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Developing Transdiagnostic Single-Session Interventions for University Students Experiencing Disordered Eating: A Mixed-Method Co-Design Study

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ABSTRACT

Objective: Many university students encounter barriers to timely support for disordered eating. Brief, scalable digital single-session interventions (SSIs) may provide an engaging and accessible transdiagnostic pathway for early intervention where there is increased distress before a diagnosis emerges. The present study co-designed smartphone-delivered transdiagnostic SSIs for university students at risk of developing an eating disorder and evaluated the feasibility, acceptability, and relevance of these SSIs.

Method: A three-phase sequential mixed-method design was employed to develop a final suite of nine consumer-informed SSIs. Phase 1 quantified student ($n = 165$) prioritization of candidate transdiagnostic psychological targets for the apps of relevance to disordered eating, derived from prior empirical and Delphi consensus work. Phase 2 gathered qualitative feedback via focus groups across 18 students related to aspects that would increase usability of apps, including content, design, and realism. Phase 3 ($n = 18$) conducted a quantitative evaluation of the usability of the prototype SSIs, including subgroup analyses by weight-concern severity (low versus high).

Results: The top nine candidate psychological targets included challenging life events, contingent self-worth, rumination, self-acceptance, self-criticism, loneliness, negative body image, negative social media use, and fear of mistakes. Overall findings indicated acceptable perceived quality between the weight-concern groups, with both qualitative feedback and quantitative ratings informing targeted refinements to clarity, engagement, and credibility prior to finalization.

Discussion: Consumer-informed transdiagnostic digital SSIs appear feasible and acceptable as low-burden early supports for university students, providing a foundation for randomized controlled trial evaluation and scalable early intervention within university mental-health contexts.

1 | Introduction

One third of eating disorder (ED) cases onset during emerging adulthood that is, 18 to 25 years (Solmi et al. 2022), making this a pertinent developmental window for early intervention. If this coincides with transition to university, vulnerability to disordered

eating may be further amplified, given increased stress, greater autonomy, disrupted routines, and heightened exposure to performance-based pressures (Harrer et al. 2020). Many young people do not access appropriate care due to lack of appropriate, accessible and affordable services (Kazdin et al. 2017), barriers that are particularly pronounced in disordered eating (Ali

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Summary

- Student-prioritized targets largely aligned with established transdiagnostic mechanisms for early eating disorder intervention, while emphasizing loneliness, rumination, and stress-related processes in university settings.
- Co-design yielded nine acceptable smartphone-delivered SSIs, with engagement shaped by credibility and usability features such as mechanism clarity, testimonials, and progress feedback.
- Digital SSIs may function as scalable, low-intensity entry points within stepped-care university mental-health systems, including waitlist and adjunct support.

et al. 2025). Minimisation of symptoms (Radunz et al. 2023), high levels of comorbidity (Udo and Grilo 2019), and reluctance to adopt diagnostic labels can further impede help-seeking, requiring scalable, transdiagnostic early intervention that can more broadly engage individuals with emerging symptoms who may not identify with disorder-specific approaches. Transdiagnostic considerations are becoming increasingly important, given interest in using diet and exercise as interventions for depression and anxiety (Firth et al. 2020), which may trigger disordered eating.

App-based digital mental health interventions (DMHIs) offer scalable early support while reducing barriers related to cost, time, and limited-service availability (Bohrer et al. 2023; Fitzsimmons-Craft et al. 2020; Karekla et al. 2022). These low-intensity self-help interventions can significantly reduce ED symptoms as well as depression, anxiety, distress, and improve self-esteem (Linardon et al. 2025). A key challenge for DMHIs is maintaining engagement, with a pooled mean of 42% adherence for disordered eating (Liu, Anderson, et al. 2026a) compared to 62% for depression and anxiety (Liu, Torous, et al. 2026b), limiting real-world effectiveness. Existing DMHIs for university students (Bohrer et al. 2023; Fitzsimmons-Craft et al. 2020) typically rely on sustained engagement over multiple sessions, which may be poorly aligned with university populations characterized by fluctuating motivation and competing demands.

The brevity and accessibility of single-session interventions (SSIs; Schleider et al. 2022) may achieve better alignment with the needs and help-seeking patterns of university students with disordered eating, where students show variable willingness to commit to longer programs (Abel et al. 2022; Kazdin et al. 2017). SSIs can reduce reliance on sustained engagement while still delivering meaningful therapeutic content in a single, low-burden session. Initial but limited evidence on ED-focused SSIs indicates small but significant improvements in symptoms and broader mental health outcomes, particularly when in a self-guided digital format (Negi et al. 2026; Schleider et al. 2022; Zhou et al. 2020).

However, existing SSIs typically target isolated symptom domains and are rarely developed using user-informed approaches for university populations. Participatory approaches further strengthen intervention relevance and acceptability by

ensuring that evidence-informed targets are translated into content and delivery formats that resonate with the end-user (Kendal et al. 2017). In this context, co-design functions as a mechanism for aligning intervention content with the lived experiences of university students with weight concerns.

Further improvements to engagement and effectiveness can be achieved by maximizing features such as personalisation, interactive elements, and guided supports for example, prompts (Ali et al. 2022; Karekla et al. 2022; Nicolaou et al. 2022), and offering choice in therapeutic targets and approaches (Anderson et al. 2024; Andersson et al. 2023). Maximizing the impact of SSIs is informed by the B.E.S.T. model, which incorporates Brain science, Empowerment, Saying-is-believing exercises, and Testimonials (Schleider et al. 2020). Many SSIs adopt a two-stage “Learn–Do” structure, in which brief psychoeducation is immediately followed by an applied activity designed to translate insight into behavior change. Together, these approaches provide a foundation for designing scalable SSIs capable of producing meaningful early change.

The overarching aim of this research was to co-design and evaluate a transdiagnostic, smartphone-delivered SSI addressing key limitations of existing DMHI, namely engagement and relevance for students who may not identify with ED-specific interventions. This was achieved across three phases. First, candidate transdiagnostic targets were identified and prioritized. Stage 2 qualitatively evaluated aspects that would increase app usability, including content, design and realism. Stage 3 evaluated the prototype SSIs rating feedback about acceptability, usability, and fitness in a university context. The resultant SSIs have been established within the *NourishED Mind* app to be tested for efficacy in a subsequent randomized controlled trial (Jabs and Wade 2026).

2 | Stage 1 Method

2.1 | Participants

Participants were 165 first-year undergraduate psychology students aged 17–25 years ($M = 18.99$, $SD = 1.84$; $n = 159$ female [88.8%]; $n = 145$ White [81%], Asian [$n = 19$, 10.6%], African [$n = 6$, 3.4%], other [$n = 9$, 5.0%]) recruited through the Flinders University SONA system. Ethics approval was obtained from Flinders University (HREC 8370). Participants received 0.5 course credit as compensation for their time.

