PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Is a smartphone application (BlueIce) acceptable and safe for university students who self-harm: an open study
AUTHORS	Cliffe, Bethany; Moore, Emma; Whittle, Kathryn; Stallard, Paul

VERSION 1 – REVIEW

REVIEWER	Harris, Lauren M Florida State University
REVIEW RETURNED	21-Feb-2023

GENERAL COMMENTS	This mixed-methods study explores the acceptability and safety of a smartphone app, BlueIce, for addressing self-harm in 15 university students. The authors conclude that BlueIce is a safe and acceptable means of coping with self-harm urges for university students. Overall, this article provides useful insights into a novel and scalable self-harm intervention for young people. Though the study is limited by a small sample size, which precludes the possibility of drawing strong conclusions about the intervention's effectiveness, this study may lay the groundwork for larger trials in the future. Overall, this study provides a novel contribution to the literature, but would benefit from minor modifications. Below are a few specific recommendations which may help the authors strengthen the article further. Introduction • There are some inconsistencies in this article regarding the novelty of this research question, and clarification would be helpful. For example, on lines 54-56, the authors state "there is no research investigating the use of a smartphone app for students who self-harm specifically [16]." However, on the subsequent page, the authors describe and cite a prior study investigating students' perceived usefulness of BlueIce ("Given the positive findings from this app with adolescents, preliminary work subsequently investigated whether it could also be of use to university students. Students were shown screenshots of the app while its functionality was explained to them, and they believed that it could help them manage their self-harm while also promoting positive mental wellbeing [17]"). Can the authors be more specific about the scope of the prior research that has been done in this domain (re: similarities and differences with the present study), and clarify whether the present study is intended as a replication/extension of prior work? Methods • Can the authors please specify whether the BlueIce app is available for download on any common app stores (e.g., Google

	Play, Apple Story) and whether it is free? • What was the primary rationale for defining “current” self-harm as occurring within the last two months? It would be useful to provide this rationale within the methods section. Results • Related to the previous point: in the results, the authors state that questions related to self-harm did not specify a timeframe. However, it appears that there are data available regarding the timeframe of self-harm and self-harm urges reported by participants. How were these timeframes established? Discussion • The authors refer to this app as “effective” for managing self-harm; this term should be used cautiously as this study was not designed to evaluate effectiveness. • This section would benefit from an expanded discussion of existing interventions for self-harm in adolescents, especially in light of meta-analytic evidence suggesting limited efficacy of self-harm interventions across all populations (Fox et al., 2020) and in adolescent populations specifically (Harris et al., 2022). Some questions to address may include: do the authors have reason to believe that this app holds particular promise for yielding significant reductions in self-harm, above and beyond what existing interventions offer? Or, are scalability and dissemination potential viewed as the primary benefits of this app?

REVIEWER	Szlyk, Hannah S Rutgers The State University of New Jersey Paid consultant for Google Health
REVIEW RETURNED	27-Feb-2023

GENERAL COMMENTS	The authors report a pilot study of BlueIce among college students. This digital intervention seeks to help youth and emerging adults with self-harm management. While the authors share great graphics of the tools and clear documentation of their qualitative data coding process, many key details of the study are missing. Examples include context of literature described in the introduction, purpose of this study (why another acceptability study), reason for recruitment site (introduction discusses need for interventions that reach youth who are not seeking help), how saturation of themes was reached, and definition of terms (self-harm, coding framework name) The article also needs to adhere to journal guidelines for formatting tables. Abstract: • Results section should include values/metrics for findings. Are some of these findings qualitative themes? This is unclear as written. Strengths and Limitations • Another limitation: recruitment from only one university. Introduction: • Make sure that you put literature into context- is this literature international or only United Kingdom specific? • The statistics seem to be missing context as well- are these past year or lifetime behaviors? What is the scope of this problem?

