Building and Pilot Testing a Couples-based Smartphone Systems to Address Alcohol Use Disorder

NCT04059549

PI: David H. Gustafson, Ph.D.

8/20/2020

Building and pilot testing a couples-based smartphone system to address alcohol use disorder

Principal Investigator:

David H. Gustafson, Ph.D.
University of WI - Madison
Industrial Engineering
1513 University Avenue, ME Bldg. Suite 4109
Madison, WI 53706
608-263-4882
dhgustaf@wisc.edu

Co-Investigators:

Elizabeth Epstein, Ph.D.
University of Massachusetts Medical School
Department of Psychiatry
55 Lake Ave North
Worcester, MA 01655
608-262-7568
elizabeth.epstein@umassmed.edu

Genie Bailey, M.D., DABAM
Stanley Street Treatment and Resources
386 Stanley St
Fall River, MA 02720
508-235-7006
genie_bailey@brown.edu

Study Coordinator:

David Gustafson, Jr, M.S.
Department: Industrial Engineering
1513 University Avenue, ME Bldg. Office 4115
Madison, WI 53706
608-262-1746
dgustafson@wisc.edu

Sponsor:

National Institutes of Health: NIAAA

Participating Institution:

Stanley Street Treatment and Resources (SSTAR)
386 Stanley Street
Fall River, MA 02720

TABLE OF CONTENTS

STUDY SUMMARY

Alcohol use disorder (AUD) is one of the most common substance use disorders. Yet only a small fraction of people who need treatment receive it, and most of them get only short-term support even though continuing care has been shown to be much more effective. Partner support can be critical to recovery, but many partners do not know how to support their partners' recovery or manage their own responses to it. Clinicians also lack evidence of the efforts patients are making toward recovery. Treating couples in which one member is recovering from AUD has been shown to be efficacious; in particular, Alcohol Behavioral Couples Therapy (ABCT) has shown positive outcomes. Still, ABCT has not been widely adopted, in part because of practical problems such as the stigma that goes with the partner needing to go to an addiction treatment agency to participate. A-CHESS is a smartphone-based system proven to substantially reduce relapse rates, but A-CHESS serves only the patient.

This project will develop and pilot test a new smartphone-based system for AUD patients, their partners, and clinicians called PartnerCHESS. PartnerCHESS will integrate key features of ABCT and A-CHESS. The project has three specific aims:

1. Integrate A-CHESS with key features of ABCT to create PartnerCHESS to serve patients, partners, and clinicians.
2. Conduct a pilot test (a small randomized clinical trial) of PartnerCHESS to estimate effect size and refine the protocol, procedures, recruitment strategy, measurements, and operations we would use in a large RCT.
3a. Decide whether to pursue an R01 application, and if so, 3b. plan for the R01.

The project would engage 6 couples to help design PartnerCHESS, test its usability and give feedback on its utility. Once ready, the system would be tested by 34 other couples randomized to receive either PartnerCHESS + treatment as usual (TAU) or A-CHESS + TAU for a 6-month trial. We will collect survey data at baseline, 2, 4, and 6 months and analyze it to see if a large clinical trial holds promise and, if so, produce an application to support a full-scale trial based on the technology developed and the research procedures employed in the pilot test.

The study is important to public health because of the scope of the alcohol abuse and the potential of technology to improve the lives of both patients and partners. If successful, such technology could greatly broaden the reach and impact of AUD treatment in general and couples therapy in particular.

1.0 BACKGROUND & SIGNIFICANCE

Alcohol Use Disorder (AUD) has a lifetime prevalence of 29.1% in adults 18 and older.[2] In 2014, 1.5 million adults sought treatment in an addiction specialty treatment program for AUD.[3] While treatment can be effective, its short term leads to high relapse rates; as many as 50% of treated patients return to problem use within a year.[4] Continuing care

can be effective[5] but is rare.[6] It is characterized by assertive outreach,[7] monitoring,[8-10] action planning,[11] symptom reinterpretation,[12-14] peer[15,16] and family support[,17] prompts,[18,19] and professional support and guidance.[9,20] But the cost of providing such care is high, and even the best research-based programs cannot address in real time the cravings, conflicts, and emotional states that often lead to relapse.[9] At best, they identify relapse early and reconnect the patient with treatment rapidly.[21] More consistent, available continuing care could considerably improve outcomes.

