Universidade de Aveiro
Ano 2022

Carla Andreia Rocha de Oliveira Pratas

A intervenção cognitivo-comportamental mediada por uma aplicação móvel para a ansiedade social no apoio psicológico universitário

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Tese apresentada à Universidade de Aveiro para cumprimento dos requisitos necessários à obtenção do grau de Doutor em Psicologia, realizada sob a orientação científica da Doutora Anabela Pereira, Professora Associada com Agregação do Departamento de Educação e Psicologia da Universidade de Aveiro e co-orientação da Doutora Paula Vagos, Professora Auxiliar do Departamento de Psicologia e Educação da Universidade Portucalense. Modalidade alternativa à apresentação de Tese nos termos dos artigos 63.º e 64.º do Regulamento de Estudos da Universidade de Aveiro

Aos meus pais, pelo apoio incondicional.

o júri

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palavras-chave

Estudante universitário, mHealth, terapia cognitivo-comportamental, ansiedade social

resumo

Nos últimos anos os serviços de apoio psicológico no ensino superior (SAPES) têm observado um aumento significativo de estudantes com perturbação mental, apresentando também uma elevada procura por parte dos estudantes e poucos recursos económicos, humanos e materiais para dar resposta. Consequentemente, os SAPES têm apresentado frequentes e longas listas de espera, tal como uma elevada sobrecarga dos seus psicólogos. A terapia cognitivo-comportamental (TCC) é a mais utilizada neste contexto e apesar da sua eficácia se encontrar bem estabelecida para um grande número de condições psicológicas apresenta também as suas limitações, como por exemplo, a por vezes reduzida adesão dos pacientes às tarefas de casa. Particularmente na ansiedade social, o tratamento psicológico é por vezes perspectivado com vergonha e ansiedade face ao medo de serem avaliados e sujeitos a escrutínio, afirmando-se como uma barreira ao tratamento. As intervenções mediadas por dispositivos móveis têm sido referidas na literatura como uma promissora solução tecnológica face a estas limitações, apresentado inúmeras vantagens. O actual projeto propôs-se assim a conceptualizar, desenvolver e avaliar uma intervenção cognitivo-comportamental combinada com um dispositivo móvel para estudantes com ansiedade social.

Para atingir os nossos objetivos realizamos vários estudos, a revisão da literatura indicou-nos que as intervenções psicológicas assistidas por dispositivos móveis são cada vez mais frequentes e a sua eficácia na redução de sintomatologia psicopatológica (e.g. stress, ansiedade e depressão), em estudantes universitários, tem sido demonstrada. Através de um estudo descritivo verificamos que os estudantes portugueses utilizam com frequência aplicações móveis e os estudantes em acompanhamento psicológico reportaram que esta poderia ser uma ferramenta útil e relevante, sugerindo aceitabilidade destas intervenções. Todos os estudantes identificados com ansiedade social reportaram interesse e referiram que adeririam caso a aplicação móvel existisse. As principais características numa aplicação móvel seriam a utilidade, conteúdo e privacidade, respectivamente. Os estudantes em contexto clínico deram primazia à segurança e privacidade. O desenvolvimento da aplicação envolveu uma equipa multidisciplinar, sendo que a usabilidade do primeiro protótipo foi testada e obteve resultados de usabilidade acima da média, no entanto, alguns módulos indicavam serem pouco intuitivos e de difícil compreensão. Por conseguinte, incluímos um especialista em design para optimizar a aplicação móvel ao nível do design interactivo. Em geral, obtivemos resultados de usabilidade superiores, com indicação de elevada satisfação com a aplicação móvel. Com o actual projeto concluímos que os estudantes parecem aceitar e aderir à aplicação móvel desenvolvida, indicando que as intervenções combinadas poderão se revelar uma solução promissora para a integração nos SAPES.

keywords College student, mHealth, cognitive-behavioral therapy, social anxiety

abstract

In recent years, psychological support services in higher education (SAPES) observed a significant increase in students with mental disorders, such as a high demand from students and few economic, human and material resources to respond. Consequently, the SAPES have had frequent and long waiting lists, as well as a therapist caseload. Cognitive-behavioral therapy (CBT) is the most used therapy in this context and despite its efficacy being well established for a large number of psychological conditions, it also has its limitations, such as the sometimes reduced adherence of patients to homework assignments. Particularly in social anxiety, psychological treatment sometimes elicits shame and anxiety due to the fear of being evaluated and subjected to scrutiny, asserting itself as a barrier to treatment. Interventions mediated by mobile devices have been suggested by the scientific literature as a promising technological solution to respond to these limitations, with numerous advantages. Thus, the current project proposed to conceptualize, develop and evaluate a cognitive-behavioral intervention combined with a mobile device for students with social anxiety.

To achieve our goals, we carried out several studies, the literature review indicated that psychological interventions assisted by mobile devices are increasingly frequent and their effectiveness in reducing psychopathological symptoms (eg stress, anxiety and depression) in university students has been demonstrated. Through a descriptive study, we verified that Portuguese students frequently use mobile applications and students undergoing psychological counseling reported that this could be a useful and relevant tool, suggesting acceptability of these interventions. All students identified with social anxiety reported interest and stated that they would join if the mobile application existed. The main features considered for a mobile application would be usefulness, content and privacy, respectively. Students in a clinical setting prioritized privacy and security. The development of the application involved a multidisciplinary team and the usability of the first prototype was tested and obtained usability results above average, however, some modules indicated that they were not very intuitive and difficult to understand. Therefore, we have included an interactive design specialist to optimize the mobile application to enhance interactive design. In general, we obtained superior usability results, with an indication of high satisfaction with the mobile application. With the current project we conclude that students seem to accept and adhere to the mobile application developed, indicating that the combined interventions could prove to be a promising solution for SAPES integration.

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Lista de Siglas

ACT – Terapia da Aceitação e Compromisso

APA – *American Psychological Association*

BIT – *Behavioral Intervention Technology*

DeCA – Departamento de Comunicação e Arte

DETI – Departamento de Eletrónica, Telecomunicações e Informática

iCBT – *Internet Cognitive-Behavioral Therapy*

IES – Instituições do Ensino Superior

IEETA – Instituto de Engenharia Electrónica e Telemática de Aveiro

OPP – Ordem dos Psicólogos Portugueses

RESAPES – Rede de Serviços de Apoio Psicológico no Ensino Superior

SAPES – Serviços de Apoio Psicológico do Ensino Superior

TCC – Terapia Cognitivo-Comportamental

TC – Terapia Cognitiva

PARTE 1: INTRODUÇÃO

CAPÍTULO 1 – O APOIO PSICOLÓGICO NO ENSINO SUPERIOR

1 O estudante do ensino superior

Características desenvolvimentais

O jovem adulto corresponde a uma fase do desenvolvimento de mudanças significativas a nível social e emocional. Vários autores contribuíram para o estudo do jovem adulto, como por exemplo, Erikson (1950, 1968), Keniston (1965, 1971) e Levinson (1978). No seguimento dos estudos anteriores, Arnett (2000) propôs a designação de "adultez emergente" para caracterizar o período de desenvolvimento de jovens entre os 18 e os 24 anos, sensivelmente. Uma das características deste período é a exploração da identidade principalmente nos domínios familiares e profissionais, o que faz com que esta fase seja dedicada à construção de um projecto de vida adulta. Outras características que marcam este período de transição são a instabilidade a nível afectivo e profissional, o auto-focus, a vivência do sentimento "in-between" (nem são adolescentes nem adultos) e a percepção de inúmeras possibilidades, relacionada com o optimismo em relação ao futuro.

Em 2014, Arnett considerou que devido a significativas mudanças sociais e culturais, este período de transição para a adultez prolongou-se consideravelmente e estendeu-o até aos 29 anos. Estas mudanças sociais referem-se, por exemplo, à frequência prolongada no ensino superior que contribui significativamente para o alargamento deste período desenvolvimental adiando, por exemplo, a transição para o casamento e a parentalidade (Monteiro, Tavares e Pereira, 2009). Para Arnett (2014) uma das principais diferenças entre os adultos emergentes e os jovens adultos é o facto de, os primeiros, ainda se encontrarem num período de grande instabilidade a nível afectivo e profissional. É importante que os profissionais de saúde mental reconheçam esta diferença para que estes adultos emergentes não sejam "confundidos" nem com adolescentes, nem com jovens adultos, em que já existe alguma estabilidade afectiva e profissional.

Por conseguinte, se atendermos ao período etário estabelecido por Arnett (2014), a grande maioria dos estudantes universitários são adultos emergentes, caracterizados por

esta exploração da identidade e instabilidade, com implicações próprias para a saúde mental. Por este motivo, e devido a algumas destas características, é comum haver uma elevada prevalência de perturbações do humor e ansiedade entres os adultos emergentes.

Desafios de saúde mental

O aumento exponencial de jovens a frequentarem o ensino superior nas últimas décadas levou a um acrescido interesse pelo estudo do jovem adulto enquanto estudante do ensino superior. A maioria dos estudantes universitários ingressa no ensino superior, pela primeira vez, aos 18 ou 19 anos; em 2012 a idade média de um estudante português do ensino superior era de 22 anos (PORDATA), situando-o neste período de desenvolvimento da adultez emergente caracterizado como já referido pela exploração, instabilidade, auto-focus, entre outros.

A fase de desenvolvimento correspondente ao jovem adulto é particularmente vulnerável para o despoletar de várias perturbações mentais. De acordo com Kessler et al. (2007) o aparecimento das perturbações mentais geralmente ocorre na infância ou adolescência, apesar de o tratamento apenas ocorrer vários anos depois. Uma recente meta-análise (Solmi et al., 2021) com 192 estudos epidemiológicos verificou que a idade média para o aparecimento das perturbações mentais, em geral, é de 14,5 anos; e a proporção de indivíduos com início de perturbação mental antes dos 14, 18 e 25 anos é, respectivamente, 34,6%, 48,4% e 62,5%. No caso das perturbações da ansiedade e relacionadas com o medo a idade média de início destas perturbações é de 5,5 anos.

Por conseguinte, é frequente encontrarmos na literatura científica vários estudos a reportaram a elevada prevalência de perturbações mentais, entre estudantes universitários (Auerbach et al., 2018; Eisenberg et al., 2007), particularmente nos últimos anos, onde se observou também um maior nível de severidade e complexidade dos diagnósticos (Lipson et al., 2019; Watkins et al., 2012). No estudo de Auerbach et al. (2018) a perturbação depressiva major foi a perturbação mais comum em estudantes universitários, em todos os países examinados, logo de seguida encontra-se a perturbação da ansiedade generalizada.

2 Os Serviços de Apoio Psicológico no Ensino Superior (SAPES)

Os SAPES surgiram face ao aumento significativo de estudantes no ensino superior, entre as décadas de 40 e 60, e uma preocupação crescente com o bem-estar psicossocial, saúde e desenvolvimento destes estudantes (RESAPES, 2002).

Em Portugal, Gonçalves e Cruz (1988) propuseram uma organização e implementação destes serviços no ensino superior, apontando para uma necessidade de prevenir e remediar os problemas que possam surgir no decorrer da experiência universitária, tal como de optimizar as possibilidades de crescimento que o processo educativo poderá proporcionar. Assim, os autores indicaram três tipos de serviço face ao apoio psicológico no ensino superior: remediativos, preventivos e desenvolvimentais. Os serviços remediativos incluem, por exemplo, psicoterapia breve ou prolongada; linhas telefónicas, para situações graves ou urgentes, e encaminhamento de estudantes para outros serviços da comunidade. Quanto aos serviços preventivos referem-se à criação de programas de desenvolvimento interpessoal; recepção, acolhimento e promoção da integração de novos alunos; orientação vocacional e aconselhamento de carreira para alunos prestes a concluir os estudos e ingressar no mercado de trabalho. Por fim, como exemplo de serviços desenvolvimentais, encontra-se os programas de desenvolvimento de competências relacionais e sociais; o treino da assertividade e desenvolvimento do auto-conhecimento, entre outros.

Assim estes serviços de apoio organizam-se em torno de, por um lado, as intervenções clínicas mais tradicionais e outras intervenções não-clínicas onde se incluem, por exemplo, os programas de mentorado e de tutorado, que procuram promover as competências psicossociais dos estudantes (Gonçalves, 2012). Com o objectivo de aproximar os coordenadores destes serviços promovendo uma troca de experiências, apoio mútuo, cooperação na formação, cooperação científica, entre outros foi criada, em 2000, a Rede de Serviços de Aconselhamento Psicológico no Ensino Superior (RESAPES) que agrega actualmente vários SAPES a nível nacional.

Recentemente a Ordem dos Psicólogos Portugueses (OPP) resumiu as principais ações que um psicólogo pode desempenhar no âmbito destes serviços. Esta considera que serviços de apoio psicológico do ensino superior têm como objectivos gerais promover o bem-estar e a saúde psicológica, as capacidades e as competências dos

estudantes, pessoal docente e não docente, e das instituições do Ensino Superior, concebendo assim contextos facilitadores de aprendizagem e desenvolvimento de competências sociais, pessoais e profissionais (OPP, 2018). A tabela 1 resume as principais acções que um psicólogo numa Instituição do Ensino Superior (IES) pode executar de acordo com uma revisão de dados e literatura científica elaborada pelo Gabinete de Estudos da Ordem dos Psicólogos Portugueses.

Tabela 1 - As Funções do Psicólogo e dos Serviços de Apoio Psicológico no Ensino Superior

Público-alvo	**Acções**
Estudantes; principal objectivo: promoção do sucesso académico (prevenção do insucesso)	Aconselhamento psicológico
	Desenvolvimento de competências cognitivas, académicas e profissionais
	Desenvolvimento de competências sociais e de vida
	Facilitação da adaptação e integração psicossocial dos novos estudantes
	Prevenção e promoção da saúde psicológica
	Aconselhamento vocacional e profissional, de gestão de carreira e na transição para o mundo de trabalho
	Promoção da educação inclusiva, equitativa e de qualidade para todos.
	Avaliação, prevenção e intervenção nos riscos psicossociais
	Intervenção em situações de crise e emergência.
Outros elementos da comunidade educativa (e.g. docentes, funcionários etc.)	Apoio psicológico ao pessoal docente e não docente
	Consultadoria colaborativa

	Formação psicopedagógica contínua
	Colaboração no processo de auto-avaliação e monitorização dos processos de ensino-aprendizagem
	Colaboração na análise da estrutura curricular, dos projectos pedagógicos e do funcionamento dos cursos
Gestão, políticas e práticas das instituições do Ensino Superior	Coordenação e gestão de projectos
	Participação nos processos de recrutamento e selecção de pessoal docente e não-docente
	Consultadoria colaborativa no planeamento estratégico, desenvolvimento, implementação e avaliação de políticas e projectos educativos
	Articulação com outros serviços e instituições da comunidade

Nota. Retirado de "O Papel e a Importância dos Psicólogos no Ensino Superior" de Ordem dos Psicólogos Portugueses (2018).

As intervenções clínicas, particularmente, o apoio psicológico individual continua a ser o apoio mais frequentemente prestado no âmbito destes serviços (Gonçalves, 2012). Na maioria dos países europeus, a intervenção cognitivo-comportamental é a intervenção dominante nos serviços de aconselhamento universitários (Rückert, 2015). Efetivamente, as abordagens cognitivo-comportamentais são as intervenções mais investigadas e eficazes no tratamento das perturbações alimentares, da ansiedade e depressão entre estudantes universitários (Barnett et al., 2021). Como já referido, a nível internacional, surgiram vários gabinetes de apoio psicológico universitários com o objectivo de intervir junto destes estudantes; no entanto, ao longo dos anos tem-se observado um aumento contínuo da procura destes serviços e uma ausência significativa de recursos para responder à mesma (Auerbach et al., 2018; Johnson & Kalkbrenner, 2017; Shaw et al., 2017). A nível nacional, apesar da crescente expansão destes serviços, alguns ainda se

debatem com dificuldades a nível económico, logístico e de recursos humanos (RESAPES, 2002).

A título de exemplo, o estudo de Lipson et al. (2019) reportou um aumento significativo de estudantes que procuram os serviços de apoio psicológico universitários (de 19% em 2007 para 34% em 2017), em universidades norte-americanas, e identificou como potenciais factores explicativos o aumento contínuo da prevalência de perturbações mentais em estudantes e a redução do estigma, ao longo do tempo, associado à doença mental. Num estudo qualitativo de Watkins et al. (2012) foram apontados vários motivos para esta elevada procura: o aumento do nível de severidade e complexidade dos diagnósticos; as diferenças psicossociais nos estudantes desta geração (os "*millennials*"); o facto de já virem referenciados para tratamento antes de iniciarem o ensino superior e a redução do estigma associado à doença mental. Esta realidade tem sido tão reportada e saliente que alguns autores já se referiram a este problema como uma "crise de saúde mental no campus" (Xiau et al., 2017).

CAPÍTULO 2 – TERAPIA COGNITIVO-COMPORTAMENTAL E ANSIEDADE SOCIAL

3 A Terapia Cognitivo-Comportamental (TCC)

A TCC surgiu entre a década de 60 e 70 com Aaron T. Beck, o qual concebeu uma forma de psicoterapia para a depressão estruturada, breve e orientada para o presente. Esta terapia foi adaptada por vários investigadores para um grande número de perturbações e problemas, formatos e contextos, mudando o foco, as técnicas e a duração do tratamento; porém a base teórica permaneceu constante. Em todas as formas de TCC, o psicoterapeuta, baseia o seu tratamento numa formulação cognitiva do paciente. O modelo cognitivo, em geral, propõe que o pensamento disfuncional é comum a várias perturbações mentais e quando aprendemos a avaliar os nossos pensamentos de uma forma mais realista e adaptativa observa-se a uma melhoria do nosso comportamento e estado emocional. São mais de 2000 estudos que demonstraram a eficácia da TCC num grande número de perturbações mentais e problemas médicos com uma componente psicológica. Incluindo estudos em que a TCC foi implementada através das tecnologias de informação e comunicação (computadores, internet, telemóveis etc.) (Beck, 2011, 2021).

Os princípios da TCC

Apesar de a terapia variar consideravelmente entre pacientes tendo em conta a natureza das suas dificuldades, nível intelectual e desenvolvimental, género, cultura, entre outros, os princípios básicos da TCC aplicam-se a todos os pacientes. De acordo com (Beck, 2021), a TCC:

1. Envolve um plano de tratamento baseado numa conceptualização cognitiva em constante evolução;
2. Requer uma aliança terapêutica sólida;
3. Monitoriza continuamente o progresso do paciente;
4. Adapta-se à cultura e ajusta o tratamento ao indivíduo;
5. Enfatiza o positivo;
6. Enfatiza a colaboração e participação ativa;
7. É aspiracional, baseada em valores e orientada para os objetivos;

8. Inicialmente enfatiza o presente;
9. É educativa;
10. É sensível ao tempo;
11. Tem sessões estruturadas;
12. Utiliza a descoberta guiada e ensina o cliente a responder às suas disfunções cognitivas;
13. Inclui um plano de acção (tarefas de casa);
14. Utiliza uma variedade de técnicas para mudar o pensamento, humor e comportamento.

De todos os princípios, a autora refere que uma sólida relação terapêutica é a base do tratamento. As técnicas subjacentes à TCC têm como objetivo intervir nas cognições, comportamentos, humor e activação fisiológica do paciente. Existem várias técnicas, como por exemplo, o questionamento socrático, treino de competências e resolução de problemas, relaxamento, mindfulness, exposição, entre outras.

4 Ansiedade social

4.1 Critérios de diagnóstico

A entidade diagnóstica da ansiedade social foi caracterizada pela primeira vez em 1980 com a publicação do *Diagnostic and Statistical Manual for Mental Disorders* (DSM–III) pela *American Psychiatric Association* (APA). Recentemente foi publicada a 5ª edição deste manual apresentando várias alterações nos critérios de diagnóstico da ansiedade social com implicações clínicas e conceptuais importantes (Heimberg et al., 2014). Os atuais critérios diagnósticos consideram a ansiedade social como medo ou ansiedade excessiva, em relação a uma ou mais situações sociais, em que o indivíduo é exposto ao possível escrutínio de outros (critério A); o indivíduo teme atuar ou apresentar sintomas de ansiedade de maneira a que possa ser avaliado negativamente (critério B); as situações provocam frequentemente medo ou ansiedade (critério C); as situações sociais são evitadas ou suportadas com intenso medo ou ansiedade (critério D); o medo ou ansiedade é desproporcional à ameaça atual apresentada pela situação social e contexto sociocultural (critério E). O medo, ansiedade e evitamento é persistente, tipicamente com

a duração de seis meses ou mais (critério F); causa significativo *distress* clínico ou incapacidade em áreas importantes de funcionamento social, ocupacional ou outras (critério G); não é atribuído aos efeitos fisiológicos de uma substância (e.g. abuso de drogas ou medicação) ou outra condição médica (critério H); não pode ser melhor explicado pelos sintomas de outra perturbação mental (critério I); se está presente uma condição médica, o medo, ansiedade e evitamento não podem estar claramente relacionados com esta condição ou têm de ser excessivos (critério J) (American Psychological Association, 2013).

De acordo com Heimberg et al. (2014) a 5ª edição realizou várias alterações, nomeadamente, no que se refere ao nome primário da perturbação (ansiedade social, eliminando o termo fobia social); o enfâse no medo da avaliação negativa; na importância do contexto sociocultural ao determinar se uma resposta ansiosa a uma situação social é desproporcional à ameaça real, e por fim a forma como apresentamos as variações da ansiedade social, substituindo o especificador "generalizada" para "performance".

4.2 Prevalência e etiologia

Na Europa a prevalência (12 meses) é de 2.3% (American Psychological Association, 2013). Um estudo realizado por Stein et al. (2017), analisando uma amostra de países de elevado, médio e baixo rendimento, observou em Portugal uma prevalência de vida da ansiedade social de 4.7% e a prevalência 12 meses de 3.1%, é uma das mais elevadas logo a seguir à Irlanda do Norte (6.0%), Austrália (8.5%), Nova Zelândia (9.5%), e Estados Unidos da América (12.1%). O mesmo estudo observou uma maior prevalência da ansiedade social em países de elevado rendimento (5.5%) comparativamente a países de médio (2.9%) e baixo rendimento (1.6%). A prevalência tende a diminuir com a idade e as mulheres tendem a apresentar mais casos de ansiedade social do que homens, esta diferença é particularmente pronunciada na adolescência e em jovens adultos (American Psychological Association, 2013).

A ansiedade social surge tipicamente, pela primeira vez, na infância ou durante a pré-adolescência. Por vezes surge em crianças com história de inibição social e timidez, podendo se desenvolver lentamente e insidiosamente ou após um evento humilhante e stressante. Os factores de risco para a ansiedade social podem estar relacionados com o

temperamento, sendo que a inibição comportamental e o medo da avaliação negativa predispõe o indivíduo para o desenvolvimento da ansiedade social. Factores ambientais como trauma e abuso infantil também se apresentam como factores de risco. A genética também parece ter alguma influência no desenvolvimento desta perturbação, até porque alguns traços como a inibição comportamental, timidez e o neuroticismo têm demonstrado possuir uma base genética (American Psychological Association, 2013).

O modelo etiológico actualizado de Spence e Rapee (2016) propõe uma série de factores de risco e protecção em constante interacção que influenciam o desenvolvimento e manutenção da ansiedade social. O modelo indica que existe uma complexa interacção entre factores intra-individuais (genéticos; de influência biológica; temperamento; cognitivos e de competências sociais) e ambientais ou extrínsecos (relações entre pares e o contexto escolar; influências parentais; trauma, abuso e experiencias sociais adversas; influências culturais). Por exemplo, o impacto da inibição comportamental ou risco genético no desenvolvimento futuro de ansiedade social pode ser influenciado pelo estilo parental.

4.3 Modelos teóricos: os modelos cognitivo-comportamentais

Desde 1980, quando a ansiedade social foi formalmente reconhecida, que vários investigadores se dedicaram ao estudo e compreensão desta perturbação, desenvolvendo vários modelos teóricos com o objectivo de contribuir para melhores abordagens terapêuticas.

Existem vários modelos teóricos, desde os modelos cognitivo-comportamentais aos modelos evolucionários e psicobiológicos. A maioria dos modelos cognitivo-comportamentais são amplamente conhecidos e estão ilustrados na Tabela 2. No âmbito deste capítulo serão descritos em maior detalhe os modelos de Clark e Wells (1995) e Rapee e Heimberg (1997), por serem os modelos mais citados e aplicados na literatura (Weeks, 2014) e os seleccionados para a fundamentação do actual projeto.

Tabela 2 - Os modelos cognitivo-comportamentais para a ansiedade social

Modelos cognitivo-comportamentais para a ansiedade social
Modelo Cognitivo de Clark e Wells (1995)

Modelo Cognitivo-Comportamental de Rapee e Heimberg (1997)

Modelo dos factores cognitivos que mantêm a Ansiedade Social de Hoffman (2007)

"*The proposed Core Fear*" de Moscovitch (2009)

A importância do *Self* na Compreensão da Ansiedade Social de Stopa (2009)

Nota. adaptado de Weeks (2014) em "*The Wiley Blackwell Handbook of Social Anxiety Disorder*"

O modelo cognitivo de Clark e Wells (1995; 2001)

Este modelo defende que a ansiedade social resulta de uma interacção entre predisposições comportamentais inatas e experiências prévias, levando a que o indivíduo encare situações sociais como perigosas. Uma característica central deste modelo é o forte desejo de transmitir aos outros uma imagem favorável de si mesmo e insegurança na sua capacidade de o fazer. Estas crenças contribuem para que o indivíduo com ansiedade social sinta que está em constante perigo de se comportar de forma inadequada ou inaceitável e esse comportamento terá consequências catastróficas na perda de estatuto, de valor e rejeição.

O actual modelo descreve o que acontece antes, depois e como um indivíduo com ansiedade social entra numa situação social. Assim, com base em experiências prévias, estes indivíduos desenvolvem uma série de suposições sobre eles próprios e o seu contexto social. Estas suposições podem ser agrupadas em três categorias:

- **Padrões excessivamente elevados de desempenho social**: "não posso mostrar quaisquer sinais de fraqueza"; "tenho sempre de parecer inteligente";
- **Crenças condicionadas** face às consequências de atuarmos de determinada maneira: "se discordar de alguém, eles vão pensar que sou estúpido e vão rejeitar-me"; "se as pessoas me conhecerem, não vão gostar de mim".
- **Crenças incondicionais** face a si próprio: "sou aborrecido"; "sou estranho"; "sou estúpido".

Tais suposições levam a que os indivíduos encarem as situações sociais como perigosas, sentindo que nunca irão conseguir atingir os níveis de desempenho social desejado e que interpretem pistas sociais frequentemente ambíguas e benignas como avaliações negativas por parte dos outros.

Durante uma situação social estes indivíduos executam um processamento de si próprio como objecto social; adoptam comportamentos de segurança; desenvolvem vários sintomas cognitivos e somáticos; e há um enviesamento no processamento de pistas sociais externa. Antes de um evento social é comum estes indivíduos já entrarem ansiosos (ansiedade antecipatória); tal acontece pois antes de entrarem numa situação social tendem a pensar e a rever o que poderá acontecer durante a mesma. Estes pensamentos são frequentemente dominados por recordações de acontecimentos falhados, imagens negativas deles próprios e outras previsões de baixo desempenho e rejeição. Face a este processo ruminativo, os ansiosos sociais tendem a evitar a situação ou participar nela em modo de atenção auto-focada, com expectativa de falhar e estar menos atentos a sinais de aceitação social por parte dos outros.

Após o evento social, é também comum o indivíduo fazer uma revisão detalhada do mesmo, onde predomina a ansiedade e uma percepção negativa de si próprio. Por conseguinte, estes acontecimentos ficam fortemente enraizados na memória e são frequentemente percepcionados como muito mais negativos do que poderão ter sido. Outro aspecto deste processo ruminativo é a recordação de eventos sociais falhados, acrescentando mais um à lista. E assim, uma experiência provavelmente neutra do ponto de vista de um observador serve para reforçar as crenças do indivíduo relativas à sua inaptidão social. Com base neste modelo, os autores defendem que o principal objectivo do tratamento deve ser a modificação das auto-avaliações e crenças disfuncionais.

O Modelo cognitivo-comportamental de Rapee e Heimberg (1997; 2010)

Este modelo baseia-se no pressuposto de que a ansiedade, numa situação social, é uma resposta a uma ameaça (percebida pelo indivíduo). O modelo descreve assim os processos cognitivos que influenciam a avaliação destas ameaças.

O modelo propõe que o indivíduo com ansiedade social, face a uma situação social, forma uma representação mental externa de si própria, do ponto de vista de uma audiência. O conceito de audiência no presente modelo é abrangente, pode ser considerada uma audiência propriamente dita, como qualquer pessoa que se apresente como uma ameaça na mente de um ansioso social e passível de o avaliar negativamente. As características da audiência (ex. importância, atractividade) e da situação (ex. grau de

anonimato) influenciam os níveis de ansiedade. Em resposta a esta percepção da audiência, o indivíduo forma uma representação mental de como ele é visto pela mesma. Esta representação pode ser uma imagem ou uma vaga sensação de como este se parece a outros; na sua essência envolve ver-se a si próprio pelos olhos de uma pessoa ou um grupo de pessoas. Acredita-se que muito provavelmente esta representação é distorcida nos ansiosos sociais e provém de múltiplas fontes (espelhos, fotografias, dificuldades experienciadas em situações sociais). Estas fontes criam uma imagem base que é modificada continuamente por fontes internas e externas ao longo de situações sociais difíceis.

Para além do mais, considera-se que os ansiosos sociais tendem a esgotar os seus recursos atencionais na monitorização do ambiente à sua volta (em busca de evidência de avaliação negativa), da sua aparência e comportamento (em busca de falhas que podem levar a uma avaliação negativa) e no envolvimento na tarefa social a decorrer. Tudo isto, em simultâneo, enquanto dura a tarefa social. Por conseguinte, tarefas sociais mais complexas tendem a resultar em baixos níveis de desempenho. Estes indivíduos também consideram que a audiência exige níveis elevados de desempenho social, e quanto mais eles acreditam que o seu desempenho e aparência estão aquém destes níveis de exigência, mais acreditam que vão ser alvo de uma avaliação negativa. Por conseguinte, desenvolvem uma série de sintomas de ansiedade cognitivos (pensamentos negativos, diálogo interno negativo), comportamentais (também conhecidos como "comportamentos de segurança", por exemplo, ao evitar contacto visual) e físicos (corar, suar, tensão muscular etc.). Estas pistas de ansiedade internas vão depois ser usadas como fontes de informação para a representação mental do ponto de vista da audiência. O que em conjunto com as pistas externas de avaliação negativa, vão alimentar um ciclo vicioso que vai exacerbar a ansiedade e manter a ansiedade social.

Em 2010, Heimberg e colegas, incorporaram no modelo original novas descobertas relativamente aos processos que ocorriam na ansiedade social, nomeadamente relacionados com a auto-imagem negativa (*"negative self-imagery"*), medo da avaliação negativa, mas também positiva, e o processamento pós-evento na manutenção da ansiedade social.

No que se refere às principais diferenças entres os dois modelos, é concordante que eles têm mais pontos em comum do que de diferenças (Weeks, 2014). Uma destas diferenças refere-se à natureza do foco atencional que ocorre entre os ansiosos sociais. Enquanto o primeiro modelo refere que o principal enviesamento atencional acontece quando o indivíduo monitoriza pistas internas ao invés de prestar atenção às atuais reacções dos outros; o segundo modelo enfatiza que apesar de haver um aumento na atenção auto-focada com elevada ansiedade, a atenção é também direccionada externamente à procura de pistas ameaçadoras. Outra questão, que difere entre os modelos, está relacionada com a importância dada aos comportamentos de segurança: no primeiro modelo estes comportamentos são vistos como um dos principais problemas na ansiedade social; em contraste, o segundo modelo, encara estes comportamentos de segurança como sintomas comportamentais subtis de evitamento.

4.4 Terapia Cognitivo-Comportamental para a Ansiedade Social

A TCC tem sido, de longe, a terapia mais estudada e melhor estabelecida para o tratamento da ansiedade social (Weeks, 2014). Recentemente surgiram outras formas de tratamento, baseadas na TCC, para a ansiedade social como as abordagens de terceira geração (mindfulness e a terapia de aceitação e compromisso (ACT)), as terapias baseadas na internet, a exposição através da realidade virtual e a modificações do viés atencional. Inovações futuras no tratamento da ansiedade social incluem tratamento personalizado baseado em características clínicas e cognitivas e a psicoterapia combinada com novos fármacos ou dispositivos interativos (Pelissolo et al., 2019). Com base nos modelos teóricos de Clark e Wells (1995; 2001) e Heimberg e Rapee (1997; 2010), a terapia cognitivo-comportamental para a ansiedade social, tem como principais objectivos modificar as distorções cognitivas e o comportamento evitante com reestruturação cognitiva e exposição a situações temidas.

A Terapia Cognitiva (Clark, 1997) baseia-se no modelo teórico de Clark e Wells (1995) e integra várias componentes: 1) o desenvolvimento de um modelo pessoal para cada cliente com ansiedade social; 2) comportamentos de segurança e experiências de atenção auto-focada; 3) mudança no foco de atenção; 4) vídeo feedback; 5) experiências comportamentais; 6) Processamento antecipatório e pós-evento problemático; 7) desafio

de suposições/pensamentos disfuncionais (Hoffman e DiBartolo, 2010). Em suma, a TC integra a exposição e reestruturação cognitiva com enfâse significativo na eliminação de comportamentos de segurança (Weeks, 2014).

O protocolo de Hope, Heimberg e Turk (2010) é um dos mais usados no tratamento individual da ansiedade social. É baseado no modelo de Heimberg e Rapee (1997) e tem como objectivo interromper o ciclo vicioso da ansiedade social descrito neste modelo. Assim, os principais aspectos abordados no tratamento referem-se às 1) crenças negativas sobre as situações sociais e outras pessoas; 2) Crenças negativas sobre si mesmo; 3) Previsões negativas sobre os resultados das situações sociais; 4) Evitamento associado a essas mesmas previsões; 5) Foco de atenção em pistas sociais ameaçadoras durante a interacção social; 6) Avaliação negativa da situação social após a mesma.

O actual protocolo defende um total de 16 sessões de terapia individual durante 20 semanas, com um total de 50 a 60 minutos por sessão, com a excepção da primeira que deverá ser de 90 minutos. Estas sessões não incluem as sessões pré-tratamento de avaliação psicológica. A tabela 3 resume as sessões envolvidas neste protocolo. De acordo com os autores, os terapeutas devem cumprir, por ordem, as sessões de 1 a 8, sem alterar a ordem ou deixar alguma por fazer. Estas sessões são acompanhadas por um manual para o cliente que os pacientes, por norma, seguem durante o tratamento.

