

A Social Support Just-In-Time Adaptive Intervention for Individuals with Elevated Depressive Symptoms: A Feasibility Study with Micro-Randomized Trial Design

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Abstract

Background: Just-In-Time Adaptive Interventions (JITAI) aim to provide psychological support during critical moments in daily life.

Objective: This preregistered study evaluated the feasibility of a social support JITAI for individuals with elevated depressive symptoms awaiting psychotherapy. Triggered by Ecological Momentary Assessment (EMA) reports, the intervention encouraged participants to activate their (digital) social support networks.

Methods: Twenty-five participants completed 2,689 EMAs and received 377 JITAI over an 18-day intervention period, including a micro-randomized trial design to compare four strategies to trigger an intervention: Fixed cutoff points of distress variables, personalized thresholds (through Shewhart Control Charts) of distress variable, momentary support need, and no intervention.

Results: The results showed high feasibility, with participants completing 85% of EMA surveys, low study-related attrition rate (7%), and reporting minimal technical issues. Engagement and perceived helpfulness were heterogeneous and moderate, with participants seeking support in one-third of triggered instances. JITAI triggered by self-reported need for support were rated as more appropriately timed, helpful, and effective for promoting support-seeking behavior compared to those based on distress indicators, despite being triggered less frequently. Barriers such as time constraints and perceived unavailability of support providers likely affected support seeking behavior, as indicated by additional qualitative analyses. Exploratory effectiveness analyses indicate Cohen's *d* effect sizes between 0.06 - 0.14 in reducing distress after JITAI were received.

Conclusions: These findings demonstrate that a social support JITAI is feasible to implement, with high compliance and minimal technical issues. Yet, further research is needed to evaluate the JITAI's effectiveness and to optimize trigger strategies in addressing individual needs and barriers to engagement.

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Original Manuscript

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Abstract

Background: Just-In-Time Adaptive Interventions (JITAI) aim to provide psychological support during critical moments in daily life.

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Results: The results showed high feasibility, with participants completing 85% of EMA surveys, low study-related attrition rate (7%), and reporting minimal technical issues. Engagement and perceived helpfulness were heterogeneous and moderate, with participants seeking support in one-third of triggered instances. JITAI triggered by self-reported need for support were rated as more appropriately timed, helpful, and effective for promoting support-seeking behavior compared to those based on distress indicators, despite being triggered less frequently. Barriers such as time constraints and perceived unavailability of support providers likely affected support seeking behavior, as indicated by additional qualitative analyses. Exploratory effectiveness analyses indicate Cohen's d effect sizes between 0.06 - 0.14 in reducing distress after JITAI were received.

Conclusion: These findings demonstrate that a social support JITAI is feasible to implement, with high compliance and minimal technical issues. Yet, further research is needed to evaluate the JITAI's

effectiveness and to optimize trigger strategies in addressing individual needs and barriers to engagement.

Keywords: Just-In-Time Adaptive Intervention, Digital Health Intervention, Feasibility, Ecological Momentary Assessment, Depression, Mental Health, Help-Seeking, Social Support, Mixed Methods



Introduction

Mental health problems, such as depression, are becoming increasingly prevalent in today's societies^{1,2}. Despite the resulting need for mental health care systems, in many countries they are struggling to meet the treatment demand: A large number of individuals around the globe report that their mental health needs are not sufficiently met³⁻⁵ and are left untreated⁶. One reason for this is restricted access to mental health care because of long waiting times for outpatient psychotherapeutic treatment⁷⁻⁹. For example, depending on the area in the US, the average waiting time for outpatient psychotherapeutic treatment is estimated to be between 19 days and 3 months¹⁰⁻¹². In Germany, for example, the waiting time is estimated to be 16 weeks¹³. Long waiting times can have serious public health consequences: A delay in receiving psychotherapeutic treatment can exacerbate mental health conditions and may prolong suffering^{14,15}.

One promising way to support individuals during this “waiting” period in coping with – for example – depressive symptoms, is through digital mental health interventions delivered through the smartphone¹¹. Digital mental health interventions have low entry barriers, can be cost-effective, and have the potential to reach a wide range of individuals, including those reluctant to seek psychotherapy due to stigma^{16,17}. Aiming to alleviate depressive symptoms, examples of digital mental health interventions include mindfulness training, self-monitoring reports, or elements of Cognitive Behavioral Therapy (CBT)^{18,19}. Yet, these static interventions often do not take the dynamic emotional experiences of participant's daily lives into account, which could be used to determine optimal intervention timepoints.

A particularly promising form of digital intervention in this context are Just-in-Time Adaptive Interventions (JITAIs)²⁰. These interventions use sensor data or responses from repeated smartphone-based surveys, such as the Experience Sampling Method (ESM) or Ecological Momentary

Assessments (EMA) ^{21–23}, to trigger timely and contextually relevant interventions. JITAIs are designed to provide support precisely when and where needed most in daily life settings, allowing them to reach vulnerable individuals in critical moments ^{20,24}. They thus represent a powerful approach that allows for real-time and personalized delivery of psychological interventions ^{25,26}. For instance, interventions can be triggered at critical moments when a particular individual is experiencing high levels of negative affect, stress, or rumination ^{27,28}.

Despite the potential of smartphone-based JITAIs, current implementations often overlook one of the smartphone's most obvious functions: connecting individuals to their social support networks. Social support is conceptualized as “a social network’s provision of psychological and material resources intended to benefit an individual’s ability to cope with stress” ²⁹ (p676). Because of this coping functionality, the availability of social support networks is a key determinant of mental health and a protective factor against depression development ^{30–32}. Socially supportive relationships protect from social isolation and its adverse effects on mental and physical health ^{29,33}. Seeking social support can be a major hurdle, especially for individuals suffering from depressive symptoms ^{34,35}. Yet, to the best of our knowledge, no mental health JITAI exists that aims to aid participants in seeking social support in vulnerable moments. Thus, there is a need to explore how JITAIs can be used to help individuals activate their (digital) social support networks.

When is “just-in-time”?

When designing a JITAI, a critical factor for its effectiveness is ensuring that it is provided at moments in participants' daily lives when they need support and are receptive to it ²⁰. But identifying these moments is challenging and requires a balance between accurately detecting distress and ensuring timely delivery. The decision rules that trigger the interventions thus need to be systematically studied when designing a JITAI as these are assumed to affect proximal outcomes, such as intervention engagement²⁰.

Initially, researchers triggered interventions based on predefined, fixed cut-off points, such as scoring above a value of 4 on a 7-point negative affect scale^{27,28}. While these cut-off points can capture general patterns, they fail to account for individual differences in what constitutes a 'high' or 'low' score—what may be normal for one person could represent significant distress for another. Moreover, they do not consider natural fluctuations in individuals' experiences over time, limiting their ability to identify meaningful deviations from a person's usual state.

A newer approach that addresses these challenges are *Statistical Process Control* (SPC) methods, specifically *Shewhart Control Charts* (SCC), to personalize the timing of interventions³⁶. SPC charts track personal variability in key psychological indicators (e.g., distress levels), and can be used to identify when someone deviates from their usual emotional state³⁶. As interventions are triggered based on real-time changes, this method makes the timing more personalized.

However, a totally different approach may be effective as well, namely directly asking participants about their need for social support at any given moment. Hence, we assume that asking individuals directly about their current need for support may offer a more accurate and tailored strategy than relying solely on fixed cutoff points or inferred dynamics of distress variables. This assumption was preregistered on the Open Science Framework (OSF)³⁷.

The social support JITAI

With the aim of helping individuals to activate their (digital) social support networks, we designed a social support JITAI based on current best practice and research on social support. The intervention we propose is designed to facilitate social support through JITAIs by sending prompts and reminders to connect with identified support figures during moments of distress, based on real-time data and responses gathered through EMAs. We identify moments of distress by assessing (fluctuations in) self-reported negative affect, stress, loneliness, and rumination. The intervention is triggered either

(i) after a participant's distress level surpasses a fixed cut-off point (condition 1), (ii) when the distress level surpasses a critical threshold based on Shewhart control charts (condition 2)³⁸, or (iii) when participants indicate that they need support (condition 3). In condition 4, no intervention is triggered. Based on a micro-randomized controlled trial design³⁹ at each EMA assessment moment, it is randomly determined which condition the current assessment falls under. If triggered, the intervention includes prompts and messages designed to encourage participants to reach out to their social networks for support. A detailed description of the social support JITAI can be found in the method section and on the project's OSF repository³⁷.

In line with the skilled support framework⁴⁰ and the optimal matching theory⁴¹, this JITAI assumes that when social support is sought in the right moment, from the right person, and in the right way, it can help individuals to cope with distress-related adversity. Receiving social support in critical moments can help individuals by feeling belongingness, activating self-worth, receiving practical aid, developing coping strategies, providing opportunities to express and regulate emotions, or by reinforcement of positive behavior – thereby contributing to getting out of dysfunctional depressed states^{42,43}. Findings from correlational studies capturing social support behaviors and affective responses in daily life indeed suggest that higher received social support in crucial moments within everyday life contributes to a reduction of felt distress⁴⁴⁻⁴⁶. Also studies on social prescribing – a process where healthcare professionals refer patients to non-clinical social support interventions – may be effective in improving mental health^{47,48}. Yet, no mental health JITAI has made use of the social support process.

