

Perspectives on the use of Acceptance and Commitment Therapy related mobile apps:

Results from a survey of students and professionals

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Abstract

Although mobile apps have proliferated as self-help or adjunctive therapy supports, scant research has explored their implementation among mental health practitioners. Little is known about uses and perceptions of mental health apps among applied practitioners, nor are agreed-upon criteria for evaluating and choosing apps available. The present survey study examined the uses and perceptions of mental health apps among 356 professionals and students familiar with Acceptance and Commitment Therapy (ACT), as indicated by being a member of the Association for Contextual Behavioral Science. The survey found that practitioners are interested in using ACT-related apps, but that use of and familiarity with apps is low. As rated by participants, the most helpful app functions pertained to supporting out-of-session skills practice and the maintenance of therapy gains. The greatest barriers to app use included little guidance as to what apps to choose, app contents that are inconsistent with ACT, and ethical concerns related to app use. Suggested criteria for evaluating apps were consistent with the perceived benefits and barriers to use. Results of this study may be used to increase implementation and improve the development of mental health apps with ACT and other therapeutic communities.

Keywords: Acceptance and Commitment Therapy; Mobile apps; Self-help; Technology; Internet

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Perspectives on the use of Acceptance and Commitment Therapy related mobile apps:

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Over the past few years, mobile apps for mental health problems have proliferated in the form of self-help and adjunctive therapy supports. A search in early 2015 found 447 available mobile applications (apps) just using cognitive behavioral therapy search terms in the app marketplace (Torous, Levin, Ahern & Oser, 2016). Although research on mobile apps has lagged behind their development, a growing body of evidence suggests the integration of apps into therapy can be beneficial. A meta-analysis of randomized trials found significant small effect sizes on clinical outcomes for 25 studies testing mobile interventions in general (effect size = .34) and 10 randomized trials specifically testing whether adjunctive mobile interventions improve treatment relative to treatment alone (effect size = .27; Lindhiem, Bennett, Rosen & Silk, 2015).

Despite the rapid pace in mobile app development and growing empirical support for their utility, very little research has explored the implementation issues for mental health practitioners using mobile apps with clients. The research literature is currently unclear on issues including how interested practitioners are in using mobile apps, how often such mobile apps are currently being used/recommended, what barriers practitioners encounter, and what mobile app features are important. A better understanding of these issues could facilitate broader adoption and implementation of mobile apps among practitioners. Similarly, an understanding of the perceived benefits, barriers, and expectations of apps among practitioners can help developers create more effective apps that are more likely to be used.

There is a small body of research examining practitioners' attitudes towards technology. Most studies have explored attitudes towards computerized therapies, with the majority finding

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either neutral or favorable attitudes towards such technologies (Becker & Jensen-Doss, 2013; Carper, McHugh, & Barlow, 2011). This literature also identified concerns with the negative impacts of computerized therapies on rapport (Becker & Jensen-Doss, 2013), as well as barriers to adopting new technologies such as limited knowledge and awareness (Carper et al., 2011), and prohibitive workplace norms (Buti et al., 2013). Almost no research has explored therapist attitudes towards smartphone applications in particular. Kuhn and colleagues (2014) suggested favorable therapist attitudes towards an exposure app for PTSD clients. However, the findings of this research are too specific to make broader inferences about other apps, and attitudes towards computerized therapies may not generalize to mobile technologies. Furthermore, it is unclear the extent to which attitudes correspond to the use of apps in therapy.

There are a number of potential barriers practitioners may encounter, and further research is needed to clarify the scope and importance of these barriers. One potential barrier is low therapist self-efficacy with mobile technologies, including concerns with learning how to use apps and respond to technical difficulties as well as concerns with maintaining privacy and confidentiality (Aguilera & Muench, 2012). Another category of possible barriers pertains to choosing apps in light of the limited evidence base, or choosing apps that are congruent with one's therapy approach. Perceived efficacy and acceptability of apps relative to one's client population can be a potential barrier. Finally, certain barriers may arise due to the practitioner's workplace environment (Buti et al., 2013). However, as noted there has been limited empirical research on barriers to using mobile apps among providers and their clients. Clarifying the scope and significance of these barriers with practitioners can help inform strategies to improve implementation of mobile apps as part of mental health services.

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Lack of guidance on which mobile apps to use might be a particularly notable barrier. Mental health practitioners are faced with a bewildering number and variety of apps on. The majority of these apps are situated in a behavioral or cognitive-behavioral framework, with common functions including self-monitoring, skills practice, just-in-time interventions, and supporting accountability between the client and therapist (Danaher et al., 2015; Heron & Smyth, 2010; Luxton et al., 2011). Very few apps have been subject to empirical scrutiny, however, and different apps may emphasize different skills or theoretical orientations (Chan, Torous, Hinton, & Yellowlees, 2014; Torous et al., 2016). This presents challenges for practitioners making an informed decision of which apps are most beneficial for whom. Information on how to select mobile apps and evaluative reviews of existing apps are likely needed to help guide practitioners. Preliminary guidelines for practitioners to search and select health apps have been suggested (e.g., Abrams, Westmaas, Bontemps-Jones, Ramani, & Mellerson, 2013; Boudreax et al., 2013) and databases reviewing mobile apps have begun to be provided (e.g. <http://www.adaa.org/finding-help/mobile-apps>; <http://www.abct.org/Resources>). However, these reviews and guidelines have been minimally informed by research (Torous et al., 2016).

Part of the delay might be that there is a lack of research on what practitioners are actually looking for in a mental health mobile app (e.g., what is helpful, what problems apps could solve, what features are unnecessary or problematic). Outside of local formative evaluation steps that might be taken (e.g., focused interviews, usability testing), app developers have little guidance as to what features practitioners want in a mobile app. Understanding what features are helpful and desired by practitioners can inform the development of mobile apps that are more likely to be successfully adopted as part of routine practice.