Tabela 3 - Resumo do protocolo de Hope, Heimberg e Turk (2010) para o tratamento individual da ansiedade social

Semanas	**Atividades**
Pré-tratamento	Entrevista e avaliação diagnóstica para determinar o tratamento adequado
1	Psicoeducação e fundamentação do tratamento
2	Psicoeducação: aprender sobre a própria ansiedade
3	Hierarquia do medo e evitamento
4	Concluir hierarquia e psicoeducação sobre etiologia da ansiedade
5 e 6	Reestruturação cognitiva

7	Primeira exposição durante a sessão
8	Segunda exposição durante a sessão
9 e 11	Continuar com exposições durante a sessão; com uma sessão dedicada à reestruturação cognitiva e planeamento mais elaborado de exposições *in vivo* como tarefas de casa
12	Reestruturação cognitiva avançada e crenças nucleares sem exposição na sessão.
	Exposições adicionais na sessão, se necessário, com uma sessão dedicada ao trabalho cognitivo mais aprofundado;
13 a 15	Planeamento de exposições *in vivo*
16	Avaliação do progresso, prevenção da recaída e conclusão do tratamento.
Pós-tratamento	Avaliação pós-tratamento e planeamento o tratamento de outros problemas que não tenham sido resolvidos.

Como podemos observar na Tabela 3, as principais técnicas da TCC para a ansiedade social são a psicoeducação, exposição e reestruturação cognitiva. Outras referem-se ao treino de competências sociais e as técnicas de relaxamento (Weeks, 2014). Apesar da existência de vários tratamentos para a ansiedade social, continuam a existir várias barreiras ao tratamento. No estudo de Olfson et al. (2000) perguntaram a indivíduos com sintomas de ansiedade social porque nunca procuraram tratamento psicológico, as três respostas mais frequentes foram: não saber onde procurar tratamento; considerarem que conseguiam resolver a situação sozinhos e serem incapazes de pagar o tratamento. Mais recentemente, e em alguns aspectos concordante com o estudo anterior, Goetter et al. (2020) identificaram várias barreiras ao tratamento da ansiedade social, nomeadamente, vergonha e estigma, as barreiras mais citadas no estudo, seguidas de questões logísticas e financeiras. À semelhança do estudo anterior os indivíduos com ansiedade social reportaram em grande número não saber onde procurar tratamento.

CAPÍTULO 3 – mHEALTH

5. mHealth: a saúde mental suportada por dispositivos móveis

5.1 Conceito

Apesar do crescente interesse e dos vários estudos desenvolvidos na área do mHealth, parece não haver ainda um consenso geral sobre a sua definição. À semelhança do eHealth é um constructo ainda difícil de operacionalizar e conceptualizar. De acordo com Cameron et al. (2017) não há uma definição clara do seu conceito e domínio, levando a que os investigadores e profissionais se foquem selectivamente em diferentes partes do todo, negligenciando a perspectiva global.

O conceito de "saúde digital" foi introduzido pela primeira vez em 2000 por Seth Frank (Frank, 2000; Guo et al., 2020). A Organização Mundial de Saúde (OMS) considerou a "saúde digital" como uma área de conhecimento e prática associada a qualquer aspeto de adoção de tecnologias digitais com o objectivo de melhorar a saúde, desde a sua criação até à sua aplicação (WHO EB142/20 of 2017). Esta refere que a saúde digital inclui dois conceitos: o ehealth ou saúde electrónica, definida como uma tecnologia de informação e comunicação (TIC) para a saúde e áreas relacionadas com a saúde, segura e custo-efetiva; e o mHealth ou saúde móvel, uma componente do ehealth, definida como a prática de saúde pública e médica, suportada por dispositivos móveis, tais como telemóveis, dispositivos de monitorização do paciente, PDAs e outros dispositivos sem fios (WHO, 2011). A literatura científica, da área da Psicologia, é concordante com a relação entre os conceitos de eHealth e mHealth, considerando o último uma subárea do eHealth (Lindhiem et al., 2015). De acordo com Donker et al. (2013) mHealth significa "saúde móvel" ou "saúde mental suportada por dispositivos móveis". É uma intervenção psicológica ou uma intervenção associada à saúde mental, disponibilizada através de um dispositivo móvel (Clough e Casey, 2015). Estes dispositivos móveis incluem os *smartphones*, *tablets*, *PDA*s e mais recentemente os dispositivos "*wearable*" (Lui et al., 2017). Particularmente, os *smartphones* são essencialmente um telemóvel com uma grande capacidade de computação que permite ao utilizador o acesso à internet e às aplicações móveis com a vantagem da leveza e da portabilidade (Luxton et al., 2011).

Mais especificamente no domínio da Psicologia, surgiu ainda o conceito de *Behavioral Intervention Technologies* (BIT) designadas por intervenções psicológicas e comportamentais que usam uma grande variedade de tecnologias com o intuito de mudar comportamentos e cognições relacionadas com a saúde, saúde mental e bem-estar (Burns e Mohr, 2013; Mohr et al., 2014). Estas tecnologias têm sido usadas para implementar estratégias de mudança, nomeadamente, auto-monitorização, psicoeducação, estabelecimento de objectivos, treino de competências, entre outros, através de diversas tecnologias como telefones, videoconferências, intervenções baseadas na internet, intervenções suportadas por dispositivos móveis (mHealth), sensores, redes sociais, realidade virtual e gamificação (Mohr et al., 2013). As BIT são consideradas uma subárea das intervenções eHealth e mHealth, pois incluem apenas e especificamente estratégias de intervenção psicológica e comportamental disponibilizadas através da tecnologia para a saúde física e mental (Schueller et al., 2013).

5.2 As aplicações móveis para a saúde mental

As aplicações móveis são *softwares* discretos e independentes que se encontram em vários dispositivos móveis, como por exemplo, os *smartphones* e os *tablets* (Lui et al., 2017). Estas apresentam uma miríade de características vantajosas, como por exemplo, proximidade do utilizador; *design* visualmente apelativo; capacidades de reproduzir vídeo e áudio; capacidades de texto sem restrições; acesso sem internet; monitorização do nosso progresso onde quisermos e quando quisermos, entre outros (Bricker et al., 2014). Também através de sensores que integram algumas aplicações é possível registar respostas fisiológicas, movimento e localização dos utilizadores (Morris e Aguilera, 2012).

Neste sentido, importa referir que os dispositivos móveis permitem dois tipos de recolha de informação: ativa e passiva. A recolhe de informação ativa é realizada através de questionários, como por exemplo para a monitorização ativa de sintomas ou avaliação momentânea ecológica, que pode ser completada espontaneamente pelo utilizador ou em resposta a uma notificação e armazenada com indicador de tempo. A recolha passiva e não intrusiva de informação através de sensores, é uma das características mais inovadoras destes dispositivos. A mais básica e recente tecnologia de sensores inclui acelerómetros, giroscópios e GPS que permitem, por exemplo, detectar movimento e

localização. Os sensores já integrados nos *smartphones* permitem também monitorizar vários estímulos como o batimento cardíaco, variabilidade da frequência cardíaca e a resposta galvânica da pele, através de sensores externos (Aguilera, 2015).

Mais recentemente também tem sido usado o tom de voz (através do microfone) e expressão facial (através da câmara). Esta forma de recolher informação automaticamente permite a redução do esforço que um paciente tipicamente tem com a recolha de informação ativa e em simultâneo permite a recolha de novos marcadores digitais do comportamento. Contudo, esta recolha de informação é muito mais complexa e densa e frequentemente requer novas técnicas da ciência dos dados, como a inteligência artificial e *machine learning*, para combinar de uma forma significativa e utilizar *big data* para informar os cuidados de saúde mental (Torous et al., 2021). Todas as vantagens dos dispositivos móveis, como por exemplo, a popularidade e proximidade com os utilizadores, tornam estes dispositivos ferramentas promissoras para a promoção da saúde mental e implementação de intervenções (Klasnja e Pratt, 2012).

Implementadas em contexto clínico

Cada vez mais clínicos e académicos têm vindo a ganhar interesse em integrar os *smartphones* como um meio de implementação de intervenções comportamentais para a saúde (Dennison et al., 2013). Vários autores consideram que os dispositivos móveis possuem um grande potencial para melhorar os serviços psicológicos e para aplicar tratamentos psicossociais de forma cada vez mais inovadora (Heron e Smyth, 2010; Morris e Aguilera, 2012). Segundo Morris e Aguilera (2012) os clínicos podem usar os dispositivos móveis de várias formas, o seu uso vai permitir estruturar intervenções mais facilmente e enriquecer a avaliação com informação contextual do funcionamento na vida diária. Na prática clínica, estes dispositivos podem aumentar a interação/ envolvimento do paciente com a terapia e a adesão terapêutica entre sessões (Clough & Casey, 2011). Podem ser vantajosos em termos de custo, de uma gestão mais eficaz do tempo e recursos do terapeuta, de melhores resultados terapêuticos e para os pacientes que possuem acesso limitado aos serviços, pode implicar uma redução das visitas durante o tratamento (Clough & Casey, 2015). As aplicações podem se verificar como uma ferramenta eficaz na intervenção, em consulta, tal como no recolher de informação fora

da consulta (Amichai-Hamburger et al., 2014). Em geral, considera-se que estas ferramentas podem reduzir várias barreiras associadas aos serviços de saúde mental (Lattie et al., 2019).

A eficácia destas intervenções tem sido demonstrada em várias populações, inclusive estudantes universitários. Efectivamente os estudantes são conhecidos por serem grandes consumidores de tecnologia (Lattie et al., 2019). Várias aplicações móveis, para uma grande variedade de perturbações, foram desenvolvidas para estudantes universitários. A título de exemplo referimos a *StudiCare Stress* direccionada para o *stress* e baseada na terapia cognitivo-comportamental (TCC) (Harrer et al., 2018); a *ACT daily* para a ansiedade e depressão, baseada na terapia da aceitação e compromisso (ACT) (Haeger et al., 2020) e a *TAO – therapist assisted online* para a ansiedade e também baseada na TCC (Benton et al., 2016). Estas aplicações demonstraram-se eficazes na redução significativa de sintomatologia relacionada com o *stress*, ansiedade e depressão.

Baseadas na terapia cognitivo-comportamental (TCC)

A TCC tem sido a terapia mais amplamente estudada e a sua eficácia avaliada em várias perturbações mentais, o mesmo se aplica às intervenções cognitivo-comportamentais baseadas na internet, frequentemente denominadas de *iCBT* (*internet cognitive-behavioral therapy*). Estas intervenções têm-se revelado eficazes em várias perturbações mentais e, em geral, as iCBT guiadas têm-se demonstrado mais eficazes que as iCBT auto-guiadas (Andersson et al., 2019). Efetivamente a estrutura, a manualização, a natureza psicoeducativa, e o princípio de nós sermos o nosso próprio psicólogo, torna a TCC uma óptima candidata às intervenções com recurso à tecnologia (Ritterband et al., 2006). De acordo com Stolz et al. (2018), os tratamentos cognitivo-comportamentais através da internet podem ser implementados através de dispositivos móveis, apresentando uma maior vantagem em relação à internet ao se integrarem mais facilmente no dia-a-dia do indivíduo.

O estudo de Rathbone et al. (2017) teve como objectivo a revisão sistemática de aplicações móveis baseadas na terapia cognitivo comportamental e explorar a sua eficácia. Em geral, o estudo concluiu que a TCC disponibilizada através de aplicações móveis, num formato auto-guiado, pode ser eficaz. Metade dos estudos tinha como

objetivo intervir na depressão e obtiveram, em geral, resultados positivos. Um dos estudos para a depressão, apesar de não ter obtido resultados conclusivos quanto à eficácia do tratamento, concluiu que a terapia combinada conseguiu intervir no dobro dos pacientes devido ao acesso à aplicação móvel. O estudo de Lindhiem et al. (2015) concluiu que as tecnologias associadas ao mHealth possuem imenso potencial para complementar o tratamento, particularmente no que diz respeito às intervenções cognitivo-comportamentais. Segundo os mesmos autores, os estudos existentes apoiam o papel da tecnologia móvel na psicoterapia, produzindo resultados clínicos superiores em todos os tipos de estudos e condições de controlo.

As características vantajosas das aplicações móveis relativas à inovação e ubiquidade fizeram com que fossem consideradas como uma solução para aumentar a adesão e o envolvimento nos trabalhos de casa, uma componente essencial da TCC e que a sua realização melhora significativamente os resultados terapêuticos (Kazantzis et al., 2010). Várias barreiras são apontadas na realização dos trabalhos de casa, sendo que muitos terapeutas têm dificuldade em desenvolver, estabelecer e avaliar os exercícios para casa com os seus pacientes; estes por sua vez têm alguma dificuldade em realizar estas tarefas, acabando por evitar ou esquecerem-se de as realizar (Bunnell et al., 2021). O último estudo explorou algumas barreiras à realização dos trabalhos de casa em jovens e à potencial solução do mHealth para ultrapassar estas barreiras, concluindo que estas intervenções podem efetivamente contribuir para ultrapassar estas barreiras, particularmente nos mais jovens. Algumas vantagens e desafios destas intervenções apontadas pelos psicólogos referem-se à utilidade clínica, fácil acesso, conforto e conveniência; por sua vez os principais desafios estão relacionados com o facto de nem todas as famílias terem facilidade de acesso a estas tecnologias, confidencialidade e impacto negativo na terapia (e.g. sobrecarga administrativa; podem não se enquadrar com as preferências do psicólogo; podem promover o isolamento social).

Aplicações móveis para a ansiedade social

A produção científica no âmbito das intervenções cognitivo-comportamentais baseadas na internet (iCBT), para a ansiedade social, tem sido significativa. Duas revisões sistemáticas e meta-análises investigaram a eficácia destas intervenções na redução da

sintomatologia da ansiedade social e observaram resultados bastante promissores (Guo et al., 2021; Kampmann et al., 2016). O estudo de Guo et al. (2020) enfatiza que estas intervenções poderão ser viáveis para os indivíduos com ansiedade social que não recorrem a ajuda profissional face-a-face devido à ansiedade e vergonha. Esta revisão concluiu que os resultados terapêuticos obtidos pela intervenção cognitivo-comportamental face-a-face, para a ansiedade, são os mesmos que a mesma intervenção baseada na internet.

Contudo, poucos estudos abordaram a eficácia da intervenção na ansiedade social através de aplicações móveis. Apesar de escassa, a investigação tem sugerido a eficácia destas intervenções com recurso a aplicações móveis, associando-se a melhorias clínicas significativas na sintomatologia da ansiedade social (Boukhechba et al., 2018; Dagöö et al., 2014; Enock et al., 2014; Ivanova et al., 2016; Stolz et al., 2018). Miloff et al., (2015) desenvolveu a *challenger app* para o tratamento da ansiedade social, no entanto, não é conhecido nenhum estudo de eficácia. No caso das aplicações móveis disponíveis comercialmente, o estudo de Alyami et al. (2017) identificou 38 aplicações móveis para a ansiedade social. A maioria das aplicações identificadas incluía uma combinação de psicoeducação, gestão de sintomas, tratamento, auto-avaliação ou recursos de suporte. A maioria não referiu a sua afiliação organizacional nem as fontes do seu conteúdo. Em geral, os autores concluíram que apesar de as aplicações móveis para a ansiedade social demonstrarem potencial para ultrapassar várias barreiras de acesso ao tratamento, não existem estudos publicados de avaliação da eficácia destas aplicações e por falta de evidência empírica, não é possível recomendar nenhuma.

5.3 Eficácia das aplicações móveis para a saúde mental

Considerando todas as possibilidades e vantagens que as tecnologias móveis apresentam importa perceber se as estas são eficazes e eficientes. Uma meta-análise de Lindhiem et al. (2015) conclui que as tecnologias móveis beneficiam a psicoterapia e outras intervenções comportamentais. Mais concretamente, o estudo enfatiza que os pacientes que usaram tecnologia móvel para complementar o tratamento ou mesmo substituir o contacto direto com o clínico obtiveram melhores resultados terapêuticos comparativamente a quem não usou qualquer tecnologia móvel. Os resultados deste

estudo também sustentam a hipótese de que os tratamentos disponibilizados apenas pela tecnologia móvel obtêm melhores resultados terapêuticos, em comparação com ausência de tratamento, indicando que uma intervenção com recurso a estas tecnologias é melhor do que a ausência de intervenção. Em 2017, uma revisão de Lui e colegas, sustenta que os resultados preliminares de eficácia e eficiência das aplicações móveis para a saúde mental são promissores, no entanto, carecem de mais investigação. Os autores referem que apesar do uso destas aplicações estar associado a significativas reduções de sintomatologia, poucos estudos foram replicados e em alguns estudos as melhorias não diferiram significativamente do grupo de controlo.

Uma recente meta-análise concluiu que há evidência que as intervenções suportadas por aplicações móveis são eficazes para várias perturbações mentais (Linardon et al., 2019). Este estudo verificou uma associação clara e consistente entre a inclusão de apoio/suporte profissional ou lembretes para interagir com a aplicação e maiores tamanhos de efeito em várias perturbações mentais. Sublinhando, no entanto, que estas intervenções obtiveram um melhor desempenho que o grupo de controlo, mesmo não oferecendo suporte ou lembretes. Este estudo sugere que as intervenções suportadas por aplicações móveis, não tendo como objectivo substituir o profissional clínico, têm imenso potencial para intervir de uma forma custo-efectiva, de baixa intensidade e facilmente acessível a todos aqueles que não têm acesso a tratamentos psicológicos. Salienta-se, que a maioria dos estudos incluídos nesta última meta-análise foi publicada nos dois anos anteriores à mesma, o que reflecte o crescimento exponencial desta área nos últimos anos. Resultados semelhantes foram obtidos no estudo de Garrido et al. (2019) que se debruçou sobre as intervenções digitais para a saúde mental em jovens com ansiedade e depressão. A revisão sistemática concluiu que as intervenções digitais são melhores que ausência de intervenção; e assumem significância clínica quando são amplamente guiadas por profissionais.

5.4 Linhas de orientação para o desenvolvimento, implementação e avaliação das aplicações móveis para a saúde mental

Nos últimos anos devido à crescente dedicação a esta área de investigação muitos avanços têm sido feitos no sentido de ultrapassar vários obstáculos e barreiras na

investigação e implementação destas tecnologias. Alguns obstáculos referem-se, por exemplo, às questões de segurança e privacidade, considerado um dos principais motivos pelos quais os psicólogos se sentem relutantes em utilizar estas tecnologias; os desenhos de investigação, como os ensaios aleatórios randomizados, por serem longos e nem sempre compatíveis com a tecnologia que se encontra sempre em rápida mudança; a desigualdade digital sendo que nem todos os indivíduos têm acesso à mais recente tecnologia ou internet; a questão do *Big Data*, muita informação pode ser bom e em simultâneo representar um problema em termos de organização e integração da informação; a interdisciplinaridade pode se apresentar como um obstáculo no sentido em que os intervenientes do processo podem ter objectivos diferentes (Aguilera, 2015).

Neste sentido, tem havido um esforço global para o desenvolvimento de *guidelines* para os psicólogos com o intuito de apoiar o processo de desenvolvimento, implementação e avaliação das aplicações móveis e a sua qualidade. A Associação Americana de Psicologia (APA) neste âmbito desenvolveu um modelo compreensivo para a avaliação das aplicações móveis, com o objetivo de guiar o psicólogo no processo de tomada de decisão quanto a uma aplicação móvel para integrar o tratamento. A OPP também lançou, em 2019, linhas de orientação para a prestação de serviços de psicologia mediados por tecnologias da informação e da comunicação, que inclui as intervenções mediadas pelos dispositivos móveis e linhas de orientação para a investigação com estas ferramentas digitais. Surgiu igualmente uma escala de avaliação da qualidade das aplicações para a saúde mental, inclusive do ponto de vista do utilizador (Stoyanov et al., 2015, 2016a) que se encontra em processo de validação para a população portuguesa pela atual equipa do projeto (ver Anexo 1).

Em geral, vários estudos têm surgido com recomendações para o desenvolvimento das aplicações móveis para a saúde mental (Bakker et al., 2016), para aumentar a envolvência (*engagement*) com a aplicação (Torous et al., 2018) para delinear os princípios para a implementação e avaliação das aplicações mHealth (Torous et al., 2019), entre outros.

O actual projeto propõe-se a conceptualizar, desenvolver e avaliar uma intervenção cognitivo-comportamental combinada com um dispositivo móvel para estudantes com ansiedade social. O objetivo geral deste projeto é contribuir para o conhecimento do desenvolvimento de aplicações móveis para a saúde mental no sentido de melhorar o acesso aos serviços de apoio psicológico do ensino superior. Para atingir tais objetivos realizamos vários estudos: 1) uma revisão da literatura onde exploramos as intervenções móveis para a saúde mental em estudantes universitários; 2) dois estudos teóricos relativos à fundamentação conceptual e desenvolvimento da aplicação móvel; 3) dois estudos de avaliação da satisfação e usabilidade da aplicação móvel.

Com base na literatura científica e no sentido de criar algo diferenciador concebemos uma aplicação móvel que não funciona de forma isolada, para além de ser complementar à intervenção cognitivo-comportamental, esta encontra-se sincronizada com uma plataforma *web* do psicólogo. Esta plataforma funciona como uma base de dados que agrega toda a informação que o paciente submete ao psicólogo, através da aplicação móvel, entre consultas. Portanto, este sistema também apresenta objetivos específicos como: 1) prestar apoio ao paciente, entre consultas, com as tarefas de casa; 2) permitir ao psicólogo uma monitorização e acesso, em tempo real, dos exercícios terapêuticos realizados pelo paciente, de uma forma estruturada e organizada. Este sistema foi concebido para funcionar em serviços de elevada procura em que o psicólogo se encontra frequentemente sobrecarregado. Por conseguinte, foi concebido para apoiar o paciente e psicólogo de uma forma equilibrada.

Com esta aplicação móvel esperamos que haja uma maior adesão dos pacientes às tarefas de casa, promovendo uma maior aprendizagem e consolidação das técnicas aprendidas em consulta, de uma forma mais intensiva e célere. Particularmente, em ansiosos sociais, que podem se sentir relutantes em frequentar a consulta psicológica, ou a partilhar temas mais difíceis em consulta, por se sentir envergonhados ou sujeitos a escrutínio. Com a plataforma do psicólogo esperamos disponibilizar ao psicólogo informação clínica dos pacientes em tempo real, entre consultas, permitindo uma maior gestão e planeamento de consultas futuras, e em simultâneo, a recepção de informação clínica (enviada pelos pacientes) num formato mais estruturado, sistematizado e acessível

(em oposição, aos por vezes, longos e complexos *e-mails*). O objetivo último desta terapia combinada é possibilitar uma gestão mais eficaz dos serviços de apoio psicológico no ensino superior e contribuir para uma intervenção mais eficaz na ansiedade social.

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PARTE 2: CONTRIBUIÇÃO EMPÍRICA - ESTUDOS

Objetivos, percurso e evolução do conceito tecnológico

Objetivos gerais

1. Rever sistematicamente estudos com intervenções realizadas com recurso a aplicações móveis para estudantes universitários e em contexto dos serviços de apoio psicológico universitário;
2. Explorar o interesse e as preferências relativamente às principais características das aplicações móveis em estudantes universitários com e sem sintomatologia de Ansiedade Social;
3. Desenvolver uma aplicação móvel (para os estudantes) e plataforma web (para o psicólogo) com base nos resultados do estudo anterior e no modelo cognitivo-comportamental para a ansiedade social;
4. Avaliar a usabilidade e aceitabilidade da aplicação móvel e Plataforma WEB;
    a. Avaliar a usabilidade da aplicação móvel com estudantes
    b. Avaliar a usabilidade da plataforma web com psicólogos.

Percurso e evolução da aplicação móvel e plataforma web do psicólogo

O actual projeto surgiu, em parte, na continuação de alguns estudos que já tínhamos iniciado no âmbito do estágio e tese de mestrado em Psicologia Clínica e da Saúde. No estágio nos Serviços de Acção Social da Universidade de Aveiro (SASUA), mais concretamente na consulta de Psicologia Clínica, pude observar ao longo de um ano o importante papel que esta estrutura desempenha na comunidade académica e as suas principais limitações e dificuldades. A tese de mestrado abordou, para além do perfeccionismo em estudantes universitários, o seu interesse em aderir a programas de prevenção, baseados na internet, para a ansiedade e depressão.

Por conseguinte, para o projeto de doutoramento, avançamos das intervenções baseadas na internet, para as intervenções mediadas por dispositivos móveis, que se apresentavam como uma área emergente e muito promissora no âmbito da saúde mental. Tendo em conta as características dos SAPES (elevada procura; longas lista de espera; sobrecarga dos psicólogos) consideramos que estes poderiam beneficiar deste tipo de intervenções. Para além do mais, os estudantes possuem uma elevada literacia

digital e já tínhamos concluído, na tese de mestrado, que estes mostravam interesse em aderir a estas intervenções.

Como podemos observar na tabela 3, este projeto foi pautado pelo início de uma revisão da literatura científica relativa à eficácia das intervenções psicológicas com aplicações móveis para estudantes universitários. No início, a literatura científica nesta população era praticamente inexistente e a revisão incluiu apenas um estudo. Assim, muito do nosso trabalho inicial foi inspirado nos trabalhos de Benton et al. (2016); Clough & Casey (2011, 2015) e Miloff et al. (2015) com várias diferenças, particularmente no que se refere à sincronização da aplicação móvel com o *website* do psicólogo e o foco na terapia combinada.

Com base na experiência do estágio, resultados de trabalhos anteriores e a escassa literatura científica nesta área, concebemos a arquitectura e base conceptual do nosso sistema tecnológico, que foi exposto num breve estudo teórico publicado em 2017 (estudo 1.2). De seguida, levamos esta base conceptual ao Instituto de Engenharia Eletrónica e Telemática de Aveiro (IEETA), com o qual iniciamos a nossa colaboração em 2017. Acordamos que a programação da aplicação móvel seria realizada por um aluno de mestrado em computação móvel, que escolheria este tema para a sua tese de mestrado, sob orientação do Professor Ilídio Oliveira.

Durante o ano lectivo 2018/2019, iniciamos a construção da primeira versão da aplicação móvel para a ansiedade social com o aluno de mestrado Bruno Alves e demos lhe o nome *Appsiety*. Em conjunto, também elaboramos um estudo que reflecte este processo de desenvolvimento e as componentes conceptuais e técnicas deste trabalho inicial (estudo 2.1). Encontramos vários desafios ao longo da construção da aplicação móvel, sendo que questões relacionadas com o *design* e a forma mais adequada de estruturar e expor a informação foram os mais predominantes. Esta dificuldade acabou por se reflectir nos estudos de usabilidade em que observamos módulos que pareciam ser menos intuitivos. A imagem seguinte reflecte um desses módulos, especificamente o de reestruturação cognitiva.

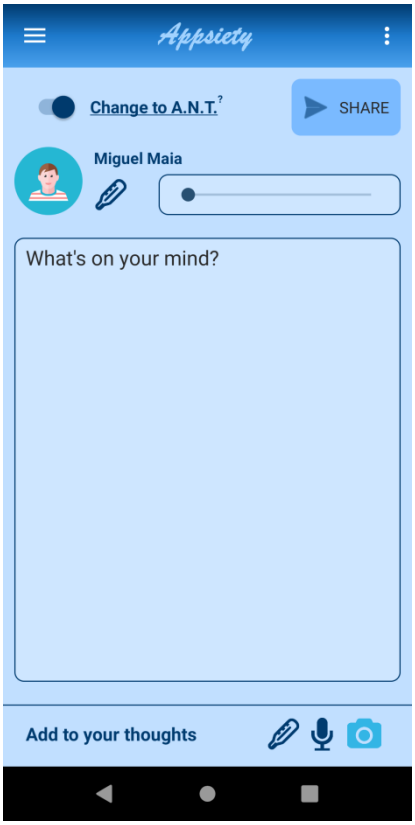

Figura 1 *- Módulo reestruturação cognitiva*

Consequentemente, no ano seguinte, com outro aluno de mestrado do Departamento de Eletrónica, Telecomunicações e Informática (DETI), integramos o Professor Mário Vairinhos do Departamento de Comunicação e Arte (DeCA), na nossa equipa com o objetivo de nos prestar esse apoio. Foram realizadas alterações significativas à aplicação móvel e plataforma do psicólogo, principalmente ao nível do *design*. A aplicação passou a denominar-se SPICA pois é um nome que ninguém associaria a uma aplicação móvel terapêutica, resguardando a privacidade do paciente. Adicionalmente é uma estrela que, apesar de parecer só uma são na realidade duas estrelas muito próximas entre si, em constante movimento, o que na nossa perspectiva reflecte um dos princípios mais importantes da TCC: a aliança terapêutica.

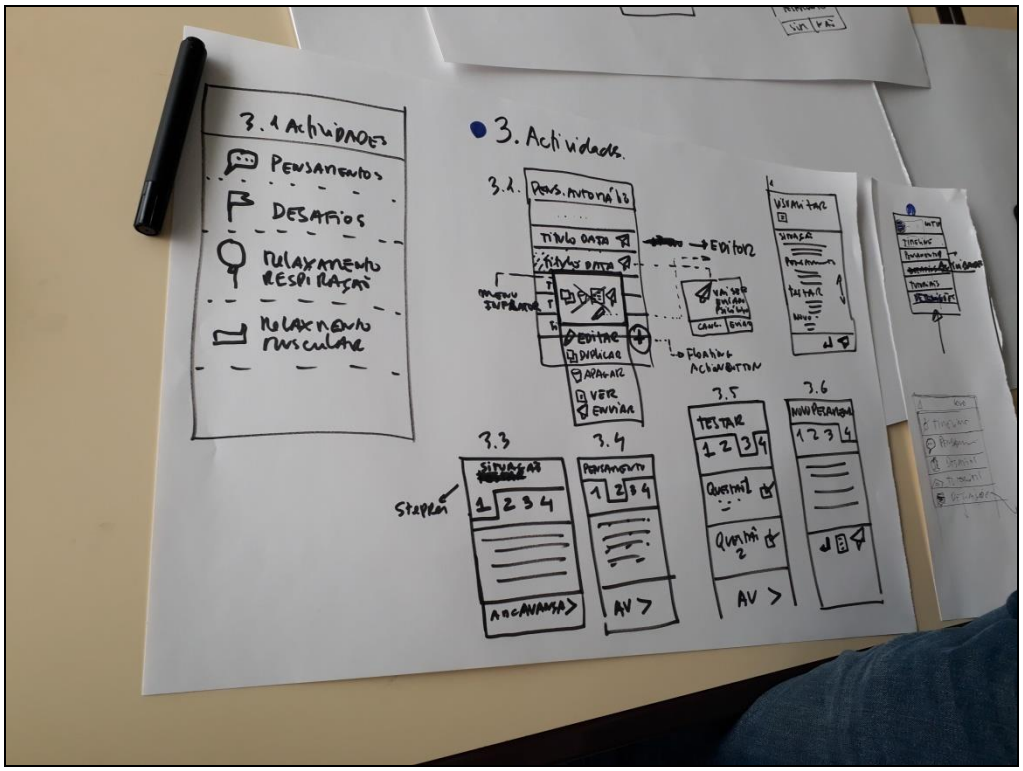

Figura 2 - Mock up do menu das principais técnicas da TCC incluídas

Figura 3 - Menu principal e menu das atividades (técnicas da TCC)

Também a Plataforma do Psicólogo sofreu várias alterações, principalmente no sentido de acompanhar a estrutura e organização da aplicação móvel. Um registo mais detalhado destas alterações e os resultados de usabilidade da versão beta podem ser encontrados no estudo 2.2, na secção dos estudos de usabilidade. À semelhança do Bruno (Alves, B., 2018), também a tese de mestrado do Miguel (Maia, M., 2019) pode ser encontrada no repositório da Universidade de Aveiro, onde eles exploram mais detalhadamente a componente técnica da aplicação móvel.

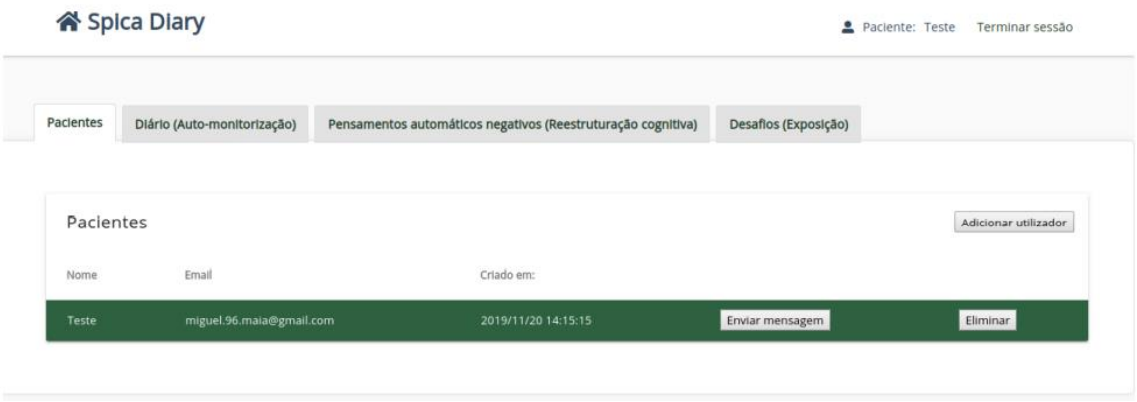

Figura 4 - Menu principal do *Website* do Psicólogo

A tabela que se segue resume, numa visão cronológica, o trabalho realizado ao longo dos últimos anos.