2.2 | Materials

Participants were instructed to “read through the targets and select the nine they considered most important to focus on for support or intervention,” with targets framed as addressing common processes underlying anxiety, depression, and EDs, and accompanied by plain-language descriptions and example activities, see Table 1. Candidate transdiagnostic targets were initially identified in Wade et al. (2025) and subsequently elaborated and prioritized in a multi-panel Delphi consensus study involving people with lived experience, significant others, clinicians, and researchers specializing in EDs (Pennesi

TABLE 1 | Plain-language descriptions of the 16 transdiagnostic psychological targets presented in Stage 1.

Target	Plain-language description	Example activities included
Loneliness	Feeling isolated or disconnected can lead to sadness, self-doubt, and beliefs of not belonging; targeting loneliness focuses on reconnecting and challenging beliefs of being alone.	Mapping social opportunities; goal setting; behavioral experiments; activity scheduling; identifying strengths.
Negative social media use*	Appearance-focused or distressing online content can worsen mood and body image; targeting social media use involves awareness of consumption and its emotional impact.	Understanding wellbeing impacts; assessing motivations; learning through stories; practising healthy habits.
Low self-worth/self-acceptance*	Feeling “not enough” or undeserving of care affects self-perception and relationships; targeting this involves learning self-kindness and understanding.	Brain and self-perception learning; cognitive experiment video; reflection on negative focus; identifying positives.
Repetitive negative thinking/rumination	Cycles of negative thoughts impair calm and focus; targeting rumination involves noticing unhelpful thoughts and shifting attention.	Attention-shifting techniques; emotion regulation; problem solving.
Low positive body image	Disconnection from the body can reduce self-worth and care; targeting positive body image builds kindness, respect, and awareness toward the body.	Brain rewiring education; celebrating body function; expanding life beyond body focus.
Psychological/cognitive flexibility	Difficulty adapting to change leads to stress and feeling stuck; targeting flexibility supports openness and adaptive responding.	Brain flexibility exercises; nutrition for the brain; everyday flexible thinking.
Distress tolerance*	Difficulty managing emotions leads to overwhelm and loss of control; targeting distress tolerance builds coping and regulation skills.	Learning coping neuroscience; reflecting on experiences; interrupting negative spirals; physical calming strategies.
Fear of mistakes	Fear of errors drives harsh self-criticism and perfectionistic focus; targeting this reframes mistakes as growth opportunities.	Exploring benefits of mistakes; shifting to big-picture focus; rediscovering curiosity.
Behavioral activation	Sad mood contributes to eating-related problems; behavioral activation promotes valued activities that increase pleasure and accomplishment.	Social connection; meaningful goals; solo enjoyable activities; “feeding your brain.”
Negative body image*	Dissatisfaction with weight or shape leads to harsh judgment and reduced self-care; targeting this promotes compassion and acceptance.	Supportive message writing; reframing memories; celebrating abilities; brain change education.
Self-criticism/self-compassion**	Chronic self-criticism creates shame and stuckness; building self-compassion fosters safety, learning, and resilience.	Inner awareness; compassionate mindset; daily practice; setback preparation.
Contingent self-worth*	Narrow bases of self-worth (e.g., achievement, appearance, control) create feelings of inadequacy; targeting self-worth broadens and balances identity.	Life-area impact learning; self-evaluation reflection; pie-chart visualization; balanced-life planning.
Life transitions*	Developmental changes can feel overwhelming; targeting transitions supports adaptation, coping, and connection to values.	Learning about change; identifying coping difficulties; coping strategies; WOOP goals; social-support planning.
Intolerance of uncertainty	Uncertainty drives worry, avoidance, and control attempts; targeting this builds tolerance and adaptive responding to the unknown.	Present-focused techniques; practising uncertainty; problem solving.
High standards (perfectionism)*	Excessively high standards tie self-worth to achievement; targeting perfectionism builds flexible self-evaluation and alternative sources of worth.	Belief identification; behavioral experiments; personal data reflection; habit reassessment.

(Continues)

TABLE 1 | (Continued)

Target	Plain-language description	Example activities included
Challenging life events	Challenging life experiences can create shame, blame, and loss of safety; targeting trauma focuses on rebuilding safety, worth, and connection.	Meaning-making; compassionate mindset; resilience and future-building.

Note: Plain-language descriptions were presented verbatim to participants in the Stage 1 survey to support informed prioritization of candidate transdiagnostic psychological targets for early intervention. Example activities are illustrative only. Targets marked with an asterisk (*) were endorsed across all stakeholder panels in the Delphi consensus study (Pennesi et al. 2025). Behavioral activation was included in the Stage 1 list to assess consumer-perceived relevance of this evidence-informed SSI approach, based on pre-treatment SSI research demonstrating relevance for early response and therapy personalisation (Wade and Waller 2025). Double asterisks (**) indicate targets that were combined for the present study; specifically, self-criticism and self-compassion were merged to reflect opposing components of the same self-evaluative regulatory process. Targets presented in bold indicate those selected for development into single-session interventions in the present study.

et al. 2025) where 9 targets were endorsed across all stakeholder panels. Seven additional targets were included; six that had high endorsement within the lived-experience panel ($\geq 90\%$; Pellizzer et al. 2026), and a behavioral activation SSI shown to differentiate rapid versus gradual responders seeking treatment for an ED (Wade and Waller 2025).

2.3 | Procedure

All surveys were completed online via Qualtrics commencing with demographic questions. Those who reported using a mental health app indicated their usage frequency (daily, a few times per week, once per week, monthly). Participants were then presented with the list of 16 transdiagnostic targets described as contributing to anxiety, depression, and EDs, and were asked to select the nine they considered most important to prioritize for support or intervention. Participants were then shown their selected nine processes and asked to rank-order them from most to least important and to rate how likely they would be to complete the corresponding SSI using a 4-point Likert scale ranging from 1 (Extremely unlikely) to 4 (Extremely likely). A text response was completed as to why they chose each given target.

2.4 | Measures

Participants then completed the Weight Concerns Scale (WCS; Killen et al. 1996), shown to be reliable and valid in a university population (Dias et al. 2015); scoring ≥ 47 suggests that a participant is at high risk of developing an ED (Jacobi et al. 2004). Participants also completed the ED-15 (Tatham et al. 2015), the Generalized Anxiety Disorder Scale-7 (GAD-7; Spitzer et al. 2006), and the Patient Health Questionnaire-9 (PHQ-9; Kroenke et al. 2001).