	• Spell out first time it is introduced. • Page 4, line 17: based on what is presented in this paragraph- I wouldn't necessarily say that alternatives to professional care are needed- just different ways of reaching students are needed. • Page 4, line 34, - "elsewhere" needs more context- a different country, etc. • Additionally, is this non-suicidal self-harm? There needs to be a definition for self-harm in the introduction. • It is unclear how this pilot of acceptability is different than the prior study. Methods: • It seems odd that students were recruited from the mental health services center, as you described that the point of this intervention is to reach youth with barriers to care. This sample has already initiated some sort of formal help-seeking. • Again, the definition of self-harm needs to be more detailed. And there is no mention of suicide risk. How was this managed, especially as there were on exclusion criteria? • Were any participants minors and needed parental consent to participant? • Page 7, final paragraph: more citations need to be used for qualitative analysis process, for example why is .79 considered a good agreement level? • Page 8: you never name the framework- why is this considered novel (re: "Strengths and Limitations" on page 3). • There needs to be a discussion about how thematic saturation was determined, especially with a smaller N. Results: • Table formatting needs to follow journal selected formatting guidelines. This table does not seem journal ready. • Current thoughts of self-harm were reported. There needs to be explanation earlier in the article why this is important to measure, etc. • A few key measurements are missing: type of means used to self-harm, suicide risk and overlap with self-harm if this is a study of NSSI, and if the participant ever had to seek medical attention for a self-harm episode. Discussion • Page 18, it is not clear to me how this study measured and reported results about safety. • Page 19, line 18, are you referencing coping scores at baseline? This needs to be clear. • Limitations: more information about difficulties with recruitment need to be discussed. • Limitations: demographics of sample and generalizability?

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1
Ms. Lauren M Harris, Florida State University

Comments to the Author:

This mixed-methods study explores the acceptability and safety of a smartphone app, BlueIce, for addressing self-harm in 15 university students. The authors conclude that BlueIce is a safe and acceptable means of coping with self-harm urges for university students. Overall, this article provides useful insights into a novel and scalable self-harm intervention for young people. Though the study is limited by a small sample size, which precludes the possibility of drawing strong conclusions about the intervention's effectiveness, this study may lay the groundwork for larger trials in the future. Overall, this study provides a novel contribution to the literature, but would benefit from minor modifications. Below are a few specific recommendations which may help the authors strengthen the article further.

Response: Thank you for your kind feedback and your useful suggestions below.

Introduction

• There are some inconsistencies in this article regarding the novelty of this research question, and clarification would be helpful. For example, on lines 54-56, the authors state "there is no research investigating the use of a smartphone app for students who self-harm specifically [16]." However, on the subsequent page, the authors describe and cite a prior study investigating students' perceived usefulness of BlueIce ("Given the positive findings from this app with adolescents, preliminary work subsequently investigated whether it could also be of use to university students. Students were shown screenshots of the app while its functionality was explained to them, and they believed that it could help them manage their self-harm while also promoting positive mental wellbeing [17]"). Can the authors be more specific about the scope of the prior research that has been done in this domain (re: similarities and differences with the present study), and clarify whether the present study is intended as a replication/extension of prior work?

Response: thank you for highlighting the need for clarification here. The phrasing has been changed to clarify that in the previous study it was just discussed whether digital interventions (including BlueIce as an example) could be acceptable for this student population. On the other hand, in the current study students were actually given the app to test out and evaluate. Information has been added to the introduction:

"However, despite these potential benefits, no prior research has been conducted where university students have used and evaluated a smartphone app specifically developed to help manage self-harm "

"Given the positive findings from this app with adolescents (up to the age of 18 years) preliminary work subsequently investigated whether it could be acceptable to university students. In interviews, students were shown screenshots of the app while its functionality was explained to them. Feedback was positive with university students believing that BlueIce could help them manage their self-harm while also promoting positive mental wellbeing"

"However, while the perceived acceptability of BlueIce for university students has been initially explored, this is yet to be corroborated by students actually using the app. This study aims to build on previous work by exploring the acceptability and safety of BlueIce for university students using the app alongside attending university wellbeing services."

Methods

Methods

• Can the authors please specify whether the BlueIce app is available for download on any common app stores (e.g., Google Play, Apple Story) and whether it is free?

Response: This information has now been added to the intervention section of the methods:

"Currently, BlueIce is freely available on a prescription basis within participating child and adolescent mental health services, with the aim of becoming freely available to download via common app stores once the outcomes have been established ".

• What was the primary rationale for defining "current" self-harm as occurring within the last two months? It would be useful to provide this rationale within the methods section.