Tabela 4 - Visão cronológica dos estudos desenvolvidos, etapas do projeto e respectivos objetivos

Estudos / Etapas	**Objetivo**
Estudo 1.1	
Revisão Sistemática da Literatura Científica	Rever sistematicamente a literatura científica relativamente a intervenções psicológicas com aplicações móveis, para estudantes universitários, implementadas no contexto do ensino superior Pesquisa de modelos e teorias em relação às intervenções mediadas pela tecnologia;
2017/2018 – 1ª Etapa	

Início da colaboração com o IETTA (Instituto de Engenharia Electrónica e Telemática de Aveiro);	Estruturação do conteúdo e suporte empírico da aplicação móvel e *website* do psicólogo; Criação de uma equipa multidisciplinar integrando a especialidade da psicologia e computação móvel: Carla Oliveira; Anabela Pereira; Paula Vagos; Ilídio Oliveira; Bruno Alves Início da construção da aplicação móvel e *website* do psicólogo;
Estudo 1.2	
Breve estudo teórico	Estabelecer o racional teórico da aplicação móvel de acordo com o modelo cognitivo-comportamental para a ansiedade social
2018/2019 – 2º Etapa	Desenvolver a aplicação móvel para a ansiedade social e base de dados para o Psicólogo; Avaliar a sua usabilidade com uma amostra de estudantes.
Estudo 1.3	
Estudo descritivo e exploratório	Explorar as características da ansiedade social em estudantes universitários e hábitos de uso de aplicações móveis; Estabelecer o racional da aplicação conforme o modelo cognitivo-comportamental para a ansiedade social e modelo teórico de Mohr et al. (2014)
Estudo 2.1	
Desenvolvimento da aplicação móvel e avaliação da usabilidade (versão alfa)	Avaliar a usabilidade da aplicação móvel numa amostra de estudantes universitários.
2019/2020 – 3ª Etapa	
Início da colaboração com o DECA (Departamento de Comunicação e Arte da Universidade de Aveiro).	Integrar um especialista em design interactivo para o aperfeiçoamento e optimização da aplicação móvel. Equipa multidisciplinar: Carla Oliveira; Anabela Pereira; Paula Vagos; Ilídio Oliveira; Miguel

	Maia; Mário Vairinhos.
Estudo 2.2	
Estudo de avaliação da usabilidade da versão beta da aplicação móvel	Descrever as alterações realizadas à versão alfa da aplicação móvel no âmbito do design interactivo. Avaliar a usabilidade da aplicação móvel numa amostra de estudantes não clínica e três psicólogos.
Estudo 3.1	
Protocolo de Estudo: avaliação da viabilidade	Estabelecer um protocolo de estudo para a avaliação da viabilidade de uma aplicação móvel para a ansiedade social
Estudo Futuro	
Estudo das características psicométricas do questionário de Avaliação da Qualidade das Aplicações Móveis – versão do utilizador (uMARS). (ver ANEXO 1)	Analisar as características psicométricas do questionário uMARS na população portuguesa.
Estudo de avaliação da eficácia e efectividade	Avaliar a eficácia da terapia combinada vs terapia tradicional; Avaliar a efectividade da terapia combinado através de entrevistas semiestruturadas e métricas de uso do sistema tecnológico.

Sobre o sistema tecnológico: aplicação móvel + plataforma web do psicólogo

Conceito

É um sistema interativo de apoio ao paciente e psicólogo ao longo de uma intervenção psicológica, é constituído por uma aplicação móvel e uma plataforma (do Psicólogo) completamente indissociáveis. Sendo que a aplicação presta apoio ao paciente entre consultas e a plataforma presta apoio ao psicólogo a nível de gestão e monitorização dos pacientes. A aplicação móvel é estruturada de acordo com a intervenção cognitivo-comportamental, para a Ansiedade Social, e visa o apoio ao

paciente entre consultas, especificamente na orientação e no incentivo à prática do trabalho/exercícios entre consultas.

A Plataforma do Psicólogo é um sistema de gestão e monitorização dos pacientes (com acesso à aplicação) que agrega, espontaneamente, todos os dados submetidos pelos pacientes através da aplicação. Este sistema visa a monitorização espontânea e acompanhamento em tempo real dos pacientes, possibilitando uma visão geral de todos os pacientes e uma maior e mais eficiente preparação antes da consulta, podendo adaptar a intervenção conforme os dados obtidos na Plataforma.

Uma descrição mais detalhada da aplicação móvel poderá ser encontrada no artigo 1.3. relativo ao processo de desenvolvimento da aplicação e plataforma. No Anexo 2 e 3 também inclui mais imagens da aplicação móvel, tal como um manual do psicólogo com o intuito de o informar quanto às funções da aplicação móvel.

Tabela 5 - Características da intervenção psicológica mediada pela aplicação móvel

Características da intervenção com SPICA	
Modalidade	Intervenção psicológica mediada por um dispositivo móvel e um website para o psicólogo.
Nível de apoio	**Guiada** – terapia tradicional individual face-a-face + aplicação móvel + plataforma do psicólogo (*website*)
Modelos Conceptuais	Modelo cognitivo-comportamental para a Ansiedade Social de Clark e Wells (1995) e Rapee e Heimberg (1997). Modelo BIT (Mohr et al., 2014)
Intervenção Psicológica	Terapia cognitivo-comportamental: Protocolo de Hope e Heimberg (2010)
Psicólogo	Durante as consultas: Pode consultar a informação que se encontra armazenada na base de dados. Entre consultas:

	Envio de mensagens breves e unidireccionais (e.g. com indicações/ orientações de trabalho de casa). Monitorização e envio de mensagens, por exemplo de incentivo, pelo chat onde se registam os exercícios de exposição. Estas mensagens são enviadas pela Plataforma WEB do Psicólogo e disponibilizados ao paciente na aplicação móvel.
Estudante	Durante as consultas: Pode consultar informação armazenada na aplicação; Entre consultas: Pode registar informação via texto, áudio Realizar exercícios de auto monitorização, reestruturação cognitiva, relaxamento e exposição.
Duração	Enquanto decorre a intervenção Deve ser desactivada após o término da intervenção Este aspeto é explicitado logo no início ao abordar as características inerentes a este tipo de intervenção.

A aplicação móvel foi assim desenvolvida de acordo com os princípios e técnicas da TCC. Especificamente e tendo em conta os seus princípios, a aplicação foi desenhada para facilitar a aliança terapêutica (não funciona isoladamente); para permitir uma monitorização contínua do progresso do paciente através da realização dos diferentes exercícios cognitivo-comportamentais; para encorajar uma colaboração ativa do paciente; para ser educativa (e.g. inclui um módulo psicoeducativo); para ser estruturada (de acordo com a TCC) e para prestar apoio aos trabalhos de casa, entre consultas. A aplicação também está estruturada de acordo com as técnicas da TCC, nomeadamente, possui um registo de auto monitorização, uma interacção relativa à reestruturação

cognitiva, exercícios de relaxamento e registo da hierarquia do medo e dos exercícios de exposição. Os estudos iniciais 1.2 e 1.3 expõem detalhadamente toda a base conceptual do sistema tecnológico.

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ESTUDO 1 – Estudos Prévios

Estudo 1.1 – Effectiveness of mobile app-based psychological interventions for college students: a systematic review of the literature

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Effectiveness of Mobile App-Based Psychological Interventions for College Students: A Systematic Review of the Literature

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Serious mental health disorders are increasing among college students and university counseling services are often overburdened. Mobile applications for mental health have been growing exponentially in the last decade and they are emerging in university settings as a promising tool to promote and intervene in college students' mental health. Additionally, considering the recent covid-19 pandemic, mHealth interventions, due to its nature and possibilities, may play an important role in these institutions. Our main objectives are to explore mhealth interventions in universities, regarding its conceptual framework, acceptability and efficacy outcomes and understand its impact and contributions to address treatment delivery and psychological difficulties resulting from covid-19 pandemic. The literature search was conducted in scientific databases, namely, Web of Science, Pubmed, and Scopus. A search in app stores was not conducted, thus regarding commercially available apps, only those found in our database search were included in our review. We selected studies with mobile applications addressing psychological interventions for college students. A total of 2,158 participants were included in the 8 selected studies and most interventions were delivered through mobile apps only and based in cognitive behavioral therapy. Results suggested that college students accept and adhere to these interventions and preliminary evidence of efficacy was demonstrated in different disorders, such as stress, anxiety, depression and risky behaviors such as alcohol and tobacco abuse and sexual knowledge. We conclude that universities, particularly college counseling services, may benefit from mhealth interventions, not only to address college students' mental health but to decrease some of its difficulties related to lack of human resources. Specifically in covid-19 pandemic context, these interventions may contribute significantly by promoting and delivering psychological interventions at a safe distance.

INTRODUCTION

Over the last decade numerous mental health mobile applications have been developed and made available for users (Bakker et al., 2016). Smartphones demonstrate numerous advantages such as great computing capacity, mobility, and more rapid and efficient access to information by using mobile applications (Donker et al., 2013). The enthusiasm of smartphones for healthcare initiatives led to the emergence of a novel field called mHealth (Ben-Zeev et al., 2014) defined as the use of mobile technologies to deliver or support psychological or mental health interventions and includes mobile devices such as smartphones, tablets, Personal Digital Assistants, and wearable devices (Clough and Casey, 2015b; Alyami et al., 2017). In clinical settings, mHealth may enhance face-to-face treatments, increase patient engagement in therapy sessions and adherence to therapy principles; provide better use of clinician time and resources and improve treatment outcome and risk of relapse (Clough and Casey, 2015b). Several studies have shown that mental health apps and cognitive behavioral therapy (CBT)-based apps are efficacious (Rathbone et al., 2017; Linardon et al., 2019). However, despite clinical potential, interest and early supporting evidence, one factor that seems to limit mental health apps is low engagement or poor adherence to the intervention (Torous et al., 2018).

One of the areas were mental health apps can have a significant impact is in universities. College years are a sensitive period to the onset of several mental health disorders (Kessler et al., 2007) and many studies have reported a significant rise in serious mental health illness among college students (Hunt and Eisenberg, 2010; Storrie et al., 2010; Auerbach et al., 2018). Major Depressive Disorder (MDD) and Generalized Anxiety Disorder (GAD) were identified as the most common disorders found in college students (Auerbach et al., 2018). University counseling services constitute a valuable resource to support college student mental health and wellness (Spooner, 2000) and a challenge that seems to be common across several counseling services is the growing student demand for these services and the limited resources to face these demands (Johnson and Kalkbrenner, 2017; Shaw et al., 2017; Auerbach et al., 2018; Lee and Jung, 2018). College students are also large consumers of technology and communicate frequently online

(Shaw et al., 2017). A study by Wilansky et al. (2016) referred that mobile applications may increase youth adherence to Cognitive Behavioral Therapy (CBT) and improve treatment outcomes. Research suggests that mHealth is already being used to increase students' awareness and to deliver healthrelated interventions with increasing popularity; preliminary findings indicate that students are open and willing to use these interventions (Johnson and Kalkbrenner, 2017).

Mobile technologies for mental health assume an important role considering our current reality of pandemics resulting from covid-19 infectious disease. Covid-19 is an infectious disease cause by a coronavirus that rapidly expanded worldwide, and some of the protective measures include physical distancing, wearing a mask, avoiding crowds and close contact, and regularly cleaning your hands (World Health Organization, 2020). College students, alongside with children and health workers, are one of the most exposed groups to develop post-traumatic stress disorder, anxiety, depression and other symptoms of distress (Saladino et al., 2020). Studies conducted during covid-19 pandemic in China concluded that almost half of Chinese college students that participated in the study experienced anxiety symptoms (Fu et al., 2021) and are more likely to suffer from stress, anxiety and depression than the general population (Li et al., 2020). Several studies highlight the need to monitor students' mental health during the pandemic and the delivery of timely and appropriate interventions (Cao et al., 2020; Fu et al., 2021) such as the importance of technological devices or digital interventions (Saladino et al., 2020). Covid-19 brought several challenges to mental health services delivery, thus many therapists rapidly adhered to telehealth to replace in-person contact (Taylor et al., 2020). The same authors state that this disease presents an imperative for mental health services to make digital mental health interventions available in routine care and not only in response to covid-19 crisis.

Previous systematic reviews with college students and mobile interventions often explore a wide range of mHealth interventions and technology (e.g., Johnson and Kalkbrenner, 2017). Our review will focus on (1) mental health mobile applications that include a psychological intervention targeting a mental disorder, (2) college students, and (3) randomized controlled trials and acceptability and feasibility studies. We aim to

explore how mobile apps are being developed to address college students' mental health in universities, if they accept and adhere to these interventions and if these interventions demonstrate efficacy. A search will be made for peer-reviewed articles of mental health mobile apps in scientific databases. The present review will not conduct a search in app stores mainly because acceptability and efficacy outcomes are not usually reported in app stores and because it would demand a different type of search strategy.

Thus, in the current review we aim to review all published literature, in scientific databases, on psychological interventions using mobile applications, in the last 12 years, for college students. Our main objective is to review efficacy outcomes, through randomized controlled trials, of mobile app-based psychological interventions compared to traditional therapy or a waiting list control group in reducing psychological symptomatology among college students. Additionally, we intend to explore how mobile interventions are being accepted by college students and which conceptual frameworks are being used to develop these interventions. Considering the recent context of covid-19 pandemics, we aim to reflect on the impact and contributions of mHealth interventions for universities and college students

METHODS

We used the search method of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher et al., 2009).

Eligibility Criteria and Information Sources

Inclusion criteria considered (1) target population: college students; (2) types of intervention: psychological interventions delivered through mobile applications (self-guided); applications combined with web-based interventions or mobile applications combined with face-to-face treatments; (3) Primary outcome measures that target specific psychological disorders or symptomatology (i.e., anxiety, depression, social anxiety, stress, PTSD, alcohol abuse); (4) clear report of the psychological intervention, specifying theoretical basis or treatment model and therapeutic techniques; (5) Types of studies: randomized controlled trials (RTC) or quasi-experimental designs that clearly report efficacy outcomes and feasibility and acceptability studies since they contribute with valuable information about conceptual framework and some provide preliminary

effectiveness results; (6) written in English; (7) published in the selected scientific databases. Exclusion criteria consisted in (1) studies with young adults (not students); (2) mobile interventions based on text messages; (3a) mobile interventions targeting physical or medical conditions (e.g., diabetes, physical activity, nutrition, weight control etc.); (3b) studies about mobile learning apps (e.g., anatomy); (3c) studies about smartphone addiction; (4) internet and computerized based interventions; (5) study protocols. Our main objective is to review conceptual framework, acceptability, and efficacy outcomes of mobile app interventions addressing mental health for college students. A search of mobile apps commercially available in the app store was not conducted in this review since, although important, demands a different type of search and selection process, and often don't report acceptability and efficacy results (in the app store). Thus, we considered that it would be more suited to do a review, with this group of apps, separately.

A narrative approach was used for extraction and synthesis of the data. Studies were identified through three major electronic databases, namely, Web of Science, Pubmed, and Scopus. An update literature search was performed in January 2021 using the same information sources.

Search and Study Selection Process

The following search keywords were considered "mobile interventions," "smartphones," "mobile application," "mHealth," "mobile technology," "college students," "students," "university," "campus." Two authors independently conducted a thorough search in the three major scientific databases with the mentioned keywords, using primarily the combination "mobile interventions" AND "college students" with year filter between 2008 and 2019. A search update was performed in January 2021 with the same study selection process. In a first instance, studies including keywords in titles and/or abstracts were selected for further thorough review. After identifying eligible studies, duplicates were removed, and full papers were examined regarding eligibility criteria. A list of studies was produced by each author. Afterwards, both authors discussed their list of included studies, and by agreement, a final list of studies was produced.

Data Extraction

Data extraction was performed by two independent researchers and included year of publication, demographic characteristics of participants, study design (RCT, quasi-experimental studies, single-arm pre-test post-test), study participants and interventions (i.e., population, conditions, sample size, outcome measures, mobile app characteristics, theoretical basis, and intervention modality), main results and findings.

Assessment of Methodological Quality

The present review resorted to critical appraisal tools from the Joanna Briggs Institute for randomized controlled trials and quasi experimental studies (non-randomized experimental studies). The Checklist for Randomized Controlled Trials [The Joanna Briggs Institute (JBI), 2017a] was utilized to assess the methodological quality of the included RCTs and the Checklist for Quasi-Experimental Studies (non-randomized experimental studies) [The Joanna Briggs Institute (JBI), 2017b] to assess methodological quality of quasi-experimental studies and studies with a one group pre-test post-test design. Each study was assessed using JBI checklists for RCT or quasi experimental studies.

RESULTS

Study Selection

As we can see in Figure 1 our search identified 957 published articles. Afterwards, we removed 23 duplicates and a review of title and abstracts excluded 904 articles. A total of 30 full-text articles were assessed for eligibility, where 11 were excluded due to motives of being a study protocol, thus not presenting feasibility or efficacy outcomes; lack of a psychological intervention or a psychological disorder; being web-based intervention or having no access to article full text. A total of 19 studies were included and examined in accordance with inclusion criteria.

Demographic Characteristics

A total of 3,399 college students were included in the selected studies (n = 19) for this systematic review. Eleven studies included college students with self-reported psychological symptomatology (i.e., elevated stress, generalized anxiety disorder (GAD), PTSD), two studies included first-year college students and the remaining studies included non-treatment seeking college students (n = 6). Most studies occurred in the USA (n = 12),

others occurred in Germany (n = 1), Sweden (n = 1), Canada (n = 1), United Kingdom (UK) (n = 2), Australia (n = 1), and Iran (n = 1).

Intervention Characteristics

Mobile intervention apps for college students target anxiety (n = 7), depression (n = 7), stress (n = 5), alcohol consumption and risky drinking (n = 4), smoking (n = 1), and sexual behaviors (n = 1), Post-traumatic stress disorder (PTSD) (n = 1). Table 1 resumes all further interventions characteristics. We considered that most studies, with self-guided apps, focus on prevention (n = 15) and the studies that included human support (therapists and coaches) and a TAU group were more focused on a treatment approach (n = 4). However, many studies with self-guided apps, included students with elevated psychological symptomatology (i.e., elevated stress, diagnosed PTSD, or GAD), and it isn't always clear the nature of their intervention.

Intervention modality varied between a combination of internet and mobile app intervention (n = 2) and mobile app intervention only (n = 17), from these 17 studies, two apps were combined with a wearable band to permit passive data collection. When combining mobile apps with internet interventions, the mobile app functioned mostly as a tool offering support for homework assignment or working as a diary app by enabling monitoring of mood fluctuations or stress levels [e.g., Harrer et al. (2018)]. Human support was considered in 4 mobile apps (Lantern; TAO; StudiCare Stress; Mind the Moment), two mobile interventions included therapists and two included a coach, StudiCare Stress app included a trained master's student in Psychology (named an eCoach) and Lantern app included a coach with various educational backgrounds. Human support varied from weekly 10–12 min brief videoconferences, to 2 face to face sessions and online sessions only.

Regarding conceptual framework most researchers used CBT intervention or CBT third wave techniques to conceptualize these apps (n = 17). Most CBT apps include mindfulness exercises (n = 11), some are solely based on mindfulness (n = 4) or acceptance and commitment therapy (ACT) (n = 2). One mobile app is focused on CBT and a biofeedback intervention (BioBase app). Some used CBT intervention as a part of a larger program such as GET.ON Stress, a stress management program, adapted to college

students; or BASICS, an alcohol intervention program for college students. In some cases, CBT was combined with other psychological models such as Lazarus Transactional Model of Stress (GET.ON Stress program) or the Unified Theory of Use and Acceptance of Technology (UTAUT). The StudiCare Stress app also included an adherence-focused guidance concept according to the human accountability model. Only two studies did not resort to CBT, the SmarTrek app that used motivational interviewing and the SEX101 that used two psychological models, the Theory of Reasoned Action (TRA; Fishbein and Ajzen, 1975) and the Transtheoretical Model (TTM) of behavior Change (Prochaska and DiClemente, 1984). Additionally, SmartTreak and MtM added an Ecological Momentary Intervention (EMI) and Witkiewitz et al. (2014), BioBase app and ACT daily included an Ecological Momentary Assessment (EMA).

As for specific techniques more than half of the mobile apps include mindfulness exercises; other included psychoeducation or general information about the target disorder; include data collection self-monitoring; exposure; systematic desensitization and relaxation exercises. Other features refer to quizzes and interactive games; virtual coach; passive sensing through sensorband; all apps for risky drinking and excessive smoking included personalized feedback on drinking patterns and motives for drinking, feedback includes information about smoking and "urge-surfing" or strategies to increase student's emotional awareness. All apps were designed to provide education, collect data, monitor/track behavior, some provide personalized feedback or guidance in CBT exercises (in some cases homework assignments).

Few studies gave information regarding privacy and security. For example, Benton et al. (2016) referred that TAO security and privacy included authentication, password protection, and encryption of databases and Lee and Jung (2018) stated that data was collected and stored on secure systems and accessed through computers with password protection and encryption.

Methodological Quality

Tables 2, 3 resume the methodological characteristics of the included studies. Eleven studies are randomized controlled trials (RCT) (Witkiewitz et al., 2014; Gajecki et al., 2017; Harrer et al., 2018; Lee and Jung, 2018; Fish and Saul, 2019; Huberty et al., 2019; Bruehlman-Senecal et al., 2020; Flett et al., 2020; McCloud et al., 2020; Newman et

al., 2020; Ponzo et al., 2020) and two studies are considered quasi-experimental trials (Benton et al., 2016; Borjalilu et al., 2019). Four studies considered a singlearm pre-test-post-test study design (Jackson et al., 2016; Leonard et al., 2017; Haeger et al., 2020; Lattie et al., 2020; Reyes et al., 2020) and one study included two groups through an iterative process (Kazemi et al., 2018).

Eleven of the included studies are RCTs and the total sample size ranges from 72 to 330 college student participants; the overall duration of the intervention range from 14 days to 3 months and when we consider follow-ups, the longest trial lasted for 9 months. Most RCTs included as a control group a waiting list control trial (n = 8). Following JBI critical appraisal tool, we consider that all RCTs reported that participants were randomly assigned to treatment groups, 9 out of 11 studies provided detailed description of the randomization procedure and two studies merely stated that the participants were randomly assigned. As for allocation concealment, three studies provided information about allocation concealment. For example, Harrer et al. (2018) stated that the randomization process was performed by a researcher not involved in the study, and although they weren't able to blind participants to study conditions, during the randomization process, they were able to conceal the allocation from participants, researchers, and e-coches. Ten studies provided information and reported similar groups at baseline. As for blinding participants, or those delivering treatment and even outcome assessors to treatment conditions may be difficult and even unachievable in this type of studies; several studies reported this issue, pointing to the inability to blind their participants to treatment conditions. There were incomplete follow-ups; however they were generally adequately described and analyzed. Six RCTs provided detailed information about intention-to-treat analyses (ITT); the remaining studies excluded participants, lost to follow-up, from analysis. All studies used primary outcome measures with good validity and reliability. The large majority of RCTs also included quantitative and/or qualitative self-report measures to evaluate usability, acceptability, user satisfaction, or app adherence.

The studies by Benton et al. (2016) and Borjalilu et al. (2019) were considered as quasi-experimental studies. The first study included a large sample size (n = 1,241) with

overall duration of the intervention of 7 weeks. They included a wait-list treatment as usual control group and the intervention group received the intervention of study. The primary outcome measure was adequately validated and provided multiple measurements along the intervention as well as pre and post assessment. Differences between groups in terms of follow-up were adequately described and analyzed. This study presented many missing data and the linear mixed-effects models was utilized to estimate parameters for missing values. As for Borjalilu et al. (2019), they conducted a study with three conditions and 68 college students, who were randomly assigned into the three groups, but no further detailed information was given about the randomization process. There were pre- a post-assessments and follow up was complete. Outcomes were measured in a reliable way and participants, from both groups, were assessed in the same way.

In this review there is a significant number of a single group pre-test-post-test design studies that aimed to evaluate acceptability and feasibility; only one study (Jackson et al., 2016) aimed to evaluate efficacy with this design. Sample sizes were similar between studies, ranging from n = 10 to n = 23, with overall duration (intervention) of 3–4 weeks. Adequate and validated main outcome measures were used. The SEX101 (Jackson et al., 2016) had a larger sample size compared to the previous studies and a follow-up assessment of 3 months after intervention completion. However, the overall duration of the intervention was very small (pre-test and intervention had to be complete in 1 week and it takes 40 min to complete) and some outcome measures were developed by the researchers with few information regarding reliability.

Intervention Outcomes and Effect Sizes

A study conducted by Newman et al. (2020) assessed the efficacy of Lantern, a self-help mobile app to treat generalized anxiety disorder. Study results demonstrated a significant reduction on the DASS stress scores (d = 0.408) and greater probability of remission from GAD (d = 0.114). Lantern revealed moderate effects in reducing anxiety, stress, and depression. BioBase is a biofeedback self-guided mobile app combined with wearable device (BioBeam), to treat anxiety in college students. Ponzo et al. (2020) conducted a RCT to assess BioBase efficacy and results indicated that a 4-week

intervention significantly reduced anxiety (d = 0.67), depression (d = 0.99), and increased perceived well-being (d = 0.65) demonstrating moderate to large effects. Sustained large effects at 2-week follow-up was found for anxiety (d = 0.81) and perceived well-being (d = 1.16).

McCloud et al. (2020) conducted a RCT to assess efficacy of Feel Stress Free app for the treatment of depression and anxiety symptoms. Results showed that there was a significant reduction of depression symptoms at week 4 (d = 0.27) and week 6 (d = 0.39), and significant reduction of anxiety symptoms at week 4 (d = 0.58). Overall effect sizes ranged from small to moderate.

Bruehlman-Senecal et al. (2020) studied Nod, a mobile app designed to reduce loneliness during the transition to college. Their RCT results indicated significant condition-bybaseline loneliness interaction to predict week-4 depression (Np2 = 0.02) and sleep quality (Np2 = 0.04), suggesting that Nod buffered participants with higher baseline loneliness against heightened midquarter depression and poor sleep quality. Calm, is a mindfulness-based app, and its efficacy was tested among students with elevated stress. The study results of Huberty et al. (2019) found significant differences among conditions in all outcomes, namely, significant reduction in perceived stress (d = 1.24), significant improvements in mindfulness (d = 1.11), and self-compassion (d = 0.84).

Harrer et al. (2018) conducted a randomized controlled trial to evaluate the efficacy of Studicare Stress, a stress management intervention app for college students. Their results indicated significant effects of the intervention compared with the waitlist control group for stress at post-test (d = 0.69) and at 3-month follow-up, other secondary outcome measures also yielded significant effects such as anxiety (d = 0.76), depression (d = 0.63), college related productivity (d = 0.33), and academic work impairment (d = 0.34). Thus, Studicare Stress revealed moderate to large intergroup effects for the reduction of perceived stress and other health and college related outcomes.

Lee and Jung (2018) conducted a pilot study to evaluate efficacy of DeStressify, a mindfulness-based app on stress, anxiety, depressive symptomatology, sleep behavior, and other variables. Results indicated that when using the app during 4 weeks, students in the experimental group at post-test reported less trait anxiety (N2 p = 0.040); an

improve in several quality of life subscales, such as general health, that significantly differed between treatment condition in post-intervention scores (N2 p = 0.07). A significant difference was also found in energy or fatigue subscale between treatment conditions (N2 p = 0.05). An interaction effect was found in the emotional well-being subscale (N2 p = 0.05). The author interpreted the partial eta squared values of 0.0099, 0.0588, and 0.1379 as small, medium, and large effect, respectively, following suggestions by Cohen (Field, 2009). This indicates that we can verify small (trait anxiety) to medium effects for general health, energy or fatigue and emotional well-being.

Telecoach app (Gajecki et al., 2017) was evaluated using a 3- arm randomized controlled trial and results demonstrated that the proportion of students with excessive alcohol consumption declined in both intervention and wait list control group compared to controls at first and second follow-ups. Secondary analysis showed reductions for the intervention group in quantity of drinking at first follow up and in frequency of drinking at both follow-ups. Across both follow-ups the odds ratios for not having excessive weekly alcohol consumption in the intervention group (1.95) was almost twice as high as for controls (1.00). Secondary analysis by gender showed that the odds ratio for not having excessive alcohol consumption among men in the intervention group compared to male controls was higher (2.68) than women in the intervention group (1.71) compared to women controls.

Witkiewitz et al. (2014) conducted a 3-arm randomized controlled trial to evaluate a mobile feedback intervention for heavy-episodic drinking (HED) and smoking among college students, and they concluded that at 1-month follow-up there were significant reduction in number of cigarettes per smoking day in both the mobile intervention (d = 0.55) and mobile assessment conditions (d = 0.45) with moderate effects. No significant results were observed on HED or concurrent smoking and drinking. As for Benton et al. (2016) quasi-experimental study, the intervention group showed improvements across time significantly greater than treatment as usual participants, for all primary outcomes except Life Functioning (LF) subscale. The size of these effects ranged from small (d = 0.16) for LF, Global Mental Health and Well-Being (d = 0.20) to medium for Anxiety (d = 0.31).

Usability, Acceptability, and Feasibility Outcomes

The large majority of the included studies evaluated acceptability and students' satisfaction with the intervention. From the 19 studies, eight studies explored adherence/satisfaction and six used adequately valid scales or methods to assess usability or satisfaction with app use. Some studies also used metrics obtained through the mobile app (n = 2). Most studies, created their own items to assess satisfaction with the intervention. Overall, we could observe good retention rates across studies, however as Gajecki et al. (2017) specifically noted in there study, there is a possibility that their fairly high retention levels could result from the desire of some participants to win an iPad (reward to participate in the study) with no actual intention to use the app. Out of the 19 studies, 10 gave rewards to their participants.

All studies that evaluated satisfaction reported moderate to high client satisfaction with the intervention. The MtM app (Leonard et al., 2017) demonstrated that 60% of the participants reported "mostly" or "very" satisfied with the sensorband and 50% with the mobile app. Also, 93.9% of the participants were very satisfied or satisfied with the intervention program of SEX101 app (Jackson et al., 2016). However, this particular study produced large attrition rates (50%) and as the authors of this study noted information regarding app components that need to be improved, added or removed should be collected. In the Witkiewitz et al. (2014) EMA app, over 65% of the participants reported an increase in awareness of their drinking and/or smoking and 60% stated that they would recommend this study to a friend because it provided greater awareness and they could help a friend reduce their drinking and/or smoking. Kazemi et al. (2018) demonstrated good usability of SmartTrek and the best feature reported by students was "Games" and the most useful features was "know your BAC" and "My strategies" that monitored alcohol intake, created behavioral change plans and reminded them of their goals. None of the studies, that provided human support (therapists), explored acceptability and satisfaction of the therapist with the intervention.

Implications and Contributions of mHealth Interventions for College Students in Covid-19 Context

Covid-19 infectious disease emerged in China and rapidly expanded around the globe, leading to an unexpected pandemic, which completely changed our daily lives and significantly limited physical and social contact with significant repercussions to our physical and mental health. Specifically in college students that live in a constant and thriving social interaction, covid-19 pandemic had a strong negative impact on mental health and may have contributed to the increase of several preexisting barriers and limitations to college counseling services. Considering these restraints, mHealth interventions may play an important role in a pandemic context due to its ubiquitous, remote and innovative functionalities that may facilitate access to evidence base treatments for mental health and also, its provider and facilitator (therapist).

Taking into consideration the included studies and their characteristics, acceptability, satisfaction and efficacy outcomes, we may determine that these interventions can significantly contribute in several important aspects related to college students' mental health. To our understanding, mobile app technologies may significantly contribute to promote mental health in college students targeting several specific disorders, such as anxiety, stress, depression, smoking, and alcohol abuse. It is also attainable to support students with coping strategies for elevated stress, anxiety, smoking, and alcohol abuse. Through mobile technologies, therapists may monitor and keep track of their patients' symptomatology and well-being, check homework assignments, and contact their patients' regularly through chat or messages, remotely. Overall, mobile technologies provide spontaneous and remote access to app content whenever we want, particularly in the comfort of our home. It helps us maintain physical distance from mental health professionals and counseling services without interrupting treatment.

DISCUSSION

Summary of Evidence

Our search for studies addressing mobile health apps for college students in university settings gathered 19 studies with different conceptual frameworks and study designs. In this review we could verify an increase in studies using mobile interventions for college students over the years, particularly in the last year, which may indicate an

increasing trend in mobile use for the delivery of health interventions for college students. The large majority of studies are being developed in North America and Europe.

Regarding target disorders we can verify that most apps target anxiety, depression and stress, others target risky or excessive drinking, PTSD and sexual behaviors. Overall, mobile interventions showed promising results to reduce psychological symptomatology associated with stress, depression, anxiety and general student's mental health. As for drinking, smoking, and sexual behaviors, the included apps seemed to reduce excessive drinking and smoking and increase contraceptive use and knowledge but not the intention to reduce sexual risk behaviors or actual risk reduction. Most of the mobile interventions showed medium to large effect sizes for the main variables the app was designed to intervene, which may indicate that these interventions are well conceptualized and grounded according to the best available empirical evidence. Some of the included studies aimed to evaluate acceptability and feasibility and overall, these apps demonstrate good acceptability and feasibility among college students, supporting the hypothesis that students may accept and adhere to these interventions.

When we explore conceptual frameworks of these mobile apps we verify that many studies adopted CBT as the main intervention, particularly Mindfulness exercises. Effectively, CBT is well-established and particularly known as an effective treatment for several mental health disorders, and have demonstrated its efficacy when delivered through apps (Rathbone et al., 2017). In some studies the intervention was complemented with psychological models, which have been shown to increase intervention efficacy (Webb et al., 2010). Aside from psychological models/theories for behavioral change, one study incorporated a technological model, namely the Unified Theory of Use and Acceptance of Technology (UTUAT). There seems to be a strong application of psychological models and intervention techniques, indicating that there is a concern in adequately conceptualizing these interventions following evidence base principles. However, considering that we are studying mobile health interventions with significant emphasis in technology, very few studies incorporated technological models. Also, security and privacy features are also rarely mentioned and increasingly relevant in

this type of interventions, best practices should be known and shared, reflecting in a mobile app quality indicator.

Regarding therapist role in mobile interventions, only 4 studies incorporated human support, two studies included therapists and two studies included a trained psychology student. From the mentioned studies, one used the human accountability model to inform this support. We consider that even though most of these apps intend to reduce therapist time and subsequently reduce therapist caseload and overburdened, this process may be optimized and better conceptualized using human support models. Moreover, evidence shows that app based interventions with therapist support has shown to produce larger effects (Linardon et al., 2019).

As for methodological quality of the included studies, most studies aimed to evaluate efficacy and resorted to a randomized controlled trial, which is natural since RCTs are known as the golden standard to evaluate efficacy. All trials randomly assigned their participants to treatment conditions; however the number of studies that performed randomization concealment and blinding was almost non-existent. This reflects the difficulty of concealment and blinding in these type of studies and the limitation of the RCT study design when assessing efficacy in this type of interventions. Most studies also use a waiting list control group; given that many studies included students with elevated psychological symptomatology (that have to wait weeks/months to get access to the intervention) and the difficulty of blinding participants with this type of comparator we wonder if this is the best control group to use in this studies. Other research designs are also being explored in these studies and should be considered, so we can obtain efficacy results timelier and reliably (Clough and Casey, 2015a). Many studies adopted a pre-test post-test study design in order to evaluate acceptability and feasibility, even though this research design is considered a weak experimental study design, we consider that for the purpose and objectives of the studies this design was well applied. Good overall retention rates may indicate treatment feasibility and acceptability. However, most studies were of short duration, with small samples and in controlled settings, with the addition of significant rewards. Additionally, many outcome measures were self-reported and not always congruent with app adherence rates. User metrics

(e.g., how many times a participant accessed the app) provided by mobile apps may contribute to more accurate indicators of use and adherence to the intervention. Also, qualitative studies exploring perceived usefulness and user experience with the app intervention may also contribute to understand and overcome some barriers of adherence and engagement. Rewards are sometimes our best option to find participants, however when we are studying acceptability and adherence to these interventions, rewards may produce biased results. Recent studies opted to reward outcome measures completion, rather than app use.