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One way to examine practitioner perspectives on mobile apps is to restrict the investigation to a particular scope of practice and therapeutic approach. This method allows for the detection of specific trends in app usage as well as themes in how practitioners view apps, which may be more difficult to discern with a more diluted and theoretically diverse group. For example, perspectives on apps might differ between therapeutic approaches due to factors including the availability of apps for that treatment approach, the emphasis on therapeutic techniques vs. process and relationship factors, and other unique concerns of the therapy. Practitioners of Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 2012) are an ideal population in light of recent growth in ACT-informed mobile apps and evaluative research (Torous et al., 2016). The experiential and skills-based format of ACT renders its behavioral techniques especially amenable to delivery through apps. This has led to the development of at least 30 ACT-related mobile apps (including 12 mobile apps developed specifically for ACT and 18 related apps relevant to ACT therapeutic processes; ACBS, 2015).

Considering a narrower population of practitioners and therapeutic approaches does not, however, preclude generalizing the results of this study to other theoretical orientations. Several components of ACT are consistent with other behavioral and cognitive-behavioral methods, such as a focus on behavioral skills, self-monitoring, and the introduction of new perspectives on psychological patterns. Similarly, ACT practitioners' perspectives on apps as a method of service delivery may be shared by practitioners of diverse theoretical camps. Therefore, feedback from ACT practitioners on specific app components as well as the use of apps generally may inform the development and effective implementation of apps in a variety of therapeutic approaches.

The present study surveyed a large sample of students and professionals regarding their current use and perceptions of ACT-related mobile apps. The survey sought to investigate the

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extent of use, familiarity and interest in apps, perceived helpfulness of apps, importance of specific app features, and barriers to using apps among practitioners familiar with ACT. In addition, it sought to identify variables linked to differences in interest, familiarity, and use of apps within this sample. The results of this survey could help to clarify implementation issues including current use, interest and familiarity with apps, what features of apps are seen as more or less helpful/important, and the barriers that need to be addressed to improve use of mental health mobile apps including ACT and related approaches.

Method

Participants

The target population of this study were members of the Association for Contextual Behavioral Science (ACBS), a large community of over 7,594 students professionals, many of whom are involved in applied psychological work using ACT. To recruit participants, study advertisements were posted on the ACBS email listserv (2175 members) and all 7,594 members of ACBS were emailed a link to the study survey.

A total sample of 382 ACBS members participated in the survey study. However, 26 of these participants dropped out after only completing the initial demographic questionnaire (without completing any questions regarding mobile apps) and thus were excluded from all reported analyses. Thus, the study included a final sample of 356, which represents a 4.7% response rate from the 7,594 ACBS members invited to participate in the study.

Procedures & Measures

The study involved completing a single time point online survey, which was distributed via Qualtrics, a secure data collection website. Questions were divided into six sections:

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Demographics, interest in using ACT apps, current use of ACT apps, helpfulness of ACT apps, barriers to using ACT apps, and possible criteria for evaluating ACT apps.

Demographics. Demographics assessed included personal characteristics such as sex, ethnicity, country of origin, education level, and current degree being pursued (if any). Professional characteristics were also assessed including primary practice settings, types of services provided, and primary treatment approach.

Interest, familiarity, and use of ACT apps. A series of questions were created for this study, which sought to determine whether participants were familiar with ACT apps, interested in using them, and current overall usage of ACT apps. Interest in ACT apps was assessed through 5 items that asked about general interest, perceived efficacy, perceived ease of use, and perceptions of client acceptability of apps. These items were rated on a 6-point scale ranging from 1 = *strongly disagree* to 6 = *strongly agree*. A forced choice approach was used in which participants had to choose 3 (slightly disagree) or lower or 4 (slightly agree) or higher in order to better characterize positive vs. negative interests in using ACT apps. In addition, the interest items were averaged to create a composite interest scale to assess overall interest ($M = 4.79$, $SD = 0.83$, $\alpha = .889$). This scale excluded the item asking about clients' willingness to pay, as this item reduced internal consistency and may assess contextual factors, such as the income of clients, that are unrelated to overall interest.

Use of ACT apps was assessed with 3 items assessing frequency of recommending ACT apps to clients, recommending apps to practitioners, and using apps as part of ACT work with clients. Each use item was rated on a 5-point scale ranging from 1 = *never* to 5 = *very often*. The use items were averaged to create a composite use scale ($M = 2.11$, $SD = 1.22$, $\alpha = .863$).

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Familiarity with ACT apps was assessed with a single 5-point question ranging from 1 = *not at all familiar* to 5 = *extremely familiar*.

Specific uses and perceived helpfulness of ACT apps. A series of items assessed the current use and perceived helpfulness of 31 specific app features and functions. These items were created for this study based on reviews of available ACT app features and functions (Levin, Oser & Haeger, 2015) and conceptual articles discussing potential uses of mobile apps in clinical work (e.g., Heron & Smyth, 2010). The 5 overarching categories of features/functions were the incorporation of apps in therapy; use of apps for skills training and generalization functions; use of apps for self-monitoring, goal-setting, and communications with the therapist; use of apps for functions specific to ACT (e.g., defusion exercises); and use of apps in light of the unique capabilities of mobile phones.

Participants were first asked which ways they have used ACT-related mobile apps with clients before, with the option to select any of the 31 features/functions they have used with clients. Thus, participants only indicated a dichotomous response of whether they have used this feature/function before with clients.

Participants were then asked to rate the perceived helpfulness of each of these 31 features/functions for ACT clinical work. Participants were instructed to rate each item, whether or not they have used them before or if they are available on existing mobile apps. Helpfulness of each feature/function was rated on a 5-point scale, ranging from 1 = *not at all helpful* to 5 = *very helpful*. Participants were also given the option to add in their own other features/functions to rate their helpfulness and current use.

Barriers to app usage. Participants were asked to rate 33 possible barriers to app usage on a scale ranging from 1 = *not at all a barrier* to 5 = *extremely a barrier*. These barriers were

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framed in terms of “how much might each of the following barriers prevent you from using ACT-related mobile apps in your applied work?” These items were created for the study based on consulting relevant literature on use of mobile apps in clinical work and challenges to implementation (e.g., Aguilera & Muench, 2012; Becker & Jensen-Doss, 2013; Buti et al., 2013; Caprter et al., 2011; Torous et al., 2016). Potential barriers included concerns related to the app marketplace, client acceptability, the features or content of apps, therapist self-efficacy in using apps, the role of apps in therapy (e.g., whether the app would replace therapist functions), and the worksite environment. Participants were also given the option to add in their own perceived barriers and rate them for any that were not on the existing list.