2.5 | Data Analysis

Selection frequencies were summarized descriptively, and rank-order data were summarized using mean rank scores (1 = highest priority). Mean ranks were calculated for the full sample and separately for participants classified as lower versus higher ED risk. Group-specific ranked lists were derived by ordering processes according to their mean rank within each risk group. Mental health app use was summarized descriptively, including the proportion of participants reporting current app use,

the most selected apps, and reported usage frequency. Group differences in symptom severity between lower and higher ED risk groups were examined using independent samples *t*-tests, with effect sizes reported as Cohen's *d*. Associations between weight concerns and symptom measures were examined using Spearman rank-order correlations.

To examine whether process selection differed between lower versus higher ED risk groups, chi-square tests were conducted for each of the 16 processes (selected in top nine: yes/no), with effect sizes reported as ϕ . Likelihood-to-complete ratings were summarized descriptively for each SSI topic. Additionally, due to likelihood ratings being measured on an ordinal Likert scale, differences in willingness ratings between lower versus higher ED groups were tested using Mann–Whitney *U* tests.

Open-text rationales were analyzed using brief content coding to identify common reasons for process prioritization. Responses were read in full and grouped into broad categories and findings are presented descriptively with illustrative quotes.

3 | Stage 1 Results

3.1 | Mental Health App Use

Of 33 participants (20.0%) currently using a mental health app, most used the app monthly ($n=15$, 45.5%) or once per week ($n=9$, 27.3%), with fewer reporting use daily ($n=5$, 15.2%) or a few times per week ($n=4$, 12.1%). There were no significant differences between app users and non-users on symptom measures (Table 2). Among app users, frequency of use was not significantly associated with symptom severity (Spearman r : 0.04 to -0.19).

3.2 | Differences in Symptom Severity by Weight Concern Group

Low ($n=78$, 47.3%) and high ($n=87$, 52.7%) ED risk groups were identified, with the latter reporting significantly greater symptom severity than the former on all symptom measures (Table 2). Weight concerns were significantly and positively associated with symptoms of depression ($\rho=0.35$, $p<0.001$), anxiety ($\rho=0.37$, $p<0.001$), and disordered eating ($\rho=0.84$, $p<0.001$).

TABLE 2 | Symptom severity by mental health app use status and weight concern status ($N = 165$).

Outcome	No app use $n = 132$ Mean (SD)	App user $n = 33$ Mean (SD)	$t(df)$	p	Low WCS $n = 78$ Mean (SD)	High WCS $n = 87$ Mean (SD)	Cohen's d 95% CI
Weight concern	48.79 (27.21)	50.20 (24.34)	-0.27 (163)	0.79	—	—	—
Depression	1.12 (0.69)	1.38 (0.81)	-1.88 (163)	0.06	0.96 (0.67)	1.36 (0.73)	-0.56 [-0.87, -0.25]
Anxiety	1.31 (0.80)	1.50 (0.86)	-1.23 (163)	0.22	1.10 (0.77)	1.57 (0.79)	-0.60 [-0.91, -0.29]
Weight, shape and eating concerns (ED-15)	2.59 (1.63)	2.76 (1.52)	-0.53 (163)	0.60	1.41 (1.03)	3.71 (1.19)	-2.06 [-2.44, -1.68]

Note: Two-tailed p values reported. Equal variances assumed (Levene's tests ns). Low WCS < 47; High WCS ≥ 47 .
Abbreviation: WCS = Weight Concerns Scale.

TABLE 3 | Selection of psychological targets (Top 9) by weight concern group (WCS), with chi-square tests.

Psychological process	Low WCS (< 47) $n = 78$ Selected n (%)	High WCS (≥ 47) $n = 87$ Selected n (%)	$\chi^2(1)$	p	ϕ
Challenging life events	61 (78.2%)	70 (80.5%)	0.128	0.721	0.028
Contingent self-worth	61 (78.2%)	66 (75.9%)	0.127	0.721	0.028
Negative thinking and rumination	58 (74.4%)	61 (70.1%)	0.368	0.544	0.047
Low self-worth/self-acceptance	51 (65.4%)	69 (79.3%)	4.021	0.045*	0.156
Self-criticism/self-compassion	54 (69.2%)	62 (71.3%)	0.081	0.775	0.022
Negative body image	43 (55.1%)	62 (71.3%)	4.628	0.031*	0.167
Loneliness	48 (61.5%)	57 (65.5%)	0.281	0.596	0.041
Social media	46 (59.0%)	42 (48.3%)	1.891	0.169	0.107
Fear of mistakes	39 (50.0%)	50 (57.5%)	0.924	0.336	0.075
High standards	43 (55.1%)	39 (44.8%)	1.746	0.186	0.103
Psychological/cognitive flexibility	40 (51.3%)	35 (40.2%)	2.026	0.155	0.111
Distress tolerance	38 (48.7%)	36 (41.4%)	0.895	0.344	0.074
Positive body image	33 (42.3%)	43 (49.4%)	0.839	0.360	0.071
Life transitions	36 (46.2%)	37 (42.5%)	0.219	0.640	0.036
Intolerance of uncertainty	31 (39.7%)	36 (41.4%)	0.046	0.831	0.017
Behavioral activation	20 (25.6%)	18 (20.7%)	0.569	0.451	0.059

Note: Values represent the number and percentage of participants in each WCS group who selected the process in their Top 9. Pearson chi-square tests were used to examine group differences in selection rates $p < 0.05$.

3.3 | Priority Psychological Targets Selected for Support or Intervention

High ED risk participants were significantly more likely to select Low self-worth/self-acceptance and Negative body image (see Table 3). Across the full sample, shown in Table 4, the most frequently selected topics for inclusion were Challenging life events (trauma), Contingent self-worth, Negative thinking and rumination, and Low self-worth/self-acceptance. Topics selected least often included Behavioral activation, Intolerance of uncertainty, and Life transitions. Psychological targets were prioritized using mean rank scores (with lower scores indicating higher relative priority), supported by selection frequency

(Table 4). The nine highest-priority targets were taken forward for SSI development, reflecting those most consistently endorsed and highly ranked by participants.

Participants ranked the nine targets from most to least important. The highest priority, shown in Table 4, was Challenging life events, Low self-worth/self-acceptance, Contingent self-worth, and Negative thinking and rumination. Topics ranked as lowest priority on average included Intolerance of uncertainty and Behavioral activation. Valid response counts indicated that Challenging life events, Contingent self-worth, and Negative thinking/rumination were among the most selected and ranked topics.

TABLE 4 | Selection frequencies of transdiagnostic targets ($N=165$) and mean ranked priority of psychological targets (lower scores = higher priority).