A final question that emerged while exploring the studies is associated with the limited visual content of the apps included in the studies. Few studies included images/visual content of the mobile apps; some studies reported how they developed the app but provided little information about app design. A study by Torous et al. (2018) concluded that most mhealth apps suffer from low engagement and adherence and this may be, along with other issues, due to poor usability and because most apps are not user-friendly. It is important that researchers provide more frequently studies regarding user's needs and report multidisciplinary teams when building (native) apps, since this area often needs involvement of psychologists, software engineers, and designers/interaction designers. Also these tools, in clinical settings (e.g., counseling services), should be designed and optimized regarding all end users: students and therapists. Therapists' point of view and evaluation was often forgotten in the included studies that involved therapists.

Mobile apps may be customized and designed under practically unlimited possibilities. They can be developed to promote, prevent or intervene in a specific mental health disorder; to promote well-being and to deliver treatment under different levels of therapist support in different mental health services. Thus, they can be implemented and tailored according to specific needs. It is important to continue studying these interventions using user-centered designs and rigorous efficacy and effectiveness studies. We consider that universities, including college counseling services, may benefit from mhealth interventions, not only to address college student mental health but to decrease some of its difficulties related to few human resources. In a context of quarantine and

confinement at home, where physical and social distance is imperative, these interventions assume special importance. They facilitate mental health promotion and support therapist and patient contact at a safe distance, avoiding treatment interruption.

Limitations

The current review presents a major limitation since we limited our search scope to the mentioned databases. Registered clinical trials and commercially available apps in app stores were not included, thus we may have missed already developed or apps that are being currently studied for college students. We may have failed to identify studies with relevant information regarding the application of mHealth intervention in college settings when we didn't consider "young adults," since it may not include college students or occur in college settings.

CONCLUSION

The current systematic review shows that mobile apps for mental health intervention in college students exists and demonstrates good acceptability and feasibility. They also demonstrate efficacy among students. Overall we may conclude that mHealth interventions may turn out to be a great resource and tool to implement in counseling services, offering therapists and students many advantages. Particularly in the current pandemic context, these interventions demonstrate innumerous possibilities and promising solution to address college students' mental health and overcome many barriers associated with treatment access.

Future studies addressing mobile apps in college students, should invest in user-centered design studies so we can better understand what students and therapists (also attending university counseling services workflow) value more in a mobile based psychological intervention, to better adapt and tailor the intervention to user's needs. Effectively, acceptability and feasibility results among therapists are lacking in studies that use mobile intervention with therapist support. Future investigations should also explore diversity when developing and studying future apps, examining the applicability and efficacy of other theories/models. Also, we consider that studies should describe the development process of the mobile application (e.g., by including visual content) so we can better understand what is actually being evaluated and how it may impact efficacy

results, in terms of usability and design. Lastly, students are large consumers of technology and so it may be important to invest more in these interventions, doing larger studies with more students, with superior methodological quality and avoiding large monetary rewards.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

CO searched for studies to include in the systematic review and wrote sections of the manuscript. AP and PV revised the manuscript and contributed to the conception of the study. CN, JG, and BA contributed to organize data extraction and the search of studies in the scientific databases. All authors contributed to the manuscript revision, read, and approved the submitted version.

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Table 1 - Mobile Interventions Characteristics

Study	Disorder	Intervention	Conceptual framework	Techniques	Human Support
Nod Bruehlman-Senecal et al. (2020)	Loneliness Depression	Mobile application Self-guided	Positive Psychology; Mindfulness-based self-compassion; Cognitive Behavioural Therapy (CBT)	CBT skill building exercises; social skills; cognitive restructuring; mood-rating tool	No
BioBase Ponzo et al. (2020)	Anxiety Depression	Mobile application + wearable band (BioBeam) Self-guided	CBT; mindfulness; biofeedback; behavioural activation theory	Psychoeducation; mood tracking via EMA; passive data collection (physical exercise, sleep quality and heart rate) obtained via BioBeam wearable band; respiration biofeedback (deep-breathing tool).	No
Lantern Newman et al. (2020)	Generalized Anxiety	Mobile application Self-guided	CBT; adapted from evidence-based psychotherapy program for GAD (Newman et al., 2014).	Psychoeducation; automatic thoughts; cognitive reframing; exposure; mindfulness.	Yes. Coach with various educational backgrounds (e.g. clinical psychology, marriage and family therapy, health

				coaching).	
Feel Stress Free McCloud et al. (2020)	Anxiety Depression	Mobile application Self-guided	CBT	Behavioural relaxation activities (calm breathing, mindfulness-style meditation, deep muscle relaxation, self-hypnosis); mood tracking; thought challenging;	No
Headspace Flett et al. (2020)	Distress	Mobile application Self-guided	Mindfulness	Meditation; mindful breathing, body scan, sitting meditation, practice of non-judgement of thoughts.	No
Calm Huberty et al. (2020)	Elevated Stress	Mobile application	Mindfulness meditation; Octalysis Framework; Self-determination theory (SDT);	Meditation; gamification.	No
ACT daily Haeger et al. (2020)	Anxiety Depression	Mobile application	Acceptance and Commitment Therapy (ACT);	Training on four ACT components: acceptance; cognitive defusion; present moment awareness; values connection; ecological momentary assessment (EMA)	No
PTSD	PTSD	Mobile	ACT	Audio-guided mindfulness	No

smartphone-app mindfulness Reyes et al. (2020)		application		meditations; video lessons based on ACT principles;	
IntelliCare for College Students Lattie et al. (2020)	Depression Anxiety	Mobile application	Eclectic (e.g. ACT, CBT, positive psychology, problem-solving therapy)	Mood rating and mood journal tool: allowed mood rating; calendar tool: history of their mood rating and journal entries; weekly symptom check: personalized feedback; short psychoeducational lessons; suite of interactive skill-focused IntelliCare apps	No
Headspace Fish & Saul (2019)	Depression	Mobile application	Mindfulness	Guided mindfulness meditation	No
Aramgar Borjalilu et al. (2019)	Stress	Mobile application	Mindfulness-based stress reduction (MSBR);	Mindfulness skills (i.e. mindful practice, eating, breathing; body scan; managing thoughts; kindness practice);	No

StudiCare Stress Harrer et al. (2018)	Elevated Stress	Internet + mobile application	Web-based GET.ON Stress – Program; CBT; Lazarus transactional model of stress; Human Accountability Model	Problem-solving strategies; emotion regulation strategies; psychoeducation: Students' specific topics; homework assignments (app); self-monitoring (app); automatic daily messages containing short motivational prompts and ultrabrief training exercises;	Yes. Trained student in a master's program in Psychology (eCoach). Contact solely established online with no face-to-face meetings.
DeStressify Lee & Jung (2018)	Stress Anxiety Depression Sleep quality Quality of life.	Mobile application (commercially available app).	Mindfulness	Mindfulness exercises: grounding visualization, gratitude, imagining the life you want, and finding meaning;	No
SmarTrek Kazemi (a) et al. (2018)	Risky drinking	Mobile application	Motivational interviewing; Ecological Momentary Intervention (EMI).	Self-monitoring; psychoeducation; incentives for behavioural changes; interactive Games; know your BAC (blood alcohol content); virtual coach: fully automated and sends daily text messages; personalized feedback;	No
Mind the	Alcohol consumption in	Mobile application (with	Ecological momentary intervention (EMI)	Personalized feedback;	Yes.

moment (MtM) Leonard et al. (2017)	female college students	integrated sensorband for Electrodermal activity).	integrated with a wearable sensorband; Motivational interviewing; CBT; Unified Theory of Use and Acceptance of Technology (UTUAT).	Emotion regulation strategies (e.g. controlled breathing, mindfulness meditation and individually-identified strategies (i.e. listening to music or exercise).	2 in-person brief counselling sessions with clinician.
Telecoachapp Gajecki et al. (2017)	Alcohol consumption	Mobile application (web-based).	CBT; Skills training to reduce excessive alcohol consumption;	Registration of alcohol consumption; relapse prevention skills; risk situation analyses or refusal exercises; relaxation exercises; positive thought exercises; urge surfing training.	No
Therapist assisted online (TAO) Benton et al. (2016)	Anxiety	Internet + mobile application	CBT	Interactive online educational modules based on CBT; Mindfulness exercises; Exposure exercises; weekly text messages for support and encouragement; homework assignments (app); summary of clients' activities and BMH-20 scores in dashboard screens (for therapists).	Yes. Weekly 10-12 minute videoconference with a therapist.
SEX101 Jackson et al.	Sexual Behaviours	Mobile application (Web-based)	Theory of Reasoned Action (TRA); Theoretical Model (TTM) of	Four separate modules: condom use; contraceptive use; sexual partner relationships and alcohol	No

(2016)			behaviour Change	use. Modules provided: general information, quizzes, brief scenario-based videos and comparison statistics on peer sexual norms to address attitudes and subjective norms for each behaviour (condom use, contraceptive use etc.); skill building exercises (e.g. quizzes, games).	
Mobile feedback intervention for heavy drinking and smoking Wietkiewitz et al. (2014)	Heavy-episodic drinking (HED) and smoking	Mobile application	Brief Alcohol Screening and Intervention for College Students (BASICS); CBT; Mindfulness	Personalized feedback; feedback about smoking and "urge-surfing"; mindfulness-based relapse prevention.	No

Table 2 - Methodological Characteristics

Study	Country	Design	Comparator	Sample size	Primary outcome measures	Intervention duration	Main Results	Main findings
Nod Bruehlman-Senecal et al. (2020)	USA	RCT	IG vs. WLG	N=221 First-year college students	Loneliness UCLA-8; Generalized Anxiety Disorder Scale (GAD-7); Patient Health Questionnaire (PHQ-9).	4 weeks Follow-up at week 8. 4 assessment points: baseline; week 2; week 4; week 8.	Significant condition-by-baseline loneliness interaction to predict week-4 depression (p=0.2, Np^2=.02) and sleep quality (p=.004, Np^2=.04)	Nod presented benefits for first-year college students with elevated risk (e.g. loneliness and depression) by buffering from heightened mid-semester loneliness and depression.
BioBase Ponzo et al. (2020)	UK	RCT	IG vs. WLG	N=262; Students with elevated	State-Trait Anxiety Inventory-short version – 6 item	4 weeks Follow-up at week 6	Significantly reduced anxiety at week 4 (p=<.001, d=67), with sustained effects at	There is evidence to support the efficacy of BioBase in

				anxiety and stress	(STAI-S-6);	4 assessment points: baseline, week 2; week 4; week 6.	a 2-week follow-up (*p*=<.001), *d*=0.81); Increased perceived well-being at week 4 (*p*=.001; *d*=0.65) and follow-up (*p*=<.001, *d*=1.16); Significant reduction in depression was found at week 4 (*p*=<.001, *d*=0.99)	reducing anxiety and increase perceived wellbeing in university students.
Lantern Newman et al. (2020)	USA	RCT	IG vs. No treatment control group	N=100 Students with self-reported GAD.	Generalized Anxiety Disorder Questionnaire for DSM-IV (GAD-Q-IV); Depression Anxiety Stress Scale (DASS stress)	3 months Follow-up at 9 months 3 assessment points: baseline; 3 month and 9 month.	Reduction on the DASS stress (*d*=0.408); Greater probability of remission from GAD (*d*=0.114); From those who remitted at post-	Preliminary support of efficacy of a smartphone-based guided and self-help intervention for the treatment of some GAD symptoms in

							treatment, 78.6% remained remitted.	college students.
Feel Stress Free McCloud et al. (2020)	UK	RCT	IG vs. WTG	N=168 Students with anxiety and/or depression symptoms	Hospital Anxiety and Depression Scale – Anxiety subscale (HADS-A) and Depression subscale (HADS-D);	4 weeks Follow-up at 6 weeks 4 assessment points: baseline; week 2; week 4 and week 6.	Week 6: reduced depression symptoms (p=00.6; d=0.39); Week 4: reduced depression symptoms (p=.04; d=0.27); reduced anxiety symptoms p=.001; d=0.58).	Feel Stress Free app demonstrates preliminary evidence of effectiveness in reducing symptoms of anxiety and depression.
Headspace Flett et al. (2020)	Australia – New Zealand	RCT	IG vs. WLG	N=250 First year students	Kessler Psychological Distress Scale (K10);	3 months; 3 assessment points: beginning of semester 1; beginning of semester 2; end	Weak evidence support of improvements in psychological distress over time. Participants in the IG who used the	Headspace app was associated with small improvement in distress and college adjustment.

						of academic year.	app more frequently reported improvements in psychological distress (-5 points, R^2 change=.12) and college adjustment (+10 points, R^2change=.09).	
Calm Huberty et al. (2020)	USA	RCT	IG vs. WLG	N= 88 Students with perceived elevated stress.	Perceived Stress Scale (PSS-10); Mindfulness; Self-compassion;	8 weeks Follow-up at 12 weeks 3 assessment points: baseline, week 8 and week 12.	Significant differences in all outcomes: stress, mindfulness and self-compassion (all p<.04). Effects persisted at follow-up (all p<.03). Effect sizes ranged from moderate (d=0.59) to large (d=1.24).	Mindfulness meditation delivered through Calm app is effective in reducing stress and improving mindfulness and self-compassion in college students suffering from elevated stress.

ACT daily Heager et al. (2020)	USA	Single-arm pre - posttest design	IG	N=11 Students suffering from anxiety and depression on the waiting list of college counselling centers (CCC)	Depression, Anxiety and Stress Scale (DASS);	2 weeks 2 assessment points: baseline and week 2.	Significant improvements in depression (g=1.08), anxiety (g=0.73), stress (g=0.81), psychological flexibility (g=0.64) (all p<.01). System usability ratings were within "excellent" range (M=90, SD=0.66)	Results support that ACT daily is acceptable and usable as a self-guided intervention for depressed and anxious students waiting for therapy in CCC.
IntelliCare Lattie et al. (2020)	USA	Single-arm pretest-posttest design	IG	N=20 College students with and without elevated symptoms of depression and anxiety	Patient Health Questionnaire (PHQ-9); Generalized Anxiety Disorder questionnaire (GAD-7); Qualitative user	8 weeks 3 assessment points: baseline, week 4 and week 8.	Significant improvements in Anxiety literacy (*p*=.045) and in the frequency with which participants used both cognitive (*p*=.04) and behavioral (*p*=.03) coping skills.	IntelliCare app for college students was considered usable and engaging.

					feedback;		High retention rate; High degree of usability.	
PTSD smartphone-app mindfulness Reyes et al. (2020)	USA	Single-arm pretest-posttest design	IG	N=23 Veteran students with PTSD symptoms	Connor-Davidson resilience scale (CD-RISC); PTSD checklist for DSM-5 (PCM-5);	4 weeks 3 assessment points: baseline, week 2 and week 4.	Significant increase in mean resilience (p<0.05) and mindfulness scores (p<0.001) and decrease in experiential avoidance, PTSD and rumination scores across assessment time points (all p<0.001). High levels of intervention satisfaction and usability;	Significant changes in resilience, mindfulness, PTSD, experiential avoidance and rumination.

Headspace Fish & Saul (2019)	USA	RCT	IG vs. WLG	N=72 College students	Patient Health Questionnaire (PHQ-9);	2 weeks 2 assessment points: baseline and week 2.	Significant interaction of group by time for depression (p=0.021) Within-subjects (p=<.001) and between-group analyses (p=0.008) showed a significant decrease in depression severity scores .	A gamified mindfulness meditation app significantly decreased depression symptom severity among college students.
Aramgar Borjalilu et al. (2019)	Iran	Quasi-experimental trial	IG vs. face-to-face therapy +app vs. face-to-face therapy only	N=68; College students	Depression, anxiety and stress scale (DASS-21)	6 weeks 2 assessment points: baseline and week 6.	Significant difference in the mean reduction of depression, anxiety and stress between conditions (all p<0.001).	Results suggested that intervention through the blended therapy was more influential on mental health

							Group 2 (Blended intervention) had the greatest mean score reduction on stress, depression and anxiety among the three groups.	(stress, depression and anxiety) compared with the other two groups.
StudiCare Stress Harrer et al. (2018)	Germany	RCT	IG vs. WLG Both conditions had full access to treatment as usual (TAU).	N=150 College students with elevated levels of stress	Perceived Stress Scale (PSS-4);	7 weeks Follow up at 3 months after baseline. 3 assessment points: baseline, week 7 and 3 month.	Significant effects of the intervention compared with the waitlist control group for stress (*d*=0.69), anxiety (*d*=0.6) and other outcomes after posttreatment. Effects were sustained at follow-up.	Internet and mobile-based interventions may be an effective approach to reduce symptoms of stress and other health and college related outcomes, as well as symptoms of depression.
DeStressify	Canada	RCT	IG vs. WLG	N=163;	Perceived Stress	4 weeks	Reduced trait	Mindfulness-

Lee & Jung (2018)				College students	Scale (PSS-10); Stait Trait Anxiety Inventory (STAI); Quick Inventory of Depressive Symptomatology Self-Report (QIDS-SR);	2 assessment points: baseline and week 4.	anxiety *(p*=.17, np^2=.01), and improve general health (*p*=.001, np^2=.07), energy (*p*=.01, np^2=.05), emotional well-being (*p=*.01, np^2=.05).	based apps may be an effective alternative to support university's student's mental health.
SmartTrek Kazemi (a) et al. (2018)	USA	2 Groups run sequentially through theater testing.	Single-arm pre-posttest design	N=10 College students	The readiness ruler; Daily Drinking Questionnaire (DDQ); Usefulness, Satisfaction and Ease of Use (USE).	1 week for Group 1 2 weeks for Group 2 2 assessment points: baseline and post intervention.	6 in 10 participants reported that the app had a positive effect on their drinking less. Good app usability. Games were considered to be the best feature and Daily log, Coach and Personalized Feedback as the	Most of the participants agreed that SmarTrek was easy to use and the information provided was useful and had a positive effect on decreasing their drinking.

							most useful features.	
TeleCoach app Gajecki et al. (2017)	Sweden	3-arm RCT	Assessment-only control group vs. IG vs. WLG	N=330; Students with excessive alcohol consumption	Daily Drinking Questionnaire (DDQ); The Alcohol Use Disorders Identification Test (AUDIT);	6 weeks 3 assessment points: baseline; week 6 and week 12.	Proportion of students with excessive alcohol consumption declined in both intervention and wait list group compared to controls at first (p<0.001) and second follow-ups (p=0.054). Reductions in the intervention group in quantity of drinking at first follow-up (p=0.037) and in frequency of drinking at both follow-ups (p=0.034).	The app demonstrated potential for reducing excessive alcohol use among college students.

Mind the Moment (MtM) Leonard et al. (2017)	USA	Single-arm pretest-posttest design.	IG	N=10 Non treatment seeking college students with risky drinking	Alcohol Use Disorders Identification Test – Consumption (AUDIT-C) Physiological measures: Electrodermal Activity (EDA) through sensorband.	3-4 weeks 2 assessment points: baseline and 3-4 week.	High levels of acceptability. Qualitative findings indicate that sensorband-elicited alerts promoted an increase in awareness of thoughts, feelings and behaviors related to environmental stressors and drinking behaviors.	These interventions have great potential to individualize behavioral interventions to reduce problem drinking and other health behaviors.
Therapist assisted online (TAO) Benton et al. (2016)	USA	2-arm non-randomized controlled trial	IG vs. TAU	N=1,241 Students with moderate levels of anxiety	Global health measure (GHM)	7 weeks Assessment points: baseline and 7 weekly assessments.	TAO scores were significantly greater than treatment-as-usual scores. Improvements across time were significantly greater for TAO than treatment-as-usual participants. Effect	This study indicates that TAO may be an effective treatment for anxiety disorders with a positive influence on an overburdened

							sizes range from small (LF *d*=016, GMH and well-being *d*=0.20), to moderate (anxiety *d*=0.31).	practitioner and treatment center.
SEX101 Jackson et al. (2016)	USA	Single-arm pretest-posttest design	IG	N=118 College students	Sexual health knowledge (developed by the researchers) to assess knowledge.	1 week Follow-up at 3 months after intervention completion. 2 assessment points: baseline and follow-up at 3 month.	Ninety-six percent (N=114) of the participants showed an increase in contraceptive use knowledge from pretest to posttest (*p*=.013). There was no statistically significant change in intention to reduce sexual risk behaviors or actual risk reduction. Most participants (93.9%) were very satisfied or satisfied with the	A brief and theory-driven mobile app intervention to decrease sexual risk behaviors among college students may be effective in increasing knowledge and attitudes about contraceptive use.

							intervention program suggesting good acceptability.	
Mobile feedback intervention for heavy drinking and smoking Wietkiewitz et al. (2014)	USA	3-arm RCT	IG vs. daily monitoring vs. minimal assessment control.	N=94 Non-treatment seeking college students	Daily Drinking questionnaire (DDQ); Daily Smoking Questionnaire (DSQ); Young Adult Alcohol Problems Screening Test (YAAPST); Ecological Momentary Assessment (EMA) Measures.	14 days Ecological momentary assessment (EMA) (monitoring period) Follow-up assessment 1 month after the monitoring period.	At 1-month follow-up there were significant reductions in number of cigarettes per smoking day in both the mobile intervention (*d*=0.55) and mobile assessment conditions (*d*=0.45). Mobile intervention group showed lower likelihood of any drinking during the intervention.	Results provide initial evidence that mobile assessment could be effective in reducing smoking among college students. It also provides initial data supporting feasibility and acceptability of the mobile intervention.

Table 3 - JBI Checklist for randomized controlled trials

	JBI Checklist	studies
1.	Randomization	11/11
2.	Allocation to treatment groups concealed	3/11
3.	Treatment groups similar at baseline	10/11
4.	Participants blind to treatment assignment	0/11
5.	Those delivering treatment blind to treatment assignment	1/11
6.	Outcome assessors blind to treatment assignment	0/11
7.	Treatment groups treated identically other than the intervention of interest	10/11
8.	Follow-up complete, and if not, were differences adequately described and analyzed	9/11
9.	Participants were analyzed in the groups in which they were randomized	6/11
10.	Outcomes measured in the same way for treatment groups	11/11
11.	Outcomes measured in a reliable way	11/11
12.	Appropriate statistical analysis	11/11
13.	Appropriate trial design, and any deviates from the standard RCT accounted for in the conduct and analysis of the trial	11/11

Estudo 1.2 - Social anxiety mobile application to enhance university psychological services

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Social Anxiety Mobile Application to Enhance University Psychological Services

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Abstract

Social anxiety is a persistent and extremely debilitating anxiety disorder that has a profound negative impact on quality of life, relationships, and social functioning. There is evidence that suggest social anxiety prevalence among university students, which is preoccupying since this disorder is associated with premature school dropout and academic underachievement. University Psychological Services has played an important role in helping students suffering from mental health. Nevertheless, scientific research indicate that traditional therapies can be enhanced using technology devices such as, for example, smartphones and its software applications. A mobile application is being developed in Higher Education settings, and its main goal is to enhance current face-to-face Cognitive Behavioral Therapy, by improving engagement and adherence to treatment in students with Social Anxiety Disorder. This application includes novel features, which can become valuable resources for both the patient and the therapist. The present study addresses the initial steps of this mobile application construction regarding main features and theoretical considerations based in scientific evidence. In future studies, we intend to include design considerations and evaluate the efficacy of this mobile application.

Keywords: Social anxiety; Mental health; Traditional therapy; Disorder

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Introduction

Social anxiety is an extremely debilitating anxiety disorder, marked by an excessive fear of negative evaluation in social situations [1]. There are studies that suggest the prevalence of social anxiety among university students [2,3], which is preoccupying since this disorder is frequently associated with the tendency to premature school dropout and academic underachievement [4,5]. This disorder has also a profound negative impact on quality of life, social functioning, family life and relationships [4]. So, it is of extreme importance to develop interventions that support more efficiently students with social anxiety, especially, in educational settings, to prevent premature school dropout. University Psychological Services emerged to promote mental health among university students, and typically delivers traditional face-to-face therapy. Particularly, Portuguese university psychological services exhibit frequently long waiting lists and few human resources [6].

Cognitive behavioral therapy for social anxiety

Regarding the treatment of social anxiety, Cognitive Behavioral Therapy (CBT) is considered the most effective therapeutic approach [7-9]. Clough et al. [10] indicate that although traditional therapies show perceived success, there is still a need for improvement, factors such as poor engagement, patient dropout, and homework compliance, may reduce the effectiveness and success of treatment. Specifically, homework assignments between sessions are a core ingredient in CBT, and may influence treatment outcome [7]. They contribute to evaluate a patient progress and to better manage treatment, in current traditional therapy this is made with pen and paper, which can be very inconvenient and may keep patients from adhering to treatment [11]. Lebeau et al. [12] suggests that improving homework compliance may potentially be a highly practical and effective way to improve clinical outcomes in CBT.

Technology based interventions

Technology based interventions may help traditional therapy overcome certain limitations, by offering new, appealing, interactive, and innovative ways to deliver treatment, especially for young university students, that are very comfortable with technologies such as computers and smartphones, and use them frequently [13,14]. Mobile technologies, particularly smartphones, with its great compute capacity and the

advantage of mobility will allow the user a fast, efficient, appealing, and accessible contact to the information, through software applications[14]. According to Clough et al.[16]smartphonesmay be able to enhance considerably face-to-face therapies, offering many advantages to researchers and clinicians. Effectively, over time there has been an increased interest of academics and clinicians regarding mobile phone as a potential mean of delivery of behavior and health interventions [17] and to enhance existing psychological services [18,19]. Internet based treatment could motivate individuals with social anxiety to seek help since they may feel less embarrassed and feel less under scrutiny [5].

Technology based CBT for social anxiety

Technology assisted psychological interventions were developed in order to increase treatment efficacy and overcome certain barriers regarding access, acceptance and implementation of existing treatments [20]. CBT is a very structured intervention and typically implemented in a sequential format, and so it is considered well suited for the delivery of technology based treatment [21]. Several studies suggest the efficacy of technology based CBT for social anxiety [20] and the same happens for mobile technologies [22-24], even though studies in this field for social anxiety are still very few. There are also studies that suggest ICBT superiority over other therapies based on technology, such as Acceptance and Commitment Therapy and Interpersonal Therapy [22,24]. There are also very few studies in this area with young adults, even though they are known to adhere more easily to new technologies, such as smartphones [17,25]. Research about the efficacy of technology based interventions are very common, however, few studies explored the role of technology as an adjunct to traditional therapy. A study involving people suffering from major depression concluded that a blended treatment approach may treat nearly twice as many patients by using a smartphone application as add-on [25]. Given the research conducted we consider of extreme importance the development of a mobile application as an adjunct to therapy, in university settings, that will support not only the patient, but also the therapist. Particularly in Portugal, to our knowledge there is no published study that evaluates the efficacy of a mobile application for social anxiety, as an adjunct to CBT intervention for university students attending University Psychological Support Services. So, our main goal

is to contribute to this area by developing a prototype of the app that will facilitate the success of the psychotherapeutic intervention, by promoting an increased engagement and adherence of patients to treatment. We also expect this application to serve as a valuable tool for the therapist, allowing him to better manage his interventions/ appointments.

Social Anxiety Mobile Application

General description

A mobile application is being developed for university students, with social anxiety, attending University Psychological Support Services. The app is going to function, between sessions, as an adjunct to traditional face-to-face CBT, and its main goal is to enhance social anxiety treatment, by increasing patient engagement and adherence to homework and therapy in general. In the present moment, developing this exploratory version, there are two teams leading the project, one team of psychologists and the other one of electronic engineers, specialized in mobile computing. The latter, are now on the process of building the mobile app. The team of psychologists are now interviewing therapists and patients to better consolidate and decide feature preferences and content that will be introduced in the application.

Structure of the mobile application

After regular first sessions proceedings, like for example evaluation, and an established diagnostic of social anxiety, the therapist will provide an access key to the patient, that will allow him to access the application. The patient will acquire the application, that will be available in the mobile application store, and then after installing and signing in with the access key, the patient has immediate access to the content of the application. Structurally, the content integrating the application will be divided by modules, that will be given access to the patient as he progresses in treatment. This application will be structured according to CBT protocol for social anxiety. The main modules include, psychoeducation; registration of thoughts, emotions, and behaviors; relaxation techniques; social skills training and exposure exercises.

a) Psychoeducation module: In this module, the patient will be provided with videos addressing social anxiety psychoeducation.

b) Registration of thoughts, emotions, and behaviors module: Patients will be able to register their thoughts, emotions and behaviors through text or audio regarding their day-to-day most relevant social interactions.

c) Relaxation Techniques module: This module will include audios and videos of relaxation techniques. That is, it will have a video explaining abdominal breathing, and audios guiding through a progressive muscular relaxation (PMR). This module will allow the patient to practice consistently PMR, so he can later move on to applied relaxation, this is a combination of general techniques of PMR and gradual exposure to feared situations [27] to help individual effectively cope with anxiety-evoking situations [28]. The applied relaxation will probably be applicable when exposure module is enabled.

d) Cognitive restructuring module: In cognitive restructuring the therapist works with the patient to identify negative automatic thoughts, and then they work on the validity of the patient's belief system, this will allow the patients to modify their habitual negative beliefs of social situations [7]. This module will provide patients with content about negative automatic thoughts, and encourage them, between sessions, to regularly make a list of these thoughts as they arise. Given the content and what he learned in therapy, the patient will then be encouraged to challenge these negative thoughts.

e) Social skills training module: Social skills training typically involves teaching and practicing social skills, this is accomplished with a combination of modeling, behavioral rehearsal, corrective feedback, and positive reinforcement [27]. The main goal of this module is to reinforce social skills acquired in session. Consequently, the therapist will configure this module with exercises given in session, and then ask the patient to practice between sessions, guided by the app.

f) Exposure module:

a) Registration of the most feared situations: Exposure begins by creating a rank-ordered list of the most anxiety-evoking social situations. This module allows the patient to make this list between sessions, and then in posterior sessions this list and related details, may be discussed with the therapist.

b) Exposure diary: This module will also allow the patient to record just about everything about their experience related to exposure exercises.

These modules will be sequential, although modules a) b) and c) will probably be provided to the patient after his first access to the application. The modules may be reconfigured and customized, by the therapist, throughout the intervention. In sessions, the application will allow the patient to review with the therapist the information he registered, and discuss main difficulties. He will also be able to self-select goals, and track his achievements through the application. This is, in the end of therapy, both therapist and patient may elaborate simple and realistic goals, related to the module in progress that may be achieved until the next session. For example, until the next session, the patient is encouraged to listen to relaxation exercises at least 4 times in a week, one time each day. Every time he accomplishes an assignment, it will be registered in the application, and so he can track his achievements.

Main features

As already mentioned, the application will include text, videos, and audios. We intend to make our own videos and audios, for example, we plan to make a video demonstrating abdominal breathing, and a few records guiding through a progressive muscular relaxation. Text is a normal and simple feature that we plan to use it frequently, because it can blend more naturally in a public setting. Notifications are another feature inherent to this application. Patients will be regularly reminded and invited to access the app, and practice recommended exercises. We are developing a set of specific notifications for each module and simple notifications for the app in general. These notifications will include specific reminders, for example, if the patient haven't accessed the app in 4 days, a notification will be sent inviting him to use the app. This feature is something that must be discussed with the patient as he can find notifications intrusive. Specific content of the notifications need to be subtle and objective, so that no one may identify the individual as a patient, just by the notifications. Privacy is something that we plan to refine extensively in this application, transmitting security and confidentiality along the therapeutic process. Patients will only have access to this application with an access key, and only be identified by the app system with a number or a user name created by them. Another main feature, and in our perspective one of the most important and unique, is the therapist platform. This is a platform that will be constantly connected

to the application, and will receive instantly all the information that the patient registers in the application. The therapist will also have access to the information regarding how many times the application was accessed during each day, and if the patient used the app. Electronic engineers are working on an application feature that allows the therapist to know if the patient accessed the application content, and engaged attentively.

Overview of Main Advantages for Patients and Therapists

From the patient perspective, the main goal of this app is to turn CBT exercises between sessions more appealing and interactive, and so promoting greater patient adherence to homework. This is a very important component of CBT, where the patient practices CBT exercises, between sessions, recommended by the therapist. Therefore, patients will be regularly reminded, through notifications, to use the application and they will be guided by the app when doing the exercises. Therefore, we expect that they will more frequently do homework assignments and practice more of these exercises. Consequently, everything they learned in previous sessions will be reinforced, allowing them to better develop their skills to be independent and autonomous when practicing these exercises in their day-to-day lives. This may lead to more productive sessions, a more intensive and deeper intervention, and may also reduce the number of sessions stipulated for the intervention. From the therapist point of view there will be a considerable advantage for treatment, especially because there will be instantaneous access to the information that the patient provides through the app. This will allow the therapist to better prepare the next sessions and to better manage the therapeutic session, he will not occupy more time by doing homework with the patient in session, or reviewing other CBT exercises given in earlier appointments. This will also provide the therapist with real context information from the patient, and so it will give him more instant and reliable information to discuss in the next session. By better organizing and managing his interventions, the therapist will save time and give more use of the time given to previous sessions. We consider that these advantages may lead to improvement of treatment efficacy.

Conclusion

We believe that an application of this nature would be an asset to psychological services, particularly in Portuguese University Psychological Support Services, where

waiting lists are frequently long, and human resources are scarce [6]. Social anxiety is a persistent and very debilitating disorder that has tremendous negative impact, especially in young university students who wish to thrive in an academic context.

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Estudo 1.3 - A social anxiety mobile-based CBT intervention for college students and therapists: theoretical framework [submetido no *International Journal of Human-Computer Studies*]

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1. Introduction

Social anxiety disorder (SAD) is a debilitating disorder, marked by an intense anxiety and fear of negative evaluation in social situations (American Psychological Association, 2013). Research suggests a high prevalence of SAD among college students (Boukhechba et al., 2018; Tillfors & Furmark, 2007) with prevalence rates ranging from 10 to 33%, compared to 7 to 13% in the general population (Russell & Shaw, 2009). This is worrisome since social anxiety in college students is frequently associated with low quality of life, premature school dropout and low academic achievement (Brook & Willoughby, 2015; Fehm et al., 2005). Universities have specific counselling services that constitute a valuable resource for students with different psychological needs or difficulties (Spooner, 2000). However, these services often provide limited resources to face an increasing demand (Johnson & Kalkbrenner, 2017; Lee & Jung, 2018; Shaw et al., 2017) leading, for example, to an increased counselor caseload and decreased session frequency (Shaw et al., 2017). mHealth interventions may be a promising and interesting solution to deal with these challenges, enabling easy access to mental health interventions in one's everyday routine.

mHealth is defined as the use of mobile technologies to deliver or support psychological or mental health interventions and includes mobile devices such as smartphones, tablets, Personal Digital Assistants, and wearable devices (Alyami et al., 2017; Clough & Casey, 2015). In clinical settings, mHealth may enhance face-to-face treatments by increasing patient engagement in therapy sessions and adherence to therapy principles, providing better use of clinician time and resources, improving treatment outcome, and lowering the risk of relapse (Clough & Casey, 2015). Other major advantages are their ability to monitor symptoms, behaviours and mood in the moment, to facilitate in vivo exposure, or to provide information and support when, for example, anxiety triggering situations occur (Olff, 2015). According to Wilansky et al. (2016) mobile applications may increase youth adherence to Cognitive Behavioral Therapy (CBT) and improve treatment outcomes. Specifically in the case of college students, using mHealth may be appealing since they are more technology oriented, communicate frequently online and many express interest in and preference for web based mental health

resources and services (Shaw et al., 2017). The number of mhealth interventions in college settings has been raising and Johnson & Kalkbrenner (2017) concludes that mhealth is being used in college settings with increased popularity.