Evaluative criteria for selecting apps. Participants were asked to rate the importance of different evaluative criteria for selecting apps. More specifically, participants were oriented to the concept of having criteria to rate ACT apps and asked to “*complete this section considering what domains ACT-related apps should be evaluated on to guide practitioners and clients in selecting which to use. How important are each of these factors in evaluating ACT-related mobile apps?*” Evaluative criteria were developed based on reviews of the literature and existing efforts to review/rate mental health apps (Torous et al., 2016). Possible evaluative criteria included general features and attributes, such as cost or visual design, as well as more specific features or functions, such as the inclusion of ACT relevant metaphors, pictures, or videos. Participants were also given the option to write in other criteria/domains for rating mobile apps. Each criterion was rated in importance on a 5-point scale from 1 = *not at all important* to 5 = *extremely important*.

Data Analysis Plan

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Given the exploratory, descriptive approach to this study, analyses focused on examining descriptive statistics for responses to each question. Patterns were also identified such as for mobile app features that are rarely used but rated as highly helpful. Additional analyses examined differences in app variables between participant subgroups based on practitioner orientation, student status, practice setting, and global region. Further correlational analyses were used to clarify the associations among variables of interest in the study. The statistics reported for each variable and test are based on participants who responded to the given item on the survey. Missing data for a given item ranged from 0.0% to 35.4%. As such, the total number of participants used in computing percentages varies.

Results

Demographics

Of the 362 participants included in the study, 67.4% were female and the mean age was 40.77 ($SD = 11.66$). The majority of participants identified as White (83.4%) and had a Master's Degree (46.8%). The majority of participants who identified as students (23.6%) were pursuing a Ph.D. or Psy.D. (72.7% of students). The vast majority of participants (92.0%) reported currently providing applied psychological services (e.g., therapy, coaching, consulting), with 9.74 years as the average length of practice ($SD = 8.011$). Most participants (45.8%) endorsed working in private practice, and the majority (61.5%) identified ACT as their primary treatment approach. Further demographic details can be found in Table 1. These demographic results are similar to those reported in the recent (2015) ACBS Diversity Survey report.

Familiarity, interest, and uses of ACT-related mobile apps

Descriptive findings on familiarity, interest and use of apps. Participants answered a series of questions about interests in using ACT-related mobile apps and current uses (see Table

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2). An interesting pattern emerged in which most participants rated apps highly on interest and helpfulness, but 65% were “not at all” or only “slightly familiar” with these apps and 73.1% endorsed “never” or “rarely” using apps with clients.

Correlations among interest, familiarity and use. Bivariate correlations among familiarity, the average score of interest items, and the average score of use items were used to further explore the relations among these variables. Familiarity and use were significantly moderately correlated ($r = .573, p < .001$), while interest and use were significantly but only modestly related ($r = .232, p < .001$). No statistically significant correlation was observed between familiarity and interest.

Differences in familiarity, interest, and usage by sub-group. Familiarity, the average score of interest items and the average score of use items were entered into t-tests with practitioner orientation, training status, and practitioner region as the independent variables (see Table 3 for item-level means and standard deviations). Findings indicated that ACT participants were more interested in ($t = 2.25, p = .025$) and familiar with ($t = 3.62, p < .001$) apps than participants of other orientations. Students reported greater use of apps compared with professionals ($t = 2.38, p = .019$). Finally, participants in North America or Europe endorsed lower familiarity with apps ($t = 2.69, p = .008$) and use ($t = 3.41, p = .001$) compared with participants in other regions.

Differences in familiarity, interest, and usage based on practice setting. Multiple regression analyses were run to examine differences in familiarity, the average of interest items, and the average of use items by practice setting. A regression approach was indicated given some participants reported being in multiple settings (thus settings were not fully independent). University, hospital, and community settings were coded as dummy variables and contrasted

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against private practice as a reference setting. The only difference revealed in these analyses was that participants in a university setting endorsed greater use, as compared with those in private practice ($b = .389, p = .009$).

Perceptions and specific use of apps.

Participants were asked to indicate how they have used ACT-related mobile apps as well as the perceived helpfulness of each of these purposes/features (see Table 4).

Frequent and highly rated app functions. The five most frequently endorsed uses for ACT-related apps were to support the practice of mindfulness skills (42.8%), to provide additional support for clients between ACT sessions (39.8%), to prompt the use of ACT skills outside of session (35.6%), to listen to audio guided exercises (31.8%), and to support self-monitoring and self-reflection (30.7%). The five highest rated uses of ACT-related apps were to listen to audio guided experiential exercises, to support the practice of mindfulness skills, to illustrate ACT concepts or skills using pictures or videos, to set reminders to practice ACT skills and behavior change strategies, and to prompt the use of ACT skills outside of session. These most frequently used and highest rated functions overlapped significantly, especially in terms of using apps to provide out of session audio exercises, mindfulness skills, and other ACT skills.

Infrequent and lower rated app functions. A few features/uses were rated notably lower both on current use and perceived helpfulness. These included features in which the app provided new content before therapy such as using an ACT-related app as a stand-alone self-help program (7% use, 42% \geq “moderately helpful”), as an initial step before face-to-face therapy (6% use, 51% \geq “moderately helpful”), and to teach new ACT concepts/skills not yet covered in therapy (10% use, 63% \geq “moderately helpful”). Of note, these lower ratings for more stand-

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alone app uses contrast with high ratings for using apps during or upon termination from therapy as well as prompting/elaborating on skills already learned in therapy.

Other lower rated domains included using apps to connect clients with social media (3% use, 57% \geq “moderately helpful”) or to access peer-to-peer support and discussion forums (3% use, 70% \geq “moderately helpful”). Finally, therapists neither used (4% use) nor viewed as especially helpful (70% \geq “moderately helpful”) using apps for just-in-time interventions delivered automatically through the phone (although this might have been due to limited familiarity with this relatively new mobile app intervention concept).