A-CHESS is a smartphone app designed to prevent relapse after treatment for AUD by offering emotional and instrumental support at almost any time and place. At set-up, patient-specific information is entered into the app, such as the patient's triggers, therapeutic goals, and healthy activities of interest. The system includes emergency contacts (to use when the patient is at immediate risk of relapse) and nonemergency resources (e.g., social support through discussion groups, weekly check-ins that lead to information on coping skills). If a patient nears a high-risk location (a bar she used to frequent), the GPS initiates asking the patient if she wants to be there. A-CHESS also includes—with patient permission—a report to the patient's counselor if weekly check-in responses signal a need for intervention. A-CHESS was tested in a large NIAAA-funded randomized trial.[1]

Partner support can help prevent relapse because alcohol problems and intimate relationships are reciprocally related. Distress in the relationship, along with partner attempts to control patient substance use, may prompt craving and trigger relapse; alcohol use is associated with greater relationship conflict.[22] Recovery destabilizes relationships. New patterns of interacting need to be negotiated to support each partner's needs.[23] Yet many partners do not know how to support recovery or manage their own responses to their partner's changed behavior and symptoms of post-acute withdrawal, such as irritability.[17] While partners can help prevent patient relapse,[24-29] doing so may increase their own stress and negative affect. They may need help too.[30-32] Couples treatment has shown efficacy for AUD outcomes; in particular, Alcohol Behavioral Couples Therapy (ABCT) has demonstrated positive outcomes for men and women with AUD.[22] Recognizing the reciprocity between intimate relationships and alcohol problems, ABCT tries to build abstinence support and strengthen the couple relationship. ABCT uses the relationship to reward abstinence and teaches tools for better communication[22] and more positive activities. Despite its outcomes, ABCT has not been widely adopted because of complexity, stigma, and cost.[22]

The proposed system, PartnerCHESS, will support the patient and partner. PartnerCHESS would integrate key features of ABCT and A-CHESS.

Recent research indicates that mobile technology can support patient recovery from chronic conditions such as AUD.[1,33,34] But PartnerCHESS will aim higher. It will have 2 complementary, interconnected versions – one each for patient and partner. PartnerCHESS will be designed to help prevent patient relapse and help both the patient and partner use coping, monitoring, and social support interventions in real time as they face triggers, cravings, and conflict. Compared with existing counseling

programs, mobile applications have the potential to provide services to more people, more often, for a longer period of time, with greater reach to a patient's social support systems. Furthermore, being able to receive help without attending 12-step meetings and sessions at the clinic can reduce stigma.

2.0 STUDY OBJECTIVES

Specific Aim 1:
Integrate A-CHESS with key features of ABCT to create PartnerCHESS to serve patients and partners.

Specific Aim 2:
Conduct a pilot test (a small RCT) of PartnerCHESS to examine feasibility and refine the protocol, procedures, recruitment strategy, measurements, and operations we would use in a large RCT.

This R34 will help us prepare a subsequent R01 by testing our design and our ability to recruit subjects, estimate effect sizes, collect data, finalize our analytical protocol, and create an operational manual.

Study Coordination
The UW-Madison Center for Health Enhancement Systems Studies (CHESS) is the coordinating site for this study. The UW study coordinator will oversee all activities at the recruitment site which includes:

- developing site specific recruitment and data collection processes that meet study objectives;
- training site staff on protocol procedures prior to start of recruitment and continuous monitoring to assure compliance with the protocol and human subjects regulation;
- communicating with site staff via weekly conference calls to monitor progress, inform of protocol changes/distribute new version of protocol, and address unanticipated issues or challenges;
- and manage all study data.

3.0 ELIGIBILITY

Patients and Partners: A total of 40 dyads will be recruited from the community and outpatient treatment programs in Fall River, MA (Stanley Street Treatment and Resources – SSTAR) and Madison, WI (UW Behavioral Health & Recovery).