The Current Study

This study aims to address the gap in understanding the feasibility, acceptability, and initial intervention effects of a social support Just-In-Time Adaptive Intervention (JITAI) among individuals seeking psychotherapy. Feasibility studies are crucial, as they provide valuable insights into how

well an intervention works in a real-world setting before proceeding to larger-scale trials. They help identify potential barriers and facilitators to implementation, ensuring that the intervention is practical and effective^{49,50}. Additionally, high compliance rates and valid, high-quality data are essential for the JITAI to be triggered at helpful moments, ensuring its effectiveness in real-world settings.

The first aim of the study is to examine various feasibility and proximal outcomes, specifically how participants report on (a) appropriateness of the interventions' timing, (b) helpfulness, (c) behavior adoption (i.e., whether they seek social support), (d) intervention engagement, (e) burden, (f) technical functioning, and (g) negative effects of the social support JITAI in general and specifically of the different triggering conditions. We expect that participants rate these aspects of feasibility and proximal outcomes in general as high. Other feasibility outcomes include the compliance rate to the EMA surveys and the data quality, measured through the rate of careless responses.

Second, we aim to evaluate which of the applied triggering strategies (i.e., decision rules) is rated highest by the participants with regard to the perceived appropriate timing, helpfulness and JITAI behavior adoption. We expect these outcomes to be the highest when the intervention is triggered after participants indicate they need support (condition 3), followed by interventions triggered based on fixed cut-off points (condition 1) or the SPC method (condition 2), as preregistered³⁷.

Third, we aim to explore the intervention effects of the social support JITAI on self-reported sought social support and momentary distress. We expect that participants a) are more likely to have sought social support and b) show a larger reduction in distress variables (negative affect, stress, loneliness, and rumination) between t and $t+1$ after a JITAI (condition 1,2,3) compared to when no JITAI is triggered on moments of distress (condition 4).

Methods

Participants

Participants were individuals seeking outpatient psychotherapy who reported elevated levels of depressive symptoms in the Beck Depression Inventory-II (BDI-II) with scores above 9⁵¹. Other inclusion criteria were owning a smartphone and agreeing to the informed consent form. Exclusion criteria included individuals with a scheduled psychotherapy session within four weeks, suicidal ideation (values > 2 BDI-II item 9), manic symptoms (determined by the Mood Disorder Questionnaire)^{52,53}, or age outside the 18-70 range. Inclusion and exclusion criteria were assessed with a screening questionnaire.

Our sample consisted of $N = 25$ individuals. Of these, 22 (88 %) self-identified as female and three (2 %) identified as male. No other gender identification categories were reported. Mean age was 35.12 ($SD = 11.42$). Most participants self-described as white ethnicity ($n = 21$, 84 %). A detailed report of the demographic variables (including also education level, employment status, living situation, and children status) can be found in Supplementary Materials Table S1.

Procedure

All participants were led through the same procedure. Participants interested in the study, either by referral from psychotherapists who had to reject or put new clients on a waiting list, or through our social media posts, were directed to a screening questionnaire. If eligible, participants were invited to an in-person meeting in which participants received information about the study (see information sheet on OSF⁵⁴), signed the informed consent form, completed a baseline survey assessing demographic information and depressive symptoms, installed the m-Path smartphone app for EMA surveys and JITAI delivery, and took part in a semi-structured qualitative interview about social support seeking and smartphone-based interventions. Subsequently, 21-day period started with

EMAs administered using the m-Path software⁵⁵. During this period, participants received six daily EMA surveys (randomly prompted between 8 am-10 am, 10 am-12 am, 12 am-2 pm, 2 pm-4 pm, 4 pm-6 pm, and 6 pm-8 pm). After three days, JITAIs were additionally delivered through the m-Path app. For details on the intervention procedure, see the Intervention section. Supplementary to the six EMA surveys, Participants received an end-of-the-day survey via m-Path every evening (between 8 pm-9 pm), and every 7 days (between 9 pm-11 pm). Participants were compensated with 160 to 250 CHF – depending on their participation rate in the surveys delivered through m-Path (160 CHF corresponded to 50%, 250 CHF to 100%). Ten days into the study, participants received information about their personal participation rate and were motivated to sustain or increase it, by reminding them of their compensation. After the 21-day EMA period, participants were again invited to a qualitative interview on their experiences during the study and a debriefing. The study was approved by the ethics committee of the Faculty of Arts and Sciences of the University of Zurich (approval nr. 23.04.11).

Measures

Distress variables. The distress variables measured through EMAs included negative affect, stress, loneliness, and rumination. The original item formulations in German can be found on OSF⁵⁴, here we present their English translations. Negative affect was measured with a single item, “To what extent do you experience negative emotions at the moment?”, rated on a 7-point Likert scale ranging from 1 (“I do not experience negative emotions”) to 7 (“very negative”)⁵⁶. Stress was measured with the item, “I feel stressed at the moment”, rated on a 7-point Likert scale ranging from 1 (“disagree completely”) to 7 (“agree completely”). Loneliness was measured with the item, “I feel lonely at the moment”, rated on a 7-point Likert scale ranging from 1 (“disagree completely”) to 7 (“agree completely”). Rumination was measured with the item, “I realize that I am thinking the same negative thoughts over and over again”, rated on a 7-point Likert scale ranging from 1 (“disagree

completely”) to 7 (“agree completely”) ⁵⁷.

Support need. Support need was measured with the item “Would it help you right now to talk to someone about your worries or negative feelings?” which could be rated either as “Yes”, “No, it would not help me”, or “I have no worries or negative feelings”.

Feasibility and Proximal Outcome Measures. A range of feasibility outcome measures was assessed at post-intervention, evenings, and weekly surveys.

Post Intervention questions. The following two questions were prompted at the beginning of the subsequent EMA survey after the intervention was triggered. The appropriateness of the timing of the intervention was measured with the item “The last time the app made me aware that I could seek social support, it was just at the right time” rated on the 7-point Likert scale ranging from 1 (“disagree completely”) to 7 (“agree completely”). Whether the participant adopted the social support intervention was measured with the question “Did you ask others for support because of the app's advice?” which could be rated as “Yes” or “No”.

Evening questions. The perceived helpfulness of the intervention was measured with the item “The app's instructions for activating social support were helpful” rated on a 7-point Likert scale ranging from 1 (“disagree completely”) to 7 (“agree completely”).

Weekly questions. The intervention engagement was measured with the question “I have asked others for social support because of the app advice” on a 7-point Likert scale with the same anchors as above. The burden of completing the EMA surveys was measured also on a 7-point Likert scale with the question “I don't mind completing the questionnaires for another week”. Technical problems were measured with the question “I had technical problems using the m-Path app”, also on a 7-point Likert scale. Negative effects of using the app were measured with the question “Answering the questionnaires of this study has worsened my mental health” and the question “Asking my social

contacts for help has worsened my mental health". These questions were rated on a 7-point Likert scale ranging from 1 ("disagree completely") to 7 ("agree completely").

Other Outcome Measures. Data quality was assessed with the attention check question "To ensure data quality, please select the value 5 for this question" on a 7-point Likert scale. This item was presented with a probability of 1/7 to reduce the likelihood of participants to learn when this item appears. Support seeking was measured with the question "I have asked someone for social support (since the last m-path questionnaire)" rated on a 7-point Likert scale ranging from 1 ("disagree completely") to 7 ("agree completely").

Baseline survey. All demographic variables reported in Table 1 were measured during the baseline survey. For detailed item formulations, see OSF repository of this project⁵⁴.

Intervention

The intervention designed in this study aims to support individuals in activating their social support networks during critical moments of distress. When the JITAI is triggered, participants receive personalized prompts on their smartphones through the m-Path app, encouraging them to reach out to members of their social network for support. The intervention includes three core components: (1) specifying the type of support needed, (2) identifying who within the available network could provide this type of social support, and (3) receiving one of six evidence-based strategies to facilitate effective support-seeking. These strategies, including scholarly references, are described in detail on OSF and aim to foster, for example, that participants clearly articulate their needs, express gratitude and foster support reciprocation, and explore alternative perspectives^{40,58–60}. Intervention delivery is randomized into four triggering conditions with a micro-randomized trial design³⁹: Participants were randomly assigned to one of four conditions at each EMA measurement time point. In condition 1, the intervention was triggered when one of the items measuring distress (i.e., negative affect, stress,

loneliness, or rumination) was equal to or higher than the fixed cut-off value of five (on a 7 point Likert scale). In condition 2, the intervention was triggered when one of the items measuring distress surpassed a personalized upper control limit of a Shewhart control chart^{36,38}. For each item separately, the personalized upper control limit was computed by using the mean and standard deviation of the first seven observations. The upper control limit was determined by summing the mean and two standard deviations (i.e., the *L* parameter in Shewhart Control Charts was set to 2). In condition 3, the intervention was triggered when participants responded with 'yes' to the question whether it would help them right now to talk with someone about their worries or negative feelings. In condition 4, no intervention was triggered on distressful moments. The intervention was also not triggered when the intervention was already triggered twice or more on the same day. If these threshold conditions were surpassed the intervention is triggered as described above.