Helpful app functions infrequently used. There were a few uses/features that were rated as helpful but rarely used (possibly due to not being currently available in mobile apps). These included using apps as an ongoing support following therapy (28% use, 95% \geq “moderately helpful”), setting reminders to practice ACT skills and behavior change strategies (9% use, 94% \geq “moderately helpful”), and recording meaningful pictures, audio, and video related to ACT work (9% use, 84% \geq “moderately helpful”). Using apps to support practitioner monitoring of client symptoms and relevant outcomes (7% use, 81% \geq “moderately helpful”), and to monitor skills and homework practice (9% use, 78% \geq “moderately helpful”) were also rated as potentially helpful but rarely used.

Ratings for targeting specific ACT components. Participants also rated what ACT components might be targeted with mobile apps. The most used and helpful component to target was mindfulness (43% use mobile apps for this, 97% \geq “moderately helpful”). Between 27% and 18% of participants rated using apps to target other ACT components. However, helpfulness ratings were still high for these other ACT components (91% to 97% \geq “moderately helpful”), highlighting the potential need for more apps that target ACT components besides mindfulness.

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Common themes in open response items. Several themes emerged in the open response items that participants rated as potentially helpful. Participants identified using apps for couples, group therapy, and the treatment of child and adolescent problems, such as bullying. In addition, several open responses cited the potential for apps to connect clients to other practitioners or to assist in finding referrals.

Perceived barriers to using ACT-related mobile apps in therapy

Participants rated a variety of different potential barriers to using mobile apps (see Table 5). The highest endorsed barriers were: not having enough guidance on which apps are credible and effective (73% \geq “moderately”), ethical concerns if clients report being suicidal or homicidal over the app (60% \geq “moderately”), concerns about commercial interest in the development of mobile apps (53% \geq “moderately”), concerns about privacy of client data (50% \geq “moderately”), low evidence base for ACT-related mobile apps (47% \geq “moderately”), concerns about the credibility of developers of mobile apps (43% \geq “moderately”), and concerns that clients would have problems learning how to use mobile apps (43% \geq “moderately”).

Some potential barriers were rated notably low. For example, barriers related to the role of mobile apps in therapy and worksite concerns were rated fairly low (between 8% and 31% rated “moderately” or higher for these barriers). Participants also rated self-efficacy concerns about using apps with clients fairly low (12% to 21% \geq “moderately”) with the exception of having problems troubleshooting technical issues (34% \geq “moderately”).

Additional barriers were identified by participants when asked to describe other barriers to the use of apps. Several participants identified problems with linguistic diversity in ACT apps (i.e., most apps are in English), with the accessibility of apps to persons with special needs, and with effectively tailoring apps to client problems. Other notable barriers included concerns about

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apps being used as an emotional control strategy, concerns about the discomfort of clients or participants with limited app experience, and concerns about the high costs and outdated appearance of therapy apps.

Correlational results. Additional correlational analyses were run to examine what barriers were predictive of interest and use of mobile apps (see Table 5). Arguably the most important barriers are those that predict low use of mobile apps. Two barriers were found to correlate with the app use total score, not knowing how to use apps in therapy and having too many apps to choose from, such that greater endorsement of these being a perceived barrier predicted lower app usage. Interest in using mobile apps was significantly related to several barriers, with the strongest relations observed for not knowing how to use apps in therapy, perceived misfit between apps and the type of therapy practiced, perceived misfit between apps and one's beliefs about therapy, and concerns that apps would detract from the therapy relationship. However, it is worth noting that the app interest items largely assess perceived helpfulness of apps, which overlaps with some of these barriers.

Criteria and domains for ACT-related mobile apps

Participants rated the importance of a variety of criteria that might be used to evaluate mobile apps, with the highest rating being a 5 “extremely important” (see Table 6). The highest rated, broad criteria included the accuracy/quality of information presented in the app (68% = “extremely important”), app content is consistent with ACT principles (64% = “extremely important”), inclusion of at least one ACT-relevant process (53% = “extremely important”), data security features to ensure privacy/confidentiality for users (57% = “extremely important”), the ease of use (48% = “extremely important”), and the extent to which the app promotes ACT inconsistent strategies (51% = “extremely important”). Altogether, consistency with an ACT

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approach, data security, and the usability of the apps appear to be important broad concerns for participants.

The highest rated specific features were the inclusion of experiential content (30% = “extremely important”), ACT relevant metaphors, pictures, and videos (33% = “extremely important”), and out of session practice strategies (30% = “extremely important”). Thus, participants rated most highly the functions that supported ACT processes out-of-session and using more experiential/multimedia-based methods.

Further criteria were indicated by participants in the open-response items. Specifically, participants identified app affordability, the accessibility of the app to diverse client populations and outside of the United States, and the availability of an app across platforms and phones as criteria for rating ACT-related apps. Other criteria included process-related abilities of apps, such as the extent to which an app supports engagement in ACT processes (versus ACT content), and the extent to which an app reinforces experiential avoidance. Altogether, the ratings and open responses of participants can be used to inform criteria for evaluating ACT-related mobile apps as well as to guide future development efforts.

Discussion

The purpose of this survey was to explore the uses and perceptions of mental health apps, with an emphasis on ACT apps, the barriers to using such apps, and the criteria for choosing apps among students and professionals. In general, participants appeared to be interested and perceive apps as a beneficial part of therapy. Patterns of actual app usage did not correspond with this trend in interest, however, as familiarity with apps and implementation in therapy were generally low. Surprisingly, interest was only weakly related to app use and unrelated to familiarity. These findings suggest that practitioners recognize the potential utility in using ACT

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apps in therapy, but may lack the support, resources, and guidance to do so. This is consistent with the highest rated barrier to app usage, which was a lack of guidance on which apps to use.

Subgroup comparisons provided further insights regarding current trends in app implementation. For example, students and participants working in university settings reported higher use of ACT apps (relative to professionals and those in private practice). Interestingly, North American and European participants endorsed lower familiarity with apps and less app usage compared with other regions, although this finding is inconsistent with global patterns of development and dissemination of apps. It is possible that this result was obtained due to the self-selection of a narrower sample ACBS members from other regions who are more familiar with apps and can speak English. Although ACT practitioners reported greater familiarity and interest in ACT apps, they do not report greater use of these apps, further highlighting the gap between interest and actual app usage. Overall, these differences suggest areas in which the scope, dissemination, and target users of such apps may be diversified.