Response: Thank you for this helpful suggestion, this information has now been added to the recruitment section:

"Current self-harm was defined as within the past two months in line with the definition used within the K-SADS [21]. This was deemed appropriate to account for the often sporadic and spontaneous nature of self-harm."

Results

• Related to the previous point: in the results, the authors state that questions related to self-harm did not specify a timeframe. However, it appears that there are data available regarding the timeframe of self-harm and self-harm urges reported by participants. How were these timeframes established?

Response: thank you for highlighting this contradiction, more information has been provided to clarify what was meant by no timeframe being specified:
"Questions regarding the prevalence of self-harm thoughts and behaviour did not specify a timeframe that they had to have occurred within so that those who had not self-harmed within the last two months were still able to provide insight into what their self-harming behaviours were typically like."

Discussion
• The authors refer to this app as "effective" for managing self-harm; this term should be used cautiously as this study was not designed to evaluate effectiveness.
Response: the authors agree with this point, and the reference to effective has been replaced with 'helpful'.

• This section would benefit from an expanded discussion of existing interventions for self-harm in adolescents, especially in light of meta-analytic evidence suggesting limited efficacy of self-harm interventions across all populations (Fox et al., 2020) and in adolescent populations specifically (Harris et al., 2022). Some questions to address may include: do the authors have reason to believe that this app holds particular promise for yielding significant reductions in self-harm, above and beyond what existing interventions offer? Or, are scalability and dissemination potential viewed as the primary benefits of this app?
Response: thank you for this suggestion, however the authors would like to clarify that the population addressed in the current research is university students (typically young adults) as opposed to adolescents. There is limited research into interventions for self-harm amongst university students, so it is tricky to compare. However, this has been discussed more in the final paragraph of the discussion:
"This suggests that BlueIce could be a useful tool that is scalable, able to offer 'out of hours' support, can help students cope in difficult moments, and reach more students who may be struggling with self-harm and feel unable to directly ask for help. Research into self-harm interventions in university settings is very limited, for example Nawaz et al [54] found only two studies meeting this criteria, neither of which were found to be effective in reducing self-harm. More research is needed to establish the effectiveness of BlueIce, nevertheless, the current study identifies it as a valuable and acceptable tool for students."

Reviewer: 2
Dr. Hannah S Szlyk, Rutgers The State University of New Jersey

Comments to the Author:
The authors report a pilot study of BlueIce among college students. This digital intervention seeks to help youth and emerging adults with self-harm management. While the authors share great graphics of the tools and clear documentation of their qualitative data coding process, many key details of the study are missing. Examples include context of literature described in the introduction, purpose of this study (why another acceptability study), reason for recruitment site (introduction discusses need for interventions that reach youth who are not seeking help), how saturation of themes was reached, and definition of terms (self-harm, coding framework name) The article also needs to adhere to journal guidelines for formatting tables.

Response: Thank you for your helpful feedback. We hope you agree that we have addressed your concerns in our comments below and in the paper.

Abstract:
• Results section should include values/metrics for findings. Are some of these findings qualitative themes? This is unclear as written.
Response: the abstract results has now been updated to include the values and clarification regarding the qualitative findings:
"Following app use, there were statistically significant reductions in symptoms of anxiety (baseline M 12.47, SD 4.42; follow-up M 10, SD 4.16) $t(14) = 2.26$, $P = .040$, $d = .58$, and depression (baseline M

16.5, SD 5.17, follow-up M 12.27, SD 3.66) t(13) = 5.50, P <.001, d = 1.47. Qualitative findings showed participants found BlueIce to be acceptable, safe and helpful, and reported that they were more able to cope with difficult feelings and better understand their self-harm triggers following use of the app."

Strengths and Limitations
• Another limitation: recruitment from only one university.
Response: This has been added, thank you for the suggestion:
"Students were only recruited from one university."

Introduction:
• Make sure that you put literature into context- is this literature international or only United Kingdom specific?
Response: thank you for this useful suggestion. The literature within the introduction has been contextualised to show whether it's from UK, USA, Canada, etc.

• The statistics seem to be missing context as well- are these past year or lifetime behaviors? What is the scope of this problem?
Response: More information has been added regarding the context of the self-harm behaviours measured in the review:
"In this review, studies measured self-harm on a range of scales, including lifetime, past four weeks, six months, 12 months and 3 years."