Data Analysis

To examine the feasibility and proximal outcomes of the social support JITAI, data were analyzed in three main steps. First, descriptives on feasibility and proximal outcomes are described based on grand means (across all participants), person-specific means (mean values per person), between-person standard deviations (standard deviations computed based on the person-specific means), and mean within-person standard deviations (mean of the standard deviations computed per person). Further, compliance and careless responding was assessed. Compliance was defined as the proportion of completed EMA surveys out of the total scheduled surveys (126 surveys per participant across 21 days), with $\geq 70\%$ of participants completing $\geq 70\%$ of surveys considered sufficient. Data quality was evaluated by calculating the percentage of careless responses to an attention-check item, with high data quality defined as having $< 5\%$ of responses being careless.

For aim two, we tested whether the outcomes appropriate timing, helpfulness, and behavior adoption differed across the three JITAI triggering strategies (fixed-cutoff, SPC, and support need). We chose

these variables because they were measured on the EMA level (appropriate timing, behavior adoption) or daily level (helpfulness). Differences were analyzed using Welch's two-sample t-tests, comparing pairs of conditions, with Cohen's *d* effect sizes to quantify the magnitude of differences. Analyses for helpfulness were restricted to days where only one intervention was triggered, as it was measured only in the evening.

Finally, for aim three, the intervention effects on subsequent social support seeking and changes in momentary distress (negative affect, stress, loneliness, rumination) were evaluated. Changes in distress variables were computed by subtracting the values from the subsequent EMA timepoint ($t+1$) from the values of the previous EMA timepoint (t). Pairwise t-tests were conducted to compare JITAI-triggered and omitted JITAI timepoints. JITAI-triggered timepoints included reports from conditions 1, 2, and 3, where the intervention was delivered. In contrast, omitted JITAI timepoints corresponded to condition 4, where no intervention was triggered, despite participants meeting at least one of the predefined triggering criteria (conditions 1, 2, or 3). In other words, a JITAI was considered omitted when participants (a) reported distress above 5 on at least one distress item (condition 1), (b) exceeded their personalized SPC cutoff (condition 2), or (c) indicated a need for social support (condition 3), but no JITAI was delivered because the timepoint was in condition 4. Cohen's *d* was calculated to determine the effect size. Given the exploratory nature of this feasibility study, no formal hypothesis testing was conducted. All tests were two-tailed with significance set at $P < .05$. Data and code to reproduce the main analyses can be found on OSF³⁷.

Results

The flowchart of this feasibility study is presented in Figure 1. Of the 130 participants who were assessed for eligibility, 36 individuals met the inclusion criteria and were scheduled for a study appointment. Of these, one did not attend, and two scheduled a psychotherapy intake appointment within two weeks and were thus excluded from the study ($n = 2$, 6%). During the initial session, one

participant had to be excluded due to expressing suicidal thoughts ($n = 1$, 3%) and two were excluded due to working night shifts ($n = 2$, 6%). Over the 3-week EMA phase, three participants dropped out, with reasons of lost smartphones ($n = 2$, 6%) and an unexpected operation ($n = 1$, 3%). Two participants decided not to continue the study due to study-related factors: Lifestyle incompatibility¹ ($n = 1$, 3%), and other personal reasons ($n = 1$, 3%). No participants were excluded based on the second interview or the minimally required EMA completion rate of 50%. Ultimately, 25 participants were included in the feasibility study.

In total, participants completed 2,689 EMA reports, with an average of 107.56 reports per participant ($SD = 20.46$). Evening assessments yielded 232 valid responses overall, corresponding to a mean of 9.28 reports per participant ($SD = 4.98$). Finally, weekly reports resulted in a total of 75 entries, with all 25 participants completing all three weekly reports. The intervention was triggered 377 times in total, corresponding to 14.0% of all EMA timepoints, 221 times by the fixed-cutoff condition (58.6% of intervention timepoints), 110 times by the SPC condition (29.2%), and 46 times by the support need condition (12.2%). The average trigger count per person was 15.08 ($SD = 8.62$, range 2-34). Figure S1 in the Supplementary Materials shows the overlap between potential trigger moments by condition, indicating a strong overlap between potential fixed-cutoff timepoints with SPC and support need timepoints. Figure S2 in the Supplementary materials exemplifies the loneliness trajectories with possible trigger timepoints for the fixed-cutoff and the SPC condition.

1 The person who left the study by choice indicated that the EMA content and schedule were not adapted to her lifestyle and that they found the items too impersonal.

Figure

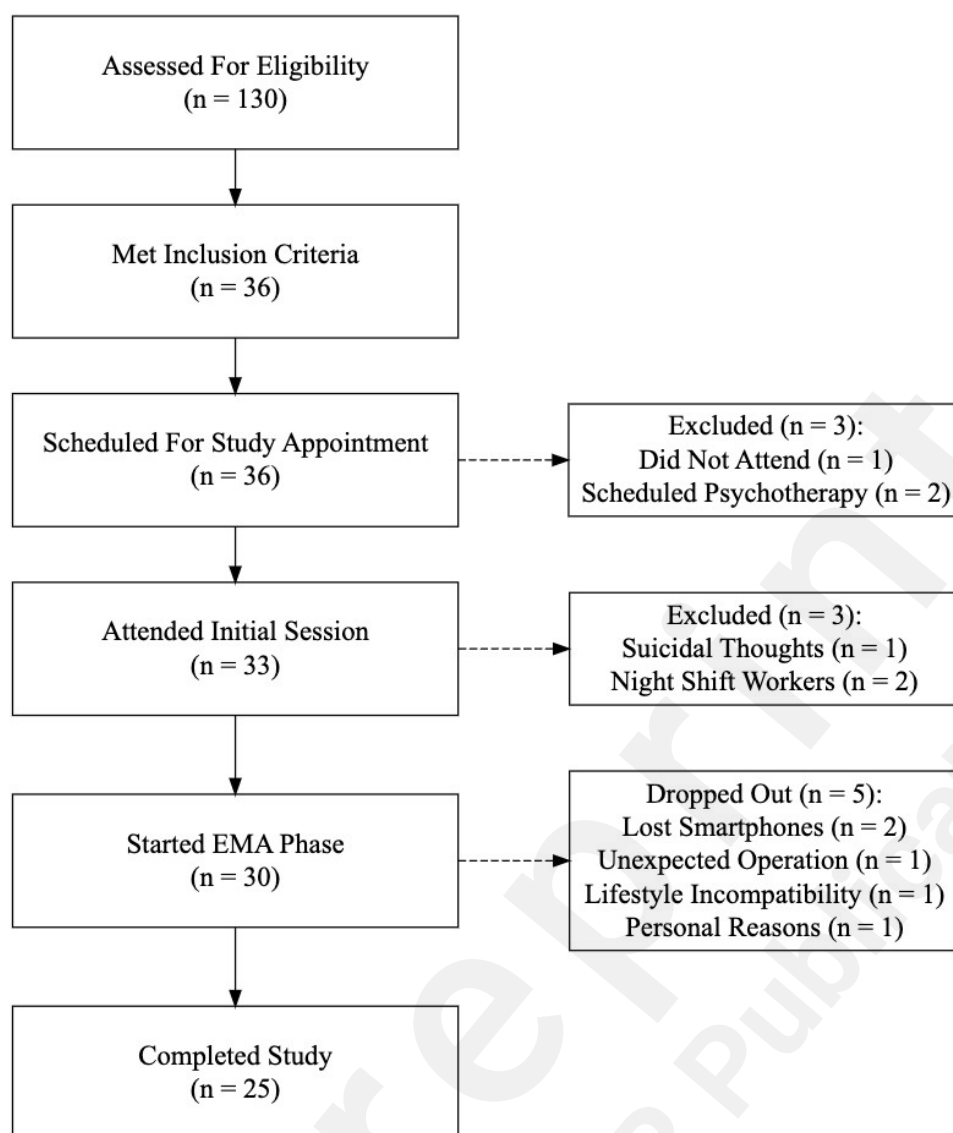
1.