Among possible uses of ACT apps, participants generally rated most frequently using functions that were also perceived as the most helpful. This correspondence between high usage and helpfulness ratings in app functions suggests that practitioners are intentional in choosing which apps they give to clients, and for what purposes. The most strongly endorsed functions in both usage and helpfulness were those related to supporting the practice of ACT therapy skills, using multimedia content to support skills, and self-monitoring outside of therapy sessions. The use of apps for self-monitoring and the practice of therapy skills outside of sessions are consistent with strategies for generalization in ACT and other cognitive-behavioral approaches.

The most frequently used ACT-specific function of apps was supporting out-of-session mindfulness practice. Functions pertaining to other ACT components were rated as similarly

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helpful but less frequently used. This finding may reflect the abundance of “mindfulness apps” available on the market, as compared with apps for processes that are more unique to ACT (e.g., acceptance, defusion). However, the high ratings for other ACT components, highlights the need for more ACT apps targeting other components (e.g., acceptance, self-as-context, values).

Other functions were rated as helpful but were rarely used by participants. These included using apps to set reminders to practice ACT skills and behavior change strategies, to maintain skills practice after therapy, to record ACT-related media content, and to monitor symptoms and skills usage. The limited use of apps to set reminders is somewhat surprising, given the emergence of ecological momentary interventions (EMIs) (Heron & Smyth, 2010) and the availability of this feature in some existing apps (e.g., ACT Companion). It is possible that apps using EMI are relatively few, clinicians are unaware of these app features, or that EMI may be considered exceedingly complex or a burden upon clients by practitioners. Conversely, apps for maintenance purposes after terminating therapy have neither been systematically investigated nor developed for this unique purpose, but they are clearly desirable based on the study’s findings. Finally, participants rated features that support communication between clients and therapists as helpful, but rarely used (e.g., monitoring symptoms and skill usage). A burgeoning literature in self-help technologies suggests a variety of ways that the practitioner might use symptom and skills monitoring in a compassionate way to support client progress through self-help interventions (e.g., supportive accountability; Mohr, Cuijpers, & Lehman, 2011). That said, features that support such data sharing between clients and providers are rarely provided in apps, and those that do often introduce additional complexities with data privacy and risk management concerns (e.g., if a client reports being suicidal in the app). Each of these functions highlight potential areas of focus in the future development of ACT and other mental health apps.

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Participants provided lower ratings for app uses/features that taught ACT skills independent of a therapist (e.g., stand alone self-help, as a tool before therapy, to teach skills not yet covered in therapy). These findings may reflect participants' attitudes, but not necessarily whether such apps would be efficacious in a more self-help format. Initial research does suggest apps can provide ACT, and other CBT interventions, in a more stand-alone/pre-therapy format (Torous et al., 2016), but the current findings highlight the need to educate and address practitioner attitudes towards this approach.

The most strongly endorsed barriers to using apps fell into three categories. Low guidance and a low evidence-base for apps were highly endorsed barriers, suggesting that limited information and empirical support for apps presents challenges for their adoption (Chan, Torous, Hinton, & Yellowlees, 2014). A second category of barriers included concerns about the privacy and confidentiality of information shared via apps as well as ethical problems if clients report risk. Little guidance is available to practitioners for determining which apps comply with ethical standards and for engaging in best-practices to protect client privacy and confidentiality, and to manage risk. The third highly rated group of barriers pertained to credibility and commercial interest in the development of apps. These concerns may parallel concerns about financial interest in the pharmaceutical industry, and fears about mhealth apps evolving into a commercially driven enterprise. Of note, participant ratings were also split with regards to whether clients would be willing to pay for an ACT mobile app.

Arguably, the most critical barrier might be conceptualized as a lack of guidance for providers on what apps to use (given the multitude available) and how to use them with clients. These reflect the only two barriers that were predictive of not using mobile apps and are consistent with the gap found between a high interest in apps, but low familiarity and use. It may

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be that app usage could be substantially increased if more clear guidelines were provided on how to select apps, reviews of available apps to pick from, and protocols for how such apps might be incorporated into therapy.

A number of other barriers were found to correlate with interest in using mobile apps, highlighting an additional set of targets that might be needed for promoting adoption of apps among providers who are more skeptical. These include concerns about how to integrate apps into therapy, perceived misfit of apps with the therapeutic approach or practitioner beliefs, and concerns about apps detracting from the therapeutic relationship. This is not to say that all providers should adopt apps, but it suggests some of the potential “negative attitudes” that might impede adoption with implementation efforts.

Participants identified consistency with ACT, protection of privacy and confidentiality, and ease of use as the most important criteria for evaluating ACT apps. Ensuring that ACT apps retain fidelity to the spirit of ACT is a relevant concern, given that many apps promote ACT inconsistent strategies such as thought restructuring or emotional control (even in the context of face valid strategies like mindfulness). The protection of privacy and confidentiality with apps was both a barrier and criterion for evaluating apps for participants. One may protect confidentiality and, to some extent, the privacy of client information by using apps that do not collect or transmit data. Ease of use was the third most highly rated criterion for evaluating apps, which may reflect the need for apps that function more like apps than traditional self-help books (Roth et al., 2014). Altogether, these findings are consistent with suggestions provided elsewhere for developing therapeutic apps and technologies (Aguilera & Muench, 2012; Roth et al., 2014), and are likely pertinent to app developers and practitioners of other orientations.

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In addition to the quantitative results of this study, the qualitative feedback of participants on open-response items revealed several important themes. Several responses emphasized the need to diversify the contents of apps to include a wider range of potential users. Tailoring apps to clients' preferred language, culture, age, and geographic location seems important for ensuring the accessibility and applicability of apps for a diverse range of audiences. Furthermore, apps tend to privilege visual and touch modalities, such that current apps may not be accessible to clients with varying levels of visual and motor abilities. No literature to date has addressed issues of culture and ability within mental health apps, however the present results illustrate the importance of considering diverse users of apps.

Other open-ended responses suggested concerns about the ability of apps to promote engagement with ACT processes, rather than ACT-related content. As mentioned by several respondents, the use of an app may be counter therapeutic to ACT if the client engages with ACT contents as a means of experiential avoidance or control. One way to ensure that clients engage with an app as intended is to discuss how they are using the app in-session and reinforce engagement with the intended processes.