According to Webb et al. (2010) there are three intervention characteristics that may influence the impact on behavior, namely, theoretical basis of the intervention, behavior change techniques and mode of delivery. Thus, to develop such interventions, researchers often resort to behavioral theoretical models (Wang et al., 2017; Webb et al., 2010) and one of the most recent model sustaining the development of mobile interventions is the behavioral intervention technologies model (BIT Model; Mohr et al., 2014). The BIT model defines the conceptual and technological architecture of a BIT and intends to combine behavioral principles into technological features to help bridge behavioral science and technology (Mohr et al., 2014). Since these technologies are more often used and more effective when delivered with human support (Schueller et al., 2017), tending to be more efficacious than self-guided interventions (Andersson & Cuijpers, 2009), the supportive accountability model and the efficiency model of support (Schueller et al., 2017) emerged. Effectively, Torous et al. (2018) suggests that apps should strengthen the therapeutic relationship rather than disrupt or replace it.

The current paper addresses the process of developing a technological system to support psychological intervention in a university counselling center for college students with social anxiety. This technological system main component is a mobile app (SPICA) that is intrinsically linked to a Web database platform, which can only be accessed by a therapist. Our developing process included two studies, with different aims: Study 1 was performed to inform and substantiate study 2. Thus, Study 1 aims to characterize social anxiety symptomatology and explore mobile app usage and preferences in a Portuguese sample of college students with and without social anxiety symptomatology; additionally it also intends to explore the subjective opinion of students attending therapy regarding acceptability and potential adherence to a mobile application to support treatment, between sessions. Study 2 aims to provide a description of the development process, structure and features of a mobile-based intervention for social anxiety; such process was based on findings from study 1 and published scientific literature in this area.

Study 1: Social anxiety in college students and reported interest of students attending therapy in using a mobile application to support treatment

2. Materials and Methods

2.1 Participants

The current study included a non-probabilistic sample of 296 university students, 77% (n=228) of which were female, and 23% (n=68) were male. The participants presented a mean age of 22.09 years (*SD=5.07*). Most of the participants are single (94.6%) and attending an undergraduate or bachelor's degree (77.2%). A subsample of 8.8% (n=26) of these students were attending therapy at the time of data collection.

From the total sample we created 3 study groups: 11.3% (n=34) are students presenting SAD symptomatology (G1); 78.1% (n=236) correspond to students without SAD (G2) and 8.8% (n=26) are students attending therapy (G3), which was subdivided into students attending therapy with and without social anxiety. Sociodemographic characteristics of each group are in more detail in [see appendix 1 - Table 1].

As for G3, students who reported attending therapy, are predominantly female (76.9%), single (93.8%) and in an undergraduate (65.6%) or master's degree (31.2%).

Concerning characteristics of mobile app use among college students, in the total sample 97.3% reported having a smartphone and 81% (n=268) of the students reported using mobile applications frequently, 16% (n=53) use it occasionally, with only 3.4% (n=10) indicating that it was rare or that they never used mobile applications. Most of G3 reported having a smartphone (96.9%) and app frequent use (81.3%).

Table 2 illustrates mobile app use among the 3 study groups and we can easily observe that most students, in all groups, have a smartphone and are frequent users of mobile applications.

Table 2 - Characteristics of mobile application use among the 3 study groups

	G1 Students with SAD	G2 Students without SAD	G3 Students attending therapy	
			With SAD	Without SAD
Do you have a smartphone?				
Yes	33 (97,1%)	230 (97,5%)	5 (100%)	20 (95,2%)

No	1 (2,9%)	6 (2,5%)	-	1 (4,8%)
Do you use mobile apps?				
Yes, frequently	28 (84,8%)	186 (79,5%)	4 (80%)	16 (76,6%)
Yes, occasionally	5 (15,2%)	39 (16,7%)	1 (20%)	4 (19%)
It's rare	-	7 (3%)	-	1 (4,8%)
Never use it	-	2 (0,9%)	-	-

2.2 Instruments

A sociodemographic questionnaire was included in this study to address sociodemographic variables such as gender, age, civil/marital status, school qualifications and therapy attendance. In this section, we also included a brief questionnaire regarding mobile app use and preferences. For participants that reported attending therapy, a brief questionnaire was available to explore their interest and adherence to a mobile app to support treatment between sessions.

2.2.1 Social Interaction and Performance Anxiety and Avoidance Scale (SIPAAS, Pinto-Gouveia, Cunha, & Salvador, 2003)

SIPAAS intends to assess the degree of discomfort and avoidance in various situations of social interaction and performance. This instrument includes 44 items that are answered regarding two subscales - distress/anxiety and avoidance. The total scores for each subscale ranges from 44 to 176. In addition, the authors suggest cut-off points that allow the distinction between individuals with generalized social anxiety and non-clinical population, specifically, through the cut-off points of 115 for the subscale distress / anxiety and 105 for the avoidance subscale (Pinto-Gouveia et al., 2003).

2.2.2 Sheehan Disability Scale (SDS; Sheehan, 1983, Portuguese version by Pinto-Gouveia, Cunha, & Salvador, 2000)

This scale aims to assess the degree of disability that Social Anxiety assumes in the daily life of the individual, as well as his/her perception of the interference of Social Anxiety in three areas of life: work or studies, social life and affective life. The results of the scale allow obtaining an incapacitation index in these three areas of life, as well as a total incapacitation index (Pinto-Gouveia et al., 2000).

2.3 Procedure

Data collection was carried out in person at the Universities of Aveiro and Coimbra, where students voluntarily completed the informed consent and questionnaires. Participants were informed of the right to non-participation, the anonymous and confidential nature of the data, as well as research goals. Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) software (version 24.0, IBM, 2016).

Descriptive statistics were used to characterize the sample regarding social situations that generate more anxiety and discomfort and mobile applications usage habits. First, we selected a group of students that reported attending therapy and created G3. We used the reported cut-offs points suggested by the author of the SIPAAS and thus obtained two groups of students not-attending therapy, one with social anxiety symptomatology (G1) that obtained scores above the cut-off point of the scale, and a group of students without social anxiety symptomatology (G2) that obtained scores below the cut-off points.

Through a brief questionnaire, we explored G3 perception regarding interest and potential adherence to a mobile application to support therapy between sessions. In G3 we were able to identify social anxiety students attending therapy through the reported cut-off points (SIPPAS) and thus acceptability and adherence was also explored in this specific group.

3. Results

3.1 Most feared social situations and degree of discomfort/anxiety and avoidance among students with and without SAD

We explored the 3 most feared social situations among students with and without social anxiety (regardless of attending therapy or not), rated as severe according to the SIPPAS scale. From the total sample (n=296) we identified 12.9% of students with SAD (n=39) and 87.1% of students without SAD (n=257). Considering all students identified with SAD symptomatology, only 13% are attending therapy (n=5).

Students with SAD identified the 3 situations that generate high levels of anxiety and discomfort to do an oral test/exam (89.7%); to represent, act or speak before an

audience (79.5%); to get up and make a short speech, without prior preparation, at a party (76.9%) and to present an assignment orally (76.9%). According to our results students without SAD have the same most feared social situations as students with SAD, namely, 25.6% of students fear to do an oral test/exam; to get up and make a short speech, without prior preparation, at a party (19.5%) and to represent, act or speak before an audience (14.8%).

3.2 Daily life interference [Sheehan Scale]

Additionally, to understand interference from the anxiety/discomfort and avoidance symptomatology in daily life, particularly in the three dimensions (i.e., work/studies, social life/friendships and affective life), the Sheehan Disablity Scale scores were analysed. These results indicated that students without social anxiety reported that symptomatology interfered more strongly in work/studies (M = 2.53, SD = 2.55), followed by social life/friendships (M = 2.37, SD = 2.19), and lastly affective life/ finding a boyfriend/girlfriend (M = 2.34, SD = 2.46). As for the social anxiety group of students, they reported that social anxiety symptoms appeared to interfere more in the following dimensions, first affective life/ finding a boyfriend/girlfriend (M = 4.74, SD = 3.48), followed by social life / friendships (M = 4.59, SD = 2.75) and, lastly, work / studies (M = 4.31, SD = 2.40).

3.3 Mobile app use characteristics

In table 3 we can observe a tendency among the 3 study groups regarding categories of the most used apps (“The apps you use more often are associated with which of the following categories?”) associated with social networks and news, followed by games and entertainment; with health and education having a poor expression.

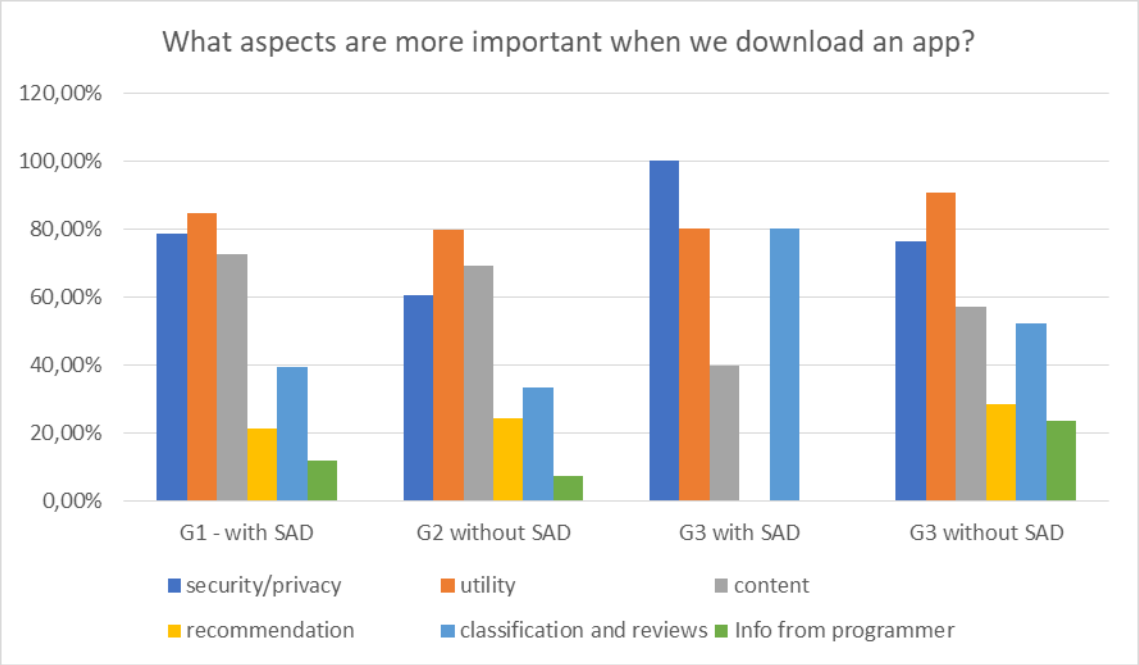
Table 3 – Categories associated with most used apps

Categories	Groups			
	G1	G2	G3	
			With SA	Without SA
Games	12 (36,4%)	62 (26,6%)	1 (20%)	9 (42,9%)
Health	2 (6,1%)	26 (11,2%)	-	6 (28,6%)
Education	2 (6,1%)	17 (7,3%)	-	6 (28,6%)

Entertainment	10 (30,3%)	106 (45,5%)	2 (40%)	8 (38,1%)
News	12 (36,4%)	91 (39,2%)	4 (80%)	10 (47,6%)
Social network	30 (90,9%)	209 (89,7%)	5 (100%)	19 (90,5%)

We also explored what aspects students consider when they download a mobile app (Figure 1), and we can conclude that utility is the most important aspect when downloading a mobile app in all groups, except for students with social anxiety attending therapy. The latter group emphasizes mainly security and privacy, with a higher expression of app classification and reviews, compared to other groups. Very few participants consider important information from the app programmer.

Figure 1 – Most important aspects when downloading an app



3.4 Exploring students attending therapy interest and adherence in mobile interventions and mobile app use characteristics

Students' in G3, without symptoms of social anxiety (n=21, 80,8%), 80% considered it useful to have an application that would aid them in therapy, and 85% of students considered that they would easily adhere to the application. All social anxiety students attending therapy considered that it would be relevant to exist and that they would adhere to an application containing information acquired during sessions, as well

as guidelines for the practice of exercises related to the intervention they would be performing [see appendix 2 – Table 4].

Study 2: Social anxiety mobile application development process

4. development process

4.1 Creating a multidisciplinary research team

To develop the mobile app and the Web Database Plataform [Therapist Web Plataform] a multidisciplinary team of psychologists and mobile computing engineers was gathered. Psychologists designed the mobile intervention, determining the app theoretical conceptual framework, clinical content and structure according to published scientific literature and previous research made by the team. The mobile computing research team developed the app technical components according to its conceptualization. Both teams worked together in several meetings and studied the translation of clinical content to features and functionalities, while programming the mobile app.

4.2 Architecture

Our research team designed a mHealth intervention that combines face-to-face psychological intervention with a mobile app for social anxiety. This system is parallel to a therapist web platform linked to the mobile app. Thus, it includes a smartphone and a backend (firebase), responsible for the database and storage, only accessible to the therapist. As such, the social anxiety app main objective is to support patients between sessions, particularly with CBT homework assignments. The application is intrinsically linked to a therapist web platform (database) where the therapist has access to all the information his patient submits in the application. The nature of this system is to support, in a balanced way, patient and therapist simultaneously.

4.3 Conceptual Framework

The mobile application was conceptualized according to the cognitive behavioral models of social anxiety (Heimberg & Barlow, 1991; Clark & Wells, 1995) and so the

mobile app was structured according to cognitive behavioral therapy (CBT) for social anxiety (Hope et al., 2010).

The current technological system is strongly aligned with therapeutic alliance and Cognitive-Behavioral Therapy (CBT) principles, given that it is considered the most effective treatment for social anxiety (Heimberg, 2002). One of the most widely used protocols considers several techniques such as psychoeducation, self-monitoring, cognitive restructuring, social skills training, relaxation exercises and exposure exercises (Hope et al., 2010). This protocol integrates cognitive restructuring into exposure exercises, enabling individuals to identify and challenge maladaptive thoughts and to use the exposure exercises to test their beliefs (Gordon et al., 2014). Such exposure exercises are often asked of the patients as homework assignments, which are seldom concluded, thus representing a strong limitation of CBT (Clough & Casey, 2015). In addition, very frequently homework is still performed with pen and paper, which may be inconvenient for patients (Michelle et al., 2014). Patients who comply with homework assignment have higher treatment gains then those who don't (Gordon et al., 2014).

Furthermore, considering our intervention characteristics we also included a technological model, particularly the Behavioral Intervention Technology (BIT) Model (Mohr et al., 2014), which intends to help us with the translation process of clinical content to a mobile health intervention app. Also, the Efficiency Model of Support, specifically the Blended Care Model (Schueller et al., 2017), was also considered, since it provides a conceptual framework to guide the action of human supporters of patients using BITs. The Blended Care Model integrates the latter model and offers patients a combination of face-to-face sessions and BITs, providing more information of the real world into sessions, thus supporting learning and use of skills outside of sessions (Schueller et al., 2017). One of the major goals of this model is to reduce clinicians' burden which is aligned with one of our most important goals regarding our mobile intervention.

4.4 Behavior Change Techniques considering CBT for social anxiety

The social anxiety mobile application integrates several elements or components (described in Table 5), representing each behavior change technique according to CBT for

social anxiety. Additionally, a therapist messaging element was included to enable a unidirectional communication between the therapist with the patient, to provide additional information, reminders or incentives. A timeline feature exposes all data the user submits in the mobile app to the therapist, in chronological order, providing a broader view of the self-monitoring exercise. Other aspects refer to incentive of app usage through notifications/prompts, security features and data protection. More detailed information regarding behavior change techniques and its corresponding BIT elements are depicted in Table 6 (see appendix 3).

Table 5 - Behavior Change Techniques and corresponding Elements

Behavior Change Technique	**Description**	**BIT Elements**
Psychoeducation	Includes psychoeducational information about anxiety in social situations, symptoms and the cycle that maintains this disorder; Provides rationale about cognitive restructuring, social skills and exposure. It is written in a first-person plural, with a non-clinical language.	Text and image based;
Self-monitoring	Includes registration of emotions, thoughts and behaviors, before, during and after a feared social situation. Therapist may identify the most fear-evoking social situations, core belief systems, negative automatic thoughts, safety behaviors etc. through the therapist database.	This registration can be made in text or audio format, and may include images. After the registration it is possible to categorize the registration as predominantly positive, neutral or negative. When negative, the student is asked if he wants to challenge his thoughts (directed to the cognitive restructuring module).
Relaxation exercises	Applied relaxation is taught to clients to help them cope with autonomic arousal during exposures practices. Includes abdominal breathing exercises and	Exercises are provided interactively trough video (abdominal breathing) and relaxation audios.

	progressive muscular relaxation (PMR).	
Cognitive restructuring	Identify anxiety-provoking assumptions and question whether these assumptions are valid, truthful, or helpful. Afterwards, individuals are challenged to create alternative thoughts, as a more functional and adaptive thinking pattern.	Interactive exercise where individuals submit negative thoughts, test their validity and afterwards submit alternative thoughts. The entire process is sent to the therapist database.
Social skills exercises	Verbal and non-verbal communication and interpersonal communication styles. The therapist should identify if the patient has some social skills deficit and personalize the interactive exercise.	Interactive exercise that challenges users to practice several social skills, submitted by the user and combined with the therapist.
Exposure exercises	Allows the creation of a rank-ordered list of the most anxiety-evoking social situations. With therapist guidance, the user is encouraged to gradually apply the exposure exercises. Naturally, these exposure exercises should be "studied" with the therapist, so each exercise can be customized to the patient and to create exercises able to intervene in the patient fear of negative evaluation, a core characteristic of social anxiety.	Interactive exercise that challenges users to practice the suggested exposure exercises studied along with the therapist. Users are able to rate each exposure challenge according to the anxiety it provokes. These challenges are submitted in the app by the user but require therapist approval. When a challenge is active, a chat system also activates to enable brief contacts with therapist to provide small incentives and support.

4.5 Therapist Web Platform (Data Base)

The therapist database is a website linked to the mobile app; it gathers all the information submitted by the patient, through the app. Thus, the therapist has access to all texts, audios and images the patient submits and sends to the therapist, namely, self-monitoring reports, cognitive restructuring exercises and outcomes of exposure exercises. The therapist can also send messages, contacting the patient if needed, for example to

give incentives or to suggest or guide homework exercises. This message system does not allow the patient to respond or contact the therapist through these messages. The website also intends to support therapists by avoiding messages and information overload. All the information stored in the database is structured and organized according to CBT intervention protocol, facilitating an improved monitoring and management of patients. A chat system is however embedded in the exposure module so therapists can give small incentives and guidelines to patients undergoing exposure exercises *in vivo*.

4.6 Privacy Settings and Data Protection

Privacy is considered a crucial component in mHealth apps, so three main functionalities were applied to ensure patients privacy and data protection, namely, authentication (i.e., to use the app patients must create an account with a valid e-mail, create a password and verify the e-mail by opening their inbox). A customizable pin lock enables the user to choose a four-digit pin to block the app; the user must insert the pin every time he opens the mobile app. Customizable proactive messages (notifications) can be altered by the user, so, if someone sees the reminder pop-up, he isn't able to identify the app, or associate the user with someone attending therapy. The app also contains a privacy policy, always accessible, informing patients about the entity and research team responsible for the project; information about the study and app purpose; privacy methods and information about data retention. Finally, the chosen app name is "SPICA", so it may blend naturally in the middle of other apps and avoids identifying the student as being in therapy because of its name (e.g. "therapyAssist").

5. Discussion

The present study explores students' anxiety in social situations and habits of mobile use and interest in mobile intervention to complement treatment. In addition, it describes the theoretical framework and development process of a mobile app and a Web database, that is being developed, informed by study one and published literature. We conceptualized and developed an mhealth intervention as a solution to specific problems (i.e. social anxiety prevalence and negative impact in college students and the overburdened college counselling centers), considering users' needs.

The first study demonstrates levels of social anxiety symptoms in line with research indicating a high prevalence of social anxiety symptomatology among college students (Russell & Shaw, 2009), with most socially anxious students not attending psychological treatment, which is in accordance with research suggesting that these individuals have significant difficulty in seeking psychological help (American Psychological Association, 2013; Olfson et al., 2000). These results reinforce the crucial need for solutions regarding social anxiety intervention among college students.

Concerning situations that generate more anxiety and discomfort, they are mainly associated with performance anxiety; however, when asked in what degree these situations interfere in daily life regarding work, affective life and social life, students with SAD primarily chose affective life/getting a boyfriend/girlfriend. This suggests that although these students suffer from great anxiety in social situations regarding their studies and academic performance, it's their affective and social life that they perceive to be more affected in their daily lives. These results impacted our mobile app content, since it reveals the importance of including skills to enhance social interaction, directed to social and affective life. Moreover, our app is highly customizable, allowing therapist to create exercises adapted to each patient.

Concerning usage habits of mobile applications, the large majority of students reported having a smartphone and using mobile applications frequently, which is consistent with research indicating that students are one of the largest consumers of smartphone technology (Shaw et al., 2017). Thus, we can suggest that also Portuguese students may easily adhere to mhealth interventions.

Results also indicated that in college students attending therapy, most of them considered relevant and would adhere if a mobile app to support treatment existed; in the specific case of students with social anxiety attending therapy, all of them reported relevance and potential adherence. Socially anxious students may have a greater tendency to adhere to these technologies, due to their fear of being subjected to scrutiny (Olfson et al., 2000), they may see these tools as a way to disclose and provide internal discourse that otherwise they wouldn't be able to verbalize. Naturally, we hope this to be a way for therapists to access reliable information more easily; afterwards they need to

work closely with the patient to overcome their fears of negative evaluation and being subjected to scrutiny. In general, we can suggest that most students attending therapy perceive technology as a useful and relevant tool in these settings, indicating acceptability of these interventions.

Exploring which features they consider most important when downloading a mobile application, most students considered utility, content and privacy, respectively. When we asked students attending therapy what features they considered more important in an application to support them between sessions, all considered privacy as being the most important, particularly students attending therapy with SAD. This is crucial for futures studies, and particularly study 2, to develop mobile apps for mental health, by giving special attention to privacy features and security, especially since many available apps do not respect privacy (Torous et al., 2018).

Results from study 1 guided us in some important features when developing our mobile app and therapist database; namely we tried to develop a highly customized app so therapists could also customize exercises (e.g. addressing specific situations associated with their social or affective life). In addition, students reported utility and privacy as very important features, to respond to this need, the app includes several characteristics to ensure privacy and security.

Overall, we consider that the app is also based in a solid conceptual framework, by including a clinical/ psychological model combined with a technological model for behavioural intervention, in line with evidence-base principles.

The present study has some limitations, namely, small sample size of students with social anxiety attending therapy, a larger sample is important to better determine and study the most preferred features of mobile apps in psychotherapy settings. Also, a more robust study addressing preferred features of mHealth apps from the user perspective are needed to better design these apps according to users' needs (e.g. by using focus groups). These studies reporting evaluation of needs should also be done from the therapist point of view, since these combined interventions, include the therapist.

Future studies in the field of mobile-based interventions in psychotherapy settings should continue to attempt to create a concise and robust protocol for the design, development, implementation and evaluation of these technologies. Many mHealth studies, in clinical psychology, address primarily the importance of evidence-based principles and experimental trials to establish efficacy, which is crucial. However, this may be better accomplished, with an adequately designed app, based on a user centered study, and with good usability. This study emerges to reinforce the importance of a multidisciplinary team, and their equal contribution in this field. It is our understanding that these technologies may have an important role in university and clinical settings, providing real support for both students and therapists.

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APPENDIX 1

Table 4 - Sociodemographic characteristics

	G1	G2	G3	
	n=34, 11.3%	n=236, 78.1%	n=26, 8.8%	
			With SAD	Without SAD
			n=5, 19.2%	n=21, 80.8%
Gender				
Female	32 (94.1%)	176 (74,6%)	5 (100%)	15 (71.4%)
Male	2 (5.9%)	60 (25.4%)	-	6 (28.6%)
Mean age (SD)	20.5 (3.37)	21.9 (4.46)	22.4 (2.96)	24.4 (5.31)
Civil status				
Single	32 (94.1%)	224 (94.9%)	5 (100%)	19 (90.5%)
Married	1 (2.9%)	6 (2.5%)	-	1 (4.8%)
Others	-	2 (0.8%)	-	1 (4.8%)
Academic degree				
Bachelor	30 (88.2%)	176 (74.6%)	4 (80%)	14 (66.7%)
Masters	3 (8.8%)	50 (21.2%)	1 (20%)	6 (28.6%)
Doctorate	-	-	-	1 (4.8%)

Note. G1 - students with SAD symptomatology; G2 – students without SAD; G3 – students attending therapy

APPENDIX 2

Table 4 – Students attending therapy that demonstrated interest and adherence to mobile apps for mental health

	G3 (n=26)	
	With SAD (n=5, 19.2%)	Without SAD (n=21, 80.8%)
Do you think it would be interesting to have a mobile app that could guide you throughout therapy?	5 (100%)	16 (80%)
If there was a mobile app that guided you between therapy sessions and with guidelines for exercises you learnt in therapy, would you easily adhere to this mobile app?	5 (100%)	17 (85%)
If there was a mobile app of this nature, which of the following features would you consider most important?		
Security and privacy	4 (80%)	14 (73.7%)
Interactivity	2 (40%)	12 (63.2%)
Being simple and easy to use	2 (40%)	11 (57.9%)

APPENDIX 3

Table 6 *- Modelo BIT*

	BIT Component	Social anxiety app
Theoretical		
Why	Intervention Aims	Clinical Aims: Larger treatment goal (Aim): reduce anxiety in social situations Sub-aims: -increase education about the disorder; -increase self-monitoring and the ability to identify and challenge negative automatic thoughts; -create more functional and adaptive thinking patterns; -enhance social skills; -reduce avoidance behaviors;
How (Conceptual)	Behavior change techniques	Grounded in cognitive behavioral intervention for social anxiety -Psychoeducation -Self-monitoring -Cognitive restructuring -Social skills training -Relaxation exercises -Exposure exercises (Goal setting) -Feedback from therapist and from the app.
Instantiation		
What	Elements	Psychoeducation delivered through text and images – information delivery. Cognitive restructuring, Exposure exercises and social skills training involve data collection through interactive logs that guide the user through the exercise. It also includes an anxiety rating scale (from 0 to 10). Relaxation exercises include abdominal breathing illustrated by an interactive image explaining the exercise and the progressive muscular relaxation delivered through and audio recording. Exposure and social skills training additionally engage in a combination of data collection and brief, predominantly unidirectional messaging component with the therapist. Timeline component is a report that provides the user all data submitted and aggregated in chronological order. Notifications include individual messages within the mobile application (app notifications).

How (technical)	Characteristics	Medium (text and audio) Medium Complexity: educated users and moderate comfort with technologies. Aesthetic: simple and clean Personalization: pin lock and notifications.
When	Workflow	BIT interventions are delivered according to changes in BIT elements, according to a task-completion rules determined by the therapist. Thus, not all BIT elements are immediately available to the patient. This intervention delivery is in accordance with the cognitive behavioral intervention protocol.

ESTUDO 2 – Estudos de usabilidade

Estudo 2.2 - A mobile application to complement face-to-face interactions in psychological intervention for social anxiety management

Alves, B., Oliveira, I., **Pratas, C.** & Pereira, A (2019). A mobile application to complement face-to-face interactions in psychological intervention for social anxiety management. *2019 IEEE 6th Portuguese Meeting on Bioengineering (ENBENG)*, pp. 1-4. doi: 10.1109/ENBENG.2019.8692484.

A mobile application to complement face-to-face interactions in psychological intervention for social anxiety management

Publisher: IEEE | Cite This | PDF

Bruno Alves ; Ilídio Oliveira ; Carla Pratas ; Anabela Pereira All Authors

162 Full Text Views

Abstract

Document Sections

I. Introduction

II. Background information and related work

III. Appsiety use cases

IV. The mobile application

V. The therapist platform

Show Full Outline

Abstract:
Social anxiety is a disorder characterized by excessive emotional discomfort triggered by exposure and the evaluation of others. Cognitive Behavioral Therapy (CBT) is considered an effective therapeutic approach in the treatment of social anxiety. CBT benefits from practical, prompt logging of thoughts, which is not always available in existing tools. The proposed solution offers a mobile application to complement face-to-face interactions between therapist and patients. The Appsiety app logs the participant's thoughts and uploads this data to a secure platform to be reviewed by the therapist and adapt possible treatment plans. The Appsiety platform provides practical support for the therapist to define personalized interventions and have immediate access to the participants recordings. Although the preliminary use indicates promising results, further validation is needed concerning the research currently being done in order to bring specialized content to the solution.

Published in: 2019 IEEE 6th Portuguese Meeting on Bioengineering (ENBENG)

I. INTRODUCTION

Most psychiatric disorders involve some social disturbance, with social anxiety being an example of this problem [1]. Social anxiety is marked by an excessive fear of negative opinions by others. When exposed to phobic situations (or in their anticipation), individuals respond with typical symptoms of anxiety even considering these reactions exaggerated or irrational [2]. Although the line that separates social anxiety and what is commonly called shyness is not always clear, the former has disruptive effects in relationships and personal life, and the latter has fewer overwhelming effects [3]. Social anxiety usually begins in childhood or adolescence and once present it is likely to become persistent and debilitating. The impact on the quality of life is enormous, with higher unemployment rates and decreased work capacity [2]. Individuals with social anxiety typically end up staying at lower levels of work considered as “safe” rather than accepting promotions that led them out of their comfort zone (and require more socialization). There are several psychological interventions that have proven effective in reducing anxiety symptoms [3]. However, barriers such as service availability, commuting problems and associated costs, often prevents the access to such support [4]. Given that long-term treatment is needed, finding ways to increase success and effectiveness in mental health treatments is increasingly needed. CBT has proven to be useful in the treatment of mood and anxiety disorders throughout life. This therapy can achieve better results if delivered in a format that increases its use, such as mobile applications. The mobile devises have the potential to increase the adherence of young people, and in return, improve the treatment outcome [5]. In this paper, we present Appsiety, a mobile application to support CBT in young populations, especially among students. Still in a prototype stage, it is meant to be used as a tool to complement CBT between appointments, and not to replace the therapist

II. BACKGROUND INFORMATION AND RELATED WORK

A. The CBT in the treatment of social anxiety

Several treatments have been investigated for social anxiety and CBT is considered the most effective therapeutic approach [6]–[8]. The treatment is based on an understanding of patient-specific patterns of behavior and beliefs with the therapist seeking various ways to change his/her thoughts and belief systems by bringing lasting

emotional and behavioral changes. It is currently used in doctor's offices, schools, vocational programs, prisons and other environments but it can also be used in non-presential forms. Internet-based approaches have based used from late 1990s (called ICBT) [9].

Gerhard Andersson proposed an approach to the ICBT based on self-help books. In his approach the therapist would give feedback and answer to the questions of his patients, schedule medical appointments that would resemble face-to-face encounters and unlock treatment modules along the way. This "self-help" should not be confused with a purely self-administered therapy since it was considered premature the decision to put a therapist out off the creation of new ICBT methods (the therapist encourages, supports and provides feedback) [9].

B. Mobile applications for the treatment of anxiety

The widespread use of smartphones presents an opportunity to extend the reach of psychological interventions [10]. Mobile applications can be used as a supplementary component of the ICBT allowing new features such as automatic messages, reminders, recording of behaviors, thoughts and feelings that otherwise would be more easily forgotten [11]. Mobile devices, and smartphones in particular, are generally available and accompany the users along the day. These devices offer an array of sensors, builtin on through connected wearables, allowing to monitor a quantify health indicators and behaviors, making them very attractive for researchers in the field of psychology [12]. However, a recent study [13] comparing the results of 52 anxiety supporting mobile apps indicated that most of them did not offer information on the methodology used, neither presented any kind of scientific validation. In this paper, some apps were selected for comparison namely, Youper [14], Beat Social Phobia [15] and Pacifica [16] (Table 1).

Table 5 -Comparison of key aspects between apps

TABLE I COMPARISON OF KEY ASPECTS BETWEEN APPS

Key aspect	Youper	B.S.Phobia	Pacifica
Provides information on the therapies used	✓	✗	✓
Has consultants with psychiatric training	✓	✗	✗
Has a therapist who accompanies each user	✗	✗	✗
Full access and for unlimited time for free	✓	✗	✗
Has studies that prove its efficacy	✗	✗	✗

None of the apps has a therapist who will follow the treatment and there aren't any studies to prove their effectiveness. Only Youper has full access (for free) and has psychiatric consultants in its development. Of the three applications selected, only Beat Social Phobia has no information on the therapies used. This app only has relaxation techniques, providing forms of getting these modules for free or for a certain price.

III. APPSIETY USE CASES

Appsiety aims to offer an interactive and appealing support to people who are comfortable with technologies. It complements the face-to-face consultation, assisting the patients in performing the treatment between sessions while collecting data. The therapist will have access to the recordings inserted by the patients and possibly adjust the treatment or provide feedback remotely. The general workflow of CBT with the use of Appsiety takes the following steps:

a) Patient goes to consultation

In the presence of the diagnostic of social anxiety, the therapist may choose to invite the patient to use the app. After the installation, the mobile app should be "unlocked" with a special on-boarding QR-Code provided by the therapist. The patient's account is created and the app is ready to be used.

b) Patient-side: the mobile application

On the mobile app, the patient will find:

• Educational contents about the therapy's activities, explaining the processes in CBT interventions and how monitoring is done.

• A personalized collection of videos, as selected by the therapist, that will serve as self-help tools and will be linked to the evolving phases of treatment.

• “Emotional states” diary that can be recorded and shared at any time (and can be considered as “thoughts”). It will be simpler for a patient to pick up their smartphone than waiting until the end of the day and fill comparative tables.

• Relaxation techniques that will help the patient relax and “regain control” of the situation (for example in case of a panic attack).

c) The therapist platform

The therapist will be able to follow the patient between appointments, accessing the data shared by the patient, without the delay for the next face-to-face encounter. The therapist web-based platform allows to:

• Monitor the patient’s information (their thoughts and emotions) and provide feedback when needed.