• Spell out first time it is introduced.
Response: it is unclear what needs to be spelled out – the authors wonder if the reviewer is referring to UK, and so have consequently spelt this out in full.

• Page 4, line 17: based on what is presented in this paragraph- I wouldn't necessarily say that alternatives to professional care are needed- just different ways of reaching students are needed.
Response: further information has been added to clarify why alternatives to professional support are required, given that some students don't feel able/willing to discuss self-harm with a professional:
"self-harm often goes unreported due to the shame, stigma and misconceptions surrounding it that leaves many students unable to discuss their self-harm [5, 6, 7, 8, 9, 10]. This means that prevalence rates are often underestimated and that very few students who self-harm ever seek or receive professional help [11, 12]. This suggests that alternative options for support should be explored so that students who do not yet feel ready or able to discuss self-harm can still access other forms of support."

• Page 4, line 34, - "elsewhere" needs more context- a different country, etc.
Response: elsewhere has been replaced with "in the USA"

• Additionally, is this non-suicidal self-harm? There needs to be a definition for self-harm in the introduction.
Response: thank you for highlighting this and the definition used has now been added:
"Self-harm, defined in the current study as any intentional act of harm or injury directed towards the self irrespective of motivation"

• It is unclear how this pilot of acceptability is different than the prior study.
Response: Further clarification has now been added to outline how this study was different, in that here students actually used the app for 6 weeks compared to the previous study where they were just interviewed about their thoughts on the use of digital interventions (such as something like BlueIce) for self-harm, without being able to use the app:
"However, despite these potential benefits, no prior research has been conducted where university students have used and evaluated a smartphone app specifically developed to help-manage self-harm "
"Given the positive findings from this app with adolescents (up to the age of 18 years), preliminary work subsequently investigated whether it could be acceptable to university students. In interviews, students were shown screenshots of the app while its functionality was explained to them. Feedback was positive, with university students and they believing that BlueIce could help them manage their

self-harm while also promoting positive mental wellbeing"
"However, while the perceived acceptability of BlueIce for university students has been initially explored, this is yet to be corroborated by students actually using the app. This study aims to build on previous work by exploring the acceptability and safety of BlueIce for university students using the app alongside attending university wellbeing services."

Methods:
• It seems odd that students were recruited from the mental health services center, as you described that the point of this intervention is to reach youth with barriers to care. This sample has already initiated some sort of formal help-seeking.
Response: this sample was intentionally chosen to try make sure students were safe while testing out an app that hadn't previously been used in this population. By asking students to test the app who were also attending wellbeing services, it ensured that students had an extra safety net in case they found the app unhelpful or even detrimental to their wellbeing. Luckily this wasn't the case for any participants. This has been clarified in the recruitment section:
"This sample was chosen to ensure that students had support in place should the app not be helpful, whilst being able to explore the safety of using the app in this population"

• Again, the definition of self-harm needs to be more detailed. And there is no mention of suicide risk. How was this managed, especially as there were on exclusion criteria?
Response: further information regarding risk and suicide has been added below the inclusion criteria. Importantly, the clinical lead for the wellbeing services was involved in determining the suitability of participants on a case-by-case basis:
"There were no exclusion criteria, including no specific exclusion criteria for participants who may have been at risk of suicide. Given the broad definition of self-harm used in this study, differentiations were not made between suicidal or non-suicidal self-harm, meaning some participants in this study may have been experiencing suicidal thoughts. Clinical judgement was used on an individual case basis, as all potential participants were discussed with the university wellbeing service team lead to confirm suitability."

• Were any participants minors and needed parental consent to participant?
Response: please see table 1 for the demographic information – as all participants were university students, the minimum age was 18.

• Page 7, final paragraph: more citations need to be used for qualitative analysis process, for example why is .79 considered a good agreement level?
Response: references have now been added for the content analysis process and for the interpretation of .79.

• Page 8: you never name the framework- why is this considered novel (re: "Strengths and Limitations" on page 3).
Response: the framework doesn't have a particular name, it is discussed within the original paper as a framework for engagement with digital interventions, but a reference is provided for the paper in which the framework is presented. We don't believe that this is necessarily novel, but we believe it to be a strength of the paper as using a pre-existing framework that was developed via a literature review etc., suggests credibility of the categories used to summarise the data.

