Article

Toolbox: technological anxiety resource for university students

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Abstract: Entering University is an important transition for students. Requires adaptation and can influence academic success. Psychological disorders might emerge when difficulties like anxiety occur due to insecurity about emotions in a student's life. We are currently living in post-pandemic conditions where pressure is increasing. The project "*Toolbox: University Student* – Web-interactive Platform", a platform for learning anxiety management, was developed to address this problem among university students. The main objective is to understand whether using the platform (based on cognitive behavioral theory) has effectively managed anxiety among students. It composes a sample of 31 students from two Portuguese Universities, aged between 19 and 47 years. They were divided into two groups: intervention (n=17) and control (n=13). The results show that participants subjected to intervention with the interactive platform decreased their anxiety.

Keywords: anxiety; university students; *web-interactive* platform

1. Introduction

Entering University is an emotional moment. Young people (re)define goals, strengthening identities (Le Gallès, 1995). Separation from high-school friends can lower self-esteem (Almeida et al., 2000; Lent et al., 2009; Paul & Brier, 2011). Anxiety may trigger phobias, obsessive-compulsive disorders, deviant behavior (Gonçalves & Cruz, 1988), cause lower attendance or dropping out (Almeida et al., 2006; Almeida, 2014; Andrews & Wilding, 2004; Hysenbegasi et al., 2005; Kessler et al., 2005;). Post-pandemic situations lead to costs to mental health and socioeconomic consequences.

Students face requirements for overcoming assessments, time management and relationships (Mondardo & Pedon, 2005). Anxiety is the body's response that alerts them with strategies to deal with adverse periods (Barriga, 2007). However, it is pathological when disproportionate (Castillo & Schwartz, 2013).

These studies frame the "Toolbox: Student University – Web-interactive Platform." It aims to promote personal, social, and academic skills and well-being, providing psychoeducational materials and relaxation exercises for anxiety. The intervention exercises are based on cognitive behavioral theory (CBT). The study evaluates the effectiveness of psychoeducation in managing anxiety (using a platform) and to understand if there are differences in pre and post-test between the target of psychological intervention and the control group. It Intends to answer the question/problem: Is using the interactive web platform effective in managing anxiety among university students? Which is a work field part of a specific research team of the university about mental health.

Anxiety: Theoretical Overview

It influences individuals personally, professionally, and socially (Simões, 2014). Bauer (2002) suggests anxiety is a vague feeling expressed through fear, which may become dysfunctional (Cruz, 2008). It triggers psychological and physiological symptoms, with social and professional problems.

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Increased heart rate, sweating, high blood pressure, and crying may associate with the external situation (state anxiety) or an internal response (Queirós et al., 2020).

In 2008, the first study of mental disorders was done in Portugal and pointed to an incidence of 22.9% of the population (Conselho Nacional de Saúde, 2019). Psychiatric disorders were 12.0% of disability-adjusted years of life lost and 18.0% of years lived with disability in 2017. Anxiety in professionals resort to pharmacology to alleviate physical symptoms (Fávero et al., 2018), intensified in the last two years due to COVID-19. The pandemic is a risk factor for anxiety (Albuquerque et al., 2021): isolation, social distancing, unemployment (Barros et al., 2020), the high number of deaths, and fear of contracting disease and dying (Santana et al., 2021). At Family Health Unit in Portugal, a study by Santana et al. (2021) showed anxiety in patients during a pandemic. Of the 285 participants, 47% had anxiety, higher in females. Unemployed, lay-off workers had the highest prevalence.

Cognitive-Behavioral Theory (CBT), as psychoeducation, is used with mental disorders, training social skills, and restructuring negative thoughts. Ito et al. (2008) mainly use it for anxiety with pharmacological treatment (Ito et al., 2008; Del Rey & Pacini, 2006).

The 3rd generation therapies (Mindfulness) improve socio-emotional functioning, attention, concentration, and sleep (O'Driscoll et al., 2017; Weis, Ray & Cohen, 2021; Sheikhzadeh, Zanjani & Baari, 2021). It activates brain regions responsible for positive emotions, benefits the body's immune functions (Davidson et al., 2003), and promotes body self-awareness. When aware of the "present moment," avoids focusing on the past/future, which is what happens with anxiety. Bamber and Morpeth (2019) studied 1492 students who showed better concentration levels after mindfulness/meditation.

Successful adaptation reduces dropping out and increases well-being (Almeida et al., 2014; Lent et al., 2009; Paul & Brier, 2011). Reason et al. (2006) suggest that integrated students benefit from intellectual and personal growth. According to Almeida (2014), adaptation requires coping mechanisms and resilience. Kessler et al. (1995) concluded that 86% with mental health problems dropped out. Age of 18 and 25 are the peaks for developing mental health problems: depression, psychotic disorders, and schizophrenia (Kessler et al., 2005).

Most young people with anxiety do not seek help from a professional (Reavley & Jorm, 2010). Diagnoses of suicidal ideation/severe depression are the last resort to help (Cooke et al., 2006). An Australian investigation revealed that 83.9% suffered from mental health disorders, and only 34.3% sought professional help (Stallman, 2010). Alternatively, resort to drinking alcohol and harmful substances (Reavley & Jorm, 2010).

Many universities provide psychological services; however, it is necessary to complementary online interventions. According to Gonçalves and Cruz (1988), they should provide human development for their community. Faced with mental problems, universities promote psychological services to students (Santos, 2011). Responsible for training citizens, it is essential to consider their personal development (Tavares et al., 2007; Oliveira et al., 2016), develop students' cognitive, academic, and professional skills, instilling responsibility and autonomy (Order Portuguese Psychologists, 2018). These services are scarce in Portugal, face difficulties in financial support, and have extensive waiting lists (RESAPES, 2002). During the confinement period, greater demand was in place compared to 2019. Video appointments increased, including new strategies according to community needs. Anxiety, academic demands, and distance learning were the main problems (RESAPES, 2021). Had positive performance, demonstrating it is possible to reinvent strategies while always maintaining scientific rigor. The lack of human resources was felt more after COVID-19, making it necessary for psychological services (RESAPES, 2021).