Study

Flow

Chart

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Aim 1: Feasibility, Proximal Outcomes, and Data Quality

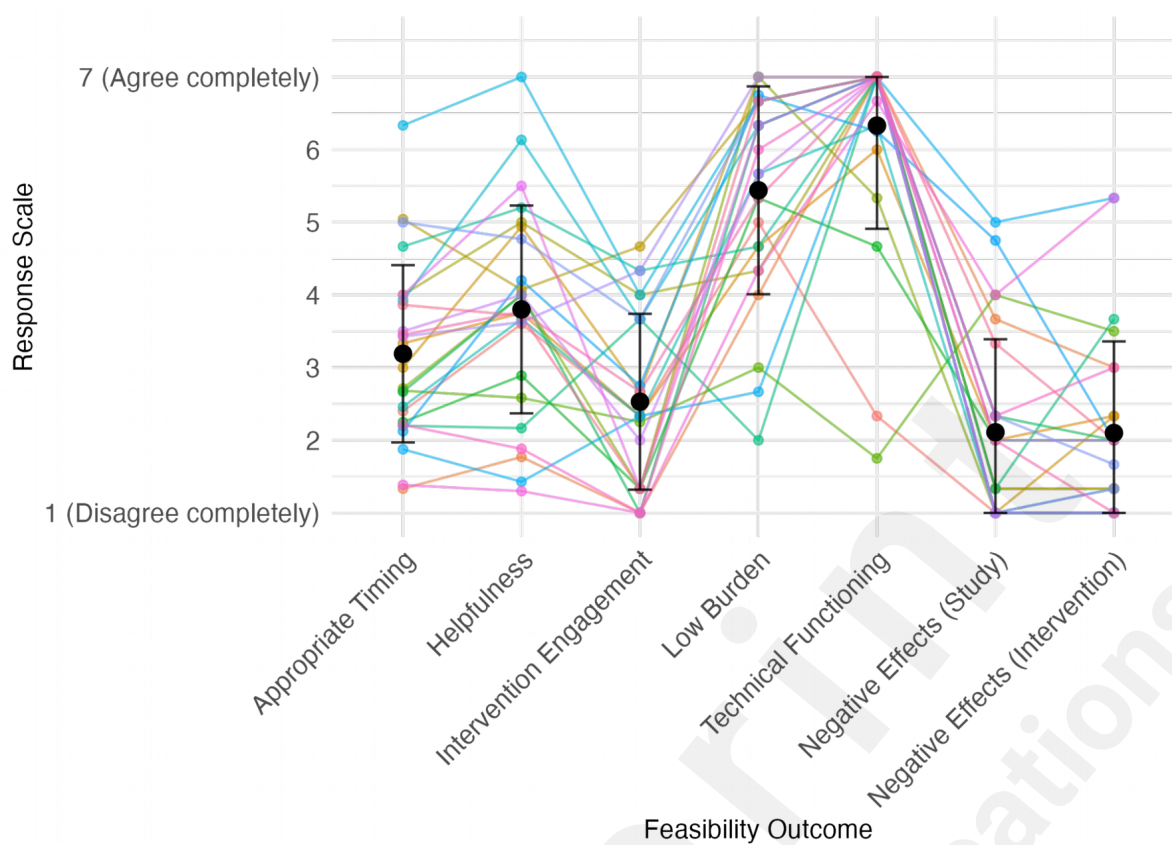
The first aim of the study was to examine various feasibility outcomes and proximal outcomes, specifically how participants perceive the (a) appropriate timing, (b) helpfulness, (c) adoption, (d) acceptability, (e) burden, (f) technical functioning, and (g) negative effects of the social support JITAI. Figure 2 presents the grand mean and between-person standard deviations of the items across all participants and timepoints as well as the person-specific means indicated by coloured data points and lines (see Table S3 in the Supplementary Materials for the means, between-person standard deviations, and within-person standard deviations). The appropriate timing and helpfulness

were rated moderately high with means 3.19 ($SD_{between} = 1.22$, $SD_{within} = 1.22$) and 3.79 ($SD_{between} = 1.44$, $SD_{within} = 1.00$), respectively (see Figure 2a). Participants reported to have adopted the suggested intervention behavior to seek for social support in 29% ($SD_{between} = 23.68$) of the situations when asked at the next EMA timepoint (Figure 2b). If they indicated no behavior adoption, we asked for the reasons why they did not seek for social support (results of a qualitative content analysis of these reports are presented in the Supplementary Materials Table S2-3). Intervention engagement rated on a weekly level was relatively low, with mean 2.56 ($SD_{between} = 1.22$, $SD_{within} = 1.22$). Low burden was rated with mean 5.45 ($SD_{between} = 1.41$, $SD_{within} = 1.15$) across the three-week observation period, indicating most participants would not mind if the study would go longer. The means for the low burden item on a weekly level were, 2.32 ($SD_{between} = 1.95$), 2.24 ($SD_{between} = 1.54$), and 3.08 ($SD_{between} = 1.82$), respectively. Technical functioning was rated high with a mean of 6.36 ($SD_{between} = 1.39$, $SD_{within} = 0.31$). Participants reported low levels of negative effects because of the study participation ($M = 2.12$, $SD_{between} = 1.30$, $SD_{within} = 0.57$) or the intervention ($M = 2.09$, $SD_{between} = 1.25$, $SD_{within} = 0.70$). However, as can be seen in Figure 2a, two participants reported relatively high negative effects (above the scale midpoint of 4). In sum, in most feasibility variables, the range of person-specific means was relatively high, suggesting that our social support JITAI was perceived positively by some individuals while being perceived less positive by others.

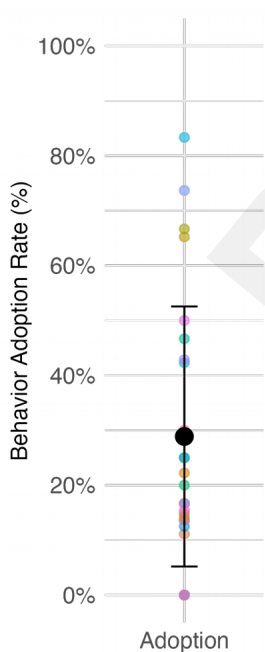
Figure

2.

Mean and SD of Feasibility and Proximal Outcome Variables with Person-Mean Data Points of (a) Likert-Scale Responses and (b) Binary Responses



(a)



(b)

Note. $N = 25$, colored data points show person-specific mean values. Technical Functioning item was

inversely formulated and recoded to present positive values.

To further evaluate the feasibility of the study, we examined the compliance rate and data quality of participants' responses. Participants were expected to complete a total of 126 EMA surveys over the 21-day period with 6 surveys per day. A compliance rate was considered sufficient if $\geq 70\%$ participants completed $\geq 70\%$ of the EMA surveys. The average compliance rate across participants was 85.37% ($SD = 16.24\%$). A total of 80% of participants met the compliance threshold, completing at least 70% of the EMA surveys.

Data quality was assessed by examining the rate of careless responses, defined as responses to an attention-check item. Out of 389 total responses, only 6 responses (1.54%) were classified as careless. This percentage is small, indicating that participants generally provided reliable responses.

Aim 2: Differences between triggering strategies

We further investigated differences in the triggering conditions in appropriate timing, helpfulness, and behavior adoption. Figure 3 shows the raw data points and grand means of these three variables by condition of the previously triggered JITAI. These exploratory results indicate that the appropriate timing was perceived differently depending on the triggering strategy. Specifically, appropriate timing ratings were significantly higher for the support need strategy (Condition 3) compared to both, the SPC strategy ($M_{\text{Condition3}} = 4.41$, Cohen's $d = -1.21$, $t(59.13) = -4.64$, $P < .001$) and the fixed-cutoff strategy (Cohen's $d = -0.77$, $t(51.95) = -4.33$, $P < .001$). Similarly, the support need strategy was associated with higher helpfulness ratings compared to both the SPC strategy ($M_{\text{Condition3}} = 4.65$, $M_{\text{Condition2}} = 3.56$, Cohen's $d = -0.65$, $t(32.63) = -2.33$, $P = .03$) and the fixed-cutoff strategy ($M_{\text{Condition1}} = 3.49$, Cohen's $d = -0.60$, $t(28.29) = -2.60$, $P = .02$). Regarding the adoption of support-seeking behavior when presented the JITAI, behavior adoption ratings were higher in the support need condition compared to both the SPC strategy ($M_{\text{Condition3}} = 43\%$, $M_{\text{Condition2}} = 22\%$,

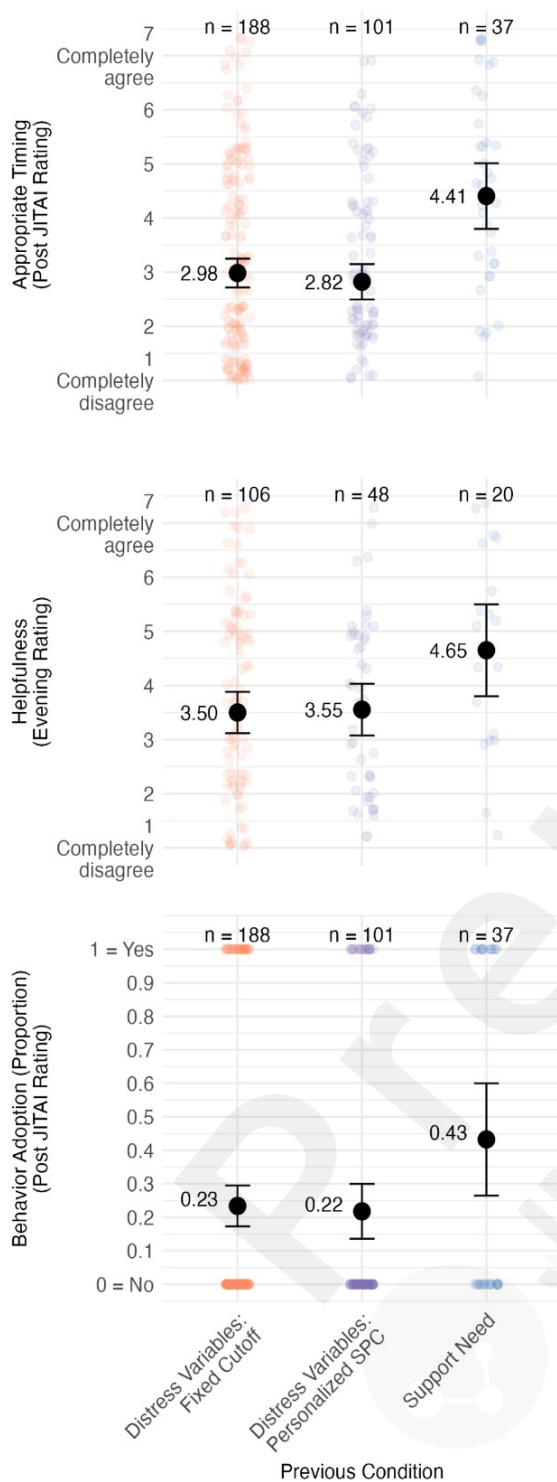
Cohen's $d = -0.49$, $t(55.01) = -2.32$, $P = .02$) and the fixed-cutoff strategy ($M_{\text{Condition1}} = 23\%$, Cohen's $d = -0.45$, $t(46.66) = -2.25$, $P = .03$). These results suggest that participants perceived the timing and helpfulness of JITAI interventions as more appropriate and were more likely to adopt the behavior when triggered based on the support need item compared to the other strategies.