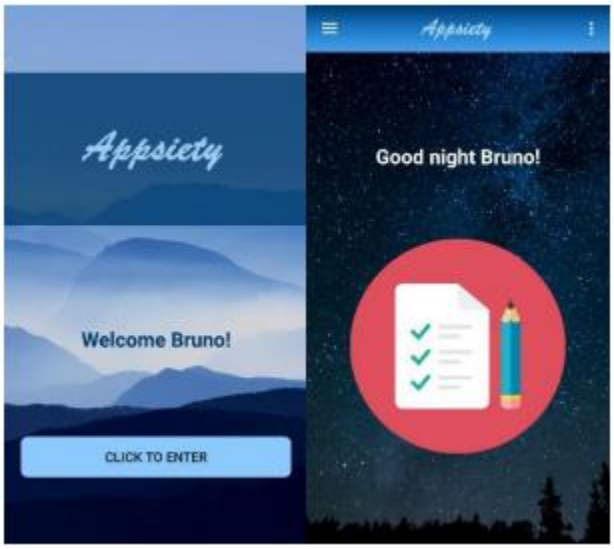
• Adapt the self-help contents and decide how often the patient will be notified to use the application.

• Prioritize the “emotional states” between the different patients and possibly detect hazard conditions.

IV. THE MOBILE APPLICATION

Appsiety is an Android application, with no special requirements, running on API 16 (Android 4.1) and later. The app makes use of the front camera for face tracking.

Figure 1 - Welcome and main screen



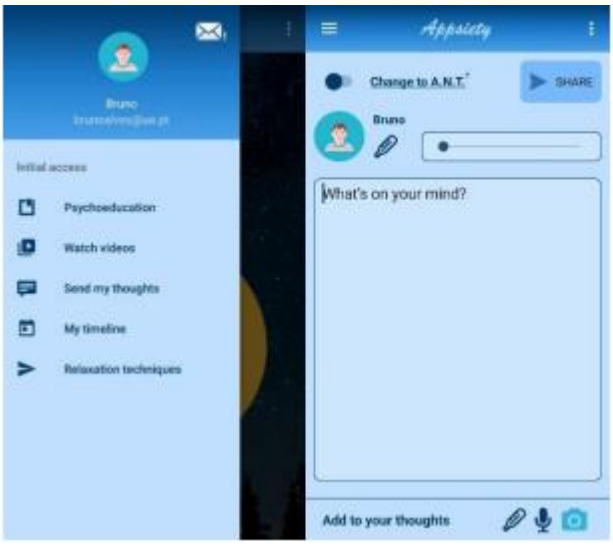
A. New participant enrolment

The process involved in the creation of an account uses the Firebase Database and authentication APIs (Figure 1). The system will send an account verification email and requires the “therapist validation”, achieved by reading a QR-code provided in the appointment. This step ensures that only users in a treatment relationship with a therapist will be using the app.

B. The CBT components

The app contains several content and activities modules with respect to the implementation of CBT

Figure 2 - Navigation drawer and "send my thoughts" fragment



The “emotional states” of the patient can be logged by “sending thoughts” with text, images, voice recordings and by filling 5 different emotional scales (0 to 10) also called “thermometers”. They are based in the work of Alex Mitchell [17] and each thought will be associated with a mandatory anxiety level and four optional scales (distress, depression, anger and need for help). This mandatory scale will be used to assess priority cases among the patients using the platform.

The patient will also be able to record and share an “automatic negative thought”. In this case, after recording the description of a negative thought, the app will send a challenge to rethink and rewrite it a more positive way.

C. Self-help videos

Although this is not meant to be a pure self-help application, there are some videos, recommended by the therapist, to help the participant cope with anxiety. The video is played in the participant's mobile device. While playing the video, the front camera of the device will detect a face and record information about the facial expressions. This enables to (1) collect evidence that the video was effectively watched (video playback is interrupted if the participant stops watching); (2) collect emotional expressions (using the Affectiva SDK [18]) .

D. Settings and customization

The participant will be able to enhance the privacy protection by defining an optional PIN code to secure the access to the app. In addition, the app notifications can be customized for discretion (e.g.: choose a non-revealing title to identify the notifications).

V. THE THERAPIST PLATFORM

The therapist will have a web app (deployed with the Firebase Hosting platform) to access to the information of the patients. This platform was developed primarily in JavaScript powered by libraries like BootStrap [19] and Xeditable [20].

A. Participant's activity

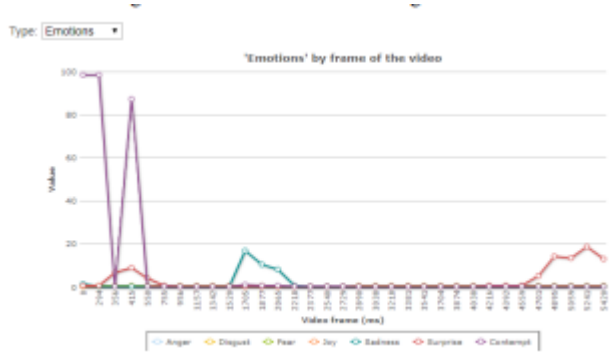
Besides managing the list of participants, the web app enables to follow up the patients shared observations. The therapist will be able to rely on graph visualizations to summarize the evolution of all the different scales (Figure 3). By selecting the data points (dots) it will be possible to access the detailed recording to verify the thoughts of the user and their content. It will also be possible to check the text from the "automatic negative thoughts" task. All recordings are time stamped allowing for trends/historic analysis.

Figure 3 - Activity of a given user

B. Multimedia content personalization

The therapist can define the self-help videos recommended for each user, and control how they are being watched. The dataset obtained with the Affectiva SDK, which analyses each video frame, can be visualized (Figure 4) for five emotional dimensions: anger, disgust, fear, joy, sadness, surprise and contempt.

Figure 4 - Emotions detected along the video



C. Messaging

At any time, the therapist will be able to send messages to a given patient providing feedback about the therapy. This channel of communication will be unidirectional. The patient will never be able to answer back or send generic messages; the goal is to encourage the participant to log more “thoughts” instead of using the app as an e-mail substitute.

VI. PRELIMINARY USE AND RESULTS

The Appsiety and the web backend were available for evaluation at the University of Aveiro. The usability of the mobile application was tested with ten participants (young adults). After a small debriefing, the participants followed a script to complete the set of tasks. The System Usability Scale (SUS) [22] was used to summarize the participants assessment, obtaining an usability rate of 92.5 (above average). A pilot test was also conducted at this University with five students acting as the target participant, completing the workflows supported by Appsiety (these were volunteer students, and not people with social anxiety diagnosis). A Psychology PhD student act as the therapist. No major flaws were found and the solution supported the planned participant/therapist interactions.

VII. CONCLUSION AND FUTURE WORK

The early results show that the proposed solution is able to support the participants/therapist interactions. Unlike other web-based CBT approaches, the mobile app enables more effective use of notifications and favors the continuous logging of thoughts. Exploring the device built-in sensors, it is possible to bring quantification to the process. In this stage, the solution is able to collect evidence that the proposed videos were watched, and collect emotional states detected from facial expressions. The main innovation of the current solution compared to the ones available is to provide multiple key aspects (Table 1) unavailable to the public with studies that bring validation to the system (currently being done). Although the technical implementation proved to be usable, it is not ready to be used as a therapy support tool. In fact, we still need further work to assess the usefulness and efficacy of the system as a CBT complementary tool. To achieve this, specialized content is being developed by a psychology team at the University of Aveiro, and based on their research [23] an improved version of Appsiety will be released to the public under a possible new codename.

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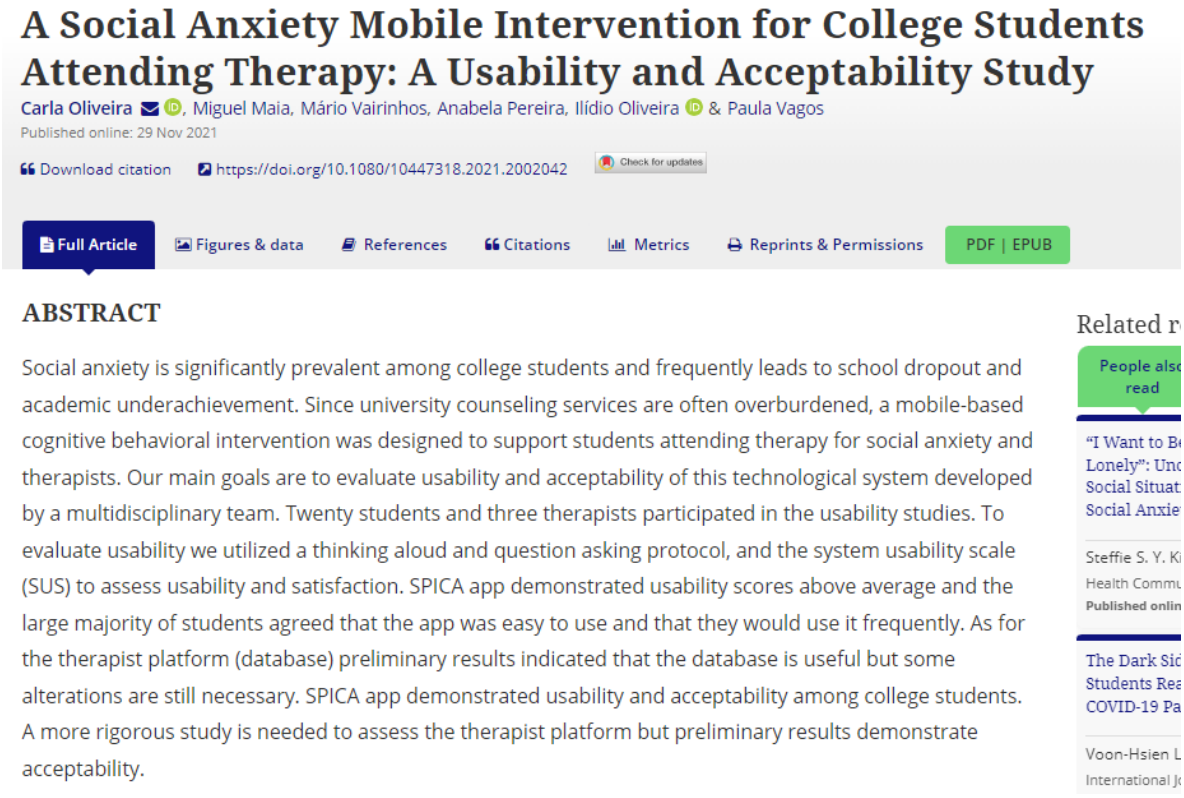
Estudo 2.1 - A social anxiety mobile-based intervention for college students and a therapist WEB database: a usability and acceptability study

Oliveira, C., Maia, M., Vairinhos, M., Pereira, A., Oliveira, I., Vagos, P. (2021). A social anxiety mobile intervention for college students attending therapy: a usability and acceptability study, 1-12. DOI: 10.1080/10447318.2021.2002042



A Social Anxiety Mobile Intervention for College Students Attending Therapy: A Usability and Acceptability Study

Carla Oliveira, Miguel Maia, Mário Vairinhos, Anabela Pereira, Ilídio Oliveira & Paula Vagos

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ABSTRACT

Social anxiety is significantly prevalent among college students and frequently leads to school dropout and academic underachievement. Since university counseling services are often overburdened, a mobile-based cognitive behavioral intervention was designed to support students attending therapy for social anxiety and therapists. Our main goals are to evaluate usability and acceptability of this technological system developed by a multidisciplinary team. Twenty students and three therapists participated in the usability studies. To evaluate usability we utilized a thinking aloud and question asking protocol, and the system usability scale (SUS) to assess usability and satisfaction. SPICA app demonstrated usability scores above average and the large majority of students agreed that the app was easy to use and that they would use it frequently. As for the therapist platform (database) preliminary results indicated that the database is useful but some alterations are still necessary. SPICA app demonstrated usability and acceptability among college students. A more rigorous study is needed to assess the therapist platform but preliminary results demonstrate acceptability.

Introduction

Social Anxiety is an extremely debilitating disorder characterized by an intense and persistent fear of one or more social situations where the individual is subject to the possible scrutiny of others (American Psychiatric Association, 2013). It has a chronic course, causes a high degree of functional limitation and the recovery rate without treatment is low (Gouveia, 2000). Several studies suggest a high prevalence of social anxiety among college students with prevalence rates ranging from 10 to 33% (Boukhechba et al., 2018; Tillfors and Furmark, 2007), compared to 7 to 13% in the general population (Russell and Shaw, 2009); which may lead to a tendency towards premature school dropout and low academic achievement (Fehm et al., 2005).

Cognitive-behavioral therapy (CBT) is considered the most effective treatment for social anxiety (Powers et al., 2008). Homework assignments are a major component of this intervention contributing to a more effective treatment (Lebeau et al., 2013). Currently this work is still performed with paper and pen, which may be inconvenient for patients and reduce their adherence to it (Michelle et al., 2014). This is one of the areas where mobile technologies can have a greater impact by offering innovative and appealing ways to support the therapeutic process, especially for college students who are more comfortable with technology and more often use it (Dennison et al., 2013; Shaw et al., 2017).

For instance, smartphones have a large computing capacity, have the advantage of mobility and, through mobile applications, allow users to obtain information faster, more efficiently and in a more appealing and accessible way (Price et al., 2014). Research suggests that smartphones can considerably improve face-to-face intervention (Clough and Casey, 2015b; Lui et al., 2017). Treatment with a mobile application could treat twice as many patients (Ly et al., 2015) and even shorten the treatment protocols (Morris and Aguilera, 2012). This may be important in college counselling centers, which usually have long waiting lists and few human resources (Shaw et al., 2017). There are few studies addressing social anxiety with mobile interventions (Boettcher et al., 2018; Boukhechba et al., 2018; Dagöö et al., 2014; Enock et al., 2014; Ivanova et al., 2016; Miloff et al., 2015) and some reported the efficacy of social anxiety treatment using mobile applications

(Dagöö et al., 2014; Enock et al., 2014). To our knowledge only one study targeted specifically college students with social anxiety (Boukhechba et al., 2018). According to Tillfors et al. (2008) these interventions may help students with social anxiety feel less embarrassed and subjected to scrutiny, and consequently seek help and adhere more easily to treatment.

Therefore, we developed a mobile application, called SPICA, targeting social anxiety for college students attending therapy in college counselling services. SPICA is structured according to the cognitive-behavioral intervention for social anxiety and the behavioral intervention technology model (Mohr et al., 2014). It is combined with regular face-to-face cognitive-behavioral treatment and is directly linked to a therapist web database that assembles all the information that the student sends to his therapist, through the mobile app. Thus, this technological system has as main objectives: 1) through the mobile application for students, we aim to 1.1) offer a support tool between sessions, specifically with homework assignments, promoting adherence 1.2) involve students more actively in treatment, consolidating concepts and techniques acquired in sessions 1.3) make available a self-monitoring register in the moment; 2) through a web database for therapists, we aim to 2.1) offer a tool that allow therapists to better monitor their patients, between sessions, through spontaneous access to clinically relevant information given by their patients (i.e. self-monitoring reports; cognitive restructuring exercises; monitoring of exposure exercises etc.) 2.2) promote homework and treatment adherence, 2.3) allow therapists to receive systematized clinically relevant information, prior to sessions. We highlight that SPICA was designed considering a blended care format, to support patients under treatment in conjunction with their therapists. It works as a unified tool, in a therapy setting, with patients and therapists, simultaneously, and not as a self-guided mobile app.

In the current study, we aim to 1) evaluate usability and acceptability of SPICA beta version; 2) optimize SPICA according to beta version usability testing; 3) evaluate usability and acceptability of SPICA alpha version – students' app; 4) evaluate acceptability of therapist database. Thus, two studies were conducted: 1) to test usability

of SPICA beta version and consequent improvements made in interaction design; and 2) to test usability of SPICA alpha version.

Related Work

Over the last few years, several mhealth solutions emerged in University settings targeting students and most frequent disorders in this context. A systematic review of Johnson and Kalkbrenner (2017) concluded that mHealth interventions, in college campuses, are being used with increasing popularity. They often target high prevalent disorders among college students such as depression and anxiety (McCloud et al., 2020; Ponzo et al., 2020) depression and social anxiety (Boukhechba et al., 2018), anxiety (Newman et al., 2020; Benton et al., 2016; Clough and Casey, 2015a), stress (Borjalilu et al., 2019; Harrer et al., 2018) and risky behaviors mainly associated with alcohol consumption, smoking cessation (Witkiewitz et al., 2014) and sexual behaviors (Jackson et al., 2016).

For example, Therapy-Assisted Online (TAO) is an individual treatment for anxiety that uses online tools to keep client engagement and therapeutic intensity high with reduced therapist time. TAO patients/students demonstrated greater reduction in anxiety and greater improvement in global mental health, life functioning and sense of well-being than treatment as usual patients (Benton et al., 2016). StudiCare Stress is an internet and app-supported stress management intervention for college students. Its theoretical framework is cognitive-behavioral model, third wave techniques and the Lazarus' transactional model of stress. Significant effects of the intervention, compared with a waitlist control group, were found for stress, anxiety and depression (Harrer et al., 2018). These are some examples of CBT interventions using mobile apps that support the use of mhealth apps in college settings.

A different example is the DemonicSalmon project that targets both depression and social anxiety (Boukhechba et al., 2018). This intervention intends to monitor college students through active ecological momentary assessments (EMA) and passive data collection (e.g. GPS, accelerometer etc.) enabled by a mobile app (Sensus). They were able to understand, for example, how measurements of negative mood (through EMA) were significantly correlated with higher symptoms of social anxiety and depression

(Boukhechba et al., 2018). To our knowledge, this is the only mHealth study targeting social anxiety for college students.

The Albatros platform is a framework that enables domain experts (psychotherapists, physiotherapists, physicians) to flexibly create and adjust therapeutic homework with the help of smartphones. A study was conducted to address applicability and results demonstrated that the platform is a proper instrument to create homework based on mobile processes (Schickler et al., 2017, 2018). The *Intersession-Online* is a similar project, and includes an app that enables data collection of intersession experiences with the primary aim to improve psychotherapy outcomes; it also includes a platform (website) for therapists and researchers that show a time line with all activities of their patients. The app is currently being tested for its usability (Gablonski et al., 2019; Stach et al., 2020). Regarding the nature of our technological system The *Albatros Platform* and *Interssession-Online* app is very similar; the main difference is that our project focuses and is adapted to students and college counselling services.

Over the last four years, the number of studies with mental health mobile apps for students increased significantly [author citation], to our knowledge very few studies focused on social anxiety and most apps are self-guided. Our project differs from most apps because our main objective is to support students between sessions, particularly with CBT homework assignments, and therapists simultaneously, in a balanced way.

Theoretical Framework of SPICA

SPICA app – for students

Social anxiety theoretical models explain disorder etiology, maintenance and implications for treatment. SPICA mobile app was conceptualized according to the cognitive-behavioral intervention for social anxiety because it is considered the most effective treatment for this disorder (Rowa et al., 2014). Following a CBT intervention, the mobile app includes psychoeducation, cognitive restructuring, relaxation exercises, social skills training and exposure exercises (Hope et al., 2010; Rowa et al., 2014). Homework assignments are an important component of CBT because it allows learning and generalizing change beyond therapy sessions; such assignments may include dysfunctional thought records, conducting behavioral experiments, or practicing

communication skills (Dobson and Dobson, 2009). SPICA aims to guide and help students with these assignments between sessions.

Considering the technological nature of our intervention and its modality (face-to-face therapy combined with mobile intervention) we also considered the behavioral intervention technology (BIT) model (Mohr et al., 2014) and the efficiency model of support (Schueller et al., 2017), specifically the blended care model. The BIT model has the purpose to guide us in the translation process of clinical content into a mobile health intervention application. SPICA integrates several elements or components representing each behavior change technique according to CBT for social anxiety. Additionally, a therapist messaging element was included to enable a unidirectional communication between the therapist with the patient, to provide additional information, reminders or incentives. A timeline feature exposes all data the user submits in the mobile app to the therapist, in chronological order, providing a broader view of the self-monitoring exercise. Other aspects refer to incentive of app usage through notifications/prompts, security features and data protection. The blended care model was considered, since it provides a conceptual framework to guide the action of human supporters of patients using BITs. The model offers patients a combination of face-to-face sessions and BITs, which serve to provide additional information of the real world of a patient into sessions, as to support learning and use of skills outside of sessions (Schueller et al., 2017). We considered that these models where ideal to organize, guide and support the conceptualization and development of this intervention.

The current app was also based in human centered design models (Norman, 2013) and usability heuristics for user interface design (Nielsen, 1994). Additionally material design, a system designed by Google and defined by a set of principles, guidelines and best practices for interface design, was also considered to build our Android mobile app.

Therapist database

Therapist database follows the same structure and is also in line with this model of intervention, its intention is to support therapists, enabling an enhanced monitoring and management of their patients without information overwhelm. The therapist has access to all the information submitted in the mobile application by the user, such as, texts and

audios submitted in the self-monitoring module, as well as the process of challenging negative thoughts and the outcomes of exposure exercises. Additionally, he has access to how many times the patient used the app, how many relaxations audios they listened or texts they read. This system may allow therapists to receive information by their patients in a more systematized and organized way, prior to sessions, which may lead to better preparation and management of sessions. This database also has a message system that allows the therapist to send messages, suggesting or guiding homework exercises.

The Current Study

This study involves a 2-round iterative process of SPICA diary mobile app and the therapist database. In February 2018, we started developing the beta version of SPICA mobile application (previously called appsiety) and a therapist database along with a team of researchers' specialists in mobile computer. After we finished the beta version, a usability study was conducted, and results were analyzed. Considering the usability results, and to improve our mobile app accordingly we included a researcher specialist in computer interaction design. During the first semester of 2019 we improved the mobile app and therapist database and then tested again its usability.

Several changes were made, from beta to alpha version, and the mobile app was redesigned in terms of color, app organization and new functionalities were added. Overall, the main changes involved the creation of the exposure and muscular relaxation module; the restructuring module was rearranged and separated from the self-monitoring module (see Appendix A); more privacy and security features were included (e.g. pin lock, personalized notifications, optimization of creating an account and login process). The therapist database was also optimized and redesigned to match the mobile app workflow, and respond according to the new modules and functionalities.

Materials and Method

Participants from Study 1: Beta version

In the beta version participated ten university students from a large public University attending a graduate degree (N=3) and master's degree (N=7).

Participants from Study 2: Alpha version

This study included two different groups of participants, one group of college students (N=10) to assess the mobile app usability, and a group of therapists (N=3) to assess the therapist database usability (N=3).

The college students mean age is 24.60 (SD=3.80), ranging from 22 to 35. Half of the participants were female (N=5) and the other half were male (N=5). Regarding academic degree, participants were attending a graduate degree (N=4), master's degree (N=3), and doctorate degree (N=3). All of them had a smartphone and 90% used apps frequently (N=9) and 10% used it occasionally (N=1).

As for therapists, mean age was 27; all of them were female and had two years of clinical practice experience. All of them use CBT in their practice, reporting familiarization with the intervention model. All reported that they use computers while they are working in clinical practice; one reported that she used before sessions, and the others reported use before, between and after sessions. They used the computer to read patients' e-mails, register information, activities and to write declarations and statements.

Measures

System Usability Scale (SUS) (Brooke, 1996; Portuguese version by Martins, Rosa, Queirós, Silva e Rocha, 2015).

One of the most widely used self-report questionnaire to evaluate usability, the SUS scale was developed to provide the usability practitioner a quick and easy usability and satisfaction assessment of a given product or service. It's a 10 item scale, scored on a 5 point likert scale of strength of agreement, where the final score can range from 0 to 100; higher scores indicate better usability (Martins et al., 2015). A formula to calculate the SUS score was established (Brooke, 1996). This formula allows converting SUS scores to a range of 0 to 100, which does not mean that SUS scores are percentages; they are a percentile ranking, indicating that a score above 68 is considered above average, and below 68 is considered usability below average. The Portuguese validation study, demonstrated reliability results with weak ICC (Intraclass Correlation Coefficient) values (ICC=.36), however percentage of agreement was satisfactory (76.67%), the authors suggest that a possible explanation for the ICC values may be due to the inverse items that characterize the scale (Martins et al., 2015).

Direct observation, "question asking protocol" and "thinking aloud protocol"

To explore usability we also used techniques such as direct observation; "question asking protocol" and "thinking aloud protocol". The direct observation consists in observing the participant while he uses a product and see how he interacts with it. A "question asking protocol" occurs when researchers ask participants questions to understand certain actions he took while using the app, for example, when he do something unique or say something interesting. A "thinking aloud method" occurs when researchers instruct participants to think aloud while they are using the app, this is used to understand participant's thoughts as they interact with the app.

Procedures

Procedures for study 1

The study was announced through a link sent by e-mail to several students from a large University. A schedule was provided so that voluntary students could enroll. The beta version study occurred in one of the Universities Psychology labs and the following protocol was applied for each participant at a time: first the researchers made a debriefing highlighting that it was not intended to evaluate their individual performance but to understand the application usability, this is, its performance. We also informed that the researchers would be observing how the participant used the application and its performance during the testing; also, we informed that he could ask for help or think aloud regarding aspects he might consider relevant to understand the app usability. After the participant signed the informed consent, we provided him an android smartphone, with the application already installed, and a guided narrative with clear instructions to explore all app functionalities.

To assess usability, we used techniques such as direct observation; "question asking protocol" and "thinking aloud protocol". Two researchers conducted testing, one was responsible to do the "thinking aloud method" and to fill the table of successes and errors. A narrative guide and a table of functionalities were developed and included 16 tasks (see Appendix B).

While the participants were performing the tasks included in the narrative instructions, the researchers were observing the participants and mobile app

performance and, simultaneously, filling a table of successful and unsuccessful attempts by the participant to perform the narrative instructions. At some moments, when the participant showed signs of difficulty or confusion, the researcher asked questions regarding this specific situation. After completing the narrative instructions, the participant filled the System Usability Scale (SUS).

We performed descriptive and inferential statistical analysis using the *Statistical Package for Social Sciences* (SPSS). First we examined if our data assumed a normal distribution; since our sample <30 we conducted a Shapiro-Wilk normality test. To understand if our SUS score (beta version) was significantly different from the cut-off point determined by the SUS author, we conducted a non-parametric test, the one sample Wilcoxon signed rank test. We used a non-parametric test because our data was not normally distributed.

Procedure for study 2

Mobile platform for students. For both studies a very similar procedure was applied. First, the study was announced through a link sent by e-mail to several students from a large University. A schedule was provided so that voluntary students could enroll. The alpha version study occurred in the electronic institute of the same University and a similar protocol described in study 1 procedure was applied. A narrative guide and a table of functionalities were developed for the alpha version and 21 tasks were included. The two studies differed in their narrative tasks since we altered the beta version of the app to produce an enhanced version (the alpha version) and thus some features and functionalities were altered, excluded or added (see Table A1 and A2 in Appendix C). After completing the narrative instructions, the participant filled the System Usability Scale.

The main differences between the first and last study is that in the alpha version study we included a brief sociodemographic questionnaire, and in addition to the SUS, we also included 3 written questions asking what they liked the most, what they liked least and what they would change. Also, prior to the study one researcher performed all the narrative tasks, as if he was participating in the study, and registered how much time it took to complete all tasks. This was our reference time point. We used a regular timer

from our smartphone to record these time measures. During the study, while the participant was completing the narrative tasks, two researchers conducted the usability testing, one was responsible to do the "thinking aloud method" and to fill the table of successes and errors and the other was responsible to start/stop the stopwatch and to ask further questions if need. Thus, we timed each participant while he was completing the narrative tasks to obtain a time average and compare it with the time obtained by the researcher. If the time average spent completing the tasks was too different from the therapist time average, this could indicate that the participants struggled when completing the tasks and app usability would not be adequate. It is important to highlight that this time average, does not refer to the time they take when they are using the app when introducing real clinical information. We instructed the users to randomly introduce words or letters in text entries.

We performed descriptive and inferential statistical analysis using the *Statistical Package for Social Sciences* (SPSS). First we examined if our data assumed a normal distribution; since our sample <30 we conducted a Shapiro-Wilk normality test. To understand if our SUS score (alpha version) was significantly different from the cut-off point determined by the SUS author, we conducted a one sample t-test.

Database platform for therapists. The therapist database study was conducted in one of the universities psychology lab. We also developed a specific narrative task to conduct the therapist database preliminary usability study. The procedure consisted first in a small debriefing explaining the study main objectives and procedures. Each participant/therapist at a time, signed the informed consent, filled a brief sociodemographic questionnaire and started following the narrative tasks in their own personal computer (see Table A3 in Appendix B). The narrative tasks instructed them to imagine as if they were in a normal day of work attending patients. They were also informed that we would be observing how they used the database, and how it will respond. We instructed to follow the thinking aloud method and ask for help if needed. After the task completion, we asked the therapists what they would change and if they consider it useful.

Results

Study 1: Beta version – usability results

System usability scale (SUS) results

Considering the participants SUS scores, we obtained a mean score (*M*=86, *SD*=15) above 68 which, according with the author of the scale, suggests that the mobile app is above average regarding its usability (see Appendix C). To understand if the SUS mean score is statistically different from the cut-off point, we performed a one-sample Wilcoxon test that indicated that the SUS score obtained in this study is not significantly higher than the cut-off point (68) (Z = 2.413, *p*=0.16).

There is also a question in the scale asking if the participant would like to use the product frequently, 80% (N=9) of the students reported agreement with this statement. Regarding the app ease of use 80% (N=9) agreed that the app was easy to use.

From our direct observation most participants could do most tasks without any difficulty; however, some users showed marked difficulty in reporting thoughts (self-monitoring module) and in activities related to sending thoughts and changing thoughts (cognitive restructuring module). The participants had difficulty finding the option to send and change their thoughts. In addition, we were also able to identify some usability problems, such as verification and validation of the e-mail account since participants had difficulty understanding that was necessary to go to their e-mail inbox to verify the e-mail that they created the account with. Some minor bugs were identified and easily rectified, such as memory leaks, dialogs that didn't open and incorrect values in the emotional thermometers. Despite these difficulties, all participants were able to finish the tasks.

Study 2: Alpha version – usability results

Time it took to complete the mobile app narrative tasks

One of our procedures was to time each participant while they were doing the narrative tasks. As we can see in the following graphic, the user that took the shortest time to complete the 21 narrative tasks was 11 minutes and the user who took the longest was 17 minutes. The average time to complete all tasks was 12.9 minutes (*M*=12.9, *SD*=1.79). Most participants could do all tasks between 11 and 13 minutes. Two

of the participants took longer to do the tasks, which may have happened since we used the Thinking Aloud Method, and some participants gave more feedback than others.

System usability scale (SUS) results

As we can observe in the following table, a mean score of 88.8 (SD=6.99) was obtained from SUS. Since the mean score is above 68 the app usability is considered above average. To verify if this difference is statistically significant, we performed a one-sample T-Test that indicated that the SUS mean score (*M*=88.8) is significantly higher than 68, the SUS cut-off point (t(9)=9.271; *p*<.001).

In the SUS scale there is an item asking if the participant would like to use the product frequently, all students reported agreement with this statement. Also, in the SUS scale, regarding the app ease of use 80% (N=9) agreed that the app was easy to use. We also asked the participants what they liked most in the app, what they liked least and what they would change (see Appendix D). From their report it is possible to suggest that what students liked most was the straightforward, minimalist and simple design of the app, considering it well-structured, easy to use and easy to communicate with the therapist. As for what they liked least, we could also find a pattern where students reported that they didn't like the therapist messages "hidden" in the settings menu; the large amount of information (text) in the relaxation exercises and tutorials; and the hold button to duplicate or erase thoughts from the list of thoughts menu. Several students hesitated, and some struggled with the hold button. What they would change is in line with what they least liked, namely, reduce the text in the relaxation exercises or put it in a more appealing way and place the therapist messages in the main menu. They would also invest in more interactions like images and animations.

From our direct observation, the app functioned very well; we only found minor bugs, as for example, a return to menu button that was not working and one information window that could be edited. There were no major usability problems identified through direct observation.

Therapist database direct observation results

To explore the therapist database usability, we obtained results from direct observation (see Appendix E). We understood that even with a brief explanation of the

database purpose, therapists had some trouble understanding the main objective of the database. For example, initially while doing the tasks they had a difficult time perceiving that the tables had information directly from the patient (obtained from the app). They thought (N=2) that therapists were supposed to fill the tables themselves. They also had trouble understanding that they needed to select each patient to access the patient's information. This was a major difficulty because it was not clear how the main menu (list of user/patients) were separated from the other information menu. Most therapists reported that after explaining the database purpose, the website was simple. They reported that they understood the information (exercises) sequence and the platform was useful.

Discussion

The current study demonstrates the work of a multidisciplinary team in creating and testing a technological system that comprises a mobile application, called SPICA, and a therapist database website. Both are linked and interchange information. In the current study, our main goal was to enhance this system regarding its usability and study acceptability.

First, the beta version of SPICA diary was created by a team of 5 researchers, 3 specialized in Psychology, and 2 specialized in mobile computing. The beta version was developed for nearly 6 months, during which we tried to transform clinical content to a mobile app features and functionalities. Usability results were very promising, and we obtained a usability score on the SUS scale above average. However, from our direct observation and participants report, we found that some tasks were somewhat difficult to understand and interact, mainly the cognitive restructuring module. Thus, we opted to include in our team a specialist in mobile interaction design, to optimize and refine the app from the interaction design point of view, and to better respond to users' needs. Subsequently, we worked for a few months with a designer to optimize and enhance the app.

Results from the alpha version also demonstrated usability scores above average. Participants consistently reported ease of use, simplicity, minimalist design as features that they liked the most. Additionally, there were no significant technical usability

problems found by the users and from direct observation and thus, we are able to validate the app regarding its usability. We may also suggest that SPICA was well accepted among college students, with all of them reporting that they would use the app frequently (imagining that they were attending therapy). The large majority also reported that the app was easy to use, which was an important goal for the team, to develop an app that was complete from a clinical perspective, but not complex. This study also indicates that students accept and are willing to use mobile interventions for mental health.

As for the therapist database, we conducted a small preliminary usability study with a very small sample, to ensure that the website was usable and understandable. Even though the therapist could do all tasks with relative ease, some constraints were identified, such as the difficulty to easily understand the database rationale. One therapist referred that this difficulty may be due to her past experience with a program to insert data from a patient rather than receiving it. Consequently, some alterations are going to be done in the database.

Overall, we may conclude that working with a multidisciplinary team allows a greater exchange of expertise and information facilitating the process of developing a technology-based intervention. We may also conclude that students are willing to use these technologies and therapists find it useful. Students frequently reported that what they liked the most was the simplistic, minimalist, easy to use design, utility and they would remove excess text. These results may support future mHealth apps in understanding college students' preferences and willingness to use these technologies. The present study has some limitations, namely, in the first usability study we didn't collect some important data, as for example, time average to complete the narrative tasks and we didn't include questions regarding features they liked the most, the least and didn't asked for suggestions and so, we were unable to compare to the following study and to extract more information from study 1. Students with social anxiety were not included in this study, even though the app is for social anxiety. Socially anxious students do not easily participate in this studies, thus we opted to include this clinical sample on our next feasibility study. The small sample is also a major limitation,

particularly in the usability study of the therapist database, which also included young therapists with few years of experience and thus, limiting our study in terms of generalization of results. Also in the therapist database usability testing we only used direct observation and question asking and thinking aloud techniques, no standardized measures were used, and so only limited conclusions can be considered.