The findings of the present study illustrate the need for guidelines for choosing apps and integrating apps into ACT, and other therapies, are sorely needed. Evaluative criteria for choosing apps should take into account which features of apps are most likely to be used, what are viewed as their key functions in the therapeutic process, and what barriers exist for practitioners in adopting apps. Guidelines for ongoing app use should address concerns related to using apps "in the spirit" of a particular theoretical orientation, protecting client privacy and confidentiality, and managing communications between the client and practitioner. The presence

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of such criteria and guidelines could bridge the gap between interest in apps and their implementation within practitioner communities.

There are some noteworthy limitations to the present study. First, participants comprised a convenience sample of ACBS members, which may not be representative of all ACT practitioners that use apps. Additionally, several participants dropped out before responding to questions about the use of ACT apps, hence the sample may represent those who are more familiar with and enthusiastic for mobile apps. Second, the measures used in this study do not reflect standardized instruments, therefore scores and variability of items should be taken tentatively. Items in the survey were established based on the consensus of researchers and therapists knowledgeable in the use of apps, and were deemed to have adequate content validity (i.e, they were phrased directly and reflected a variety of content domains relevant to the use of apps in ACT). Finally, the survey was administered in English, and most participants identified as White and North American, despite the international makeup of ACBS. Therefore, the views reflected in the present sample may be biased towards a White, North American perspective on apps, and the findings are limited to those sufficiently fluent in English to respond to the survey. The demographics represented in the present study may also reflect a Eurocentric bias in the development of apps, because those most familiar with apps may have self-selected to complete the survey. Future research is needed to better clarify app perceptions among various specific cultures using a more emic approach that is sensitive to the unique needs and barriers/facilitators that might guide targeted app development and implementation.

The goal of this study was to clarify providers' perceptions with regards to using mobile apps in therapy, not to identify what app features/uses are actually effective. Thus, although highly rated features may be more acceptable to therapists, this does not mean that such features are

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effective per se (and similarly low rated features are not necessarily ineffective). There are a large number of untested questions regarding if, when and how mobile apps are effective that need to be tested in well-controlled research, which can subsequently inform more evidence-based practice guidelines with apps.

The goal of this study was to also focus on a specific therapy modality, ACT, in order to provide a clearer and more precise understanding of app preferences and barriers. In support of this approach, issues were identified (e.g., apps providing ACT inconsistent content) that would be much less likely to be identified with a broader survey of mental health apps. However, at least some of the study's findings are likely generalizable to other therapeutic approaches such as with regards to the gap between app interest and use, specific app features that are more or less highly rated, barriers to use, and factors for evaluating mobile apps. Future research would benefit from replicating this study with other therapeutic approaches to determine generalizability and to identify unique factors that might apply in other treatments.

Conclusion

This study represents the first attempt to investigate uses and perceptions of ACT apps among students and practitioners. The results illustrate the importance of considering practitioners' perspectives on apps for development and implementation. For example, a number of patterns were identified with regards to preferred app features and functions. The findings also importantly illustrate a gap between interest and actual use of apps, highlighting key barriers that are likely relevant to a variety of therapeutic approaches. Some of the most critical barriers appear to be related to a lack of guidance of what apps to use and how to integrate them into therapy, which could be addressed by developing evidence-based practice guidelines and reviews of existing mobile apps. Further research and development of practice guidelines may help to

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facilitate more widespread adoption and use of apps within and across therapeutic communities such as ACBS.

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Table 1. Demographic Characteristics of the Study Sample

Item	Frequency	Percentage
<u>Ethnic Affiliation</u>	Valid N ^a = 343	
White	286	83.4%
Asian	13	3.8%
Middle Eastern	13	3.8%
Latino or Hispanic	11	3.2%
Black or African	5	1.5%
Other	2	0.6%
Mixed	13	3.8%
<u>Continental Location</u>	Valid N ^a = 355	
North America	205	57.7%
Europe	73	20.6%
Australia	47	13.2%
Asia	21	5.9%
South America	9	2.5%
<u>Highest Degree</u>	Valid N ^a = 356	
Masters	166	46.8%
Ph. D. or Psy. D.	130	36.6%
Bachelors	28	7.9%
High School	2	0.6%
Other	26	7.3%
<u>Pursuing Degree</u>	Students = 84	23.6%
Ph. D. or Psy. D.	61	72.7%
Masters	15	17.9%
Bachelors	2	2.4%
Other	6	7.2%
<u>Practice Setting</u>	Valid N ^a = 356	
Private Practice	161	45.2%
University	88	24.7%
Community Practice	79	22.2%
Hospital	57	16.0%
College Counselling Center	30	8.4%
Primary Care	25	7.0%
Research Institute	19	5.3%
Veterans Affairs	18	5.1%
Inpatient	15	4.2%
<u>Services Provided</u>	Valid N ^a = 323	
Individual or Group Therapy	274	84.8%
Coaching or Workshops	26	8.0%
Applied Behavior Analysis	7	2.2%
Industrial Organizational Services	3	0.9%
Other	13	4.0%

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<u>Primary Treatment Approach</u>	Valid N ^a = 356	
ACT	219	61.5%
CBT	30	8.4%
Eclectic or Integrative	10	2.8%
DBT	5	1.4%
Mindfulness Based	4	1.1%
ABA	4	1.1%
Other	84	23.6%

Note. ^aThe number of participants who selected *any* response to this demographic item.

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Table 2. Familiarity, interest and use with ACT-related mobile apps

Item	<i>M(SD)</i>	Percentages	
<u>Familiarity question</u>			
How familiar are you with ACT-related mobile apps?	2.12 (1.09)	1 “not at all” or 2 “slightly” 65.1%	4 “very familiar” or 5 “extremely familiar” 11.2%
<u>Interest Questions</u>			
I am interested in using ACT-related mobile apps in my ACT work with clients.	5.02 (.95)	≤ 3 “slightly disagree” 6.0%	≥ 4 “slightly agree” 93.9%
I feel that using such apps would improve my ACT work with clients.	4.90 (.90)	5.3%	94.8%
ACT-related mobile apps would be easy to use in my clinical work.	4.51 (1.11)	18.4%	91.6%
My ACT clients would be interested in using ACT-related mobile apps.	4.65 (.91)	9.7%	91.3%
My ACT clients would be willing to pay to use an ACT-related mobile app	3.13 (1.40)	58.0%	42.2%
<u>Use Questions</u>			
How often do you recommend ACT-related mobile apps to your ACT clients?	2.19 (1.40)	1 “never” or 2 “rarely” 64.8%	4 “often” or 5 “very often” 12.1%
How often do you use ACT-related mobile apps as part of your ACT work with clients?	1.97 (1.30)	73.1%	6.3%
How often do you recommend ACT-related mobile apps to other practitioners?	1.99 (1.10)	67.0%	9.5%

Table 3. Item-level familiarity, interest and use with ACT-related mobile apps by practitioner orientation, student status, and region.