Rank	Psychological target	% selected (Mean $\times 100$)	Rank	Mean rank	Valid N (ranked)
1	Challenging life events	79.3%	1	3.28	142
2	Contingent Self-worth	76.0%	3	4.53	136
3	Negative thinking and rumination	73.2%	4	4.57	131
4	Low self-worth/self-acceptance	72.6%	2	4.35	130
5	Self-criticism/self-compassion	71.0%	6	4.91	127
6	Loneliness	64.3%	6	4.91	115
7	Negative body image	62.0%	5	4.68	111
8	Social media	54.8%	6	4.91	98
9	Fear of mistakes	53.6%	13	6.09	96
10	High standards	51.4%	11	5.51	92
11	Distress tolerance	45.8%	9	5.19	82
12	Psychological/cognitive flexibility	46.4%	12	5.87	83
13	Positive body image	44.7%	10	5.23	80
14	Life transitions	41.9%	14	6.10	75
15	Intolerance of uncertainty	39.1%	15	6.42	70
16	Behavioral activation	24.0%	16	6.72	43

Note: Percentages reflect the proportion of participants who selected each transdiagnostic target as one of their top nine priorities. Targets presented in bold indicate those selected for development into single-session interventions (SSIs) in the present study. Mean rank reflects participants' prioritization of each topic among the nine they selected (1 = most important; 9 = least important). Lower mean ranks indicate higher average priority. Valid N indicates the number of participants who selected and ranked each topic.

3.4 | Willingness to Complete SSI Modules

Overall willingness to complete each SSI was moderate to high ($M_s = 2.70-3.08$). Shown in Table 5, the highest average willingness to complete was reported for Repetitive Negative Thinking and Rumination, High Standards, and Fear of Mistakes, while the lowest willingness ratings were observed for Challenging life events and Contingent self-worth. Willingness ratings did not differ significantly between participants with low and high ED risk for 14 of the 16 SSIs (see Table 6). However, participants in the high ED risk group reported significantly greater willingness to complete the Behavioral activation SSI and Negative body image SSI. The nine targets chosen for SSI development are shown in bold in Table 1.

3.5 | Open-Text Rationales for Prioritized Processes

Content coding of the open-text suggested selection was guided by personal relevance, perceptions that the target was a widespread and important contributor to mental health, and a desire for practical strategies to improve coping and wellbeing. Many participants explicitly linked selected processes to anxiety, depression, and ED risk, describing them as underlying drivers of distress and maladaptive coping patterns (e.g., "Self-worth is an important aspect of wellbeing... and not having a positive self-worth can lead to depressive states and anxiety or EDs"). Several participants also emphasized the value of addressing these processes early to

prevent escalation and support longer-term change (e.g., "I think it's important to focus on the roots of EDs..."). Rationales were also shaped by university and social contexts, including academic pressures and social comparison influences, particularly in relation to social media use (e.g., "Social media... makes individuals seek external validation which can in turn harm our mental health"). Some participants highlighted functional impacts on day-to-day life, including avoidance, overwhelm, and disrupted motivation (e.g., "If you are stressed or scared... avoidance will most likely occur, causing procrastination").

4 | Stage 2 Method

4.1 | Participants

Eighteen undergraduate students who completed Stage 1 participated in focus groups ($n=8$ low ED risk; $n=10$ high ED risk). Participants were not informed that grouping was based on risk status to maintain confidentiality and minimize demand characteristics.

4.2 | Procedure

Focus groups were conducted online via Microsoft Teams by two facilitators, one of whom was a clinical psychologist. During sessions, which were audio-recorded and transcribed verbatim for analysis, participants reviewed draft SSI materials and elements

TABLE 5 | Overall willingness to complete each SSI (1–4 scale).

SSI topic	N	Min	Max	Mean	SD
Repetitive negative thinking and rumination	118	1	4	3.08	0.70
High standards	82	2	4	3.02	0.57
Fear of mistakes	89	1	4	3.00	0.74
Self-criticism/Self-compassion	116	1	4	2.97	0.59
Negative body image	104	1	4	2.91	0.71
Intolerance of uncertainty	66	1	4	2.91	0.72
Social media	88	1	4	2.88	0.86
Behavioral activation	35	2	4	2.86	0.60
Psychological/cognitive flexibility	74	1	4	2.84	0.72
Low self-worth/self-acceptance	120	1	4	2.83	0.61
Positive body image	76	1	4	2.83	0.76
Life transitions	73	1	4	2.82	0.65
Distress tolerance	74	1	4	2.81	0.77
Loneliness	105	1	4	2.81	0.77
Contingent self-worth	127	1	4	2.75	0.58
Challenging life events	131	1	4	2.70	0.83

Note: Willingness ratings were collected only for SSI topics selected by participants in their top nine priorities. Higher scores indicate greater willingness to complete the SSI. Targets presented in bold indicate those selected for development into single-session interventions (SSIs) in the present study.

of design mock-ups (as presented in the focus group slides) and engaged in a guided semi-structured discussion. Participants provided feedback across four domains:

- **Content preferences:** elements that would increase likelihood of completing the SSI/app experience (e.g., psychoeducation, reflection prompts, interactive components).
- **Design and usability:** navigation, structure, visuals, interactivity, and engagement support (e.g., progress indicators, personalisation, reminders).
- **Realism and relevance:** perceived authenticity and fit of story/case examples for university students and suggestions to improve realism.
- **Suggested refinements:** recommendations for language, tone, and missing components needed to improve acceptability and completion likelihood

4.3 | Data Analysis

Transcripts were analyzed using reflexive thematic analysis (Braun and Clarke 2022) within a critical realist framework. Analytic insights were translated into targeted modifications to SSI content, language, case examples, and design features prior to prototype testing.

5 | Stage 2 Results

Reflexive thematic analysis generated four overarching themes reflecting preferences for engagement, content, interactivity,

and visual design within draft SSIs and their app-based delivery that were broadly consistent across participants with higher and lower ED risk. A visual representation of the thematic structure is presented in Figure 1. Themes and associated subthemes are described in Table 7.

In the first theme, *drivers of engagement*, participants documented several factors that motivated them to initially download a mental health app and support their sustained usage. These drivers focused on the interplay between building consistent habits, feeling emotionally connected to the app content, and having visuals that illustrated tangible signs of progress. In combination, these elements promoted personal investment in the app, increasing the likelihood that they would engage in long-term use.

In the second theme, *preferred content and its impact*, participants expressed clear preferences for specific types of content, noting that certain formats and topics were more likely to capture attention, encourage return visits, and provide perceived value. While individual preferences varied, a consistent pattern emerged: content that was concise, visually appealing, emotionally resonant, and actionable was most likely to be viewed as useful and motivating.