Because in this analysis, we do not differentiate between different participants, in Supplementary Materials Figure S3 we also compare the person-means of appropriate timing, helpfulness, and behavior adoption.

Figure**3.**

Outcomes With Raw Datapoints and Means with 95% Confidence Intervals by Condition





Note. $N_{\text{ind}} = 25$, Appropriate timing and behavior adoption were asked at the next EMA timepoint following a JITAI. Helpfulness was rated in the evening when at least one JITAI was triggered.

Aim 3: Intervention Effects on Support Seeking and Changes in Distress

As this study is a feasibility study rather than a full-scale effectiveness trial, the primary aim was to assess the feasibility of implementing the JITAI and participants' perceptions of its usability and acceptability rather than to test its impact on mental health outcomes. Nonetheless, we explored the intervention effects of the social support JITAI on the proximal outcomes of (a) sought social support and (b) changes in momentary distress measured at the subsequent EMA timepoint by comparing the intervention conditions (1, 2, 3) against the control condition when the JITAI that should have been triggered by one of the conditions was omitted (condition 4). Figure 4 shows the raw data points and grand means of sought social support and changes in distress measures split by whether the JITAI was triggered (conditions 1, 2, 3), not triggered, or omitted at the previous EMA timepoint (i.e., instances where participants met the triggering criteria but no JITAI was delivered). Figure 4a shows that support seeking at timepoint $t+1$ was rated higher when the JITAI was triggered ($M = 3.20$) compared to when it was omitted at timepoint t ($M = 2.72$, Cohen's $d = 0.24$, $t(272) = 2.06$, $P = .04$), indicating that the intervention had a positive effect on subsequent support seeking. Figure S4 in the Supplementary Materials shows these comparisons additionally split by condition (fixed-cutoff, SPC, support need). These results indicate that subsequent support seeking was rated higher in the fixed-cutoff when the JITAI was triggered compared to when it was omitted ($M_{JITAI} = 3.78$, $M_{omitted} = 2.78$, Cohen's $d = 0.46$, $t(101) = 2.73$, $P = .007$), but not in the SPC ($M_{JITAI} = 3.16$, $M_{omitted} = 3.28$, Cohen's $d = -0.05$, $t(92) = -0.27$, $P = .79$) or support need condition ($M_{JITAI} = 2.53$, $M_{omitted} = 2.82$, Cohen's $d = -0.15$, $t(63) = -0.13$, $P = .55$).

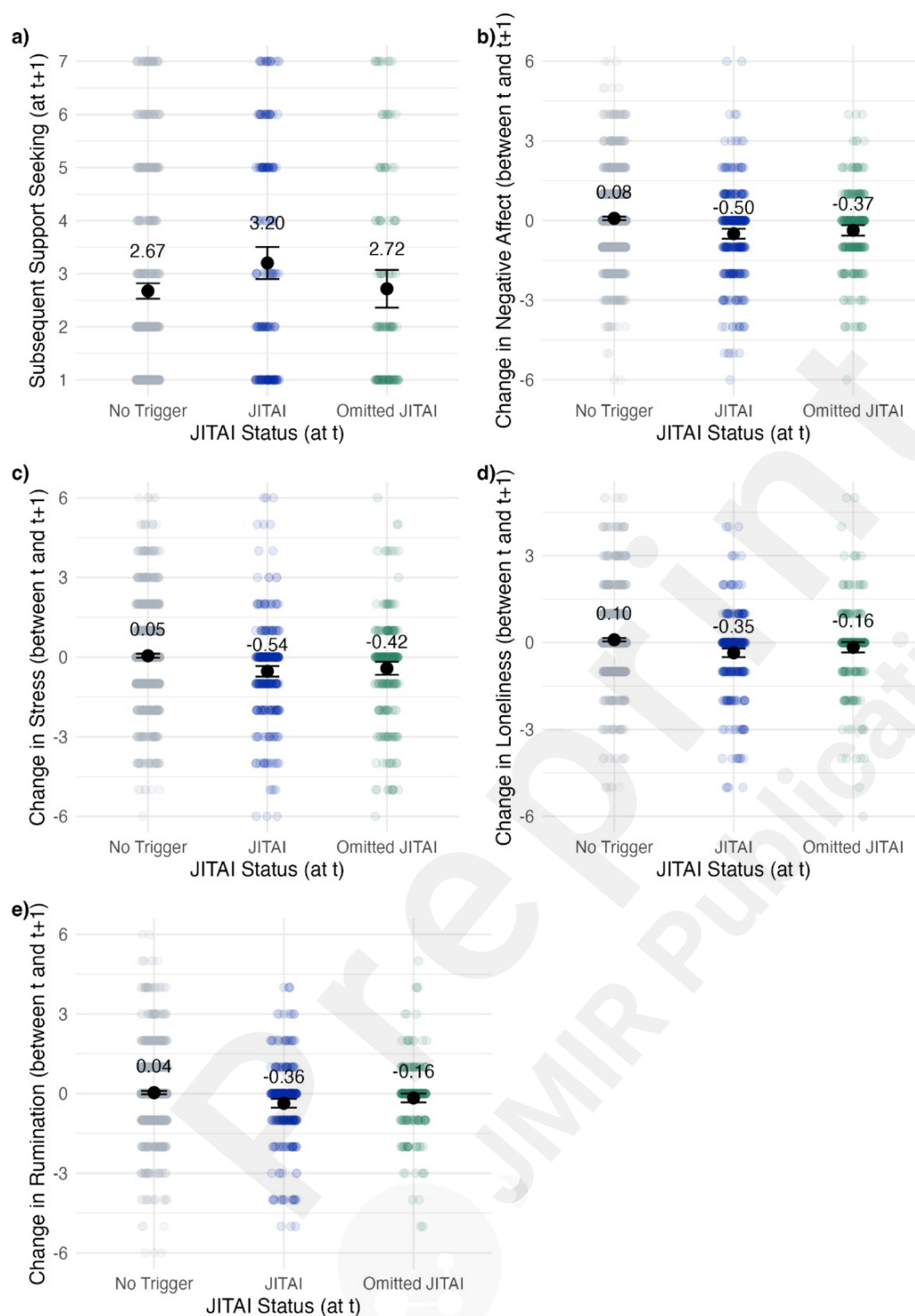
Figures 4b-d show the raw data points and mean changes in momentary distress variables between the previous EMA timepoint (t) and the subsequent timepoint ($t+1$) split by JITAI status (i.e., not triggered, triggered, or omitted). Figures 4b–4d present the changes in negative affect, stress, loneliness, and rumination between timepoints t and $t+1$, comparing when the JITAI was not

triggered, triggered, and when it was omitted (i.e., no JITAI condition but at least one criterion met for conditions 1-3). More negative change values represent larger reductions in distress. While descriptive trends suggest slightly larger reductions in these variables when the JITAI was triggered, the differences were not statistically significant in pairwise comparisons. Specifically, for negative affect (Figure 4b), changes were not significantly different between the JITAI-triggered timepoints ($M = -0.50$) and the JITAI-omitted timepoints ($M = -0.37$, Cohen's $d = -.08$, $t(546) = -0.92$, $P = .36$). Similarly, for Stress (Figure 4c), the change scores did not differ significantly ($M_{JITAI} = -0.54$, $M_{omitted} = -0.42$, Cohen's $d = -.06$, $t(503.95) = -0.70$, $P = .48$). Regarding loneliness (Figure 4d), participants showed a slightly larger reduction when the JITAI was triggered ($M = -0.35$) compared to when it was omitted ($M = -0.16$), but this difference was not statistically significant (Cohen's $d = -.14$, $t(518.18) = -1.60$, $P = .11$). Lastly, for rumination, the difference in change scores approached significance, with larger reductions observed in the JITAI-triggered condition ($M = -0.36$) compared to the omitted condition ($M = -0.16$, Cohen's $d = -.14$, $t(556.18) = -1.71$, $P = .09$). Overall, the JITAI-triggered timepoints did not significantly differ from the JITAI-omitted timepoints in reducing negative affect, stress, loneliness, or rumination. Figures S5-8 in the Supplementary Materials show these comparisons additionally split by condition (i.e., fixed-cutoff, SPC, support need). Additionally, Figures S9-12 in the Supplementary Materials show the effects of the intervention split by whether the participants reported to have sought for social support because of the intervention. These figures descriptively show that the intervention effects are larger or only apparent when participants seek for social support due to the JITAI, as opposed to not seeking support or not getting the intervention presented.