Literature supports the prevention of mental disorders held by new technologies (Oliveira et al., 2016). Over the last three decades, online support has grown, accessing more individuals. The pandemic contributed to reinventing new working methods (Simpson et al., 2021): psychotherapy by videoconference, psychoeducational websites, online support groups, blogs, self-guided interventions, and mobile health (Barak & Grohol, 2011; Clough & Casey, 2015). Research sustains beneficial results for that (Spek et al., 2007). Online psychotherapy promotes openness and facilitates disclosure (Fletcher-Tomenious & Vossler, 2009; Roy & Gillett, 2008; Simpson et al., 2021). Psychoeducational sites are informative but do not provide personalized information; they help learn topics on mental

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health. In online support groups, people communicate without professional intervention (Barak & Grohol, 2011). Ko and Kuo (2009) demonstrate that the more an individual reveals himself online, the more he changes his perception of social capital, promoting well-being. A study with 238 students (Freeman et al., 2008) who viewed websites about problems and had online support improved their well-being. Self-guided online interventions are a self-help CBT interactive exercise and personalized feedback (Barak et al., 2009; Barak & Grohol, 2011).

According to Oliveira et al. (2016), with Portuguese students, new technologies improve well-being. Most considered online anxiety programs relevant. A study from 2022, with medical students at a Brazilian university, showed satisfaction with the mobile application for monitoring well-being. All recommend it (Aquino Ferreira et. al., 2022). Interventions on online platforms based on CBT show positive results with adolescents (Clarke et al., 2014).

Compared to traditional interventions, new technologies are an asset: economic, easier to access, less stigmatizing, reach isolated communities, overcoming geographic and socioeconomic barriers (Barak & Grohol, 2011; Farrer et al., 2013). Suler (2004) argues that anonymity encourages self-reflection, emotional expression, and flexibility (Hanley & Reynolds, 2009). Despite the evidence, progress could be faster. After the pandemic, countries made efforts to implement online psychotherapy. Blumenstyk (2020) considers the quick response made is not just temporary. Mental health institutions respond well through technology, and there is no reason to abandon this. It is essential when unforeseen viruses and catastrophic events driven by climate change are frequent.

2. Methods

Evaluate the effectiveness of psychoeducation in managing anxiety among university students, using a web-interactive platform vs. without a web-interactive platform. The group that had access to the platform was the experimental group, and the students who did not have access to the interactive online platform were the control group.

The Project “ToolBox: University Student – Web-Interactive Platform” is a Web-Interactive Platform with three objectives (Lucas, Oliveira & Soares, 2010; Lucas, Santos, Soares, Baras & Oliveira, 2018; Santos, 2018):

1) development of personal, social, and professional skills;

2) academic success, help in the transition to a job;

3) eliminate barriers to students' psychological help, making requests more online.

Includes psychoeducational content, interactive exercises on CBT, ideas, and support personal reflection. Students create a user account (not mandatory). All have access to toolkits (anxiety management), quizzes and self-questionnaires. After informed consent, (registered) users start exercises. They access the "Thermometer of emotions", to monitor emotional states and activate helping tips. There is a forum where registered users participate: with questions, suggestions, and psychologists' moderation. They find daily tips and access them in the personal area of each user (Lucas, Santos Soares, Baras & Oliveira, 2018).

First, a joint action occurred between all elements to survey mental health problems and needs. Focus groups showed us perceptions before and during the platform testing phase, which topic they would look for in a website that could help them. Then, an online platform was disseminated, and registrations were collected.

The methodology is experimental analysis pre and post-intervention. The aim is to compare the pre and post-intervention, where anxiety management exercises were implemented via an online platform (intervention group), with a group that was not the target of intervention via an online platform (control group). A quantitative analysis was done, including research hypothesis, characterization sample, instruments, procedures, and analysis/discussion of results.

Research Hypothesis

Academic demands can lead to exhaustion (Cruz et al., 2020). Young people have difficulty recognizing disorders and do not seek help (Lopez et al., 1998; Komiya et al., 2000; Mackenzie et al., 2004

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& Lucas et al., 2010). The study is on anxiety management supported by literature and students, as one of the problems they most ask for psychological help. The hypothesis is: to investigate the effectiveness of an interactive platform in managing anxiety in both groups (experimental/control). Did anxiety levels improve after intervention with an interactive web platform?

The convenience criterion was chosen for sample gathering, as subjects are selected considering *availability/willingness criteria* (Freitag, 2018). There were 49 students from two Portuguese public universities, with 18 missing cases (36% still need to answer pre and post-test).

The sample was 31 participants, 61.3% (n=19) female, 35% (n=11) from University 1 (U1) and 25.8% (n=8) from University 2 (U2); 38.7% (n=12) male, with 22.6% (n=7) attending U1 and 16.2% (n=5) U2. The intervention group is 35% (n=11) female and 19.4% (n=6) male. Control group, 25.8% (n=8) corresponds to females and 19.4% (n=6) males (Table 1). All participants complete both pre- and post-measures.

Table 1. Distribution of sample Intervention/Control group, Gender/University.

	Group										**University**			
	Intervention		**Control**		**U2 Intervention**		**U2 Control**		**U1 Intervention**		U1 Control		Total Gender	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Female	11	35,5	8	25,8	5	16,1	3	9,7	6	19,4	5	16,1	19	61,3
Male	6	19,4	6	19,4	2	6,5	3	9,7	4	12,9	3	9,7	12	38,7
Total	17	54,8	14	45,2	7	22,6	6	19,4	10	32,2	8	25,8	31	100

The age is 19 to 47, averaging 23.7 (M=23.7; SD= 1.17). The students attend undergraduate, master's degrees in Engineering (n=16), Design (n=1), Psychology (n=2), Management (n=3), Cultural Management (n=1) Cultural Studies (n=1), Organic Agriculture (n=1), Economics (n=1), Basic Education (n=2), Educational Sciences (n=2) and Mathematics (n=1).

In pre-intervention, a questionnaire was applied to both groups: 1) sociodemographic/contextual data; 2) State-Trait Anxiety Inventory (STAI Y1/2; Spielberg, Gorsuch and Lushene 1970), validated for the Portuguese population by Silva and Campos (1998). After the intervention, the State-Trait Anxiety Inventory (STAY) was applied to both.

The State-Trait Anxiety Inventory (STAY) assesses anxiety. Two scales, 20 items, the State Scale (Y1) and Trait Scale (Y2), Likert type, vary between 1 (rarely) and 4 (almost always). Each Scale has a maximum score of 80 and a minimum of 20.