• There needs to be a discussion about how thematic saturation was determined, especially with a smaller N.
Response: Thank you for this suggestion. We have now discussed how the information power was used to determine the adequacy of the sample size:
"An information power approach was taken to determine the adequacy of the sample size for the qualitative analysis. Given the narrow aim of the study, the specificity of the experiences of the sample, the previous findings regarding the acceptability of BlueIce, and the in-depth dialogue within the interviews, a smaller sample of 15 participants was appropriate to address the research aims."

Results:
• Table formatting needs to follow journal selected formatting guidelines. This table does not seem journal ready.
Response: Thank you for pointing this out, however the only guidance available (to the best of our

knowledge) is that tables should be in word format. We hope that the editors will be able to help us with this.

• Current thoughts of self-harm were reported. There needs to be explanation earlier in the article why this is important to measure, etc.
Response: This information has now been added to the self-harm measures section within the methods:
"These measures were chosen to capture both self-harm urges and behaviours, as there is evidence to suggest that thoughts of self-harm can still provide affect regulation. Moreover, it has been found that even students who do not currently self-harm can still struggle significantly with urges to."

• A few key measurements are missing: type of means used to self-harm, suicide risk and overlap with self-harm if this is a study of NSSI, and if the participant ever had to seek medical attention for a self-harm episode.
Response: This study does not distinguish between suicidal and non-suicidal self-harm. More examples of the means of self-harm have been added to the results section:
"Cutting was the most common method of self-harming among the sample (11/15, 73%), followed by hitting (6/15, 40%), scratching (5/15, 33%), interfering with wound healing (5/15, 33%) and banging head (4/15, 27%)."
Information about suicide and seeking medical attention have also now been included:
"Only one participant (7%) had visited a doctor for their self-harm, and two participants (13%) had made a previous suicide attempt."

Discussion
• Page 18, it is not clear to me how this study measured and reported results about safety.
Response: Safety was determined in three ways, firstly by checking whether any wellbeing scores got worse during the study period, secondly it was explored qualitatively with participants being asked to report on whether they found BlueIce safe or whether it could present any risks to students. Finally, the wellbeing staff were asked to report any adverse events. This has been added to the quantitative results section:
"No scores on any measures were worse following the intervention period, and no adverse events were reported by wellbeing staff or participants."
It has also been clarified in the discussion:
"Safety was determined quantitatively, with no scores on wellbeing measures deteriorating over the period, and qualitatively, with participants reporting that BlueIce was safe to use and presented no risks to students. Similarly, no adverse events were reported by participants or wellbeing staff."

• Page 19, line 18, are you referencing coping scores at baseline? This needs to be clear.
Response: thank you for highlighting this, "at baseline" has now been added to make this clear.

• Limitations: more information about difficulties with recruitment need to be discussed.
Response: recruitment challenges have now been discussed in the limitations section:
"Challenges to recruitment were experienced including problems accessing students during the university summer break and the COVID-19 pandemic when students were not physically present on campus. In addition, to maximise student safety we recruited participants through the University wellbeing services but this meant that we had no direct access to possible participants. Steps were taken to try and mitigate these challenges, such as drafting email templates and eligibility checklists to reduce staff burden, but recruitment remained limited. Consequently, future research would benefit from a larger scale study to determine the effectiveness of BlueIce in this population."

• Limitations: demographics of sample and generalizability?

Response: This has now been added as a limitation:
"Similarly, the sample were demographically homogenous so these results may not generalise to students from other genders or ethnicities for example."

VERSION 2 – REVIEW

REVIEWER	Harris, Lauren M

	Florida State University
REVIEW RETURNED	05-Sep-2023

GENERAL COMMENTS	The authors have taken care to respond thoroughly to reviewer comments, and the manuscript has been strengthened as a result. I have no further substantive recommendations.