Figure**4.**

Raw Datapoints and Means with 95% Confidence Intervals for Sought Support and Changes in Distress by Previous Triggering Status





Note. $N_{ind} = 25$, JITAI = Just-In-Time Adaptive Intervention triggered by either fixed-cutoff, SPC, or support need conditions. omitted JITAI = control condition with fixed-cutoff, SPC, or support need condition met but JITAI was not presented.

Discussion

This feasibility study explored the practical implementation of a social support Just-In-Time Adaptive Intervention (JITAI) delivered via the smartphone for psychotherapy-seeking individuals with elevated levels of depressive symptoms. We assessed participants' perceptions of the intervention's feasibility and proximal outcomes, while also comparing the effects of different JITAI triggering strategies on proximal outcomes, such as support-seeking behavior and changes in affective states. Exploratory analyses examining the potential intervention effects should be interpreted with caution as the study was not designed or powered to establish efficacy.

The results suggest that the social support JITAI is practically feasible. High compliance rates were observed, with participants completing an average of 85% of the EMA surveys. The majority of participants (80%) also exceeded the preregistered compliance threshold, and the data quality was high, with a negligible proportion of careless responses (1.54%). Additionally, participants reported minimal technical issues, and burden scores indicated that completing the EMA surveys was not overly demanding. These findings are encouraging, particularly given the challenging nature of intensive data collection in real-world settings, and suggest that JITAI-based interventions can be effectively integrated into participants' daily routines.

Despite the intervention's technical feasibility, participants rated the overall helpfulness and appropriateness of the JITAI as moderate. Similarly, the subjective experiences of the intervention were mixed: Participants scored low on engagement in the intervention and adopted the intervention (i.e., sought social support) in about 1 out of 3 times after the intervention was triggered. Barriers to seeking support, such as time constraints (i.e., not having time to seek support) or perceived unavailability of support providers, may have contributed to the lower adoption rates (see Table S2 for reasons provided by participants). At the same time, it is difficult to judge what acceptable behavior adoption rates would have been for this type of intervention, given that already a few more high-quality interactions may help to reduce depressive symptoms^{61–63}. Another factor that might

influence adoption rates may lie in the assumptions about when good intervention timepoints are, which is something that we addressed by randomizing different intervention-triggering conditions.

When zooming in on differences between triggering conditions, it seems that the JITAI triggered based on participants' explicit self-reported need for support ("support need" condition) were rated as more appropriate, helpful, and effective in encouraging behavior adoption than those triggered based on predefined distress thresholds ("fixed cutoff" condition) or personalized control limits ("SPC" condition), with average Cohen's d effect size of -0.69 (range -0.45 to -1.21) and moderately high agreement scores. These findings align with the notion that individuals are more likely to engage with an intervention when it aligns with their subjective experiences and immediate needs rather than relying solely on inferred distress^{40,41}. However, it is worth noting that the support need strategy was triggered far less frequently than the other strategies, likely capturing rarer but more meaningful moments for participants. This lower frequency may contribute to the higher feasibility and adoption ratings observed in this condition, as the intervention aligned more closely with participants' perceived relevance and immediate needs. On the one hand, individuals may be more willing to seek support when they explicitly feel they need it, rather than merely experiencing distress. Feeling distressed alone may not necessarily prompt the desire or readiness to seek social support^{59,64}. In particular, not all distress is necessarily conducive to seeking support – interpersonal distress, for example, may make individuals hesitant to reach out, especially if the source of distress is a conflict within their social network. On the other hand, the thresholds used for the fixed-cutoff and SPC conditions may have been set too low, leading to frequent interventions that participants did not perceive as necessary. This discrepancy is evident from the substantially lower frequency of reported support needs compared to the number of triggers in these conditions.

In examining the initial intervention effects on the proximal outcomes of support-seeking behavior and changes in distress variables (negative affect, stress, loneliness, rumination), we found that receiving the social support JITAI was associated with greater self-reported subsequent support-

seeking behavior – specifically, in the fixed-cutoff condition but not the SPC or support-need condition. Here, support-seeking was significantly higher when the JITAI was triggered compared to when it was omitted. This finding suggests that the fixed-cutoff strategy may effectively identify moments of distress that prompt participants to seek social support, even if these moments do not align with participants' explicit perceptions of need.

These results, however, contrast with the findings on behavior adoption attributed to the JITAI. While the support-need condition showed higher immediate behavior adoption (explicitly linked to the JITAI), participants reported greater overall social support seeking after fixed-cutoff triggers. This apparent contradiction may reflect delayed or indirect effects of the intervention: participants might not have acted on the JITAI prompt immediately but may have been "nudged" to seek support later. Furthermore, the fixed-cutoff strategy may have been effective at identifying moments of distress that participants did not perceive as opportunities to seek support. Together, these findings highlight the complexity of optimizing JITAI decision rules, suggesting that different strategies may serve complementary roles in addressing both explicit and implicit needs for support.

For changes in distress variables, JITAI-triggered timepoints consistently showed descriptively larger reductions in negative affect, stress, loneliness, and rumination compared to omitted timepoints. However, these differences did not reach statistical significance, likely due to the limited statistical power in this feasibility study. While the observed effect sizes (Cohen's $d = 0.06$ – 0.14) are small, even modest improvements in social support and distress reduction may be meaningful in real-world mental health interventions. Given the exploratory nature of this study, a larger trial is warranted to determine whether these effects translate into clinically significant benefits over time. These findings highlight the need for larger-scale studies to further evaluate the effectiveness of the intervention on proximal – but also distal – outcomes while addressing potential mismatches between intervention timing and participants' emotional states.

Implications

The findings of this study have several implications for the design and implementation of JITAI-based interventions. First, unlike existing JITAIs that primarily focus on self-monitoring or mindfulness (e.g., Teepe et al., 2021), this study uniquely targets social support activation, which is a well-documented protective factor for mental health^{29,30}, with a social-support-specific JITAI. Second, our results underscore the importance of incorporating participants' subjective needs into intervention decision rules. Triggering strategies that rely on participants' self-reported support need may be more effective and acceptable than approaches based on emotion dynamics. Additionally, their effectiveness may also depend on participants' receptiveness (i.e., whether they have time) and contextual factors, such as the availability of a supportive social network or the perceived accessibility of potential support providers (as indicated by additional qualitative analysis). As evidenced by the higher ratings in the support need condition, integrating participants' support need into intervention decision rules could significantly enhance engagement and effectiveness. At the same time, these results underscore the need for JITAI decision rules that accurately capture participants' subjective need while avoiding unnecessary triggering. Overly frequent interventions, as observed in the fixed-cutoff and SPC conditions, may reduce perceived appropriateness and helpfulness, potentially leading to disengagement²⁰. Third, the lower than expected behavior adoption rate highlights a potential gap between the intervention's suggestions and participants' readiness or ability to act on them. One reason might lie in the perceived availability of time by the participant and their support resources, as indicated by their reasons for not adopting the intervention (see Supplementary Materials for a qualitative analysis). Future iterations of the JITAI could incorporate receptivity – both the respondent's receptivity to seeking support and the potential availability of support providers. This could include assessing whether the respondent has time to act on the support-seeking impulse and identifying which support providers are potentially currently or later available.

Limitations

This study has several limitations. First, the study's short duration and exploratory focus on proximal outcomes, such as behavior adoption and distress reduction, preclude conclusions about the intervention's long-term impact on mental health outcomes. Future research should assess whether these short-term effects translate into sustained improvements in depressive symptoms. Second, the intervention focused exclusively on emotional social support, which may not address the broader range of support needs (e.g., instrumental or informational support). We chose so, because of the key role of emotional social support reducing distress symptoms⁶⁵. However, individuals with depressive symptoms may experience difficulties in accurately perceiving or utilizing available social support due to cognitive biases, which could limit the intervention's effectiveness^{66,67}. Additionally, social support may not always be skillful and thus inadvertently exacerbate distress^{40,68}. Expanding the intervention's scope to include other types of support may be beneficial.

Future Research

An important finding is the heterogeneity between individuals in the reported feasibility and the effects of the JITAI. This indicates that the JITAI may be feasible and effective for some but not for others. As such, examining individual differences in the feasibility and effectiveness of the intervention (e.g., baseline levels of distress, social support availability) could help identify a) subgroups of participants who are most likely to benefit from the social support JITAI and b) factors that might inform the personalization of future JITAIs. Future iterations of the JITAI could also integrate components of cognitive-behavioral therapy (CBT) or psychoeducation to incorporate a broader range of coping strategies. For instance, making the intervention adoptive to whether a supportive person is available or whether support is perceived to be helpful for the participants – and otherwise suggest CBT elements, could be used to further tailor the intervention.