Adapted for Portuguese population by Silva and Campos (1998) items are: State Scale (Y1): 1) "calm"; 2) "safe"; 3) "tense"; 4) "exhausted"; 5) "at ease"; 6) "disturbed"; 7) "worried about misfortunes"; 8) "satisfied"; 9) "scared"; 10) "rested"; 11) "confident"; 12) "nervous"; 13) "restless"; 14) "indecisive"; 15) "relaxed"; 16) "happy"; 17) "worried"; 18) "confused"; 19) "stable"; 20) "good"; Trait Scale (Y2): 21) "good"; 22) "nervous"; 23) "satisfied"; 24) "happy"; 25) "like a failure"; 26) "calm"; 27) "calm,"; 28) "difficulties"; 29) "worry"; 30) "happy"; 31) "worrying thoughts"; 32) "don't have confidence"; 33) "safe"; 34) "make decisions"; 35) "I am not capable"; 36) "happy"; 37) "unimportant thoughts"; 38) "take disappointments seriously"; 39) "stable person"; 40) "tense."

Cronbach's Alpha was more outstanding than .70, with values of α= .91 and α= .93 onY1 Scale and α= .89 and α= .90 on the Y2 Scale for men and women (Silva & Campos, 1998). In another study, high school, 112 males and 110 females obtained Cronbach's Alpha of α=.89 on the State scale (Y1) and α=.88 on the Trait scale (Y2) (Silva & Campos, 1998). In 2000, Silva et al. performed a final validation for the Portuguese population, involving 1000 subjects. The results on Y1 Scale were α= .91 and .93 (female and male), and on Y2 Scale, α=.89 (female and male). Cronbach's Alpha corresponds

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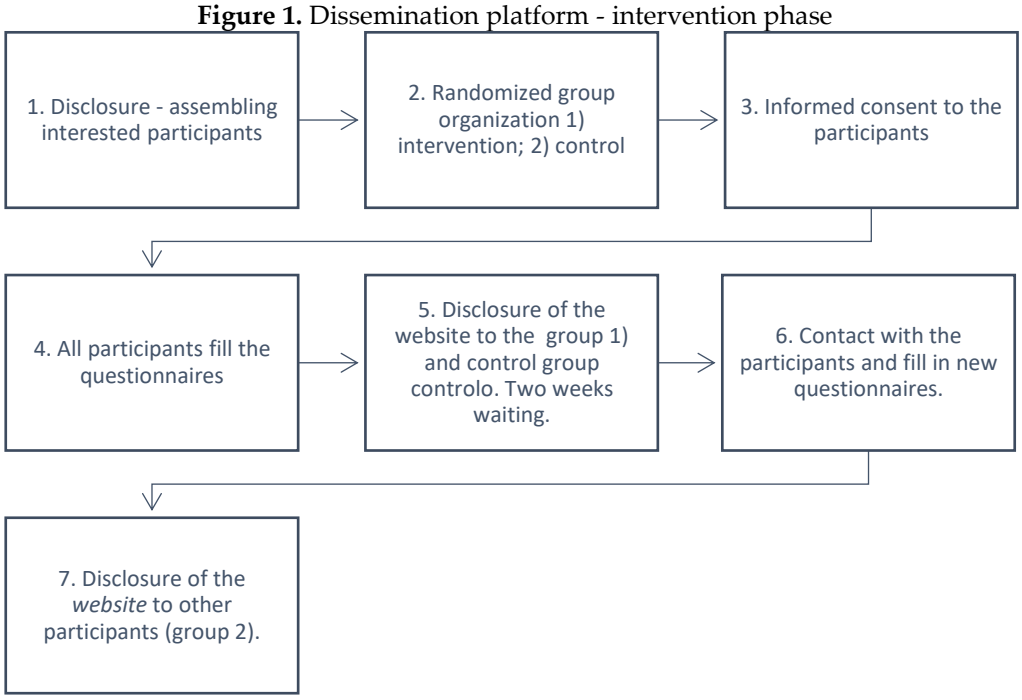
to α= .86 in the Y1 inventory and α= .89 in the Y2 inventory, revealing good internal consistency greater than .70 (Silva & Campos, 1998).

Procedures

During the first phase, the platform was disseminated (figure 1), inviting into the pilot project and collecting registration. They were assigned to groups (intervention and control). All ethical procedures were considered (informed consent/ anonymity). Students received a guide, and psychologists remained available. Then, it was disclosed to the intervention group for carrying exercises for one week. Participants completed the questionnaires, and, in the end, the platform was also made available to the control group, respecting equity and methodological ethics, but these results were not analyzed.

Figure 1. Dissemination platform - intervention phase



(Lucas, et al, 2018; Santos, 2018)

The database was in SPSS, version 28. Gender, age, University, and course characterized the sample. A descriptive analysis was done: means, standard deviations, and minimum/maximum response values. The normality was analyzed to decide which tests to use. The Paired Samples t-test was used for pre and post-test, an Anova, to compare students from two universities and genders. The reliability measurement was done by *Cronbach's alpha coefficients* (α).

3. Results

Tables 2 and 3 show descriptive statistics of the State-Trait Anxiety Inventory (Y1) (2) Anxiety in the intervention group. The mean results were lower in some items in the post-test phase compared to the pre-test, showing decreased anxiety. Item 3, "tense" (M pre-test = 2.71; M post-test = 2.12), item 7, "worried about misfortunes" (M pre-test = 2.18; M post-test= 1.59), reveal improvement in anxiety.

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Table 2. -Descriptive statistics State-Trait Anxiety Inventory (STAI) - intervention group Y1.