Future studies should continue to explore students and therapists experience, preferences and goals to better inform the design and development of mobile apps in these settings. In the future we aim to proceed to a feasibility and effectiveness study, a longer study with a larger sample size, where we aim to add a clinical sample, of students with social anxiety, with respective therapists. We also plan to do a more robust and rigorous study of the therapist database, especially regarding its acceptability, reported by a larger sample of therapists with greater clinical experience. We expect to obtain acceptability, adherence and satisfaction by the therapist that uses this system and contribute to an enhanced monitoring of the patient without overburden of information.

In conclusion, mHealth interventions are emerging in college settings and are demonstrating acceptability among students. Therefore, it is important to continuously refine mobile interventions to better respond to students needs regarding mental health interventions.

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Appendix A

Cognitive Restructuring Module – Alterations

Figure A1

Cognitive restructuring - beta version

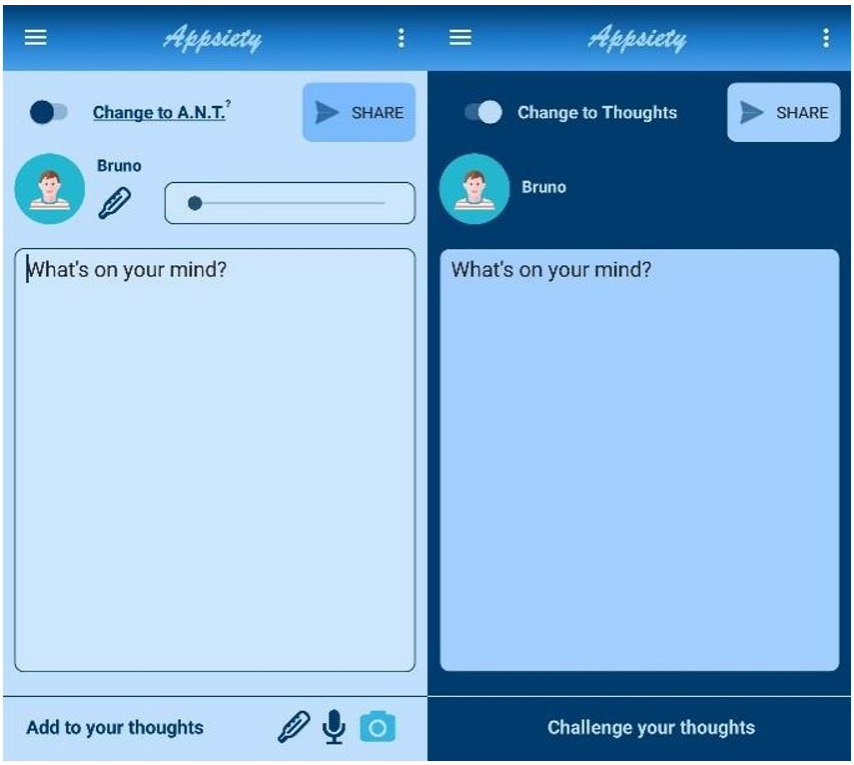


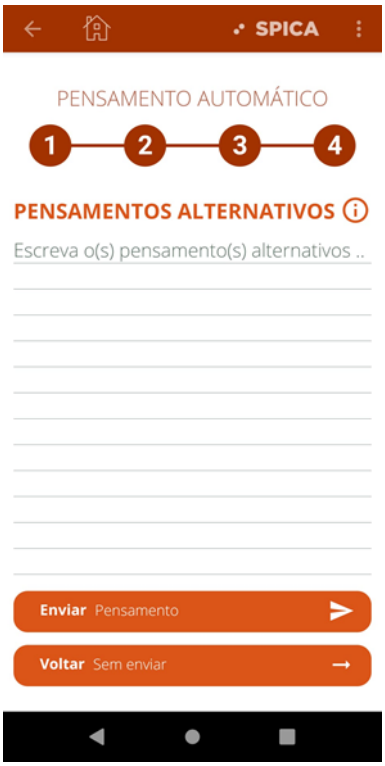
Figure A2

Cognitive Restructuring – alpha version

1) Describe situation

2) Write thoughts, emotions and behaviors

3) Challenge your thoughts



4) Alternative thoughts

Appendix B

Narrative tasks

Table A1

Narrative tasks - beta version

1	Create a user account	9	Change to automatic negative thoughts
2	Verify and validate e-mail	10	Fill automatic negative thoughts
3	Verify QR code	11	Change your thoughts
4	Open “settings”	12	Fill an emotional thermometer
5	Define a pin code	13	Select a photo in the thought’s module
6	Customize prompts	14	Do an audio record
7	Play a video	15	Open “timeline”
8	Find the thoughts module	16	Check your “timeline”

Table A2

Narrative tasks - alpha version

1	Create user account	12	Select questions
2	Verify and validate e-mail	13	Generate an alternative thought and send
3	Open “settings”	14	Duplicate and erase a thought
4	Define a pin code	15	open ACTIVITIES
5	Customize prompts	16	Create a “challenge” and Interact with the CHAT interface
6	Open THOUGHTS	17	Open Relaxation breathing and play the animation
7	Write a thought	18	Open Muscular Relaxation and play the audio
8	Classify it as negative	19	Open Tutorial
9	Add a photo and an audio	20	Open Help Menu
10	Change to automatic negative thoughts	21	Check your therapists’ messages
11	Write an automatic negative thought	20	Check your Timeline

Table A3

Narrative tasks for Therapists – Therapist Database

1	Create user account
2	Verify THOUGHTS (self-monitoring) from users
3	Verify CHALLENGE THOUGHTS (cognitive restructuring)
3.1.	Verify the questions used to challenge their thoughts and alternative thoughts
4	Verify EXPOSURE EXERCISES
4.1.	Check all challenges submitted by the user
4.2.	Change one challenge status to “resolved”
4.3.	Interact with the user using the chat interface
5.	Send a message to the user with the word “test”.

Appendix C

Table 1

SUS scores

	Min.	Max.	*M*	*SD*
SUS scores - beta version	45	95	86,0	15.14
SUS scores – alpha version	80	100	88,8	6.99

Appendix D

Table 1

SPICA diary: what students liked, liked the least and what they would change.

What they liked	What they liked least	What would they change
Well-structured	Couldn't find CHAT in the challenge's menu;	Less text in the relaxation exercises;
Main menu is very clear and so you can understand right away what you can do with the app.	Therapists messages in the settings menu	Change the therapist messages to the main menu;
Very accessible;	Lots of information in the sections of relaxation and tutorials. Not interactive and appealing.	More interaction in the sections where there is a lot of text;
Minimalist design	Not so self-explanatory;	More space to the breathing relaxation exercise;
Easy to use	Some functionalities could be more well placed	Would include meditation;
Ease to communicate with the therapist;	Hold the thought button to duplicate or erase that thought from the list	More imagens and animations;
Useful;		Use click the button instead of hold;
Straightforward;		
User-friendly;		
Simplicity;		
Responsiveness and design;		
E-mail verification.		

Appendix E

Table 1

Therapists Database Direct Observation and Thinking Aloud Method Results

Main difficulties	Suggestions by the therapists for improvement
Understanding the database purpose and rationale and how it is linked to a patients' mobile app.	Provide a homepage with information and tutorials.
Selecting a patient to have access to their information	Provide a video or animation of the mobile app, so it could be easy to associate the app with the information of the database.
Understand the difference between sending a message (bidirectional) in the challenge (exposure) module and a message in the main menu module (unidirectional).	More clarity in understanding which participants we are looking at when we are checking the information or sending a message.
Getting out of the sending messages and CHAT messages window (no return button).	In the self-monitoring module, add a 0 to 100 scale to determine how much he believes in the veracity of that negative thought and add the same scale in the cognitive restructuring.
After interacting with the exposure module (change state of the challenge or sending a CHAT message) the page would automatically return to the main menu instead of going back to the exposure module main page.	Calendar with the therapists appointments.

ESTUDO 3 – Estudos de Aplicação em Contexto Clínico

Estudo 3.2 - A viabilidade de uma aplicação móvel para a gestão da ansiedade social em estudantes universitários: protocolo do estudo

Oliveira, C., Pereira, A., Vagos, P. (2020). A viabilidade de uma aplicação móvel para a gestão da ansiedade social em estudantes universitários: protocolo do estudo. In *Atas do V Congresso da RESAPES: Mudam-se os tempos, mudam-se as vontades – contributos da Psicologia no Ensino Superior*

ABSTRACT

A Ansiedade Social é caracterizada por um medo intenso e persistente em situações sociais que afeta severamente os estudantes universitários. As novas tecnologias possibilitam um envolvimento mais ativo dos estudantes no tratamento da Ansiedade Social, particularmente nos Serviços de Apoio Psicológico do Ensino Superior [SAPES] em que as listas de espera são frequentemente longas e os recursos humanos escassos. O presente trabalho tem como objectivo expor o protocolo de estudo de viabilidade de uma aplicação móvel que se propõe como suporte à intervenção individual da ansiedade social.

O estudo terá a duração de 60 dias e irá incluir uma amostra de 25 estudantes com sintomatologia de Ansiedade Social e 5 psicólogos. Serão aplicados questionários sociodemográficos e após o uso da aplicação e plataforma serão realizadas entrevistas semi-estruturadas e a aplicação do questionário de satisfação e usabilidade (SUS) e recolha de métricas de uso e entradas na aplicação, isto é, indicadores quantitativos de adesão à aplicação. Será feita uma análise descritiva dos dados sociodemográficos, uma análise qualitativa referente às entrevistas semi-estruturadas e uma análise quantitativa referente aos dados que serão obtidos através do questionário SUS.

Pretende-se assim avaliar a adesão, a aceitabilidade e satisfação de psicólogos e estudantes face às ferramentas desenvolvidas e verificar o seu adequado funcionamento em contexto real. Este estudo propõe-se também a informar e preparar estudos futuros para a avaliação da eficácia destas ferramentas.

Introdução

A literatura científica tem demonstrado uma elevada prevalência de perturbações associadas à saúde mental em estudantes universitários, sendo que cada vez mais estudantes procuram ajuda profissional e apresentam problemas psicológicos mais severos (Hunt & Eisenberg, 2010). De entre estes problemas contam-se comummente a Ansiedade Social (Pereira et al., 2006; Tillfors & Furmark, 2007). Particularmente, nos serviços de apoio e aconselhamento psicológico no Ensino Superior, a ansiedade é considerada uma das principais causas de procura de ajuda, salientando-se a fobia social e a ansiedade aos exames (Pereira et al., 2006). A Ansiedade Social caracteriza-se por um medo excessivo e persistente de situações sociais em que o indivíduo é exposto a uma possível avaliação por parte de outrem, receando comportar-se de uma forma que conduza a uma avaliação negativa por parte dos outros (American Psychological Association, 2013). Por temerem expor as suas vulnerabilidades a outros e serem por isso mal avaliados, os ansiosos sociais podem frequentemente ficar reticentes em recorrer a serviços de apoio psicológico (Tillfors & Furmark, 2007). Por outro lado, ainda que tais serviços existam no Ensino Superior os mesmos parecem apresentar algumas limitações, principalmente recursos humanos insuficientes e frequentes listas de espera para atendimento (RESAPES, 2002). A disponibilização de uma forma de intervenção assíncrona poderá, portanto, ser particularmente benéfica e contribuir para o agilizar do processo terapêutico no ensino superior (Michelle, Jarzabek & Wadhwa, 2014).

Assim, torna-se evidente a relevância das tecnologias móveis, que têm despertado o interesse de cada vez mais clínicos e académicos, como potencial meio de aplicação de intervenções comportamentais para a saúde (Dennison, Morrison, Conway, & Yardley, 2013) e melhoria dos serviços psicológicos existentes (Clough & Casey, 2011; Heron & Smyth, 2010). Os *smartphones*, com grande capacidade de computação e a vantagem da mobilidade, poderão permitir ao utilizador um contacto rápido, eficiente, acessível e apelativo à informação por recurso às *software applications* (*apps*) (Luxton, McCann, Bush, Mishkind, & Reger, 2011; Price et al., 2014). O *mHealth* significa "saúde móvel" ou "saúde mental suportada por dispositivos móveis" (Donker et al., 2013). Vários autores consideram que os dispositivos móveis possuem um grande potencial para melhorar os

serviços psicológicos e para aplicar tratamentos psicossociais de forma cada vez mais inovadora (Heron & Smyth, 2010; Morris & Aguilera, 2012). Na prática clínica, os dispositivos móveis podem aumentar a interacção/ envolvimento do paciente com a terapia, e a adesão terapêutica entre consultas (Clough & Casey, 2011). Podem ser vantajosos em termos de custo, de uma gestão mais eficaz do tempo e recursos do terapeuta, de melhores resultados terapêuticos e para os pacientes que possuem acesso limitado aos serviços pode implicar uma redução das visitas durante o tratamento (Clough & Casey, 2015). As *apps* podem se verificar como uma ferramenta eficaz na intervenção, em consulta, tal como no recolher de informação fora da consulta (Amichai-Hamburger, Klomek, Friedman, Zuckerman, & Shani-Sherman, 2014). Segundo Morris & Aguilera (2012) os clínicos podem usar os dispositivos móveis de várias formas, o seu uso vai permitir estruturar intervenções mais facilmente e enriquecer a avaliação com informação contextual relativa ao funcionamento na vida diária.

Klasnja & Pratt (2012) referem que todas as vantagens dos dispositivos móveis, inclusive, popularidade e proximidade com os utilizadores, tornam estes dispositivos estratégias promissoras para a promoção da saúde mental e aplicação de intervenções. Segundo Lindhiem et al. (2015) as tecnologias associadas ao *mHealth* possuem imenso potencial para completar o tratamento, particularmente no que diz respeito às intervenções cognitivo-comportamentais. Segundo os mesmos autores, os estudos existentes apoiam o papel da tecnologia móvel na psicoterapia e noutras intervenções comportamentais. No caso da Ansiedade social, o tratamento baseado na internet pode motivar os indivíduos com fobia social a procurar ajuda, pois pode fazer com que se sintam menos embaraçados e sujeitos a escrutínio (Tillfors et al., 2008). Vários estudos sugerem a eficácia destas intervenções para a ansiedade social (Kampmann, Emmelkamp & Morina, 2016) e apesar de ainda escassos o mesmo acontece especificamente com as tecnologias móveis (Boukhechba et al., 2018; Dagöö et al., 2014; Enock, Hofmann, & McNally, 2014; Ivanova et al., 2016).

Recentemente a literatura tem apontado para a eficácia e relevância destas tecnologias móveis numa série de variáveis psicológicas, desde a depressão e ansiedade social até à qualidade de vida e afeto positivo (Linardon, Cuijpers, Carlbring, Messer, &

Fuller-Tyszkiewicz., 2019). Nas universidades também se tem implementado estas tecnologias com crescente popularidade (Benton, Heesacker, Snowden &Lee, 2016; Johnson & Kalkbrenner, 2017; Shaw, Lee & Benton, 2017). Atualmente procura-se estabelecer linhas orientadoras para a avaliação da qualidade destas aplicações móveis para a saúde mental (Torous et al., 2019).

Estudo com a aplicação SPICA e Plataforma do Psicólogo

Nos últimos anos começamos por desenvolver uma aplicação móvel, baseada no modelo cognitivo-comportamental, para estudantes com ansiedade social que frequentam a consulta de Psicologia Clínica dos Serviços de Apoio Psicológicos do Ensino Superior (SAPES). Esta aplicação funcionaria como uma ferramenta de apoio entre consultas, nomeadamente ao trabalho entre consultas, envolvendo mais ativamente o estudante no tratamento, consolidando conceitos e técnicas adquiridas em consulta e disponibilizando registo de auto monitorização no momento e, por isso, mais próximos da realidade.

Em paralelo, esta aplicação está associada a uma base de dados (Plataforma do Psicólogo) que recolhe e armazena toda a informação submetida pelo estudante. Esta plataforma permite ao Psicólogo a recolha, monitorização e interacção com os dados submetidos pelos pacientes através da aplicação. Permite também obter informação do paciente de uma forma mais sistematizada e estruturada, ao mesmo tempo que facilita a realização dos exercícios recomendados para trabalhar entre consultas.

A aplicação móvel foi conceptualizada de acordo com o modelo cognitivo-comportamental para a ansiedade social (Heimberg & Barlow, 1991; Clark & Wells, 1995) e o modelo tecnológico denominado behavioral intervention technology model (BIT; Mohr et al. 2014) que orienta o processo de traduzir conteúdo clínico para conteúdos de uma aplicação móvel.

Este sistema foi criado por uma equipa multidisciplinar, nomeadamente da área da Psicologia, Informática e Electrónica e Design (Oliveira, Pereira, Vagos, & Oliveira, 2017). A usabilidade da aplicação já foi testada (Alves, Oliveira, Pratas, & Pereira, 2019) faltando testar a sua viabilidade e aceitabilidade em contexto clínico real.

O actual estudo tem como objectivo expor o protocolo de um estudo de viabilidade, de uma aplicação móvel, que se propõe como suporte à intervenção individual da ansiedade social em estudantes universitários.

Método

Participantes

O estudo irá incluir uma amostra de 25 estudantes universitários e 5 psicólogas dos SAPES. O rácio desejado é de 1 psicólogo para 5 estudantes e, pelo menos, 2 serviços de apoio psicológico diferentes.

Instrumentos

Questionário sociodemográfico específico a estudantes e outro para psicólogos. Para além de variáveis sociodemográficas exploram ambos o uso das novas tecnologias no dia-a-dia por parte destes dois grupos.

Entrevistas semiestruturadas (estudantes e psicólogos)

Estas entrevistas visam explorar a utilidade e pertinência deste sistema tecnológico, com questões como, por exemplo, “Considera que a usaria frequentemente?”; “Considera que este sistema poderia alterar a gestão da sua prática/consultas em clínica? De que forma?”; “Se, através deste sistema, obtivesse acesso a dados de pacientes que estivessem a ser seguidos por estagiários sob sua supervisão clínica, consideraria pertinente e útil?”. E outras mais associadas à ansiedade social (e.g. “No âmbito da sua prática clínica, com casos de ansiedade social, considera que a informação disponibilizada é relevante para um melhor acompanhamento do paciente? Porquê?”). Um terceiro grupo de questões refere-se a problemas técnicos.

Escala de Satisfação e Usabilidade (System Usability Scale, SUS, Martins et al., 2015)

É uma das escalas mais usadas para avaliar a usabilidade. Esta escala foi desenvolvida com o objectivo de avaliar a satisfação e usabilidade de um produto ou serviço de uma forma rápida e fácil. A escala é constituída por 10 itens, numa escala de likert de 5 pontos que expressa a força de concordância. O valor final pode variar entre 0 a 100 e quanto maior o valor, maior é a usabilidade (Martins et al., 2015).

Os valores obtidos pela escala (de 0 a 100) não são percentagens, são percentis que indicam que um valor acima de 68 é considerado como usabilidade acima da média e

abaixo de 68 como usabilidade abaixo da média. O estudo de validação para a amostra portuguesa demonstrou resultados de fidelidade com valores de coeficiente de correlação intraclasse (CCI) fracos (CCI=.36). Contudo, a percentagem de concordância foi satisfatória (76,67%). Como possível explicação para os resultados obtidos, os autores sugerem que os valores do CCI podem se dever ao facto de haver itens inversos na escala.

Procedimento

O procedimento do estudo inicia-se com o recrutamento das Psicólogas por *e-mail*, convidando-as a participar no estudo. Esta amostra deve estar a trabalhar num SAPES e estar familiarizada com o modelo cognitivo-comportamental. Após manifestarem interesse será explicado às Psicólogas os procedimentos e objectivos do estudo facultando-lhes o consentimento informado e obter as devidas autorizações, por parte dos serviços, para iniciar o estudo. De seguida, as psicólogas preenchem um breve questionário sociodemográfico e recebem todas as indicações de como funciona o sistema tecnológico. Ser-lhes-á comunicado os critérios de inclusão dos participantes para o estudo, nomeadamente, sintomatologia de ansiedade social; a psicóloga considerar que o envolvimento do paciente com esta ferramenta não irá interferir com o normal curso da intervenção; ter o sistema operativo Android. Também será entregue todas as indicações necessárias para comunicar ao participante (objectivos do estudo, como irá funcionar a aplicação). À psicóloga também lhe será dado acesso à plataforma do Psicólogo, atribuindo-lhe um e-mail (psicóloga1@hotmail.com) e senha (que deverá ser prontamente alterada). Portanto, o recrutamento dos estudantes será feito pelas psicólogas através da identificação, em primeira consulta ou já em consulta, de estudantes que apresentem sintomatologia associada à Ansiedade Social. Após esta identificação, as psicólogas irão explicar os objectivos do estudo e requerer a sua participação. Após resposta positiva, o participante irá ler e, após concordar, assinar o consentimento informado, e todas as indicações de uso da aplicação móvel, tal como o preenchimento de um breve questionário sociodemográfico. Após a consulta a psicóloga comunica à equipa de investigação a entrada do participante, e esta irá atribuir-lhe um e-mail (participante1@hotmail.com) e enviar todas as instruções de instalação da aplicação móvel. O objectivo deste procedimento é garantir a segurança e privacidade do paciente

face à equipa de investigação. De seguida, o engenheiro da equipa de investigação irá atribuir o participante à conta da respectiva Psicóloga na Plataforma do Psicólogo. Esta depois terá acesso aos dados que o paciente submete na aplicação.

A intervenção com a aplicação terá a duração de 60 dias. No final da intervenção serão realizadas entrevistas semiestruturadas aos participantes e o preenchimento do questionário de auto-relato sobre satisfação e usabilidade. Será igualmente recolhidas métricas de usabilidade, isto é indicadores de adesão ao sistema tecnológico (i.e. quantas vezes acedeu à aplicação/ plataforma, que funcionalidades/ módulos usou mais frequentemente; quantos conteúdos submeteu etc.). Os dados quantitativos serão analisados com o *software* IBM SPSS 24 e os dados qualitativos serão utilizados recorrendo ao *software* NVivo.

Resultados

Será usada uma análise descritiva para a os dados obtidos pelo questionário sociodemográfico e as métricas de uso da aplicação e plataforma que nos irão facultar indicadores de adesão e possivelmente outras informações como conteúdos preferenciais. As entrevistas semi-estruturadas serão transcritas e análise de conteúdo será realizada com recurso ao *software* NVivo.

Através do Questionário de Usabilidade e Satisfação obter-se-á um valor de 0 a 100, onde valores acima de 68 indicam que o sistema se encontra acima da média, a nível de usabilidade, e abaixo de 68 indica que o sistema se encontra abaixo da média.

Discussão/ Conclusão

Espera-se com este estudo obter resultados preliminares da eficiência desta aplicação móvel e base de dados (*Website* - Plataforma do Psicólogo) em contexto clínico, isto é, em contexto real. De igual modo espera-se conhecer a percepção dos estudantes e psicólogos face a este sistema tecnológico em contexto real, particularmente, ao nível da utilidade, satisfação e usabilidade. Principalmente queremos perceber se este sistema se ajusta de uma forma adequada e equilibrada a este contexto, sem gerar situações de sobrecarga de informação e tarefas, tanto no psicólogo, como no estudante. Por fim esperamos obter informação relativa ao que pode ser melhorado neste sistema, de forma a torná-lo mais eficiente e ajustado a este contexto.

De uma forma geral, pretendemos com estas ferramentas tecnológicas capacitar os SAPES ultrapassando algumas das suas limitações associadas a longas listas de espera e recursos humanos reduzidos. Tal como apoiar os estudantes com ansiedade social entre consultas, ao mesmo tempo que se promove um maior comprometimento com os exercícios terapêuticos recomendados entre consultas.

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CONCLUSÃO INTEGRATIVA

Principais conclusões

Através deste projeto propusemo-nos a contribuir para a concepção, desenvolvimento e avaliação das intervenções psicológicas mediadas por dispositivos móveis. Foi um processo longo, complexo e repleto de aprendizagens que se caracterizou 1) por uma revisão da literatura relativa a eficácia das aplicações móveis para a saúde mental em estudantes universitários; 2) pela concepção de uma aplicação móvel baseada na evidência científica recorrendo a modelos psicológicos e tecnológicos atuais; 3) pelo desenvolvimento da aplicação móvel para a ansiedade social num contexto multidisciplinar; 4) pela avaliação da aceitabilidade e usabilidade numa amostra de estudantes universitários.

Tendo em consideração o contexto de pandemia e a adaptação do projeto a esta realidade consideramos que atingimos a maioria dos objetivos deste projeto. Não foi, no entanto, possível avaliar a viabilidade e eficácia deste projeto. Resumidamente salientamos as principais conclusões deste projeto: através da revisão da literatura conseguimos concluir que as intervenções psicológicas assistidas por dispositivos móveis são cada vez mais frequentes e que alguns estudos têm verificado a sua eficácia na redução de sintomatologia psicopatológica (e.g. stress, ansiedade e depressão) em estudantes. A grande maioria destas aplicações móveis é baseada na terapia cognitivo-comportamental, particularmente mindfulness, e são de auto-ajuda. Em geral concluímos que os estudantes parecem aceitar e aderir facilmente a estas intervenções.

A nossa pesquisa pelos modelos teóricos mais adequados para fundamentar a nossa aplicação móvel, no âmbito da teoria psicológica, indicou-nos que o modelo cognitivo-comportamental para a ansiedade social seria o mais adequado. Para além de ser considerado o tratamento de primeira linha para esta perturbação, a TCC é também facilmente adaptada para integrar estas tecnologias. Optamos também por escolher um modelo tecnológico que nos apoiasse ao longo do processo de desenho, desenvolvimento e implementação da aplicação móvel e para isso escolhemos o modelo BIT de David C. Mohr, um psicólogo clínico, que se dedica ao estudo do desenho e implementação dos tratamentos para a saúde mental digitais de forma a enquadrarem-se num contexto de vida real, isto é, no dia-a-dia das pessoas. Tendo em conta que o nosso objetivo era

desenhar uma aplicação móvel para estudantes universitários a frequentar os SAPES, este modelo parecia agregar todos os ingredientes necessários para facilitar e executar este processo.

Em conjunto com a pesquisa da melhor base conceptual para o nosso projeto, propusemo-nos a explorar as características que os estudantes procuravam nas aplicações móveis e se estas variavam em estudantes com ou sem ansiedade social. Através deste estudo observamos que também os estudantes portugueses utilizam com frequência aplicações móveis, maioritariamente associadas às redes sociais. A grande maioria dos estudantes em acompanhamento psicológico reportou que esta poderia ser uma ferramenta útil e relevante, sugerindo aceitabilidade destas intervenções. Todos os estudantes identificados com ansiedade social reportaram interesse e referiram que adeririam caso a aplicação móvel existisse. A maior parte dos estudantes referiu que as principais características que considerariam mais importantes numa aplicação seriam a utilidade, conteúdo e privacidade, respectivamente. Os estudantes em contexto clínico referiram a privacidade em primeiro lugar. Este estudo teve um impacto direto na construção da nossa aplicação pois validou a sua importância e interesse nesta população e indicou as principais características a incluir na sua construção (e.g. segurança e privacidade).

Face ao estudo anterior iniciamos o desenvolvimento do sistema tecnológico com uma equipa multidisciplinar de três psicólogas e dois especialistas em computação móvel. O protótipo da aplicação móvel foi desenhado no âmbito de uma tese de mestrado de um aluno do Departamento de Eletrónica, Telemática e Informação (DETI) que pode ser consultado no repositório da Universidade de Aveiro. O primeiro ano foi o mais difícil pois fomos confrontados com questões que não antecipamos e outras que se revelaram mais complexas do que o previsto (e.g. RGPD, questões de design, de incorporação de informação etc.). Após testar a usabilidade do primeiro protótipo concluímos que, apesar de ter obtido uma usabilidade acima da média, alguns aspectos poderiam ser melhorados, principalmente ao nível do *design*. Sendo assim, um membro de equipa de *design* seria essencial, por conseguinte no ano seguinte e em conjunto com um segundo aluno de mestrado, trabalhamos com uma equipa de design. Esta fase do projeto revelou

a importância de trabalhar numa equipa multidisciplinar nunca descurando nem a parte do design, do interface, da atractividade da aplicação nem o suporte empírico do sistema tecnológico. Ambos precisam de coexistir de uma forma equilibrada. E foi isto que verificamos no segundo estudo de usabilidade em que os alunos reportaram as suas características preferidas, como sendo o *design* simplista e minimalista da aplicação e a facilidade de uso.

Esperamos, com este projeto, ter contribuído para a área do mhealth ao expor o nosso processo de conceptualização, desenvolvimento e avaliação da usabilidade de uma intervenção mediada por uma aplicação móvel e uma plataforma *web* do psicólogo. Até ao momento, a maioria das aplicações para a saúde mental são auto-guiadas, com pouco ou nenhum contacto com um psicólogo. Esta aplicação não só está combinada com a intervenção psicológica, como dá feedback ao psicólogo através da plataforma do psicólogo. Assim, este pode observar em tempo real, o desempenho e a informação clínica actualizada do seu paciente.

Limitações

O actual projeto, apesar de importantes conclusões e implicações para a prática clínica, possui algumas limitações. Uma delas refere-se ao estudo inicial que pretendia informar algumas das decisões no desenvolvimento do sistema tecnológico. Particularmente consideramos que teria sido importante a realização de um estudo mais qualitativo, com grupos focais, especialmente com alguns psicólogos dos SAPES. Este estudo apesar de ter sido planeado, acabou por avançar de uma forma mais simples através de questionários online, no sentido de começarmos o mais brevemente possível a fase de construção da aplicação e desenho dos conteúdos.

Outra limitação deveu-se a uma amostra reduzida de participantes, particularmente de psicólogos. Efectivamente, no primeiro estudo de usabilidade, a plataforma do psicólogo ainda não tinha sido totalmente concebida e por esse motivo, nesse estudo não há participantes psicólogos. No segundo estudo, a plataforma foi testada em três psicólogas o que limita a generalização dos nossos resultados.

Uma das nossas maiores dificuldades também se deveu ao processo moroso de desenvolvimento da aplicação, o qual se revelou mais longo e complexo do que o

esperado. A programação da aplicação móvel foi realizada por dois alunos de mestrado, no âmbito da tese de mestrado, e apesar do esforço e entrega ao projeto, por parte destas alunos, naturalmente que este também foi um processo de aprendizagem e alguns contratempos.

O estudo de viabilidade arrancou em Dezembro/Janeiro de 2019, o qual teve que ser interrompido devido a problemas técnicos com a plataforma do psicólogo. Este estudo já incluía uma amostra de estudantes com ansiedade social a frequentar os SAPES e uma amostra de psicólogas. Infelizmente acabou por nunca ser retomado pois o surgimento do Covid-19 limitou as deslocações aos serviços e o estudante que nos prestava o apoio técnico já tinha terminado a tese de mestrado, já não tendo a mesma disponibilidade para se deslocar a Aveiro. Enquanto algumas questões técnicas poderiam ser resolvidas à distância, outras poderiam surgir em que tal não era possível. Estas situações geraram alguma insegurança na prossecução do projeto e com receio de ter algum impacto negativo na intervenção psicológica optamos por interromper o estudo e focarmo-nos na publicação do trabalho realizado até ao momento.

Implicações para a prática clínica

As aplicações móveis para a saúde mental apresentam várias implicações para a prática clínica, como por exemplo, permitem aumentar a literacia em saúde mental e tornar os tratamentos psicológicos mais acessíveis. Especificamente as intervenções cognitivo-comportamentais mediadas por dispositivos móveis podem facilitar a gestão de consultas, permitindo que o psicólogo detenha à priori um conjunto de informações e dados que poderão facilitar o processo de organização e preparação de consultas; do ponto de vista do cliente, a aplicação móvel poderá facilitar a realização das tarefas de casa, ao guiar o paciente de uma forma interativa e apelativa, no treino dos exercícios propostos pelo psicólogo.

Ao incentivar o treino de exercícios da TCC entre consultas, por exemplo através de notificações e lembretes, e disponibilizar informação relativa aos diferentes exercícios e técnicas psicológicas, estes dispositivos podem proporcionar uma aprendizagem mais consolidada e profunda destas técnicas. Como esta se tornaria a principal via de envio de informação ao psicólogo, estes teriam que necessariamente realizar os exercícios e enviar

a informação de uma forma estruturada e organizada. Estes aspectos podem facilitar a transição das técnicas aprendidas em consulta para a vida real. Outro aspeto refere-se à forma como a informação é gerada, o psicólogo recebe a informação, por exemplo, em formato de registos de auto-monitorização e em processos de reestruturação cognitiva. Esta forma estruturada e sistematizada de receber informação pode ser conveniente quando trabalhamos num serviço sobrecarregado, em que por vezes há uma grande entrada de informação por outras vias como o correio electrónico, em que a informação se encontra frequentemente desorganizada e dispersa. Este tipo de intervenção pode também revelar-se como uma mais-valia para todos os pacientes que se revelem mais inibidos socialmente e mais à vontade com o uso das novas tecnologias, tornando-o mais fácil e apelativo.

Uma ferramenta desta natureza pode também contribuir significativamente para o processo de supervisão clínica de estagiários. O psicólogo pode assim monitorizar os pacientes e o processo de intervenção psicológica do estagiário, contribuindo para um processo de aprendizagem mais direccionado e enriquecedor. Esta aplicação móvel evidenciou muito potencial na sua implementação, a qual se apresenta promissora para a prática clínica do psicólogo. Ultrapassadas todas as formalidades da usabilidade e da avaliação da eficácia, sugere-se que esta aplicação seja formalizada na OPP e acessível a todas os sócios com cédula profissional, quer a outras identidades com a DGS e a DGE.

Investigações futuras

Tendo em conta o actual projeto, seria importante futuramente investigar a eficácia e efectividade desta intervenção mediada por um dispositivo móvel em estudantes com ansiedade social. Seria importante explorar o valor acrescido dos dispositivos móveis nas intervenções psicológicas em contexto de serviços sobrecarregados, principalmente do ponto de vista do psicólogo. Futuramente também se poderia planear a inclusão de módulos associados às terapias de terceira geração, como a ACT e o mindfulness. Seria igualmente relevante haver mais estudos com psicólogos a informar o desenvolvimento e implementação destas intervenções. A maioria das aplicações móveis também estão muito circunscritas à esfera clínica, seria

interessante perceber se estas ferramentas se adaptariam bem noutros contextos, como por exemplo, o das organizações.