Patients and partners must:

- Must be 18 or older
- Not have a mental or physical condition that limits smartphone use

- Not report fear of being involved in PartnerCHESS or fear that their partner would hurt them physically or emotionally for being involved in PartnerCHESS
- Not have a history of schizophrenia

Patients:

- Must have a DSM-5 diagnosis of alcohol use disorder or meet NIAAA guidelines for risky drinking.
- Have had at least one alcoholic drink in the last 3 months

Partners:

- Must be a spouse, or in a 6-month or longer committed romantic relationship
- Willing to participate in the study

4.0 REGISTRATION PROCEDURES

Patient Recruitment and Consent

Patient recruitment will be the same for both groups of participants, the 6 dyads for the initial development phase and the 34 dyads for the 6-month pilot test. The consent process will be the same although the consent form itself will be different between the two groups.

Community Recruitment: Recruitment targeting the general community in Fall River, MA and Madison, WI will be done by newspaper/Craiglist ads, flyers, and internal staff/faculty emails.

Outpatient Treatment Recruitment: SSTAR and UW Behavioral Health & Recovery staff will use medical records and client intake forms to identify and prescreen patients based on the eligibility criteria outlined in section 3.0.

After potentially eligible subjects are identified (via a phone call from the patient/partner regarding one of the community recruitment strategies or outpatient treatment staff), the research staff will explain the study and its benefits and risks via the phone. If the patient/partner is interested and believes their partner would be willing to learn more, research staff will screen the patient/partner for eligibility and discuss the options for talking with their partner - 1) if available, talk to the patient/partner on the phone directly following screening of the first member of the dyad, 2) provide research staff phone number for patient/partner to call when convenient, or 3) mail/email/text the Opt-in Letter (Partner Letter) which they can review and return if interested giving research staff permission to call and convenient times. Once the research staff has talked with both the patient and partner and they are eligible and interested, the consent forms and study information sheets will be mailed, emailed, or texted, whichever method the participants prefer. Staff will also mail the baseline surveys and a set of calendars as part of the survey instrument that will be administered on their first study call. At the first study call staff will go over the consent forms in detail, verbal informed consent will be documented, baseline surveys will be conducted, participants will be randomized, and

an app training call will be scheduled. Staff will then mail the study phones so they arrive prior to the training call, at which time they will go over the different services the app offers.

We believe that recruitment will accrue faster than normal for couples therapy because costs for internet coverage will be paid and partners will not have to visit the clinic at all (even phone delivery can be provided at a more convenient location). Hence the incentive is high and the stigma in participating is low. If either the patient or the partner declines, the dyad will be excluded. To help us prepare for an R01, we will measure the number and percent of patients who are eligible and accept, the number and percent of partners who accept, and the number of dyads that join. We will document reasons for any refusal and monitor whether refusal rates differ by patient and partner sex, race, and age. Based on the results, the recruitment process for the R01 may need to change. We will note whether partners are of the opposite or same sex. To avoid coercion, SSTAR will be paid on a fixed-price contract rather than a per-couple-recruited basis.

Patient Randomization: The 6 dyads recruited to take part in the initial development phase will not be randomized. For the 34 dyads taking part in the pilot study, we will use www.randomization.com to stratify on patient gender so the A-CHESS and PartnerCHESS groups have the same proportions of men and women patients, balancing on same-sex couples, age, and race. When the baseline survey is complete, the UW Study Coordinator will enter participant numbers and randomization data through a secure internet line to the www.randomization.com website.

5.0 TREATMENT PLAN

This project includes a 15-month initial development phase that will involve 6 dyads and a small 6-month randomized trial that will involve 34 dyads. During the 6-month randomized trial half the dyads will use A-CHESS and half will use PartnerCHESS. During that time, the smartphone will continuously collect data on how patients, partners, and clinicians are using the technologies, along with responses to a weekly survey about their satisfaction with services and suggestions for improvement. We will also conduct surveys with participants at baseline and at 2, 4 and 6 months. Based on past CHESS research, we expect a dropout rate of about 10%, leaving about 15 dyads per arm to complete the pilot RCT.