		N	Min	Max	M	SD
E Y1						
1) calm	Pré	17	1	4	3,06	.899
	Pós	17	1	4	**3,29**	.772
2) safe	Pré	17	1	4	2,82	.809
	Pós	17	1	4	2,71	.920
3) tense	Pré	17	1	4	2,71	1,105
	Pós	17	1	4	**2,12**	.993
4) sold out	Pré	17	1	4	2,41	1,004
	Pós	17	1	4	2,41	1,121
5) at ease	Pré	17	1	4	2,82	.883
	Pós	17	1	4	2,82	.951
6) disturbed	Pré	17	1	3	1,65	.702
	Pós	17	1	3	**1,59**	.870
7) worried	Pré	17	1	4	2,18	1,185
	Pós	17	1	4	**1,59**	1,004
8) satisfied	Pré	17	1	3	2,18	.728
	Pós	17	1	4	2,59	.795
9) scared	Pré	17	1	4	1,88	1,054
	Pós	17	1	4	1,59	.939
10) rested	Pré	17	1	4	2,24	.752
	Pós	17	1	4	2,35	.931
11) confident	Pré	17	1	4	2,29	.849
	Pós	17	1	4	2,47	.943
12) nervous	Pré	17	1	4	2,18	1,015
	Pós	17	1	4	2,24	1,147
13) restless	Pré	17	1	4	2,29	1,160
	Pós	17	1	4	2,00	1,118
14) indecisive	Pré	17	1	4	2,76	1,147
	Pós	17	1	4	2,29	1,105
15) relaxed	Pré	17	1	4	2,18	1,074
	Pós	17	1	4	2,41	1,004
16) happy	Pré	17	1	4	2,00	.791
	Pós	17	1	4	2,35	.786
17) worried	Pré	17	1	4	2,59	1,064
	Pós	17	1	4	2,53	1,125
18) confused	Pré	17	1	4	2,12	1,111
	Pós	17	1	4	1,94	1,088
19) stable	Pré	17	1	4	2,29	1,105
	Pós	17	1	4	2,47	1,231
20) well	Pré	17	1	4	2,41	.795
	Pós	17	1	4	2,82	1,015

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Table 3. Descriptive statistics State-Trait Anxiety Inventory (STAI) - intervention group Y2.

		N	Min	Max	M	SD
T Y2						
21) fine	Pré	17	1	4	2,59	.795
	Pós	17	2	4	2,71	.686
22) nervous		17	1	4	2,59	.795
		17	2	4	2,59	.870
23) satisfied		17	1	4	2,18	.809
		17	1	3	2,12	.697
24) happy		17	1	4	2,06	1,144
		17	1	4	2,00	1,061
25) failed		17	1	4	2,18	.951
		17	1	4	2,12	1,111
26) quiet		17	1	4	2,24	.903
		17	1	3	2,41	.795
27) weighted		17	1	4	2,65	.862
		17	1	4	2,71	.985
28) difficulties		17	1	4	2,47	1,125
		17	1	4	2,29	1,105
29) worry		17	1	4	2,94	1,029
		17	1	4	2,71	1,047
30) happy		17	2	4	2,82	.728
		17	1	4	2,76	1,033
31) worried		17	1	4	2,29	.985
		17	1	4	2,12	.993
32) poor confidence		17	1	4	2,71	.920
		17	1	4	2,41	1,064
33) insecure		17	1	4	2,24	.903
		17	1	4	2,59	.795
34) decisions with ease		17	1	3	1,76	.831
		17	1	4	1,94	.827
35) not able		17	1	4	2,65	.862
		17	1	4	2,65	1,115
36) happy		17	2	4	2,65	.702
		17	1	4	2,59	.795
37) unimportant thoughts		17	1	4	2,76	1,200
		17	1	4	2,65	1,272
38) disappointment		17	1	4	2,47	1,068
		17	1	4	2,35	1,057
39) stable		17	1	4	2,59	1,004
		17	1	4	2,59	1,064
40) tense		17	1	4	2,59	1,064
		17	1	4	2,65	1,272

Tables 4 and 5 show descriptive statistics of the Control group's State-Trait Anxiety Inventory (Y1) (Y2). State Inventory (Y1) 5 items have lower average results in the post-test compared to the pre-test (items: 4, 7, 14, 16, 18). Items 7 (M pre-test= 2.43; M post-test= 2.07) and 18 (M pre-test=2.29; M post-test= 1.86) are significant. The control group was not subject to exercises on the interactive

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platform, and State Inventory data (Y1), considered the most modifiable, did not undergo significant changes. On the contrary, Trait Inventory (Y2) average response was lower in the post-test (11 items) when compared pre-test (items: 21, 22, 24, 25, 27, 28, 29, 30, 31, 34, 36).

Table 4. Descriptive statistics State-Trait Anxiety Inventory (STAI) - control group Y1.

		N	Min	Max	M	SD
(Y1)						
1 calm	Pré	14	1	4	2,64	1,082
	Pós	14	1	4	2,79	1,051
2 safe		14	1	4	2,50	1,092
		14	2	4	2,86	.663
3 tense		14	1	4	2,43	.938
		14	1	4	2,57	.938
4 sold out		14	1	4	2,64	1,151
		14	1	4	2,57	.852
.5		14	1	4	2,50	.941
		14	1	4	2,64	1,008
6 disturbed		14	1	3	1,79	.699
		14	1	3	1,86	.864
7 worried		14	1	4	2,43	1,284
		14	1	4	2,07	.997
8 satisfied		14	1	3	2,29	.726
		14	1	4	2,50	.855
9 scared		14	1	4	2,00	1,038
		14	1	4	2,07	.917
10 rested		14	1	3	1,79	.802
		14	1	3	1,86	.770
11 confident		14	1	4	2,29	.914
		14	1	4	2,57	.938
12 nervous		14	1	4	2,36	1,151
		14	1	4	2,50	1,092
13 restless		14	1	4	2,71	1,069
		14	1	4	2,71	1,139
14 indecisive		14	1	4	2,36	1,151
		14	1	4	2,07	1,141
15 relaxed		14	1	3	2,07	.829
		14	1	3	2,14	.663
16 happy		14	2	4	2,57	.646
		14	1	4	2,50	.941
17 worried		14	1	4	2,86	1,099
		14	2	4	2,93	.829
18 confused		14	1	4	2,29	1,204
		14	1	3	1,86	.770
19 stable		14	1	4	2,50	.855
		14	1	4	2,57	.938
20 well		14	1	4	2,50	.855
		14	1	4	2,64	1,008

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Table 5. Descriptive statistics State-Trait Anxiety Inventory (STAI) - control group Y2.