The third theme, *Interactivity and Personalisation as Drivers of Engagement*, underscored that interactivity and personalisation were central to making a mental health app engaging and motivating for sustained use. Interactive elements (e.g., swipeable cards, drag-and-drop activities, quizzes, and “choose your own path” navigation) were described as enjoyable and dynamic ways to explore content.

TABLE 6 | Low versus high WCS differences in willingness (Mann–Whitney *U*).

SSI topic	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>p</i>
Contingent self-worth	61	2.75 (0.62)	66	2.74 (0.54)	0.72
High standards	43	3.07 (0.51)	39	2.97 (0.63)	0.46
Social media	46	2.89 (0.88)	42	2.86 (0.84)	0.84
Life transitions	36	2.81 (0.67)	37	2.84 (0.65)	0.95
Low self-worth/self-acceptance	51	2.76 (0.62)	69	2.88 (0.61)	0.22
Distress tolerance	38	2.71 (0.73)	36	2.92 (0.81)	0.24
Behavioral activation	18	2.61 (0.50)	17	3.12 (0.60)	0.01*
Negative body image	42	2.69 (0.72)	62	3.06 (0.67)	0.005*
Self-criticism/self-compassion	54	3.00 (0.61)	62	2.94 (0.57)	0.52
Fear of mistakes	39	3.03 (0.67)	50	2.98 (0.80)	0.92
Repetitive negative thinking	58	3.07 (0.65)	60	3.10 (0.75)	0.73
Challenging life events	61	2.62 (0.84)	70	2.77 (0.82)	0.39
Psychological/cognitive flexibility	40	2.83 (0.78)	34	2.85 (0.66)	0.68
Intolerance of uncertainty	30	2.90 (0.66)	36	2.92 (0.77)	0.95
Loneliness	48	2.71 (0.80)	57	2.89 (0.75)	0.18
Positive body image	33	2.76 (0.66)	43	2.88 (0.82)	0.35

Note: Likelihood of completing each SSI was rated on a 1–4 scale (higher scores indicate greater willingness). *p* values are from Mann–Whitney *U* tests comparing Low (<47) and High (≥47) WCS groups. Bold values indicate statistically significant differences (*p* < 0.05).

The fourth theme was *visual appeal and seamless navigation*; the former was repeatedly identified as a critical factor in determining whether participants would use an app regularly. Across all themes, the “why” behind preferences was consistent: students wanted an app experience that felt relevant, approachable, and aligned with their daily realities. Collectively, these preferences provide a foundation for a mental health app that feels effortless to engage with and trustworthy in supporting students’ mental health.

6 | Stage 3 Method

6.1 | Participants

Participants (*n* = 18) were recruited from the first-year psychology SONA participant pool. Smartphone prototypes of each of the nine SSIs were evaluated by two participants: one with lower and one with higher weight concern. Participants were randomly assigned to one SSI.

6.2 | Procedure

After providing informed consent and completing demographic items and the WCS, participants were emailed instructions to access their assigned SSI. Each participant engaged with one updated SSI (approximately 30 min), followed by completion of the Early Intervention Apps Checklist (≈10 min), which evaluates dimensions of intervention usability, engagement, clarity, relevance, and perceived impact. Participants were

given 7 days to complete both the SSI and checklist, commencing from the date access instructions were sent (within 48 h of baseline survey completion). Full checklist items are presented in Table S1. In addition to structured checklist ratings, open-ended qualitative feedback was collected regarding aspects of the intervention requiring refinement. Following review of checklist scores and qualitative feedback, the lead researcher implemented targeted revisions to each SSI. Revised SSIs were then reviewed by an ED researcher and clinical psychologist to confirm clinical appropriateness and preserve theoretical fidelity prior to finalization.

6.3 | Data Analysis

Participant checklist ratings were analyzed quantitatively to evaluate perceived SSI quality and identify priority areas for refinement. Each checklist item was scored on a 0–3 scale, with higher scores indicating greater perceived adequacy. The checklist was used as a pragmatic evaluation tool, with items analyzed individually rather than as a composite scale. As such, analyses did not assume a unidimensional structure or rely on total scores. Descriptive statistics were calculated for individual checklist items. Independent-samples *t*-tests were conducted to examine whether ratings differed according to baseline weight-concern status (low vs. high). A priori interpretation thresholds were applied to guide refinement decisions, whereby mean scores of 2.5–3.0 indicated satisfactory content requiring no modification, scores of 1.5–2.4 indicated minor revision needs, and scores below 1.5 indicated substantial revision prior to finalization. Quantitative findings were integrated with qualitative feedback to inform targeted

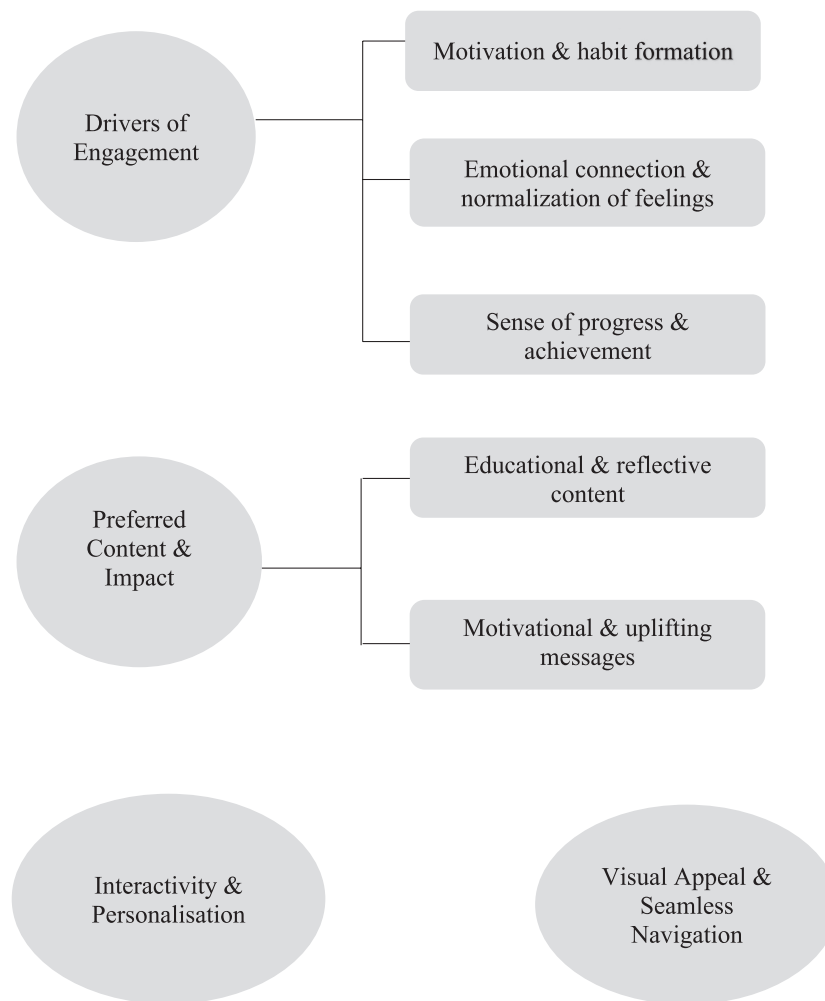


FIGURE 1 | Thematic map of engagement drivers and design preferences for app-delivered single-session interventions. *Note:* Four overarching themes (in circles) and associated subthemes (in rectangles) reflecting university students' preferences for engagement, content, interactivity, and visual design in app-delivered single-session interventions.

