environment might act as a buffer against the impact of certain variables on suicide risk, making it a potential target for all interventions. It is also crucial to integrate these findings with existing literature to comprehend the co-occurrence of all factors. Health care providers in college settings must ensure that quality resources are available to prevent, identify and, if necessary, intervene in suicidal behaviors and thoughts among college students. Acting to prevent suicide risk, is expected to lead to a decrease in suicidal attempts and provide more support and an improved quality of life to students.

The findings of this study empirically demonstrate the critical importance of addressing suicide risk in college students. Notably, among the associations assessed in this study, suicide risk was positively associated with lifetime NSSI, emotional reactivity, and psychological distress, and negatively associated with the satisfaction with academic experiences. Furthermore, lifetime NSSI and depressive symptoms emerged as significant predictors of suicide risk. Results also showed the mediating role of psychological distress, particularly depressive symptoms, in the relationship between emotional reactivity and suicide risk. Given these results, mental health care providers are advised to give special attention to lifetime NSSI, heightened emotional reactivity, and symptoms of depression when assessing suicide risk. Moreover, it is recommended to enhance the satisfaction with the academic environment, as it may serve as a buffer against suicide risk.

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Universidade do Minho

Conselho de Ética

Appendix A. Comissão de Ética para a Investigação em Ciências Sociais e Humanas (CEICSH)

Identificação do documento: CEICSH 099/2023

Título do projeto: *Avaliação do Risco de Suicídio e de Ferimentos Autoinfligidos em Estudantes Universitários*

Equipa de Investigação: Ana Rita Ribeiro Brochado Pimenta (IR), Mestrado em Psicologia Clínica e Psicoterapia de Adultos, Escola de Psicologia, Universidade do Minho; Professora Doutora Sónia Gonçalves (Orientadora), Centro de Investigação em Psicologia, Escola de Psicologia, Universidade do Minho

PARECER

A Comissão de Ética para a Investigação em Ciências Sociais e Humanas (CEICSH) analisou o processo relativo ao projeto de investigação acima identificado, intitulado *Avaliação do Risco de Suicídio e de Ferimentos Autoinfligidos em Estudantes Universitários.*

Os documentos apresentados revelam que o projeto obedece aos requisitos exigidos para as boas práticas na investigação com humanos, em conformidade com as normas nacionais e internacionais que regulam a investigação em Ciências Sociais e Humanas.

Face ao exposto, a Comissão de Ética para a Investigação em Ciências Sociais e Humanas (CEICSH) nada tem a opor à realização do projeto nos termos apresentados no Formulário de Identificação e Caracterização do Projeto, que se anexa, emitindo o seu parecer favorável, que foi aprovado por unanimidade pelos seus membros.

O Presidente da CEICSH

Assinado por: EMANUEL PEDRO VIANA BARBAS DE ALBUQUERQUE
Num. de Identificação: 07089799 Data: 2023.09.25 17:45:55 +0100

(Emanuel Pedro Viana Barbas Albuquerque)

Anexo: Formulário de identificação e caracterização do projeto