		N	Min	Max	M	SD
(Y2)						
21 fine	Pré	14	1	4	2,79	.802
	Pós	14	1	4	2,64	.929
22 nervous		14	1	4	2,86	.864
		14	1	4	2,50	.855
23 satisfied		14	1	4	2,57	.852
		14	1	3	2,57	.646
24 happy		14	2	4	2,29	1,139
		14	1	4	2,07	1,072
25 failed		14	1	4	2,29	1,204
		14	1	4	1,93	.997
26 quiet		14	1	3	2,14	.770
		14	1	4	2,36	.745
27 weighted		14	1	4	2,50	1,019
		14	1	3	2,29	.726
28 difficulties		14	1	4	2,57	.938
		14	1	4	2,50	.760
29 worry		14	1	4	2,71	1,069
		14	1	4	2,43	.938
30 happy		14	1	4	3,00	.961
		14	1	4	2,64	.745
31 worried		14	1	4	2,29	,914
		14	1	4	2,21	1,188
32 poor confidence		14	1	4	2,43	1,089
		14	1	4	2,57	1,089
33 insecure		14	1	4	2,43	.938
		14	1	4	2,50	.855
34 decisions with ease		14	1	4	2,36	.842
		14	1	4	2,21	.893
35 not able		14	1	4	2,21	1,122
		14	1	4	2,29	1,069
36 happy		14	1	4	2,86	.864
		14	1	4	2,64	.842
37 unimportant thoughts		14	1	4	2,29	1,069
		14	1	4	2,29	1,069
38 disappointment		14	1	3	1,93	.730
		14	1	4	2,36	1,008
39 stable		14	1	4	3,14	.949
		14	3	4	2,43	.646
40 tense		14	2	4	3,21	.802
		14	1	4	2,64	1,151

For the normality sample (Table 6) Shapiro-Wilk test was applied, considering n<50 (Nascimento, Tibana, Melo & Prestes, 2015); it has a normal distribution according to sig=.609 and *p-value* >.05 (Pallant, 2005).

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Table 6. Results of Sample Normality- Shapiro-Wilk test.

Statistic	gl	*Sig.*
,973	31	.609

3.1. Originality

Did anxiety levels improve after intervention with an interactive web platform? Yes. The pre and post-test of the State-Trait Anxiety Inventory (the Paired Sample t-test) show that (table 6). The State Inventory (Y1) intervention group average obtained in the post-test (M=44.00; SD=14.874) is lower than the pre-test (M=48.24; SD=12.602). So, after using the platform, students showed less anxiety, as Silva (2003) mentioned. In Trait Inventory (Y2) intervention group, despite improvement in the post-test (M=49.12; SD=13.724) compared to the pre-test (M=51.88; SD= 12,154), the differences are not significant (p> .05; sig= .09).

Exercise contributed to managing anxiety. Despite significant results only on the State scale (Y2; sig= .34), on the Trait scale (Y1) average result also indicates an anxiety reduction (M pre-test= 51.88; M post-test= 49,12), although not significant. The results obtained from State (Y1) Trait (Y2) Anxiety Inventory in the pre and post-test control group (table 7) were not significant in any of the scales, with *sig* values of .21 and .46. These students were not the target of intervention. Back-end data regarding participants' use of the toolbox was collected.

Table 7. Results Paired Sample t-test State (Y1) Trait (Y2) Anxiety Inventory (STAI) pre/post-intervention groups: intervention/control.

			Significance		
	Mean	Standard deviation	t	Unilateral p	Bilateral p
STAI Intervention (Y1)	4,24	9,516	1,835	**.043**	.085
Pré	48,24	12,602			
Pós	44,00	14,874			
STAI Intervention (Y2)	2,76	8,143	1,400	.090	.181
Pré	51,88	12,154			
Pós	49,12	13,724			
STAI Control (Y1)	1,79	8,144	,820	.213	.427
"	49,86	13,002			
	48,07	10,064			
STAI Control (Y2)	,14	5,332	,100	.461	.922
"	48,36	10,470			
	48,21	11,878			

4. Discussion

After the intervention, State-Trait Anxiety Inventory showed significant improvement in the post-test of Y1 Scale - intervention group when compared pre -the test. The same did not happen with Y2 Scale, although anxiety decreased post-test. Although not expressive, Y1 Scale expresses the student's state and is modifiable with training; it shows an anxiety reduction. STAI results between genders were insignificant, although females showed higher levels in line with Silva and Campo's (1998) study with secondary students, where higher anxiety levels occur in females. Although the sample size was limited, students who underwent intervention showed improvements.

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5. Conclusions

Results encourage investments in online platforms that help students manage their anxiety levels. The Internet is growing exponentially, providing more access to people. Barak and Grohol (2011) highlight the importance of online groups, social interaction and well-being. Freeman et al. (2008) found that students who viewed websites about anxiety and had online support improved their well-being. The use of a platform like the one tested here is compelling. It helps decrease mental health problems, prevent academic dropouts, and promote career skills for a successful transition to the job (Lucas, Santos, Soares, Barras & Oliveira, 2018). Provides support to students who otherwise do not seek psychological help (Soares et al., 2018).

Investment in these approaches is highly recommended, after COVID-19, considering that stress experienced by students has intensified in the last two years. Despite the small sample size and the recognition that further studies with larger groups using stratified sampling to assign groups are needed, we point out that

it is crucial to meet students' needs after adopting different pedagogical methods to understand their integration into their academic path and well-being.

All participants could access the forum when accessing the toolbox, but the frequency of the accesses was not counted for this study and as such one of the limitations of the study is the analysis of the insights about those that participated in the forum compared to others that didn't. Also analyzing the reflections made by the students in the focus groups and how did that knowledge inform the intervention content should have been more deeply analyzed, beyond the thematic of Anxiety (which was the one more mentioned as concerning by the students).

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References

Albuquerque, M., Baptista L., Oliveira P., Nunes P., Trindade P., Vasconcelos, A. & Gago, J. (2021). Saúde mental cuidados saúde primários. *Acta medica portuguesa*, *34*(10), 647-649. Retrieved: https://run.unl.pt/bitstream/10362/127076/1/15911_70845_1_PB.pdf, june 2022.

Almeida, L., Soares, A. & Ferreira, J. (2000). Transição, adaptação à universidade: Apresentação questionário vivências académicas (QVA). *Psicologia, 14*(2), 189–208. Retrieved: https://doi.org/10.17575/rpsicol.v14i2.510, november 2021.

Almeida, L., Guisande, M., Soares, A. & Saavedra, L. (2006). Acesso, sucesso Ensino Superior Portugal: Questões género, origem socio-cultural, percurso académico alunos. *Psicologia: Reflexão Crítica, 19*(3), 507-514. Retrieved: https://doi.org/10.1590/S0102-79722006000300020, december 2021.