REVIEWER	Szlyk, Hannah S Rutgers The State University of New Jersey
REVIEW RETURNED	15-Sep-2023

GENERAL COMMENTS	Introduction: • Are you conceptualizing self-harm as non-suicidal? • Is your study population university-aged young adults? What does this mean? The same question regarding years of university. If you are writing for a worldwide audience, this needs to be defined. • In the first paragraph, you mention a review. Is this a review based on worldwide studies? Also, you mention different categories of self-harm behavior, but the statistic you mention does not include this time frame. • Line 43, paragraph 3: Why is that finding interesting? Connect the dots. • Page 4, paragraph starting at line 49: why are you mentioning the literature on anxiety and depression here? What about digital health interventions for self-harm among different demographics? • Page 5, starting at line 9: I would make sure that no other relevant interventions have been developed or published on since 2021 (the year of the reference cited here). • You can mention a bit more detail about the previous trials of BlueIce (e.g., sample size)? • Also, it is unclear what the previous studies with university students entailed and how do not overlap/repeat the aims of the current study. Methods: • Why did you decide to keep the definition of self-harm broad? • Page 6, line 40: what is an information power approach? • Did you conduct a power analyses for the quantitative approach? • Page 7, line 8: what does “a prescription basis” mean? Is there cost to use the app? • Page 7, line 17: different participants ever reach out with technological concerns? • How did you attend to participant safety during the study timeline? • Having some interviews last only 15 minutes may impact the richness of the qualitative data, especially as the sample size was only 10 students. • Page 8, line 43: what was the engagement framework used? • Did participants receive any compensation? • Why did you not examine past mental health history in addition to current behaviors and symptoms? Results: • Were there additional sub-themes identified among the categories besides what is reported? • Why did you specifically have the sub-categories of barriers and facilitators?

VERSION 2 – AUTHOR RESPONSE

Reviewer: 1
Ms. Lauren M Harris, Florida State University
Comments to the Author:
The authors have taken care to respond thoroughly to reviewer comments, and the manuscript has been strengthened as a result. I have no further substantive recommendations.

Response: The authors thank you for your input.

Reviewer: 2
Dr. Hannah S Szlyk, Rutgers The State University of New Jersey
Comments to the Author:
Introduction:

• Are you conceptualizing self-harm as non-suicidal?

Response: the definition of self-harm used in this paper is provided in the opening sentence, whereby we define it as any act of harm or injury irrespective of the motivation (i.e., whether it is suicidal or not) – this definition is in line with the NICE guidelines. Further information regarding the conceptualisation of self-harm is provided in the methods section where the definition of 'current self-harm' is offered: 'There were no exclusion criteria, including no specific exclusion criteria for participants who may have been at risk of suicide. Given the broad definition of self-harm used in this study, differentiations were not made between suicidal or non-suicidal self-harm, meaning some participants in this study may have been experiencing suicidal thoughts.'

• Is your study population university-aged young adults? What does this mean? The same question regarding years of university. If you are writing for a worldwide audience, this needs to be defined.

Response: Our study population were university students, regardless of their age. It is discussed in the introduction that university students face novel challenges associated with university specifically, so we have focused on this population rather than that of a particular age. In the results we provide an age summary. Participants' ages ranged from 18-26 (mean 19.87, SD 2.39). It has been clarified in the recruitment section that: "there were no restrictions around year of study or degree type".

• In the first paragraph, you mention a review. Is this a review based on worldwide studies? Also, you mention different categories of self-harm behavior, but the statistic you mention does not include this time frame.

Response: Thank you for raising this question, it has now been clarified that this review was indeed "worldwide". The time frames are listed in the following sentence "In this review, studies measured self-harm on a range of scales, including lifetime, past four weeks, six months, 12 months and 3 years."

• Line 43, paragraph 3: Why is that finding interesting? Connect the dots.

Response: We've noted that this finding is interesting as the high rates of digital intervention use aligned with reported barriers to accessing mental health services, suggesting that amongst those who struggle to access these services, digital support can help to bridge the gap.

• Page 4, paragraph starting at line 49: why are you mentioning the literature on anxiety and depression here? What about digital health interventions for self-harm among different demographics?

Response: We mention the literature on digital interventions for other mental health difficulties here to show that there's evidence to support the use of digital interventions amongst university students – our population of interest here. Thank you for suggesting including information regarding digital interventions for self-harm in other demographics, this has now been added to the final paragraph before the BlueIce section in the introduction: "Given the difficulties students face in seeking professional support for self-harm, coupled with the perceived advantages of digital support, a smartphone application (app) seems like a valued option. Wider research has also suggested that digital interventions for self-harm can be helpful and produce positive outcomes for other demographics [16]. However, despite these potential benefits, no prior research has been conducted where university students have used and evaluated a smartphone app specifically developed to help manage self-harm [17]."