modifications to SSI content, clarity, engagement features, and visual feedback mechanisms before prototype testing.

7 | Stage 3 Results

7.1 | Quantitative Evaluation of SSI Quality

Overall SSI quality scores did not significantly differ between the low weight-concern group and the high weight-concern group. Item-level analyses similarly indicated no significant group differences across any of the 13 SSI components (see Table S2). While the absence of group differences is consistent with the potential transdiagnostic acceptability of the intervention, this cannot be conclusively determined given the small sample size. Across items, the lowest mean ratings were observed for the brain science component and dopamine-related visual rewards (both $M=2.04$), followed by self-efficacy ($M=2.08$), feedback/graphical progress indicators ($M=2.08$), and testimonials ($M=2.12$). Consistent with the predefined interpretation criteria, these scores indicated the need for minor refinements. Accordingly, targeted revisions

were made to the SSI to strengthen clarity, engagement, and perceived usefulness within these components prior to finalization.

7.2 | Qualitative Evaluation of SSI Quality

Brief qualitative comments provided after each checklist rating were examined to contextualize quantitative scores and inform targeted refinements. Feedback was largely positive, with participants consistently describing the SSI as clear, engaging, and helpful, particularly highlighting the usefulness of goal-setting activities and the interactive learn-do structure. Several recurring areas for improvement emerged. Participants indicated that the brain science content would benefit from greater depth and clearer explanation of mechanisms, that feedback and progress-tracking features were insufficiently visible or engaging, and that testimonials could be strengthened through increased realism or relatability. These qualitative patterns aligned with the lowest-scoring checklist domains and directly informed subsequent revisions to enhance clarity, engagement, and perceived credibility prior to finalization.

TABLE 7 | Themes from Phase 2 about enhancing usability of app DMHIs.

Theme	Description	Illustrative quotes
Theme 1: Drivers of engagement		
a. Motivation and Habit Formation	Incorporation of features that support routine use, such as gentle reminders, streak tracking, and small rewards that provide a dopamine “hit” and encourage repeat use. Although streaks were motivating for some, participants stressed the need for flexibility, emphasizing that missing a day should not feel punitive. This balance was seen as crucial for sustaining engagement without creating pressure.	“It’s nice when the app says, ‘you’ve done 3 days in a row’—it makes me want to keep going—but if I miss a day, I don’t want it to be like I’ve failed” (FG2, P5). “If it gave me a little nudge in the morning, like ‘here’s your focus for today’, that would make me open it” (FG1, P3).
b. Emotional connection and normalization of feelings	The importance of feeling emotionally connected to the app’s content. Storytelling emerged as a particularly powerful driver of this connection. Real-life narratives were seen as validating and reassuring, helping participants recognize they were not alone in their experiences. Participants valued audio delivery, which allowed them to listen without having to read large amounts of text, and felt that hearing someone’s voice enhanced authenticity and emotional resonance. Some contrasted this with written stories, which they found harder to connect with emotionally. Hearing diverse accounts helped participants reframe their own experiences, particularly during times of stress or self-doubt. For some, this provided motivation to persist with the app’s tools or return during difficult moments. Participants also provided constructive feedback on how to make storytelling more effective. While short, relatable snippets were appreciated, some noted that the existing story testimonials felt too brief to fully capture the journey or emotional depth. They recommended extending these segments to provide greater context and impact. “	“When I hear someone else say they’ve been through it, it’s like, okay, I’m not the only one” (FG3, P2). “Having it read to you makes it more personal—you can hear the emotion in their voice” (FG2, P4). “You hear a story, and you realize it’s okay to feel how you do—that’s when you keep going with it” (FG1, P3). “The ones you have now are over so quickly—I wanted to hear more about how they got from that point to where they are now” (FG4, P5).
c. Sense of progress and achievement	Participants highlighted the importance of visible progress, whether through completed activities, unlocked content, or personal insights gained over time. These indicators provided a sense of accomplishment that encouraged continued engagement. Some participants preferred qualitative progress (e.g., improved mood or clarity) over purely numerical measures, reinforcing the value of flexible feedback mechanisms.	“Even just ticking something off—it’s like, I’ve done something for myself today” (FG1, P4). “It’s not always about numbers; sometimes I just feel better, and that’s what matters” (FG2, P6).
Theme 2: Preferred content and impact		
a. Educational and reflective content	Participants favored educational elements that included quick, accessible insights. Brief brain facts, research-based statistics, and simple explanations of mental health concepts were seen as trustworthy and easy to absorb. Participants emphasized that such information should be delivered in short, visually supported formats rather than text-heavy paragraphs. Reflective prompts, including guided questions and affirmations, were also considered useful for promoting self-awareness and reframing thinking patterns. However, participants differed on their preferences for journaling: while some valued the opportunity to write at length, others found it time-consuming or overwhelming. Several explicitly linked this to their current stage of life, noting that as university students they already spend substantial time reading and writing for coursework. For this demographic, an app that demands large amounts of written input or extended reading was seen as unlikely to sustain engagement.	“I like little bite-sized facts that make you go, ‘oh, I didn’t know that’—and then you remember it” (FG1, P3). “If I have to write a lot, I won’t do it—but a quick question I can just think about in my head works” (FG4, P2). “We already have so much reading for uni... I don’t want my mental health app to feel like more homework” (FG3, P1).