Almeida, J. (2014). *Saúde mental global, depressão, ansiedade, comportamentos de risco estudantes ensino superior: Estudo prevalência e correlação.* (Tese Mestrado, UN Lisboa). Retrieved: http://hdl.handle.net/10362/15722, december 2021.

Andrews, B., & Wilding, J. (2004). Relation depression, anxiety to life-stress achievement in students. *British Journal Psychology, 95*(4), 509–521. Retrieved: https://doi.org/10.1348/0007126042369802, December 2021.

Aquino Ferreira, L., Benevides, A., Rabelo, J., Medeiros, M., Barros F., Sanders, L. & Peixoto, R. (2022). Desenvolvimento, Satisfação, Usabilidade plataforma móvel monitoramento saúde mental estudantes universitários. *Research, Society Development*, *11*(2), e19911225525-e19911225525. https://rsdjournal.org/index.php/rsd/article/view/25525

Bamber, M. & Morpeth, E. (2019). The Effects of mindfulness meditation in college student anxiety: a meta-analysis. *Mindfulness*, *10*(2), 203–214. Retrieved: https://link.springer.com/article/10.1007/s12671-018-0965-5, June 2022.

Barak, A., & Grohol, J. (2011). Current and future trends internet-supported mental health interventions. *Journal Technology Human Services, 29*(3), 155-196. Retrieved: https://doi.org/10.1080/15228835.2011.616939, October 2021.

Barak, A., Klein, B., & Proudfoot, J. (2009). Defining internet-supported therapeutic interventions. *Annals behavioral medicine, 38*(1), 4–17. Retrieved: https://doi.org/10.1007/s12160-009-9130-7, October 2021.

Barriga, I. (2007). *Respostas Emocionais (Stress, Ansiedade, Depressão), Coping Dor Estudantes Universitários.* (Tese Mestrado, U. Algarve). Retrieved: https://sapientia.ualg.pt/bitstream/10400.1/269/5/ESCALA_DE...pdf, February 2022.

Barros, M., Lima, M., Malta, D., Szwarcwald, C., Azevedo, R., Romero, D., ... & Gracie, R. (2020). Relato tristeza/depressão, nervosismo/ansiedade, problemas sono na população adulta brasileira durante pandemia COVID-19. *Epidemiologia Serviços Saúde*, *29*, e2020427. Retrieved: https://www.scielosp.org/article/ress/2020.v29n4/e2020427/pt/, march 2022.

Bauer, S. (2002). *Ansiedade a depressão; psicofarmacologia à psicoterapia ericksoniana*. São Paulo: Livro Pleno.

Blumenstyk, G. (2020). Why coronavirus looks like 'black swan'moment higher ed. *Chronicle Higher Education*, *66*, 25.

Castillo, L. & Schwartz, S. (2013). Introduction special issue college student mental health. *Journal clinical psychology*, *69*(4), 291-297. Retrieved: https://onlinelibrary.wiley.com/doi/abs/10.1002/jclp.21972, October 2021.

Clarke, A., Kuosmanen, T., & Barry, M. (2014). Systematic review online youth mental health promotion and prevention interventions. *Journal Youth Adolescence, 44*(1), 90–113. Retrieved: https://doi.org/10.1007/s10964-014-0165-0, December 2021.

Clough, B. & Casey, L. (2015). Smart therapist: Look to the future of smartphones and mHealth technologies psychotherapy. *Professional Psychology: Research Practice, 46*(3), 147–153. Retrieved: https://doi.org/10.1037/pro0000011, January 2021.

Conselho Nacional de Saúde. (2019). Sem mais tempo a perder: saúde mental Portugal - desafio próxima década.

Cooke, R., Bewick, B., Barkham, M., Bradley, M., & Audin, K. (2006). Measuring, monitoring, and managing the psychological well-being of first-year university students. *British Journal Guidance & Counselling, 34*(4), 505–517. Retrieved: http://doi.org/10.1080/03069880600942624, December 2021.

Cruz, M. (2008). Ansiedade, bem-estar transição ensino superior: papel suporte social (Tese de Mestrado, U. Porto). Retrieved: https://repositorio-aberto.up.pt/bitstream/10216/23383/2/29839.pdf, january de 2022.

Cruz, M., Gonçalves, F., Melo, K., Soares, A., Silva, W., Silva, C., ... & Ibiapina, C., (2020). Ansiedade universitários iniciantes cursos área saúde. *Brazilian Journal Health Review*, *3*(5), 14644-14662. Retrieved: https://brazilianjournals.com/ojs/index.php/BJHR/article/view/18335, january, 2021.

Davidson, R., Kabat-Zinn, J., Schumacher, J., Rosenkranz, M., Muller, D., Santorelli, S. F., ... & Sheridan, J. (2003). Alterations in brain immune function produced mindfulness meditation. *Psychosomatic Medicine*, *65*(4), 564-570.

D'El Rey, G. & Pacini, C. (2006). Terapia cognitivo-comportamental fobia social: modelos técnicas. *Psicologia em estudo*, *11*(2), 269-275.

Fávero, V., del Olmo Sato, M. & Santiago, R. (2018). Uso Ansiolíticos: Abuso Necessidade? *Visão acadêmica*, *18*(4). Retrieved: https://revistas.ufpr.br/academica/article/view/57820, june 2022.

Farrer, L., Gulliver, A., Chan, J., Batterham, P., Reynolds, J., Calear, A., Tait, R., Bennett, K., & Griffiths, K. (2013). Technology-based interventions mental health tertiary students: Systematic review. *Journal Medical Internet Research, 15*(5), 1–14. Retrieved: https://doi.org/10.2196/jmir.2639, December 2021.

Fletcher-Tomenius, L., & Vossler, A. (2009). Trust online therapeutic relationships: Therapist's experience. *Counselling Psychology Review*, *24*(2), 24–34. Retrieved: http://oro.open.ac.uk/17204/, December 2021.

Freeman, E., Barker, C., & Pistrang, N. (2008). Outcome online mutual support group college students with psychological problems. *Cyberpsychology & behavior, 11*(5), 591–593. Retrieved: https://doi.org/10.1089/cpb.2007.0133, November 2021.