• Page 5, starting at line 9: I would make sure that no other relevant interventions have been developed or published on since 2021 (the year of the reference cited here).

Response: Thank you, we have checked this and no further interventions / literature have been developed/published.

• You can mention a bit more detail about the previous trials of BlueIce (e.g., sample size)?

Response: Thank you for the suggestion. Information regarding the sample size and settings of previous studies has been added to the BlueIce paragraph in the introduction.

• Also, it is unclear what the previous studies with university students entailed and how do not overlap/repeat the aims of the current study.

Response: Under the BlueIce paragraph in the introduction it is outlined how, in the initial study with university students, they were just shown screenshots of the app and its functionality was explained to them. More detail has been added for clarity: "In qualitative interviews, 25 students were shown screenshots of the app while its functionality was explained to them and they were asked to provide initial feedback on the concept of the app and its perceived suitability for university students." Thank you for this suggestion/

Methods:
• Why did you decide to keep the definition of self-harm broad?

Response: This justification has now been added to the methods section: "A broad definition was used to capture a range of self-harm experiences, due to the heterogeneous nature of self-harm."

• Page 6, line 40: what is an information power approach?

Response: Thank you for this question. More detail regarding the information power approach has been added here: "An information power approach was taken to determine the adequacy of the sample size for the qualitative analysis. This dictates that the sample size required is dictated by the richness of the interview data, whereby if participants provide thorough and in-depth responses, fewer participants are required to address the research question."

• Did you conduct a power analyses for the quantitative approach?

Response: No power analysis was conducted due to the exploratory nature of this study. A need for sufficiently powered studies is noted in the limitations and the conclusions section.

• Page 7, line 8: what does “a prescription basis” mean? Is there cost to use the app?

Response: in this sentence it is noted that the app is freely available, and more information has been added regarding the prescription basis: “Currently, BlueIce is freely available on a prescription basis (i.e., a mental health professional can ‘prescribe’ it to young people to use for free using a single-use access code)”

• Page 7, line 17: different participants ever reach out with technological concerns?

Response: no technological concerns were reported.

• How did you attend to participant safety during the study timeline?

Response: It is discussed in the paper that the recruitment of participants attending wellbeing services was key to promoting their safety during the study, as this meant they were under the care of mental health professionals throughout, who were aware of their participation. In the first paragraph of the discussion, it is noted that “Safety was determined quantitatively, with no scores on wellbeing measures deteriorating over the period, and qualitatively, with participants reporting that BlueIce was safe to use and presented no risks to students.”

• Having some interviews last only 15 minutes may impact the richness of the qualitative data, especially as the sample size was only 10 students.

Response: The average length of interviews was roughly 25 minutes, and it was believed by the research team that, overall, the data from the interviews was sufficiently in-depth and rich to address the research question. Nevertheless, it is noted in the limitations that this was a small study and must therefore be interpreted cautiously.

• Page 8, line 43: what was the engagement framework used?

Response: the engagement framework is referenced, and has no other name other than ‘existing framework of engagement with digital interventions’. It was developed by Liverpool et al.

• Did participants receive any compensation?

Response: unfortunately there were no funds to compensate participants. This has been added to the procedure section: “No renumeration was provided to participants.”

• Why did you not examine past mental health history in addition to current behaviors and symptoms?

Response: Given the battery of questionnaires required by participants to complete, it was difficult to find a balance between getting all data of interest and burdening participants or wellbeing staff, particularly considering the context of this research taking place during difficult transitions relative to the COVID-19 pandemic and the existing stressors facing all.

Results:
• Were there additional sub-themes identified among the categories besides what is reported?

Response: there were no additional sub-themes other than those reported.

• Why did you specifically have the sub-categories of barriers and facilitators?

Response: The data were analysed using Liverpool's engagement framework, and their categories were used. We believed that these categories mapped well onto our data, allowing a comprehensive overview and insight into how BlueIce was perceived across these domains. This included the specific barriers and facilitators to these domains to help identify what may help and impeded its use and implementation.