(Continues)

TABLE 7 | (Continued)

Theme	Description	Illustrative quotes
b. Motivational and uplifting messages	Short, positive statements (e.g., affirmations, motivational quotes, and messages of encouragement) were named as uplifting and motivating, with added benefit if an exercise included participants having to not only read the positive statements but say them aloud. Many participants valued these as quick boosts that could shift their mindset in moments of stress. These were often seen as most effective when tailored to the user (e.g., using their name) and when paired with visually appealing design elements or interactive features. Specifically, supportive visuals which fostered positive mood and avoided overstimulation.	“Sometimes all you need is that one little sentence to make you feel like you can keep going” (FG1, P5).
Theme 3: Interactivity and personalisation as drivers of engagement		
	Interactivity and personalisation were seen as helpful to incorporate between reading sections to assist in maintaining attention and providing a sense of agency in how information was accessed. Embedded audio was also identified as a preferred format, allowing participants to listen rather than read.	“If I can swipe or drag things around, I’m actually doing something, not just reading another block of text” (FG2, P6). “Because we already do so much reading for uni, if the app feels like more homework, I’m not going to stick with it” (FG1, P2).
	Personalisation was viewed as vital to foster connection. Participants valued being able to tailor both content and design to their preferences, such as selecting a profile photo, choosing colors, and having their name or nickname displayed (“Welcome back, [Name]”). They also saw value in personalized recommendations. For example, mood tracking or quiz results that lead to tailored affirmations, suggested activities, or specific coping tools.	“If it feels like it knows me — like it remembers my mood or what I liked before—then I’ll come back” (FG3, P4).
	Personalisation was viewed as vital to foster connection. Participants valued being able to tailor both content and design to their preferences, such as selecting a profile photo, choosing colors, and having their name or nickname displayed. They also saw value in personalized recommendations. For example, mood tracking or quiz results that lead to tailored affirmations, suggested activities, or specific coping tools.	“If it feels like it knows me—like it remembers my mood or what I liked before—then I’ll come back” (FG3, P4).
	Some participants expressed that personalisation should remain optional and user-controlled, with features like streak tracking, progress bars, or reminders offered as customizable settings rather than defaults. This flexibility was considered important for supporting different motivation styles and avoiding pressure that could lead to anxiety or stress. Overall, interactivity and personalisation were seen not just as aesthetic or functional preferences, but as active mechanisms for building sustained engagement. Participants described these features as making the app feel “alive” and responsive to their needs, increasing both initial curiosity and sustained use.	“I’d use streaks if I could turn them on or off—I don’t always want that pressure” (FG2, P3).
Theme 4: Visual appeal and seamless navigation		
	Clean, minimalist layouts with balanced spacing, appealing color schemes, and simple icons were preferred over cluttered or text-heavy designs. Participants noted that visual balance helped them feel calm and focused, aligning with the app’s mental health purpose.	“If it’s messy or too busy, it makes me feel stressed, which defeats the point of a mental health app” (FG1, P3).
	The home screen was seen as particularly important in shaping first impressions and motivating ongoing use. Participants favored designs that were easy to scan briefly, with key features (e.g., daily tools, mood tracking, or favorite content) accessible within one or two taps. Others suggested that the home screen could adapt to recent use patterns or highlight new content to maintain interest, potentially using customizable widgets. This would allow users to control which features or icons appear most prominently, ensuring their preferred tools are immediately accessible.	“I don’t want to dig around for what I use most—it should be right there when I open it” (FG2, P5).

(Continues)

TABLE 7 | (Continued)

Theme	Description	Illustrative quotes
	Smooth, intuitive navigation was described as equally important as visual design. Simple menus, swipe-based movement between screens, and minimal loading times were valued for maintaining flow and avoiding frustration. While some participants enjoyed subtle animated transitions for visual polish, they emphasized these should never slow down interaction or feel distracting. Consistency in design elements such as, color use, font style, and icon placement was also highlighted as contributing to trust and usability. A disjointed or inconsistent interface was seen as unprofessional and could undermine confidence in the app's credibility. Overall, participants described visual appeal and seamless navigation not as superficial features, but as essential components of an app that feels professional, approachable, and aligned with its purpose to improve mental health.	"I like animations if they're quick—it feels modern—but if I'm waiting for them to finish, I'll get annoyed" (FG3, P6).

Note: Quotations are lightly edited for clarity and brevity while preserving meaning. Themes were derived using reflexive thematic analysis. Abbreviations: FG = focus group; P = participant.

8 | Discussion

Through sequential prioritization and co-design, the present study produced a final suite of nine transdiagnostic SSIs in the *NourishED Mind* app: (1) learning to tolerate distress during tough moments; (2) showing self-compassion instead of criticism; (3) changing the way you see your body; (4) learning to accept yourself and see your worth; (5) expanding your self-worth; (6) unplugging from social media and reconnecting with others; (7) from stuck to steps (focuses on challenging life events and integrates behavioral activation principles); (8) from lonely to linked (social connection); and (9) breaking free from negative thought loops. The nine most highly endorsed transdiagnostic targets, based on mean endorsement scores in Table 4, informed SSI development. Subgroup patterns (Table 6) further informed intervention design; accordingly, behavioral activation was not retained as a standalone SSI but was instead integrated within the challenging life-events SSI.

Subgroup patterns further informed intervention design. Students with elevated weight concern were significantly more willing to complete SSIs targeting behavioral activation and negative body image, underscoring the importance of recognizing lived experience as a form of expertise within early-intervention development. In response, behavioral activation was not retained as a standalone SSI but the approach was integrated within the challenging life-events SSI given that pre-treatment behavioral activation SSIs can differentiate rapid from gradual responders and guide therapy personalisation (Wade and Waller 2025), alongside the present finding that action-oriented coping was particularly acceptable for students with higher weight concern.

Taken together, these findings indicate that (a) patterns of student prioritization converged with established transdiagnostic mechanisms, while highlighting processes of particular salience within university contexts, (b) staged consumer feedback can be used to iteratively optimize SSI content and delivery prior to efficacy testing, and (c) brief interventions can be designed to retain transdiagnostic reach while remaining sensitive to subgroup salience (e.g., elevated weight concern). Importantly, the final SSI suite spans cognitive (rumination/negative thought loops),

affective-regulatory (distress tolerance), interpersonal (loneliness/social connection), and self-evaluative (self-criticism, self-worth, body image) mechanisms, supporting a modular, suite-based early intervention approach.

Comparison with the preceding Delphi consensus revealed substantial convergence (Pennesi et al. 2025), strengthening confidence in the transdiagnostic validity of the final SSI set. Notable differences were limited to the prominence of loneliness/social disconnection, negative thinking and rumination, and challenging life events, alongside comparatively lower prioritization of high standards and life transitions. This pattern suggests that while expert- and stakeholder-identified mechanisms largely generalize to university populations, students may place relatively greater emphasis on social-emotional immediacy and cognitive distress than on perfectionistic or developmental transition processes. These issues may feel most proximal and urgent in day-to-day university life (e.g., loneliness, rumination, and stress exposure), even though other mechanisms (e.g., perfectionism/high standards) are theoretically central to ED risk. Keeping in mind the relatively poor adherence to ED compared to mental health DMHI (Liu, Anderson, et al. 2026a; Liu, Torous, et al. 2026b), it may be advantageous to focus on targeting processes that students perceive as most pressing to reduce drop-off and increase completion. It also supports a modular library approach, offering choice, where multiple entry points can accommodate heterogeneity in presenting concerns while retaining coherence through a transdiagnostic framework.