Freitag, R. (2018). Amostras sociolinguísticas: probabilísticas ou conveniência? *Revista estudos linguagem*, *26*(2), 667-686. Retrieved: https://www.researchgate.net/publication/319186082_Documentacao_sociolinguistica_coleta_de_dados_e_etica_em_pesquisa, october, 2021.

Gonçalves, Ó. & Cruz, J. (1988). A organização, implementação serviços universitários consulta psicológica, desenvolvimento humano. *Revista Portuguesa Educação, 1*(1), 127-145. Retrieved: http://hdl.handle.net/1822/12454, november 2021.

Hanley, T. & Reynolds, D. (2009). Counseling psychology internet: Review of quantitative research into online outcomes, alliances within text-based therapy. *Counselling Psychology Review, 24*(2), 4–13.

Hysenbegasi, A., Hass, S. & Rowland, C. (2005). Impact of depression academic productivity university students. *Journal Mental Health Policy, Economics, 8*(3), 145–151.

Ito, L., Roso, M., Tiwari, S., Kendall, P. & Asbahr, F. (2008). Terapia cognitivo-comportamental fobia social. *Brazilian Journal Psychiatry*, *30*, s96-s101.

Jordaan, J.-P., Myers, R., Layton, W. & Morgan, H. (1980). Counseling psychologist: definition in 1968. In J. M. Whiteley (Ed.), *History counseling psychology* (pp. 179–195). Monterey, CA: Brooks/Cole. Retrieved: https://faculty.sites.uci.edu/whiteley/files/2018/05/historical-copy.pdf, December 2021.

Kessler, R., Foster, C., Saunders, W., & Stang, P. (1995). Social consequences psychiatric disorders, I: Educational attainment. *American Journal Psychiatry, 152*(7), 1026–1032. Retrieved: https://doi.org/10.1176/ajp.152.7.1026, October 2021.

Kessler, R., Berglund, P., Demler, O., Jin, R., Merikangas, K., & Walters, E. (2005). Lifetime prevalence age-of-onset distributions DSM-IV disorders in National Comorbidity Survey Replication. *Archives General Psychiatry*, *62*(6), 593–602. Retrieved: http://doi.org/10.1001/archpsyc.62.6.593, November 2021.

Khubchandani, J., Sharma, S., Webb, F., Wiblishauser, M., & Bowman, S. (2021). Post-lockdown depression, anxiety in USA during COVID-19 pandemic. *Journal Public Health*, *43*(2), 246-253. Retrieved: https://academic.oup.com/jpubhealth/article/43/2/246/6078709?login=false, february 2022.

Ko, H., & Kuo, F. (2009). Can blogging enhance subjective well-being through self-disclosure? *CyberPsychology & Behavior, 12*(1), 75–79. Retrieved: https://doi.org/10.1089/cpb.2008.016, November 2021.

Komiya, N., Good, G. & Sherrod, N. (2000). Emotional openness predicts college students' attitudes toward seeking psychological help. *Journal Counseling Psychology, 47*(1), 138–143. Retrieved: https://doi.org/10.1037/0022-0167.47.1.138, November 2021.

Lent, R., Taveira, M., Sheu, H., Singley, D. (2009). Social cognitive predictors academic adjustment life satisfaction Portuguese college students: a longitudinal analysis. *Journal Vocational Behavior, 74*(2), 190–198. Retrieved: https://www.sciencedirect.com/science/article/abs/pii/S0001879108001310, February 2022.

Le Gallès, P. (1995). Les étudiants et leurs familles: dépendance et autonomie négociée,idéal de cadre. *Galland O., Clémençon M., Le Gales P. et Oberti M., Le monde étudiants, Paris, PUF*, 165-184.4

Lopez, F., Melendez, M., Sauer, E., Berger, E. & Wyssmann, J. (1998). Internal working models, self-reported problems, help-seeking attitudes among college students. *Journal Counseling Psychology, 45*(1), 79-83. Retrieved: https://doi.org/10.1037/0022-0167.45.1.79, January de 2022.

Lucas, C., Oliveira, F., & Soares, L. (2010). "Crenças", "Porquês" e "Ses" relativos procura ajuda psicológica: caracterização preliminar numa amostra alunos universitários, *Livro atas I Congresso nacional Apoio Psicológico Ensino Superior: Modelos, Práticas - RESAPES*, U. Aveiro, 20, 21 Maio, 480-486, ISBN: 978-972-789-311-9.

Lucas, C., Santos, W., Soares, L., Baras, K. & Oliveira, F. (2018, setembro). *"ToolBox: Estudante Universitário" - Plataforma Web Interativa.* Sessão Poster 4º Congresso Ordem Psicólogos Portugueses, Braga, Portugal.

Mackenzie, C., Knox, V., Gekoski, L., & Macaulay, L. (2004). Adaptation, extension of attitudes toward seeking professional psychological help scale. *Journal Applied Social Psychology, 34*(11), 2410-2433. Retrieved: http://doi.org/10.1111/j.1559-1816.2004.tb01984.x, January 2022.

Mondardo, A. & Pedon, E. (2005). *Stress, desempenho académico estudantes universitários*. Retrieved: http://www.revistas.fw.uri.br/index.php/revistadech/article/viewFile/262/480, may 2022.

Nascimento, C., Tibana, R., Melo, G. & Prestes, J. (2015). Testes normalidade em análises estatísticas: orientação para praticantes ciências da saúde, atividade física. *Revista Mackenzie Educação Física, Esporte, 14*(2). Retrived: https://www.researchgate.net/publication/320310794, october 2021.

O'Driscoll, M., Byrne, S., McGillicuddy, A., Lambert, S. & Sahm, L. (2017). Effects mindfulness-based interventions social health care undergraduate students- systematic review literature. *Psychology, Health & Medicine*, *22*(7), 851–865.

Oliveira, C., Varela, A., Rodrigues, P., Esteves, J., Henriques, C., & Ribeiro, A. (2016). Programas prevenção para a ansiedade, depressão: avaliação perceção estudantes universitários. *Interacções, 12*(42), 96-111. Retrieved: https://doi.org/10.25755/int.11815, december 2021.

Order Portuguese Psychologists, (2018). *O Papel a Importância Psicólogos no Ensino Superior*. Gabinete Estudos OPP. Lisboa. Retrieved: https://recursos.ordemdospsicologos.pt/repositorio/estudo/o-papel-e-a-importancia-dos-psicologos-no-ensino-superior, may 2022.