Em geral, consideramos que investigações futuras devem continuar o esforço em desenvolver um protocolo sistematizado para o desenvolvimento, implementação e avaliação das aplicações móveis para a saúde mental, particularmente na área da segurança e privacidade e suporte empírico. Também, na fase da avaliação da eficácia, poderia se apostar no conhecimento de diferentes desenhos de investigação que se revelassem mais compatíveis com a investigação nesta área. Mais estudos de eficácia e efectividade de elevada qualidade metodológica também são necessários, não só para as perturbações do humor e ansiedade mas também para outras, como por exemplo, as perturbações do sono, alimentares e somatoformes. Vários estudos exploram a eficácia de aplicações móveis para a saúde mental num formato de auto-ajuda, ou auto-guiadas, seria também importante mais investigação quanto ao contributo destas aplicações combinadas com a intervenção psicológica.

As aplicações móveis para a saúde mental correspondem a uma área do conhecimento recente e que ainda carece de bastante investigação. No entanto, é inegável que se apresenta como uma área de múltiplas oportunidades no contexto da saúde mental. Tudo o que é necessário é uma boa dose de criatividade, ponderação e conhecimento científico. Cumpre-nos ainda afirmar que este projeto foi para nós muito gratificante, fonte de enormes desafios e aprendizagens que muito enriqueceram o nosso conhecimento nesta área.

REFERÊNCIAS

*Atendendo a que a tese foi construída por artigos, as referências encontram-se em cada uma das partes que integram os respectivos capítulos e artigos.

ANEXOS

ANEXO 1 - Estudo suplementar

Artigo em preparação para submissão

Oliveira, C., Pereira, A., Vagos, P., Stoyanov, S. (2021). Translation and Validation of the User Version of the Mobile Application Rating Scale (uMars) to the Portuguese Population

Translation and Validation of the User Version of the Mobile Application Rating Scale (uMars) to the Portuguese Population

Introduction

Mobile apps are discrete and independent softwares available in several mobile devices, such as smartphones and tablets (Lui et al., 2017). Over the last decade many mental health apps have been developed and made available to users, these apps usually aim to improve mental health and well-being (Bakker et al., 2016; Donker et al., 2013). mHealth apps holds great promise and offers many advantages. In the last few years increasingly more mental health apps have been developed under rigorous study and many have shown to be efficacious and with clear clinical advantage, particularly for anxiety and depression (Lecomte et al., 2020; Linardon et al., 2019).

Although significant improvements have been made, there are still thousands of mental health apps currently available in apps stores lacking empirical assessment (Lecomte et al., 2020) and very few resources to support end users to evaluate the quality and suitability of these apps. For this reason, there is an urgent need to establish appropriate standards, principles and practices regarding research and evaluation of mental health apps (Torous et al., 2019).

The Mobile Application Rating Scale – user version (uMARS) is a brief tool that helps end users to classify and evaluate the quality of mHealth apps regarding engagement, functionality, aesthetics and information (Stoyanov et al., 2016b). Thus, the current scale can be used by researchers, clinicians and other users to evaluate the quality of mHealth apps.

In Portugal similar uptake of smartphone and mobile applications has been observed and more mobile apps have been developed for mental health issues. Additionally 78% Portuguese internet users access the internet through smartphones (INE, 2016). Thus, the current study aims to adapt and validate the uMARS to the Portuguese population.

Method

Study design

To validate the user version of the mobile application rating scale (uMars) was established a process of cross-cultural adaptation, translation, back-translation, review, piloting and a psychometric evaluation.

Participants

A non-probabilistic sample of 11 college students voluntarily participated as raters in the main study. Age ranged from 10 to 41 with mean age of M=23 (SD=6,48). 60% of the total sample is female and 40% is male.

The User Version of the Mobile Application Rating Scale (uMars)

The Mobile Application Rating Scale (MARS) is a brief tool, for researchers, professionals and clinicians, to classify and assess mHealth apps quality. The MARS scale has 23 items and contains 4 objective quality subscales, namely, engagement, functionality, aesthetics and information quality, and a subjective quality rating (Stoyanov et al., 2015). The uMars is a simpler, end user version of the MARS, and contains 20 items, that includes 4 objective quality subscales, such as engagement, functionality, aesthetics and information

quality, and one subjective quality subscale. Additionally, another 6-item subscale intends to measure users perceived impact of the evaluated mobile application. Validation of the uMars in an Australian population demonstrated excellent internal consistency (alpha=.90) for the total scale, and good levels for all subscales. Also, the total score and subscales had good teste-retest reliability over 1-2 months and 3 months. Results indicate that the uMars provides a measure of app quality in target user (Stoyanov et al., 2016a).

Adaptation and translation process

A translation from English to Portuguese was performed by a health professional with good English proficiency. After this, a blind backward translation to English was made by a professional translator. We sent this version to the corresponding author of the scale, who reviewed the backward translation, compared against the original, and provided feedback and corrections regarding some items.

Also, the Portuguese version was reviewed by a Psychologist, the translator that made the backward translation, whose first language is Portuguese and an IT researcher and specialist in mobile computing, to assure that the IT terms were adequately translated. After this process, a final and official Portuguese version of the uMars Scale was obtained.

Selection process of the mobile applications

We made a systematic search of mobile apps in two app stores (Google Play and Apple) and 5 apps were chosen.

The following terms were searched: *mental health; fitness; mental training (…)*

In this study we considered the following inclusion criteria: a) app availability in the Portuguese or English language; b) relevance to university students, given that the participants in the pilot study are mainly college students; c) mHealth apps targeting mental health intervention, physical activity, mental training etc.

Exclusion criteria: a) apps targeting other areas than mental health apps.

Pilot testing of the uMars Portuguese translation/version

For pilot testing, we gathered a sample of two university students to rate one mobile application regarding mental health. After a thorough use of the mobile app, we asked the participants to rate the app using the uMars scale. To finish, we asked if they had identified any unclear item or difficulty in understanding any aspect of the scale.

Procedure of the validation study

We asked students to participate in our study via e-mail, as we reached 10 participants we commenced our study. We invited via an online platform, for participants to read and accept the informed consent, which includes information regarding our study goals and procedures, data confidentiality and anonymity, their rights to participate voluntarily and leave the study if they wish at any time. In the same platform the participants were instructed to download the selected apps and test them thoroughly for three days. After these days, they receive the uMars Scale to evaluate application quality.

Data analysis

Outlier analysis was carried out, using two standard deviations from the total mean rating of each app. Rater 11 had continuously presented as an outlier on three out of the four apps, therefore was excluded from the analysis.

Cronbachs alpha was used to calculate internal consistency of the uMars subscales and total scores.

To measure inter rater realiability of uMars subscales and total scores we used intra-class correlation coefficients (ICCs) using a two-way random effects average measures model with absolute agreement.

1. Results

Adaptation and translation process

Given the Portuguese reality regarding mobile application and frequent usage, we considered that the construct of the uMars is conceptually equivalent. By the process of translation, item equivalence and semantic equivalence were

The translation from English to Portuguese presented no major difficulties, however certain IT terms and other loanwords were difficult to translate given that these English foreign words are frequently used in Portuguese communication, especially in the young population, and the translated Portuguese IT terms (more technical) are less used. Still, an IT specialist reviewed the Portuguese translation and words such as “links” (“hiperligações”), “Layout” (“esquema do ecrã”), “gestural design” (“interação por gestos”), in some items this term wasn’t translated (i.e. “design gráfico”, “design visual”, “design pobre” etc.), “prompts” (“notificações”), “download” (“descarregar”) were translated, the only exceptions were “bugs”, that was kept without translation, considered a technical word, and “feedback” because it is a highly frequent word used in Portuguese communication. The “OK” was excluded from the items, since the phrase that followed the “OK”, in Portuguese, had the same meaning as the “OK”.

The blind backward translation made by a professional Portuguese translator was sent to the author of the uMars, who suggested some corrections, mainly in words that presented as non-equivalent, some examples are review/revise; registered/reported; briefly/for a while; no response/no answer; comprehensive/understandable. In this matter, we reviewed once more the identified non-equivalent words, and worked in finding a better translation considering the comments made by the author regarding the semantic meaning of the words.

Pilot Study

In the pilot study participated two university students, 1 female and 1 male, attending an undergraduate degree in Psychology and the other in Biology and Geology. The questions made about the scale indicated that the participants hadn't identified any error or difficulty in understanding any item or aspect of the scale. We asked about some terms that weren't translated to Portuguese (i.e. feedback, bugs, design), and they stated that they understood them quite well with no difficulty. Also, we asked about some IT terms that were translated to Portuguese but no so frequently used in in our day-to-day communication in portuguese (português corrente), such as ("links" translated to "hiperligações", "Layout" – "Esquema do Ecrã", "download" – "descarregar").

Validation Study – brief summary of results

As we can observe in Table 1, uMARS subscales presented ICCs that ranged from excellent to acceptable. The Functionality and Aesthetics subscale presented questionable ICCs, and Information and Perceived Impact revealed poor ICCs.

As the reliability ICC for the Information subscale was low, we implemented the following edits to the items, to increase their clarity and objectivity of the ratings. It is

hoped that these edits should facilitate the accurate application of these items to increase user reliability. Furthermore, we have added additional instructions to facilitate the rating process.

Table 6 Intra class correlation coefficients by subscale

Scale	ICC	
	Estimates	95% CI
Engagement	.75	.56-.88
Functionality	.63	.34-.84
Aesthetics	.61	.24-.86
Information	.40	-.00-.76
Total uMARS	.81	.75-.86
Subjective items	.90	.81-.96
Perceived Impact	.22	-.05-.51

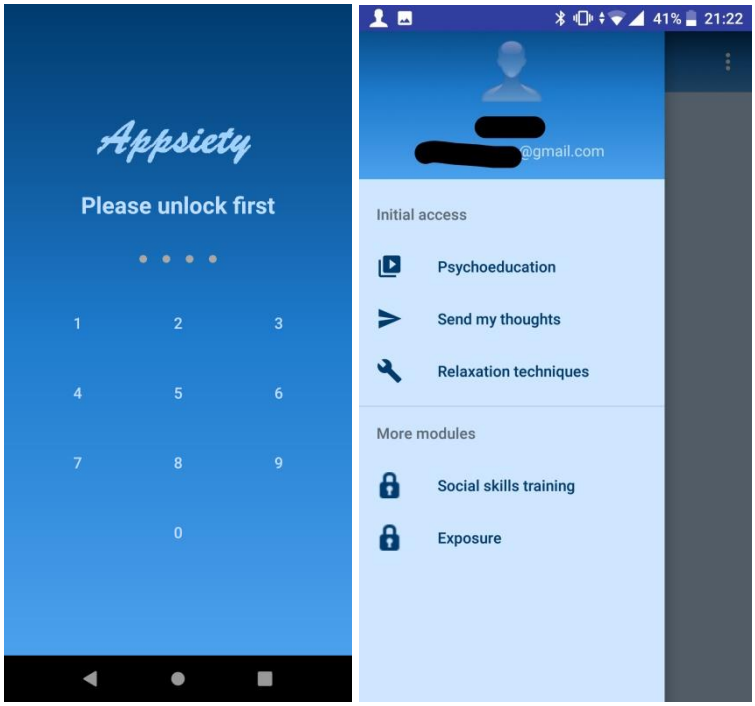
Table 7 - Cronbach's alpha coefficients by subscale

Subscales	Cronbach's alpha
Engagement	.80
Functionality	.71
Aesthetics	.65
Information	.52
Total uMARS	.82
Subjective items	.91
Perceived Impact	.33

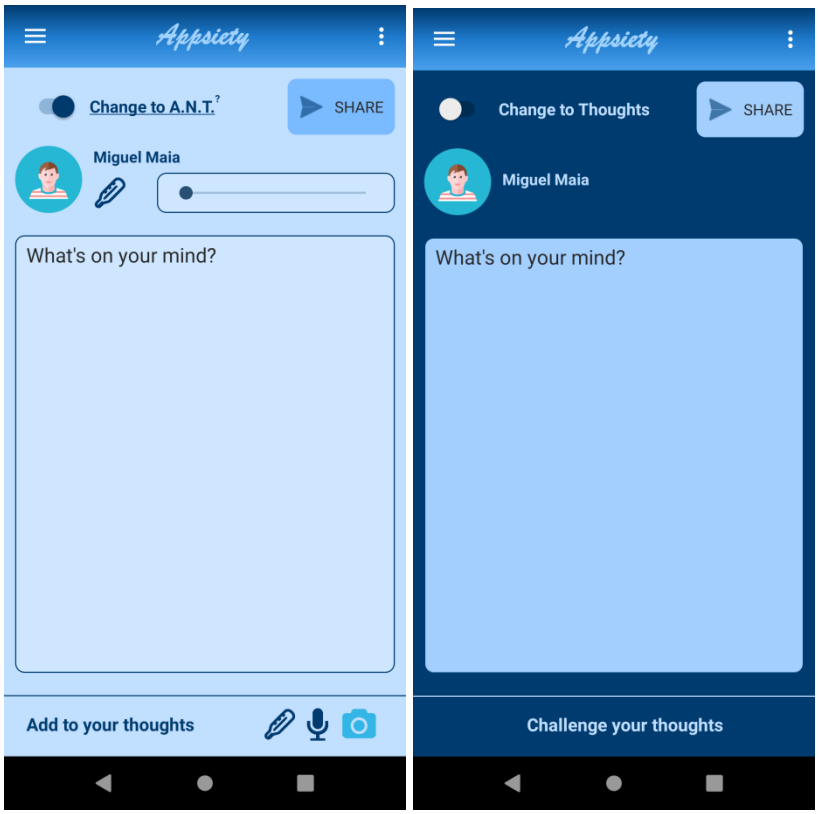
ANEXO 2

Algumas imagens da versão beta da aplicação móvel

1) Menu principal



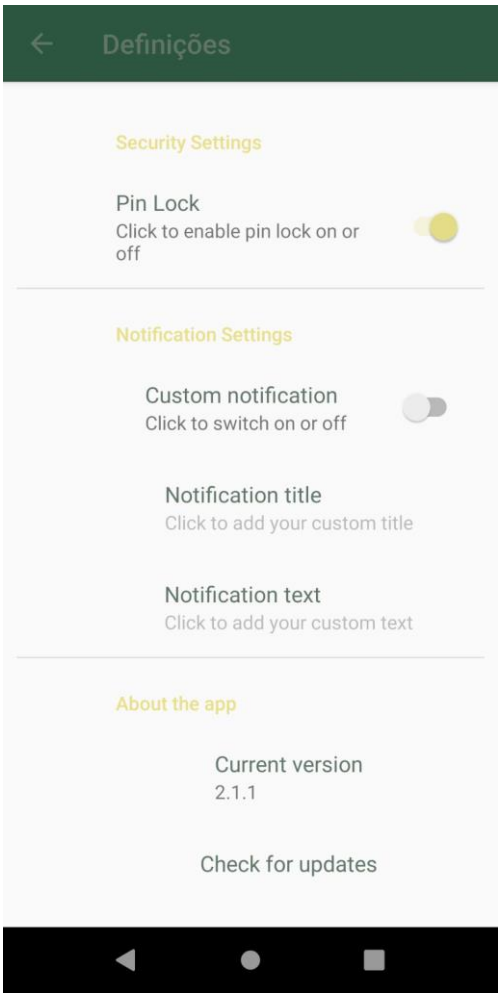
2) Reestruturação Cognitiva



Algumas imagens versão alfa da aplicação móvel

1) Módulo de auto-monitorização

2) Questões de segurança e privacidade (personalização do código PIN e das notificações)



ANEXO 3

Manual do Psicólogo – Estudo de viabilidade

Índice

1. Introdução

Este sistema foi concebido no âmbito do Projeto de Doutoramento intitulado "O Apoio Psicológico no Ensino Superior: desenvolvimento e avaliação da eficácia de uma aplicação móvel para a Ansiedade Social" sob orientação científica das Professoras Doutoras Anabela Pereira e Paula Vagos. Posteriormente, devido à sua forte contribuição, consideramos o Professor Doutor Ilídio Oliveira como um membro desta equipa de investigação.

Este projeto surgiu com o propósito de apoiar, tanto o paciente, como o psicólogo, através de meios tecnológicos, ao longo de um processo de intervenção psicológica. Especificamente, neste projeto, recorreu-se aos smartphones, e às aplicações móveis, com um enquadramento na intervenção cognitivo-comportamental para a ansiedade social. Neste sentido, foi desenvolvida uma aplicação móvel, para os pacientes, e uma plataforma Web, para os psicólogos, sempre sincronizada e indissociável. A Plataforma do Psicólogo, é um Website – base de dados, que agrega todo os dados que o paciente envia ao psicólogo através da aplicação móvel.

O objetivo geral deste sistema é servir de suporte ao paciente, entre consultas, com os exercícios terapêuticos, recomendados para prática entre consultas, com recurso à aplicação móvel SPICA. Por outro lado, é um sistema que permite apoiar o psicólogo permitindo uma maior e mais eficaz gestão e monitorização dos seus pacientes.

2. Descrição do Sistema Tecnológico

Conceito

É um sistema interativo de apoio ao paciente, com Ansiedade Social, e ao psicólogo ao longo de uma intervenção psicológica, é constituído por uma aplicação móvel e uma plataforma (do Psicólogo) completamente indissociáveis. Sendo que a aplicação presta apoio ao paciente entre consultas, e a plataforma presta apoio ao psicólogo a nível de gestão e monitorização dos pacientes.

Aplicação Móvel

A aplicação móvel é baseada na intervenção cognitivo-comportamental, para a Ansiedade Social, e visa o apoio ao paciente entre consultas, especificamente na orientação e no incentivo à prática do trabalho/exercícios entre consultas. Divide-se em vários módulos principais sendo eles os seguintes:

1) *Módulo de Intervenção Cognitivo-Comportamental*
   - Psicoeducação (na aplicação: ***Tutorial***);
     - texto de familiarização do paciente com o modelo cognitivo-comportamental para a ansiedade social;
   - Auto-monitorização (na aplicação: ***Diário***);
     - 1) Registo de pensamentos/emoções/comportamentos (situações) em formato texto, áudio ou fotografia;2) atribuem valência ao pensamento (positivo, neutro ou negativo). Através deste módulo, se o paciente categorizar o pensamento como negativo, podem passar diretamente ao modulo de reestruturação cognitiva. (*Neste módulo, de auto-monitorização, o paciente pode optar por guardar a informação e submeter à Plataforma quando entender).
   - Reestruturação cognitiva (na aplicação: ***Pensamentos automáticos***)
     - Exercício que permite aos pacientes que 1) submetam os pensamentos automáticos negativos (PAN), posteriormente 2) selecionam as questões de debate aos PAN (reflexão) e por fim 3) geram os pensamentos

alternativos (PA); (*Neste módulo, o paciente pode optar por guardar a informação e enviar ao psicólogo quando entender).

- Exercícios de relaxamento interativos (na aplicação: ***exercícios de relaxamento***);
    - Instruções relativas à Respiração diafragmática (em texto, imagem interativa e áudio);
    - Instruções do Relaxamento Progressivo Muscular de Jacobson (em texto e áudio);
- Exposição (na aplicação: ***Desafios***)
    - Hierarquia dos medos (submetida pelo paciente);
    - O psicólogo pode atribuir "estados" ao desafio, através da plataforma. O desafio fica pendente enquanto o psicólogo não rever o exercício e atribuir um estado. Posteriormente o psicólogo pode ativar, inativar ou, mais tarde, resolver o desafio.
    - Quando o exercício está "ativo" – o psicólogo pode interagir com o paciente através do CHAT. Este CHAT é de respostas breves, essencialmente de incentivo ou motivacionais.

2) *Módulo Cronologia*
    - Resume ao paciente toda a informação que submeteu na aplicação e disponível ao Psicólogo para monitorização;
3) *Módulo de Notas do Psicólogo (na aplicação **AVISOS**)*
    - As notas do Psicólogo são um meio de comunicação unidirecional, em que o psicólogo pode deixar "notas" ao paciente, como por exemplo para orientação de trabalhos de casa, ou outras situações;
4) *Segurança e Proteção de dados*
    - A aplicação está reservada ao uso exclusivo de pacientes, que estejam em consulta com um Psicólogo – apenas o psicólogo pode introduzir o e-mail do paciente e tornar a aplicação acessível para ele.
    - A aplicação móvel inclui uma verificação inicial, onde se cria uma conta pessoal, e verifica-se o e-mail (o e-mail tem de ser válido);

- Inclui uma definição opcional de bloqueio da aplicação através de um PIN de quatro dígitos.
- Inclui um texto informativo relativo à Política de Privacidade, incluindo boas práticas de segurança*

5) *Definições*
   - Permite personalizar as notificações (i.e. quando o paciente recebe uma notificação da aplicação – não aparece o nome da app, aparece o texto personalizado que ele colocou);
   - Permite fazer um PIN Lock
   - Política de Privacidade.

Plataforma do Psicólogo

A Plataforma do Psicólogo é um sistema de gestão monitorização dos pacientes (com acesso à aplicação), que agrega, espontaneamente, todos os dados submetidos pelos pacientes, através da aplicação. Este sistema visa a monitorização espontânea e acompanhamento em tempo real dos pacientes; possibilitando uma visão geral de todos os pacientes e uma maior e mais eficiente preparação antes da consulta, podendo adaptar a intervenção conforme os dados obtidos na Plataforma.

A plataforma é passível de agregar os seguintes dados:

- O número de vezes que o paciente acedeu à aplicação;
- O Registo de situações relevantes, nomeadamente, a descrição da situação, pensamentos, emoções e comportamentos associados e valência (positivo, neutro e negativo). Imagens ou áudios associados a cada situação.
- Todo os PAN, as questões selecionadas pelos pacientes e respetivos PA enviadas;
- Todos os desafios (exercícios de exposição) submetidos pelos pacientes e respetivos estados. Inclui também as mensagens trocadas no CHAT.
- Todas as mensagens enviadas (pelo próprio psicólogo) através do Módulo AVISOS na aplicação.

3. Aplicação Clínica

De seguida encontra-se uma descrição dos conteúdos e funcionalidades que integram a aplicação móvel do paciente. Esta informação visa a familiarização do psicólogo com o conteúdo incluso na aplicação móvel, e como tirar maior partido da aplicação ao longo da intervenção.

Descrição dos Módulos de Intervenção Cognitivo-Comportamental

a. Psicoeducação

A ansiedade que por vezes sentimos em situações sociais é comum nos humanos e está relacionada com a nossa estrutura social de grupo e com a sua organização hierárquica, portanto é frequente sentirmos alguma ansiedade em situações sociais, no entanto esta ansiedade, não deve impedir um funcionamento social adequado e pode até ser benéfico para o desempenho social.

No entanto, há pessoas que sentem uma ansiedade tão elevada e persistente em situações sociais que interfere com o seu funcionamento social normal, levando mesmo ao evitamento destas situações. Estas pessoas têm um medo excessivo de ser avaliado negativamente pelos outros e hipersensibilidade ao escrutínio por parte de outrem.

Podemos desenvolver uma elevada consciência de nós mesmos (atenção auto-focada) e face a esta situação podemos despertar sintomas de natureza somática, cognitiva e comportamental.

Como por exemplo:

Sintomas Somáticos/fisiológicos: palpitações cardíacas, sudação, rubor, tremor e urgência de micção.

Sintomas Cognitivos: são pensamentos que acontecem antes, durante e após o enfrentar da situação temida.

- Antes do enfrentar de uma situação social que tememos muito, muitas vezes surgem-nos pensamentos associados ao fracasso, falta de competências necessárias para causar uma impressão positiva, preocupações com a aparência e a possibilidade de ser avaliado negativamente.

- Durante a situação temida, a nossa atenção é auto-focada e há um aumento da consciência de nós mesmos.

- Após a situação surgem enviesamentos negativos na auto-percepção e na auto-avaliação do seu desempenho social, assim como expectativas negativas acerca das consequências sociais de futuras interações são frequentes. Em algumas pessoas podem ocorrer espontaneamente imagens negativas e distorcidas de si mesmo, em que se vêm a si mesmos a partir de uma perspetiva do observador.

Sintomas Comportamentais: um comportamento muito frequente e incapacitante, que frequentemente surge na antecipação a uma situação social que tememos muito é o evitamento. Muitos estudos na área da psicologia clínica defendem que o evitamento das situações sociais que mais tememos é uma das razões que leva à que este medo/ansiedade social dificilmente desapareça. Isto acontece porque ao evitar estas situações, torna-se impossível aprendermos, praticarmos e melhorarmos as nossas aptidões para lidarmos com elas, tornando-se cada vez mais difícil e desconfortável passar por elas.

Outro comportamento também muito frequente é aquilo que chamamos "comportamentos de segurança". São comportamentos que adoptamos para "esconder" ou controlar a ansiedade que sentimentos nestas situações (i.e. desviar os olhar; esconder as mãos nos bolsos; tapar a cara com as mãos etc.)

Este conjunto de pensamentos automáticos negativos, comportamentos de segurança e o evitamento das situações temidas ajudam a manter as nossas dificuldades e a ser cada vez mais difícil quebrar o ciclo.

Na Aplicação Móvel: Este módulo é expositivo e traduz-se em texto e esquemas, subdividido em: - Etiologia; - Características (sintomas fisiológicos, cognitivos e comportamentais); - Como é que se mantém o ciclo de ansiedade em situações sociais.

b. Módulo de Auto-Monitorização

A auto-monitorização é o registo de pensamentos, emoções e comportamentos.

É importante registarmos regularmente situações do nosso dia-a-dia que nos tenham provocado ansiedade, ou outras situações que consideramos relevantes. Neste registo é

importante termos em conta o registo do que pensamos, sentimos e o que fizemos, antes, durante e após a situação social temida.

Posteriormente este registo pode nos dar pistas de certos padrões de comportamento, bem como a consciência de determinados sentimentos e estados emocionais.

Na Aplicação Móvel: Este módulo inclui: - Racional sobre o que é a auto monitorização, o seu propósito e importância; - Valência (positivo, neutro e negativo; - Um campo, onde é possível inserir texto ou fazer uma gravação áudio, ou inserir fotografias retiradas com a câmara do telemóvel.

c. Exercícios de Relaxamento

- **Respiração abdominal ou diafragmática**

Ambiente: Tranquilo; deitada(o) confortavelmente ou sentada(o) recostada; de olhos fechados; mão direita na zona abdominal e mão esquerda no peito.

Descrição: vamos começar por colocar a nossa mão direita sobre a zona abdominal e a mão esquerda sobre o peito. A mão sobre o peito tem apenas o propósito de nos certificarmos de que o peito não se move, porque o mais importante é o movimento da zona abdominal. Agora, suavemente vamos inspirar e encher a nossa barriga como um balão. De seguida expiramos, empurrando a nossa barriga para dentro, esvaziando o balão. Relembrando que respiramos apenas pela zona abdominal.

Benefícios: Ao fazermos esta respiração permitimos que o diafragma se movimente e nos auxilie no processo respiratório, quando inspiramos o diafragma movimenta-se para baixo, permitindo uma maior entrada de ar nos pulmões (e, portanto, de oxigénio), e ao expirarmos o diafragma movimenta-se para cima, "empurrando" o ar para fora dos pulmões, evitando que fique nos pulmões ar residual ou estagnado. Esta respiração permite que utilizemos toda a nossa capacidade pulmonar e que recebamos 7 vezes mais oxigénio. O oxigénio que recebemos a mais permite-nos estimular uma resposta de relaxamento.

- **Relaxamento Muscular Progressivo de Jacobson (RMPJ)**

Ambiente: Tranquilo; deitado confortavelmente.

Descrição: o treino do relaxamento Muscular Progressivo, consiste em contrair e descontrair 16, 7 ou 4 grupos musculares. Começamos por contrair fortemente determinados músculos do nosso corpo, e após máxima contração de 2 ou 3 segundos, descontraímos profundamente esse mesmo músculo.

Etapas:

1) contração/ descontração 16/7/4 grupos musculares;
2) descontração apenas (sem a contração – relembrando apenas a sensação de descontração; visualizando os nossos músculos a relaxar um de cada vez)
3) relaxamento com imagética guiada (guided imagery).

Benefícios: a prática regular deste relaxamento, permite-nos aprender a perceber quando e quais os músculos que se encontram em tensão, e de seguida aprendemos a induzir o relaxamento, descontraindo esses mesmos músculos. Neste sentido, associamos ao estímulo de tensão uma resposta de relaxamento.

Na Aplicação Móvel: Este módulo disponibiliza: - Racional que inclui: Ambiente; Descrição e benefícios dos exercícios (acima descrito); - Formas interativas de exposição aos exercícios, via áudio principalmente.

d. Reestruturação Cognitiva

Desafio: Desafiar os teus pensamentos automáticos

Os pensamentos automáticos são pensamentos que surgem automaticamente face a acontecimentos ativadores, e eles revelam a nossa atitude face à realidade e a nós próprios. Os Pensamentos Automáticos Negativos (PAN) são pensamentos automáticos e são negativos, e como é um processo automático, muitas vezes não nos apercebemos deles.

A reestruturação cognitiva é um processo em que um pensamento automático negativo é identificado e questionado, dando origem a um pensamento alternativo mais

realista e funcional. Podemos dar origem ao PA através do debate lógico (A. Ellis) ou através do teste empírico (A. Beck).

IDENTIFICAÇÃO DOS PAN

(ex. “eles nunca mais vão falar comigo”; “ficaram a pensar que eu era estranha”)

Registo de PAN:

QUESTÕES PARA O DESAFIO DOS PENSAMENTOS AUTOMÁTICOS NEGATIVOS

Estas questões são exemplos orientadores que nos ajudam a refletir e a desafiar os pensamentos automáticos negativos. Tendo em conta os pensamentos negativos que registaste, seleciona as questões que mais se adequam e te apoiam no desafio dos teus pensamentos.

Questões 1 **[Pensamento tudo ou nada]**

- Será que isto foi mesmo assim tão mau?
- O que aconteceu de bom?
- O que posso aprender com esta experiência?

Questão 3 **[Bola de Cristal]**

- Como é que eu sei que isto vai mesmo acontecer assim?
- Já me aconteceu muitas vezes?
- Costuma acontecer a toda a gente?

Questão 4 **[Leitura da Mente]**

- Como posso ter a certeza que é mesmo isso que ele(a) está a pensar/ sentir?
- Ele pode estar a pensar de outra maneira?

Questão 5 **[Imperativos]**

- Estou a exigir demais de mim?
- Posso mesmo ser perfeito?
- Alguém pode ser perfeito?

Questões 6 **[Catastrofização]**

- Como vou saber o que vai acontecer se não tentar?
- Se alguma coisa de mal realmente acontecer, como posso lidar com isso?
- Se isto acontecer, é mesmo assim tão mau?

Questão 7 **[Aproximação à realidade]**

- Qual a consequência mais realista?
- Que evidência é que eu tenho que este pensamento automático é verdadeiro? (corresponde mesmo à realidade).
- Poderá existir alguma explicação alternativa?

[gerar pensamento alternativo]

- Que efeito tem em mim eu acreditar no pensamento?
- Quais coisas seriam diferentes, se pensasse de forma diferente?
- Se um amigo meu estivesse no meu lugar e tivesse este pensamento, que lhe diria?

PENSAMENTOS ALTERNATIVOS

Aqui podes registar os pensamentos que resultaram do teu desafio aos pensamentos automáticos negativos. [o objetivo não é responder diretamente às questões que selecionaste anteriormente – o objetivo é que estas nos ajudem a pensar de forma diferente]. E por isso, estes pensamentos são mais funcionais e realistas e por isso nos permitem estar melhor no nosso dia-a-dia.

O objetivo do registo dos pensamentos alternativos não é responder diretamente às questões que selecionaste anteriormente – o objetivo é que estas questões nos ajudem a pensar de forma diferente, mais funcional e adaptativa.

e. Módulo de Exposição

Esta fase da intervenção envolve a exposição gradual e sistemática a situações sociais geradoras de ansiedade, possibilitando a habituação à ansiedade fisiológica, extinção do medo e ocorrência de novas aprendizagens. A exposição tem o propósito de reduzir a ansiedade nestas situações e o evitamento.

No entanto, quando temos muitos ansiedade em situações sociais a Exposição só é eficaz quando permite modificar (desconfirmar) as crenças disfuncionais subjacentes ao problema, sendo assim, a exposição deve ter como alvo o desafio às crenças relacionadas com o medo de avaliação negativa.

Na aplicação

1) Listagem hierárquica de situações geradoras de ansiedade submetida pelo paciente;
2) O Psicólogo pode:
    a. Ativar: é sobre aquela situação que vai começar a trabalhar primeiro – CHAT fica ativado.
    b. Inativar: não é para o paciente pensar naquelas situações, de momento – CHAT INATIVO.
    c. Resolvido: exercício já alvo de exposição e funcional.
3) O CHAT só está ativo para situações “Ativas”. E deve ser usado pelo Psicólogo como este achar adequado, no entanto, é essencialmente para imagens de incentivo e motivacionais.

4. O Estudo passo a passo

0) Seleção do Psicólogo

a. envio do link para registo na Plataforma

1) Seleção da amostra

a. O psicólogo seleciona a amostra (**Numa 1ª ou 2ª consulta**);

b. Atribui um e-mail fictício;

c. Assina o consentimento informado e questionário sociodemográfico.

2) Inclusão no Estudo

a. O psicólogo introduz o e-mail fictício do participante/paciente e a plataforma envia automaticamente por e-mail o link que irá permitir a instalação da aplicação móvel (para o e-mail fictício);

3) Interação Plataforma Web Psicólogo – App paciente

a. Assim que o paciente instalar a aplicação, o psicólogo terá acesso a todo os dados que o paciente envia ao psicólogo.

4) Avaliação ao longo da intervenção

a. 2º momento de avaliação: breve conjunto de questionários;

5) Final da intervenção

a. 3º momento de avaliação: breve conjunto de questionários.

ANEXO 3

Parecer do conselho de ética relativo ao estudo que estava planeado decorrer nos SASUA.

sua referência
Pedido de parecer

sua comunicação de
24/11/2017 (e-mail)

nossa referência
07-CED/2018, 22/02/2018

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Exma. Senhora
Doutora Anabela Maria Sousa Pereira

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Assunto: Processo n.º: 19/2017.
Requerente (s): Doutora Anabela Maria Sousa Pereira.
Designação do Projeto e objeto de Parecer do Conselho de Ética e Deontologia: "Desenvolvimento e Avaliação da Eficácia de uma Aplicação Móvel para a Ansiedade Social em Contexto Psicoterapêutico"

Exma. Senhora Doutora Anabela Maria Sousa Pereira,

Na sequência do pedido de parecer, com o processo n.º 19/2017, para o projeto: "Desenvolvimento e Avaliação da Eficácia de uma Aplicação Móvel para a Ansiedade Social em Contexto Psicoterapêutico", junto envio o respetivo parecer favorável aprovado, com unanimidade, na reunião plenária do CED do dia 21 de fevereiro de 2018.

Com os melhores cumprimentos,

O Presidente da Conselho de Ética e Deontologia da Universidade de Aveiro,

Professor Doutor Victor M. S. Gil.