Beyond target selection, the alignment between qualitative feedback and quantitative usability ratings highlights the importance of the engagement of lived experience in the design of digital early intervention. Perceived usefulness was closely linked to clarity, interactivity, personal relevance, and visual coherence, indicating that credibility in brief DMHIs depends on both psychological content and user experience. Refinement informed by consumer feedback prior to efficacy testing therefore represents a critical step in developing scalable early-support tools.

Furthermore, findings highlight practical challenges for the implementation of brief DMHIs in real-world student settings. The present results provide a clear design signal regarding areas

requiring refinement (e.g., clarity of brain-based explanations, visibility of progress and feedback, and realism of testimonials). Within a brief SSI format, such elements appear to function as credibility cues, such that when users do not quickly understand the intended mechanism of change, recognize personal relevance in the content, or perceive reinforcing feedback, disengagement may occur despite the evidence-informed therapeutic approach. In this context, co-design extends beyond acceptability testing, serving as the process through which theoretically grounded targets are translated into content that is experienced as trustworthy, relevant, and usable within a university population.

Practically, these findings support the use of: (a) mechanism explanations using plain language and minimal but meaningful psychoeducation; (b) interactive “learn-do” transitions that move from insight to action; and (c) progress indicators that are visible and motivating. Specifically, the Stage 3 feedback explicitly linked perceived usefulness to these user experience elements, suggesting they may positively impact subsequent trial engagement.

From a clinical and service-delivery perspective, the absence of differences in perceived SSI quality across weight-concern severity suggests that transdiagnostic digital SSIs may function as broadly acceptable early supports while still addressing mechanisms relevant to individuals at elevated risk. This combination of scalability and subgroup sensitivity positions SSI-based tools as promising entry points within stepped or stratified university mental-health systems. If effective, such interventions could extend support beyond traditional services and reduce barriers to help-seeking among university students. In the context of university counseling services that frequently operate under high demand, limited appointment availability, and constraints on session numbers, an app-based SSI suite can be integrated as a low-intensity entry point within a stepped-care model. This could include being offered immediately after routine screening or self-referral; used as a waitlist support to reduce deterioration and improve coping while students await counseling; or deployed as an adjunct to university counseling (e.g., between sessions) to reinforce skill practice and consolidate therapeutic gains. In this model, SSIs do not replace specialist treatment; rather, they may increase readiness for higher-intensity care as well as extending help to students who might never present for face-to-face services.

In addition, the observed subgroup willingness patterns (elevated weight concern was associated with greater willingness to engage with negative body image and behavioral activation content) suggest potential for stratified delivery pathways. This may involve offering students choice across modules to support autonomy and acceptability, alongside guided recommendations informed by baseline profiles to facilitate efficient matching of needs to intervention targets. Importantly, the intervention is framed in transdiagnostic mental-health terms rather than positioned as an eating-disorder specific app, despite incorporating eating-disorder relevant examples and functional nutrition content. Such positioning may reduce stigma that can limit engagement with disorder-specific resources, thereby broadening initial uptake and enabling subsequent personalisation through stratified module selection. In this way, transdiagnostic framing and stratified delivery may operate together to support earlier

and more acceptable engagement while still targeting mechanisms implicated in ED risk.

Several limitations should be considered when interpreting the present findings. The sample was relatively homogeneous, comprising predominantly female undergraduate psychology students, which may limit generalizability to broader university populations, including male and gender-diverse students, culturally diverse groups, and students outside psychology cohorts. In addition, prototype evaluation was designed to assess perceived acceptability, usability, and relevance rather than clinical impact, and the modest sample size limits power to detect subgroup differences. As such, findings should be interpreted as informing intervention development and optimization prior to efficacy testing. A further consideration concerns the framing of the intervention and the target-prioritization task in Stage 1. Targets were presented in transdiagnostic terms as contributors to anxiety, depression, and EDs rather than being framed solely as disordered-eating intervention targets. This broader framing may have influenced the relative salience of certain processes (e.g., loneliness and rumination) and therefore should be interpreted as reflecting transdiagnostic early-intervention priorities rather than ED-specific prioritization. However, symptoms of anxiety and depression commonly precede or co-occur with the emergence of eating-disorder symptoms, supporting the relevance of transdiagnostic early-intervention approaches (Godart et al. 2007; Godart et al. 2002). From this perspective, framing targets in relation to broader mental-health processes may be clinically appropriate, enabling support at an earlier stage of risk while still addressing mechanisms implicated in eating-disorder onset and maintenance.

Next steps include a preregistered randomized controlled trial evaluating the SSI suite within the *NourishED Mind* app, with eating-disorder, depression, and anxiety symptoms assessed as primary outcomes. Given the central role of engagement in the impact of digital interventions, trials should also prioritize adherence-related outcomes and examine whether refinements to user experience (e.g., clearer mechanism explanations, visible progress indicators, and relatable testimonials) translate into improved completion and sustained use.

Implementation-focused evaluation in university settings will also be important, including testing integration within counseling pathways, screening portals, and waitlist support programs. The findings provide a strong foundation for efficacy testing and suggest a practical pathway for integrating digital SSIs as scalable, low-intensity supports within stepped-care university mental health systems.

Author Contributions

Maya Jabs: conceptualization, methodology, investigation, data curation, formal analysis, visualization, project administration, validation, writing – original draft, writing – review and editing. **Tracey D. Wade:** conceptualization, methodology, writing – review and editing, Supervision, funding acquisition.

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Lived Experience Involvement Statement

No specific efforts were undertaken to involve persons with lived experience in the study design or execution, or in the preparation of this manuscript.

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Conflicts of Interest

Tracey D. Wade is a senior associate editor of the International Journal of Eating Disorders and co-author of this article. She was excluded from editorial decision-making related to the acceptance of this article for publication in the journal.

Data Availability Statement

The data that support the findings of this study are openly available in Open Science Framework at https://osf.io/724bu/overview?view_only=c2979c94b3174b6680d56947a848605b.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Table S1:** Early Intervention Apps Checklist items used to evaluate refined SSIs in Stage 3. **Table S2:** Item-level SSI quality ratings and independent-samples comparisons by weight-concern group.