Initial development phase. After recruitment and consent, 6 dyads will take part in 3 2-hour focus groups to help develop and test the PartnerCHESS app. Topics for the 3 focus groups include:

- Initial design feedback
- Mock-ups feedback
- Content feedback
- Usability testing
- Pilot testing
- Review and give feedback on surveys to be used during the pilot

During the development phase the PartnerCHESS software design team will develop a series of interface prototypes and use rapid-cycle testing to gather user feedback about them. We will ask questions such as how intuitive the system is (Can people find what they are looking for? Do the graphics and naming conventions make sense?), how visually appealing it is, and whether the services seem useful. We will use tools such as wireframes, mockups, and paper and html prototypes to test prototypes, use feedback to quickly make changes, and test again. The information gathered from the 6 dyads will help us gauge ease of use, perceived value and reveal other changes to make before the pilot test begins. Our baseline and follow-up surveys will also be tested with the 6 dyads. Study participants will receive $35 for each focus group they attend for a maximum of $105.

Approximately 2 months after the 2nd focus group we will ask study participants to download the app and use all the features of the app, which includes completing the weekly check-in, in their regular daily life. This 1-month pilot test is an invaluable process that will identify programming bugs and user experience issues that we would not be able to get from one to two hour in-person usability testing. If study participants do not have a smartphone we will provide one for the month long pilot test. If study participants have a smartphone we will pay them $50 toward their phone service.

We will improve our predictive analytic service in A-CHESS based on our research indicating that real-time linguistic analysis (LIWC)[57] can detect weakened defenses against relapse. Our analyses of A-CHESS data found that some patterns of participants' word use in the discussion group (i.e., an increase in swear words) signaled impending relapse (R^2=.40). For A-CHESS and PartnerCHESS, we propose modifying the analysis program so that it immediately identifies such patterns, allowing us to push tailored interventions right away. (This analysis currently occurs off line. The innovation is to make it work in real time.) Once the predictive analytic has been improved, the 6 dyads who user-test the technologies will test it and revisions will be made based on their feedback during the focus groups.

6-month pilot A-CHESS services. Patients randomized to the A-CHESS group will receive the A-CHESS app on a smartphone. A-CHESS services are:

Instant Library. FAQs and brief information on addiction and couples-related issues, e.g., taking care of yourself, financial matters, alcohol abuse overview, crisis intervention, referral, medications.
Discussion groups. Forums connect patients or partners with others. Posts are analyzed to predict relapse.
Personal stories. Audio of both patients and partners talking about experiences dealing with addiction.
Location monitor *(optional)*. Geo-fencing of areas identified as triggers (e.g., a bar that was frequented), which prompts a warning followed by rescue services. If the patient stays in the area, a recorded message encourages him or her to leave. If the patient doesn't leave, a support person is automatically notified.

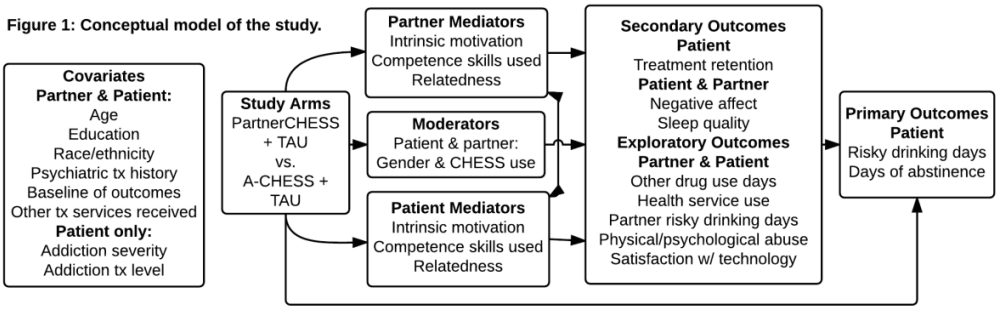
Surveys/EMAs. Questions assess immediate needs and trends over time. Partners will be asked about their own status and their perspectives on the patient's status. Advice or referrals to other A-CHESS or PartnerCHESS services will arise from responses to questions as well as from the Bayesian prediction of relapse risk using data from discussion groups and surveys.[41]
Guided relaxation. Audio to guide mindfulness, relaxation exercises, games, and other help for cravings.
Meeting locator. Patients and partners can use GPS to find AA/Al Anon meetings. Smartphone GPS data enable clinicians to estimate treatment adherence, e.g., attending 12-step meetings or other appointments.
Healthy activities. Database of ideas (e.g., taking a walk) and local recovery-friendly activities. Couples can add them to their recovery calendar.
Crisis button. Relaxation exercises, optional calls to supporters, games for distraction, and other resources.
Skills reminders. Tips and reminders of CBT-based skills (e.g., effective communication, refusal skills, etc.)