Pallant, J. (2005). *SPSS survival manual: step-by-step guide using SPSS Windows*. New South Wales: Allen & Unwin.

Paul, L., & Brier, S. (2011). Friendsickness in transition to college: Precollege predictors and college adjustment correlate. *Journal Counseling & Development, 79*(1), 77–89. Retrieved: http://doi.org/10.1002/j.1556-6676.2001.tb01946.x, January 2022.

Queirós, C., Borges, E., Mosteiro, P., Abreu, M. & Baldonedo, M. (2020). Personalidade, ansiedade vulnerabilidade ao burnout em enfermeiros: estudo comparativo Portugal/Espanha. *Revista ROL Enfermeria,* 43,1, Suplemento Digital.

Reason, R., Terenzini, P., Domingo, J. (2006). First things first: Developing academic competence in first-year college. *Research Higher Education*, 47(2), 149–175.

Reavley, N. & Jorm, F. (2010). Prevention and early intervention to improve mental health higher education students: Review. *Early intervention psychiatry, 4*(2), 132-142. Retrieved: https://doi.org/10.1111/j.1751-7893.2010.00167.x, January 2022.

RESAPES, (2002). *A situação Serviços Aconselhamento Psicológico Ensino Superior Portugal* (1-3). Lisboa. Retrieved: http://resapes.pt/dossiers/, may 2022.

RESAPES, (2021). *Impacto confinamento nos Serviços de Apoio Psicológico Ensino Superior Pandemia COVID-19*. Lisboa. Retrieved http://resapes.pt/dossiers/ may 2022.

Roy, H., & Gillett, T. (2008). E-mail: A new technique for forming a therapeutic alliance with high-risk young people failing to engage with mental health services? Case study. *Clinical Child Psychology Psychiatry*,13(1),95–103. Retrieved: https://doi.org/10.1177/1359104507086344, November 2021.

Santana, M., Gonçalves, M., Henriques, D., Velho, D., Cardoso, J., Antunes, J., & Coimbra, M. (2021). Ansiedade e depressão -estado de emergência nacional COVID-19: Unidade de Saúde Familiar. *Revista Portuguesa Medicina Geral Familiar*, *37*(6), 498-505. Retrieved: https://www.rpmgf.pt/ojs/index.php/rpmgf/article/view/13049, march 2022.

Santos, R. (2011). *Saúde mental, comportamentos de risco estudantes universitários* (Dissertação Mestrado, U. Aveiro). Retrieved: http://hdl.handle.net/10773/6738, may 2022.

Santos, W. (2018). *WebProject: toolbox estudante universitário* (Tese de Mestrado, U Madeira). Retrieved: https://digituma.uma.pt/handle/10400.13/2116 august, 2022.

Sheikhzadeh, M., Zanjani, Z., & Baari, A. (2021). Efficacy Mindfulness-Based Cognitive Therapy and Cognitive Behavioral Therapy for Anxiety, Depression, Fatigue in Cancer Patients: Randomized Clinical Trial. *Iranian Journal Psychiatry*, *16*(3), 271. Retrieved: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8452833/, June 2022.

Silva, D. (2003). O inventário estado-traço ansiedade (STAI). In Gonçalves, M., Simões, M., Almeida, L. & Machado, C. (Eds), *Avaliação Psicológica, instrumentos validados população portuguesa.* Coimbra: Quarteto Editora.

Silva, D. & Campos, R. (1998). Dados normativos do inventário de estado-traço de ansiedade–forma y (STAI-Y) de Spielberger população portuguesa. *Revista Portuguesa de Psicologia*, *33*(2), 71-89.

Silva, D., Silva, J., Rodrigues, A. & Luis, R. (2000). Estudo adaptação e estabelecimento de normas do inventário Estado-Traço ansiedade (STAI) - Forma Y de Spielberger para população militar portuguesa. *Revista de Psicologia Militar*, *12*, 8-26.

Simões, B. (2014). *Ansiedade, satisfação, bem-estar em finalistas, profissionais de psicologia início de carreira* (Tese Mestrado, U. Acores). Retrieved: https://www.proquest.com/openview/e8a961ec68ba9e64b336d42413c82d72/1?pq-origsite=gscholar&cbl=2026366&diss=y, january 2022.

Simpson, S., Richardson, L., Pietrabissa, G., Castelnuovo, G., & Reid, C. (2021). Video therapy, therapeutic alliance in COVID-19. *Clinical Psychology & Psychotherapy*, *28*(2), 409-421. Retrieved: https://onlinelibrary.wiley.com/doi/full/10.1002/cpp.2521, May 2022.

Soares, L., Baras, K., Faria, C. & Coelho, C. (2018). The Smartphone project: Digital tools promote university students' psychological well-being. *International HETL Review*, 8, 9.

Spek, V., Cuijpers, P., Nyklíček, I., Riper, H., Keyzer, J., & Pop, V. (2007). Internet-based cognitive behavior therapy symptoms of depression and anxiety: a meta-analysis. *Psychological Medicine*, *37*(3), 319–328. Retrieved: https://doi.org/10.1017/S0033291706008944, march 2022.

Spielberger, C., Gorsuch, R. & Lushene, R. (1970). Stai. *Manual for State-Trait Anxiety Inventory (Self Evaluation Questionnaire). Palo Alto California: Consulting Psychologist*, *22*, 1–24.

Stallman, H. (2010). Psychological distress university students: comparison with the general population. *Australian Psychologist*, *45*(4), 249–257. Retrieved: https://doi.org/10.1080/00050067.2010.482109, January 2022.

Suler, J. (2004). The Online Disinhibition Effect. *CyberPsychology & Behavior*, *7*(3), 321–326. Retrieved: https://doi.org/10.1089/1094931041291295, December 2021.

Tavares, J., Pereira, A., Gomes, A., Monteiro, S., Gomes, A. (2007). *Manual Psicologia Desenvolvimento Aprendizagem*. Porto: Porto Editora.

 doi:10.20944/preprints202306.0452.v1

Weis, R., Ray, S. & Cohen, T. (2021). Mindfulness is a way to cope with COVID-19-related stress and anxiety. *Counselling Psychotherapy Research*, *21*(1), 8-18. Retrieved: https://onlinelibrary.wiley.com/doi/full/10.1002/capr.12375, June 2022.