Conclusion

This study supports the feasibility of implementing a social support JITAI in real-world settings and provides preliminary results about their proximal effects. By addressing the critical gap in leveraging social support for mental health, this intervention represents a step toward personalized and scalable digital mental health interventions. In summary, the findings suggest that the JITAI is practically feasible, supporting its integration into participants' daily lives. The intervention appears to effectively encourage individuals to seek support when they recognize a personal need for it, with participants rating the JITAI as moderately helpful and appropriate under such conditions. However, prompting support-seeking behavior may be less effective, appropriate, and helpful when individuals experience elevated levels of negative affect, stress, loneliness, or rumination. Additionally, the results indicate that the JITAI does not significantly reduce distress indicators in daily life, suggesting that further refinement of the social support JITAI may be needed to address its effectiveness. By providing support in real-time during critical moments, this approach aligns with the call for innovative solutions to bridge the gap between demand and accessibility in mental health care (Patel et al., 2018; Saxena et al., 2007). While this JITAI is not a substitute for professional care, it offers a low-threshold, accessible, and feasible intervention that could complement existing mental health support by fostering proactive social connectedness – provided its effectiveness is supported in future studies.

Author Contributions

Timon Elmer: Conceptualization, Methodology, Software, Validation, Resources, Data Curation, Formal Analysis, Visualization, Funding acquisition, Writing Original Draft, Writing - Review & Editing. **Markus Wolf:** Conceptualization, Writing - Review & Editing. **Evelien Snippe:** Writing Original Draft, Writing - Review & Editing. **Urte Scholz:** Conceptualization, Writing - Review & Editing.

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Declaration of Interests

None to declare.

Abbreviations

BDI-II: Beck Depression Inventory II

CBT: Cognitive Behavioral Therapy

EMA: Ecological Momentary Assessment

ESM: Experience Sampling Methods

JITAI: Just-In-Time Adaptive Intervention

OSF: Open Science Framework

SCC: Shewhart Control Charts

SPC: Statistical Process Control

Data Availability

Data and code to reproduce the main analyses reported in this study are publicly available on the Open Science Framework (OSF)³⁷.

References

1. Patel V, Saxena S, Lund C, et al. The Lancet Commission on global mental health and sustainable development. *The Lancet*. 2018;392(10157):1553-1598. doi:10.1016/S0140-6736(18)31612-X
2. Whiteford HA, Degenhardt L, Rehm J, et al. Global burden of disease attributable to mental and substance use disorders: findings from the Global Burden of Disease Study 2010. *Lancet*. 2013;382(9904):1575-1586. doi:10.1016/S0140-6736(13)61611-6
3. Baer N, Schuler D, Füglistner-Dousse S, Moreau-Gruet F. *Depressionen in Der Schweizer Bevölkerung: Daten Zur Epidemiologie, Behandlung Und Sozial-Beruflichen Integration.*; 2013.
4. Lal S. E-mental health: Promising advancements in policy, research, and practice. *Health Manage Forum*. 2019;32(2):56-62. doi:10.1177/0840470418818583
5. Saxena S, Thornicroft G, Knapp M, Whiteford H. Resources for mental health: scarcity, inequity, and inefficiency. *Lancet*. 2007;370(9590):878-889. doi:10.1016/S0140-6736(07)61239-2
6. Waitzfelder B, Stewart C, Coleman KJ, et al. Treatment Initiation for New Episodes of Depression in Primary Care Settings. *J Gen Intern Med*. 2018;33(8):1283-1291. doi:10.1007/s11606-017-4297-2
7. Clement S, Schauman O, Graham T, et al. What is the impact of mental health-related stigma on help-seeking? A systematic review of quantitative and qualitative studies. *Psychol Med*. 2015;45(1):11-27. doi:10.1017/S0033291714000129
8. Siponen U, Välimäki M. Patients' satisfaction with outpatient psychiatric care. *J Psychiatr Ment Health Nurs*. 2003;10(2):129-135. doi:10.1046/j.1365-2850.2003.00567.x
9. Thornicroft G. Stigma and discrimination limit access to mental health care. *Epidemiol Psychiatr Soc*. Published online 2008. doi:10.1017/S1121189X00002621
10. Blech B, West JC, Yang Z, Barber KD, Wang P, Coyle C. Availability of Network Psychiatrists Among the Largest Health Insurance Carriers in Washington, D.C. *Psychiatr Serv Wash DC*. 2017;68(9):962-965. doi:10.1176/appi.ps.201600454

11. Peipert A, Krendl AC, Lorenzo-Luaces L. Waiting Lists for Psychotherapy and Provider Attitudes Toward Low-Intensity Treatments as Potential Interventions: Survey Study. *JMIR Form Res.* 2022;6(9):e39787. doi:10.2196/39787
12. Sun CF, Correll CU, Trestman RL, et al. Low availability, long wait times, and high geographic disparity of psychiatric outpatient care in the US. *Gen Hosp Psychiatry.* 2023;84:12-17. doi:10.1016/j.genhosppsych.2023.05.012
13. Kruse J, Kampling H, Bouami SF, et al. Outpatient Psychotherapy in Germany. *Dtsch Arzteblatt Int.* 2024;121(10):315-322. doi:10.3238/arztebl.m2024.0039
14. Alonso S, Marco JH, Andani J. Reducing the time until psychotherapy initiation reduces sick leave duration in participants diagnosed with anxiety and mood disorders. *Clin Psychol Psychother.* 2018;25(1):138-143. doi:10.1002/cpp.2134
15. Bennett CB, Ruggero CJ, Sever AC, Yanouri L. eHealth to redress psychotherapy access barriers both new and old: A review of reviews and meta-analyses. *J Psychother Integr.* 2020;30(2):188-207. doi:10.1037/int0000217
16. Borghouts J, Eikey E, Mark G, et al. Barriers to and Facilitators of User Engagement With Digital Mental Health Interventions: Systematic Review. *J Med Internet Res.* 2021;23(3):e24387. doi:10.2196/24387
17. Graham AK, Weissman RS, Mohr DC. Resolving Key Barriers to Advancing Mental Health Equity in Rural Communities Using Digital Mental Health Interventions. *JAMA Health Forum.* 2021;2(6):e211149. doi:10.1001/jamahealthforum.2021.1149
18. Colombo D, Palacios AG, Alvarez JF, et al. Current state and future directions of technology-based ecological momentary assessments and interventions for major depressive disorder: Protocol for a systematic review. *Syst Rev.* 2018;7(1):1-7. doi:10.1186/s13643-018-0899-y
19. Linardon J, Cuijpers P, Carlbring P, Messer M, Fuller-Tyszkiewicz M. The efficacy of app-supported smartphone interventions for mental health problems: a meta-analysis of randomized controlled trials. *World Psychiatry.* 2019;18(3):325-336. doi:10.1002/wps.20673
20. Nahum-Shani I, Smith SN, Spring BJ, et al. Just-in-time adaptive interventions (JITAIs) in mobile health: Key components and design principles for ongoing health behavior support. *Ann Behav Med.* 2018;52(6):446-462. doi:10.1007/s12160-016-9830-8
21. Csikszentmihalyi M, Larson R. Validity and reliability of the Experience-Sampling Method. *J Nerv Ment Dis.* 1987;175(9):526-536. doi:10.1097/00005053-198709000-00004
22. Shiffman S, Stone AA, Hufford MR. Ecological momentary assessment. *Annu Rev Clin Psychol.* 2008;4:1-32. doi:10.1146/annurev.clinpsy.3.022806.091415
23. Trull TJ, Ebner-Priemer UW. The Role of Ambulatory Assessment in Psychological Science. *Curr Dir Psychol Sci.* 2014;23(6):466-470. doi:10.1177/0963721414550706
24. Sels L, Homan S, Ries A, et al. SIMON: A Digital Protocol to Monitor and Predict Suicidal Ideation. *Front Psychiatry.* 2021;12(July):1-11. doi:10.3389/fpsy.2021.554811
25. Firth J, Torous J, Nicholas J, et al. The efficacy of smartphone-based mental health interventions