6-month pilot PartnerCHESS services from ABCT. Patients randomized to the PartnerCHESS group will receive all A-CHESS services listed above, plus the following services from ABCT:

Urge discussion. Daily EMAs will track preconditions for relapse (urges), review urge reduction options on PartnerCHESS, and encourage discussions between partners on the causes of and ways to reduce urges.
Homework checklist. Tracks which interventions the couple is using/practicing, along with resources to help.
Relapse plan. Monitoring and reminders of steps planned for relapse prevention.
Reminders. Reminders to notice something positive in partner, of reasons to stay sober, to take meds, etc.
Trigger identification and removal. During set-up, patient and partner enter triggers. PartnerCHESS will quiz couples on upcoming trigger events and remind them of ways to address each.

Conceptual model of study. Figure 1 shows the conceptual model we propose to study. It suggests that PartnerCHESS and A-CHESS will improve the secondary outcomes both directly and through multiple meditational paths. Changes in secondary outcomes (e.g., sleep[58]) will improve the primary outcomes. We anticipate that PartnerCHESS will (more than A-CHESS alone) affect the patient's intrinsic motivation to abstain as well as his or her relatedness

Figure 1: Conceptual model of the study.



and competence. Importantly, the patient effects of Partner- and A-CHESS will affect outcomes both directly (by affecting the patient's secondary outcomes) and by affecting the partner (and vice versa). For example, if PartnerCHESS boosts the partner's feelings of relatedness, the patient's feelings of relatedness may increase as a result.[59] PartnerCHESS effects on intrinsic motivation, competence, and relatedness will mediate its effects on secondary outcomes such as negative affect.[60] Because couple interventions can vary by gender,[61,62] we anticipate that the sex of the patient and partner will moderate the indirect effects of PartnerCHESS on both mediators and secondary outcomes (i.e., women – partners or patients – will use discussion groups more and will benefit more). Similar expectations hold for patients assigned to A-CHESS, except that the partner will not be directly affected by A-CHESS since the partner does not have access to it. However, partners may be indirectly affected by the changes A-CHESS makes in patients. Finally, we anticipate that the extent to which partners PartnerCHESS will affect mediation and secondary outcomes.

Inclusion of sex as a moderator variable. We will examine how men and women use the interventions differently and how the interventions affect them differently.

Comparison group and TAU. Appropriate comparison groups are a hotly debated topic.[63-69] We considered using TAU for this pilot test and a possible RCT, but our concerns about the lack of equipoise and the need for the comparison arm to offer some proven benefit (as A-CHESS does) led us to propose comparing PartnerCHESS+TAU to A-CHESS+TAU rather than comparing PartnerCHESS+TAU to TAU alone.

Treatment as Usual (TAU). At our recruitment site (SSTAR), TAU involves all patients learning core CBT skills. Patients receive training in anger and depression management, communication skills, distress tolerance, enjoying recovery, maintaining sobriety, parenting, problem solving, relapse prevention, seeking safety, and setting weekly objectives. A-CHESS and PartnerCHESS will prompt patients to use – and how to use – the skills that SSTAR teaches. SSTAR uses a fidelity scale to ensure that trainers teach the required skills, and we will use it to ensure that our services remind participants of the same skills.