Item	Practitioner Orientation		Student Status		Region	
	ACT <i>M(SD)</i>	Non-ACT <i>M(SD)</i>	Student <i>M(SD)</i>	Professional <i>M(SD)</i>	EU/NA <i>M(SD)</i>	Other <i>M(SD)</i>
<u>Familiarity Question</u>						
How familiar are you with ACT-related mobile apps?	2.26** (1.09)	1.83** (1.03)	2.02 (1.12)	2.15 (1.08)	2.03* (1.03)	2.44* (1.22)
<u>Interest Questions</u>						
I am interested in using ACT-related mobile apps in my ACT work with clients.	5.14* (0.90)	4.91* (0.93)	5.10 (0.86)	5.05 (0.93)	5.06 (0.88)	5.09 (0.99)
I feel that using such apps would improve my ACT work with clients.	4.97 (0.89)	4.83 (0.89)	4.97 (0.85)	4.91 (0.91)	4.90 (0.89)	5.03 (0.90)
ACT-related mobile apps would be easy to use in my clinical work.	4.63* (1.03)	4.32* (1.25)	4.42 (1.15)	4.57 (1.10)	4.55 (1.12)	4.49 (1.08)
My ACT clients would be interested in using ACT-related mobile apps.	4.71* (0.83)	4.49* (1.10)	4.61 (0.90)	4.65 (0.93)	4.64 (0.92)	4.65 (0.95)
My ACT clients would be willing to pay to use an ACT-related mobile app	3.10 (1.43)	3.17 (1.31)	3.19 (1.34)	3.03 (1.39)	3.17 (1.34)	3.07 (1.38)
<u>Use Questions</u>						
How often do you recommend ACT-related mobile apps to your ACT clients?	2.27 (1.44)	2.19 (1.60)	2.63* (1.85)	2.14* (1.36)	2.12** (1.41)	2.78** (1.71)
How often do you use ACT-related mobile apps as part of your ACT work with clients?	2.05 (1.30)	2.08 (1.66)	2.62** (1.95)	1.90** (1.19)	1.95* (1.37)	2.54* (1.59)
How often do you recommend ACT-related mobile apps to other practitioners?	2.09* (1.11)	1.83* (1.14)	2.01 (1.20)	2.00 (1.10)	1.91* (1.06)	2.36* (1.28)

Note. * $p < .05$. ** $p < .001$ with regards to *t*-test comparisons between groups (ACT vs. non-ACT; student vs. professional; EU/NA vs. Other).

Table 4. Specific uses of ACT-related mobile apps and perceived helpfulness of uses/features.

Uses of ACT-related apps	% Use	Helpful <i>M(SD)</i>	≥ 3 “moderately helpful”
<i>Incorporating into therapy</i>			
As an additional support for clients between ACT sessions	40%	3.97 (.81)	95%
As an ongoing support after face-to-face psychological services finished	28%	3.98 (.85)	95%
As a training tool to help you learn how to provide ACT to clients	16%	3.23 (1.20)	70%
As a stand-alone self-help ACT program instead of receiving face-to-face psychological services	7%	2.53 (1.10)	42%
As an initial step for clients to start to learn ACT before starting to receive face-to-face psychological services	6%	2.71 (1.13)	51%
<i>Skills training/generalization functions</i>			
To prompt the use of ACT skills outside of session	36%	4.05 (.89)	93%
To elaborate on ACT concepts or skills already presented in therapy	24%	3.87 (.90)	93%
To teach new ACT concepts or skills not covered yet in therapy	10%	3.02 (1.16)	63%
<i>Monitoring/communication/goal setting functions</i>			
To support self-monitoring and self-reflection	31%	3.98 (.92)	92%
For clients to review their self-monitoring data	17%	3.81 (1.02)	88%
To review progress towards goals	14%	3.83 (1.02)	89%
To work on setting, prompting, and completing goals	14%	3.75 (1.05)	87%
To support practitioner monitoring of clients’ symptoms/relevant outcomes	7%	3.48 (1.21)	81%
To support practitioner monitoring of clients’ skills and homework practice	9%	3.59 (1.21)	78%
To support communications between the client and practitioner	10%	3.27 (1.26)	73%
<i>ACT skills/content areas</i>			
To support the practice of mindfulness skills	43%	4.09 (.81)	97%
To support the practice of defusion skills	25%	3.88 (.87)	93%
To support the practice of acceptance skills	27%	3.87 (.88)	92%
To support clarification or connection with personal values	19%	3.85 (.81)	91%
To support the practice of committed action	21%	3.99 (.84)	95%
To support coping in times of crisis	19%	3.43 (1.07)	79%
To support a self-as-process or self-as-context perspective	18%	3.70 (.99)	86%
<i>Mobile app features/tools</i>			
To listen to audio guided experiential exercises	32%	4.18 (.83)	96%
To set reminders to practice ACT skills and behavior change strategies	19%	4.09 (.91)	94%
To read brief explanations of ACT concepts and skills	15%	3.60 (1.02)	84%
To access an open toolbox of ACT exercises and tips that clients can browse and use as needed	14%	3.86 (1.01)	88%
To provide automatic, tailored feedback based on assessment responses	6%	3.26 (1.23)	73%
To record meaningful pictures, audio or videos relevant to ACT work	9%	3.75 (1.12)	84%
To receive just-in-time interventions automatically from the phone	4%	3.27 (1.26)	70%
To access peer-to-peer support and discussion forums	3%	3.19 (1.15)	70%
To connect clients with social media (e.g., sharing about goals, etc...)	3%	2.87 (1.23)	59%