- for depressive symptoms: a meta-analysis of randomized controlled trials. *World Psychiatry*. 2017;16(3):287-298. doi:10.1002/wps.20472
26. Myin-Germeyns I, Klippel A, Steinhart H, Reininghaus U. Ecological momentary interventions in psychiatry. *Curr Opin Psychiatry*. 2016;29(4):258-263. doi:10.1097/YCO.0000000000000255
27. Rauschenberg C, Boecking B, Paetzold I, et al. An ecological momentary compassion-focused intervention for enhancing resilience in help-seeking youth: a pilot study (Preprint). *JMIR Ment Health*. 2020;(August). doi:10.2196/25650
28. Wang L, Miller L. Assessment and Disruption of Ruminative Episodes to Enhance Mobile Cognitive Behavioral Therapy Just-in-Time Adaptive Interventions in Clinical Depression: Pilot Randomized Controlled Trial. *JMIR Form Res*. 2023;7(1):e37270. doi:10.2196/37270
29. Cohen S. Social relationships and health. *Am Psychol*. 2004;59(8):676-684. doi:10.1037/0003-066X.59.8.676
30. Kawachi I, Berkman LF. Social ties and mental health. *J Urban Health*. 2001;78(3):458-467. doi:10.1093/jurban/78.3.458
31. Lakey B, Cronin A. Low Social Support and Major Depression. Research, Theory and Methodological Issues. *Risk Factors Depress*. Published online 2008:385-408. doi:10.1016/B978-0-08-045078-0.00017-4
32. Taylor SE. Social Support: A Review. In: Friedman HS, ed. *The Oxford Handbook of Health Psychology*. Oxford University Press; 2012:1-48. doi:10.1093/oxfordhb/9780195342819.013.0009
33. Holt-Lunstad J, Smith TB, Baker M, Harris T, Stephenson D. Loneliness and Social Isolation as Risk Factors for Mortality: A Meta-Analytic Review. *Perspect Psychol Sci*. 2015;10(2):227-237. doi:10.1177/1745691614568352
34. Griffiths KM, Crisp DA, Barney L, Reid R. Seeking help for depression from family and friends: A qualitative analysis of perceived advantages and disadvantages. *BMC Psychiatry*. 2011;11(1):196. doi:10.1186/1471-244X-11-196
35. Teo AR, Marsh HE, Ono SS, Nicolaidis C, Saha S, Dobscha SK. The Importance of “Being There”: a Qualitative Study of What Veterans with Depression Want in Social Support. *J Gen Intern Med*. 2020;35(7):1954-1962. doi:10.1007/s11606-020-05692-7
36. Schat E, Tuerlinckx F, Smit AC, De Ketelaere B, Ceulemans E. Detecting Mean Changes in Experience Sampling Data in Real-Time: A Comparison of Univariate and Multivariate Statistical Process Control Methods. *Psychol Methods*. 2022;in press.
37. Elmer T, Wolf M, Scholz U. A Social Support Just-In-Time Adaptive Intervention for Individuals Seeking Psychotherapy: Feasibility Study with a Micro-Randomized Trial Design Comparing Different Trigger Strategies. Published online 2024. doi:10.17605/OSF.IO/BP4NY
38. Bissell D, Montgomery DC. Introduction to Statistical Quality Control. *The Statistician*. 1986;35(1):81. doi:10.2307/2988304
39. Klasnja P, Hekler EB, Shiffman S, et al. Micro-Randomized Trials: An Experimental Design for

- Developing Just-in-Time Adaptive Interventions. *Health Psychol Off J Div Health Psychol Am Psychol Assoc.* 2015;34(0):1220-1228. doi:10.1037/hea0000305
40. Rafaeli E, Gleason MEJ. Skilled Support Within Intimate Relationships. *J Fam Theory Rev.* 2009;1(1):20-37. doi:10.1111/j.1756-2589.2009.00003.x
41. Cutrona CE, Russell DW. Type of social support and specific stress: Toward a theory of optimal matching. *Soc Support Interactional View.* 1990;(January):319-366.
42. Lehman DR, Ellard JH, Wortman CB. Social Support for the Bereaved. Recipients' and Providers' Perspectives on What is Helpful. *J Consult Clin Psychol.* 1986;54(4):438-446. doi:10.1037/0022-006X.54.4.438
43. Thoits P. Mechanisms linking social ties and support to physical and mental health. *J Health Soc Behav.* 2011;52(2):145-161. doi:10.1177/0022146510395592
44. Coppersmith DDL, Kleiman EM, Glenn CR, Millner AJ, Nock MK. The dynamics of social support among suicide attempters: A smartphone-based daily diary study. *Behav Res Ther.* 2019;120(April 2018):103348. doi:10.1016/j.brat.2018.11.016
45. Cutrona CE. Behavioral manifestation of social support: a microanalytic study. *J Pers Soc Psychol.* 1989;51(1):201-208.
46. Harlow RE, Cantor N. To Whom Do People Turn When Things Go Poorly? Task Orientation and Functional Social Contacts. *J Pers Soc Psychol.* 1995;69(2):329-340. doi:10.1037/0022-3514.69.2.329
47. Chatterjee H, Polley M, Clayton G. Social prescribing: community-based referral in public health. *Perspect Public Health.* 2018;138(1):18-19. doi:10.1177/1757913917736661
48. Dubbeldeman EM, Kiefte-de Jong JC, Ardesch FH, et al. Intervention Characteristics and Mechanisms and Their Relationship with the Influence of Social Prescribing: A Systematic Review. *Health Soc Care Community.* 2024;2024(1):5597259. doi:10.1155/2024/5597259
49. Gadke DL, Kratochwill TR, Gettinger M. Incorporating feasibility protocols in intervention research. *J Sch Psychol.* 2021;84:1-18. doi:10.1016/j.jsp.2020.11.004
50. Bowen DJ, Kreuter M, Spring B, et al. How We Design Feasibility Studies. *Am J Prev Med.* 2009;36(5):452-457. doi:10.1016/j.amepre.2009.02.002
51. Beck A, Steer R, Brown G. *Beck Depression Inventory-II (BDI-II).*; 1996. <http://www.pearsonclinical.com/psychology/products/100000159/beck-depression-inventoryii-bdi-ii.html?Pid=015-8018-370>
52. Hirschfeld RM, Williams JB, Spitzer RL, et al. Development and validation of a screening instrument for bipolar spectrum disorder: the Mood Disorder Questionnaire. *Am J Psychiatry.* 2000;157(11):1873-1875. doi:10.1176/appi.ajp.157.11.1873
53. Meyer TD, Bernhard B, Born C, et al. The Hypomania Checklist-32 and the Mood Disorder Questionnaire as screening tools--going beyond samples of purely mood-disordered patients. *J Affect Disord.* 2011;128(3):291-298. doi:10.1016/j.jad.2010.07.003

54. Elmer T, Wolf M, Scholz U. A Social Support Just-In-Time Adaptive Intervention for Individuals Seeking Psychotherapy: Feasibility Study with a Micro-Randomized Trial Design Comparing Different Trigger Strategies. Published online March 8, 2024. Accessed February 24, 2025. <https://osf.io/58awr/>
55. Mestdagh M, Verdonck S, Piot M, et al. m-Path: an easy-to-use and highly tailorable platform for ecological momentary assessment and intervention in behavioral research and clinical practice. *Front Digit Health*. 2023;5. doi:10.3389/fdgth.2023.1182175
56. Cloos L, Ceulemans E, Kuppens P. Development, validation, and comparison of self-report measures for positive and negative affect in intensive longitudinal research. *Psychol Assess*. 2023;35(3):189-204. doi:10.1037/pas0001200
57. Geschwind N. *From Vulnerability to Resilience against Depression The Value of Daily-Life Positive Emotions.*; 2011.
58. Barbee AP, Cunningham MR. An Experimental Approach to Social Support Communications: Interactive Coping in Close Relationships. *Ann Int Commun Assoc*. 1995;18(1):381-413. doi:10.1080/23808985.1995.11678921
59. Forest AL, Walsh RM, Krueger KL. Facilitating and motivating support: How support-seekers can affect the support they receive in times of distress. *Soc Personal Psychol Compass*. 2021;15(6):1-21. doi:10.1111/spc3.12600
60. Walsh RM, Forest AL. Can Expressing Positivity Elicit Support for Negative Events? A Process Model and Review. *Personal Soc Psychol Rev Off J Soc Personal Soc Psychol Inc*. 2021;25(1):3-40. doi:10.1177/1088868320961899
61. Elmer T, Ram N, Gloster AT, Bringmann LF. Studying Daily Social Interaction Quantity and Quality in Relation to Depression Change: A Multi-Phase Experience Sampling Study. *Pers Soc Psychol Bull*. Published online 2023. doi:<https://doi.org/10.1177/01461672231211469>
62. Hall JA, Holmstrom AJ, Pennington N, Perrault EK, Totzkay D. Quality Conversation Can Increase Daily Well-Being. *Commun Res*. Published online January 27, 2023:00936502221139363. doi:10.1177/00936502221139363
63. Sun J, Harris K, Vazire S. Is well-being associated with the quantity and quality of social interactions? *J Pers Soc Psychol*. 2019;2019(August 2019). doi:10.1037/pspp0000272
64. Dunkel-Schetter C, Skokan LA. Determinants of Social Support Provision in Personal Relationships. *J Soc Pers Relatsh*. 1990;7(4):437-450. doi:10.1177/0265407590074002
65. Ko LK, Lewis MA. The Role of Giving and Receiving Emotional Support on Depressive Symptomatology among Older Couples: An Application of the Actor-Partner Interdependence Model. *J Soc Pers Relatsh*. 2011;28(1):83-99. doi:10.1177/0265407510387888
66. Blanchard JJ, Horan WP, Brown SA. Diagnostic differences in social anhedonia: A longitudinal study of schizophrenia and major depressive disorder. *J Abnorm Psychol*. 2001;110(3):363-371. doi:10.1037/0021-843X.110.3.363
67. Kupferberg A, Bicks L, Hasler G. Social functioning in major depressive disorder. *Neurosci*

Biobehav Rev. 2016;69:313-332. doi:10.1016/j.neubiorev.2016.07.002

68. Gleason MEJ, Iida M, Shrout PE, Bolger N. Receiving Support as a Mixed Blessing: Evidence for Dual Effects of Support on Psychological Outcomes. *J Pers Soc Psychol.* 2008;94(5):824-838. doi:10.1037/0022-3514.94.5.824
69. Mayring P. *Qualitative Inhaltsanalyse: Grundlagen und Techniken*. 12., vollständig überarbeitete und aktualisierte Aufl. Beltz; 2015.



Supplementary Files

Multimedia Appendixes

Supplementary Materials.

URL: <http://asset.jmir.pub/assets/650c4b801e42b577e1e387152c7729f8.docx>