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Table 5. Ratings of perceived barriers to app use and correlations with interest and use.^a

Perceived barriers	<i>M</i> (<i>SD</i>)	≥ 3 “moderately”	<i>r</i> ’s with Interest	<i>r</i> ’s with Use
<i>App marketplace concerns</i>				
Not enough guidance on which ACT-relevant mobile apps are credible/effective	4.20 (1.43)	73%	-.002	-.067
Too many apps to choose from	2.80 (1.60)	37%	-.085	-.138*
<i>Client acceptance concerns</i>				
My clients would have problems learning how to use mobile apps	3.12 (1.30)	43%	-.223**	.021
My clients can’t afford a smartphone	2.93 (1.54)	48%	-.223**	.051
My clients aren’t interested in using mobile apps	2.84 (1.32)	37%	-.289	-.001
They don’t fit with my client’s cultural background	2.57 (1.49)	28%	-.191**	.040
They don’t fit my client’s developmental level	2.42 (1.42)	24%	-.109	.072
They don’t fit with my client’s presenting problem	2.39 (1.38)	22%	-.287**	.058
<i>Mobile app features/content concerns</i>				
Concerns about privacy of client data.	3.40 (1.64)	50%	-.096	-.111
Low evidence base for ACT-related mobile apps	3.28 (1.33)	47%	-.190**	-.089
Concerns about commercial interest in the development of mobile apps	3.50 (1.59)	53%	-.182**	-.053
Concerns about credibility of developers	3.24 (1.41)	43%	-.018	.064
A lack of content in mobile apps that would be helpful to clients	2.68 (1.49)	34%	-.077	.019
App developers know less about how to do ACT than I do	2.74 (1.51)	34%	.026	.094
They are too general to be effective	2.55 (1.41)	29%	-.178**	.030
Concerns about technical problems with apps	2.81 (1.53)	34%	-.071	.064
The app may not be consistent with ACT concepts or principles	2.41 (1.34)	21%	-.075	.070
ACT-related mobile apps are potentially harmful	1.68 (1.16)	9%	-.176**	-.012
ACT-related mobile apps don’t work.	1.85 (1.22)	11%	-.196**	.054
<i>Self-efficacy using apps concerns</i>				
I would have problems troubleshooting technical issues	2.74 (1.50)	34%	-.187**	-.054
I don’t know how to use mobile apps in my therapy work	2.19 (1.46)	21%	-.413**	-.230**
I won’t be able to keep up with advances in mobile app technologies	2.21 (1.43)	21%	-.321**	-.027
I would have problems learning how to use mobile apps	1.79 (1.23)	12%	-.263**	-.103
<i>Role of mobile apps in therapy concerns</i>				
Ethical concerns if my client reports being suicidal or homicidal over the phone app	3.58 (1.69)	60%	-.102	-.011
Excessive redundancy among mobile app content and the contents of therapy	1.81 (1.03)	24%	-.209**	.017
Concerns about perpetuating habits of overusing mobile phones	2.60 (1.61)	31%	-.263**	-.110
Mobile apps detract from the therapeutic relationship	1.96 (1.32)	13%	-.342**	-.061
Ethical concerns if some of my clients can use ACT-related apps while others can’t	2.13 (1.43)	18%	-.115	.062
Concerns that mobile apps will replace my functions as a therapist	1.59 (1.13)	8%	-.039	-.028

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Use of ACT-related mobile apps does not fit in with my beliefs about therapy	1.71 (1.23)	9%	-.386**	-.114
Mobile apps don't fit in to the kind of therapy that I practice	1.78 (1.21)	9%	-.429**	-.043
<i>Worksite concerns</i>				
Low support from my work setting for using ACT-related mobile apps	2.00 (1.44)	18%	-.254**	.023
My work setting doesn't allow access or discourages use of phones	1.83 (1.39)	16%	-.300**	.018

^aNegative correlations indicate that higher scores on the barriers are related to lower overall interest or use.

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Table 6. Criteria for evaluating ACT-related mobile apps.

Criteria/domain	<i>M (SD)</i>	Endorsed 5 “extremely”
Accuracy and quality of information presented	4.55 (.78)	68%
App content is consistent with ACT principles	4.52 (.74)	64%
App promotes ACT inconsistent strategies (e.g., thought suppression, control strategies)	4.25 (.95)	51%
Their ease of use	4.31 (.81)	48%
The inclusion of at least one ACT-relevant process (e.g., defusion, mindfulness, values)	4.37 (.80)	53%
Data security features to ensure privacy/confidentiality for users	4.33 (.94)	57%
Provides the tools, features or methods to accomplish its intended purpose	4.16 (.82)	40%
Cost	4.11 (.92)	42%
Technological problems/reliability of the app	4.18 (.80)	39%
Includes functions that support ACT work, such as self-monitoring, skills prompting, etc.	4.05 (.80)	31%
Empirical support for specific strategies and methods included in the mobile app	4.05 (.95)	38%
Empirical support for the mobile app	3.74 (1.03)	29%
Effort required by users using the app	4.03 (.94)	35%
Visual design	3.78 (.95)	25%
The extent to which an app is tailored to its target population	3.67 (.99)	26%
Ratings from users on their experiences and satisfaction with the app	3.72 (1.02)	25%
Credibility of the developers	3.94 (.97)	33%
Popularity of the mobile app	2.75 (1.21)	11%
<i>More specific features and functions</i>		
Number of functions and uses that can be performed (e.g., self-monitoring, skills, etc.)	3.55 (.96)	18%
The inclusion of ACT-relevant metaphors, pictures, or videos	4.01 (.97)	33%
Includes experiential content (e.g., mindfulness, guided visualization)	4.07 (.88)	30%
Includes features related to goal setting, skills practice, out of session practice strategies	3.93 (.88)	30%
Provides brief, focused interventions	3.63 (1.03)	22%
Provides data tracking features	3.49 (1.07)	21%
Provides feedback to users	3.55 (1.04)	19%
Provides tools and support for practitioners to use this app with their clients	3.67 (1.07)	26%
Can be personalized to an individual’s needs	3.83 (.96)	29%
Includes interactive exercises	3.84 (.86)	24%
Uses multimedia elements (audio, videos, etc...)	3.39 (1.04)	14%