Data collection. The 34 dyads will use the technologies for 6 months. Daily, PartnerCHESS will track triggers, relationship satisfaction, substance use, and cravings. Weekly, it will track the homework couples are doing; every 2 months, surveys will track the skills couples are using. UW staff will conduct surveys over the phone. While partners of A-CHESS patients will not receive software, they will be surveyed. Each patient and partner in the PartnerCHESS group and patients in the A-CHESS group will receive $20 for each completed survey. Partners in the A-CHESS group will receive $50 for each completed survey. In addition, if patients and partners in the PartnerCHESS group and patients only in the A-CHESS group have a smartphone, they will be paid $50 per month towards their phone service in addition to the payments for completing surveys. If patients and partners in the PartnerCHESS group and patients in the A-CHESS group do not have a smartphone, they will be given one with paid service for 6

months. As appropriate, participants will provide feedback about what is helpful in the system and changes they would make. SSTAR will provide retention data.

App use data will be automatically collected by the technologies by placing “cookies” on smartphones (with participants’ consent) when randomization takes place. Data are stored on a central server, maintained by UW-Madison Division of Information Technology (DoIT), for protection in case of phone loss. Remaining data will come from patient surveys and be entered into REDCap, a secure, web-based application designed to support data management for research. After baseline data collection, surveys will omit stable data. UW staff will periodically call participants to promote system use and response to assessments. The timing of surveys will be based on enrollment date. The payment we selected is consistent with what we have used successfully in earlier studies**.**

Qualitative data and analysis. The baseline, 2, 4, and 6-month surveys will also collect qualitative data to help us further refine our interventions, the study design, and protocol. Seven issues will be addressed, tailored to whether the interviewee is a partner or patient and their study arm. Assuming the questions were asked of a patient assigned to PartnerCHESS: (1) What impact do you think PartnerCHESS has on your risky drinking and why? (2) What impact has it had on your relationship with your partner? (3) How easy was it to use the technology? What would make it easier? (4) How can we make the technology better? (5) Looking back on the study, what should have gone more smoothly (introduction, training, data collection, phone performance, etc.)? Be as specific as possible. (6) Suppose we could make only one change to the study, what should it be? (7) What do you like best/least about the technology? Non-duplicated lists of answers will be created and we will track the number of times each response is noted. Survey data will be double coded with deviations, if found, resolved. Importance will be estimated by the number of times each issue is identified. Using that and our own judgments to set priorities, we will improve the technologies and the study design.

Continuing development. Once the pilot test begins, we will analyze use data every 2 weeks to note trends in use, which services are most accessed, and differences in patterns of use between patients and partners. One of the tools for patients within A-CHESS and PartnerCHESS will be a weekly survey adapted from the Brief Alcohol Monitor (BAM).74 The survey asks about 5 factors that put patients at risk of relapse and 5 factors that protect against relapse; responses help CHESS systems tailor services to patients. During the pilot test, we will add 2 questions to the weekly survey that ask participants what they like and don’t like about their system and its services. We will also add questions to the 2, 4, and 6 month surveys. These questions will change over time as we explore specific issues and services. If a service is not used for a month, we will add a question on the PartnerCHESS survey about why it isn’t used. If certain services are used a great deal, we will ask users to describe what they are getting from the service. In this way, we can continue to learn about and act on what is helpful and not helpful in a more immediate way than just from the surveys.

Keeping patients and partners engaged. Other CHESS studies have done 4 things to

increase engagement. We will use all 4: (1) Monitor and respond to changes in amount of CHESS use. (2) Examine discussion group posts using tools such as the Linguistic Inquiry and Word Count (LIWC)57 to automatically detect worrisome language. (3) Use EMAs and weekly check-in data to identify disconcerting trends. These indicators lead to gentle interventions from our research staff (e.g., a call to ask how the person is doing) and referrals to relevant CHESS services, such as games and customized tips to address concerns, e.g., poor sleep. In this R34, we will enhance our inventory of games, especially ones that can be played by couples. (4) Regularly refresh the interventions with new information and resources so people keep coming back.

Dissolution of the relationship. If a partner and patient separate, we will encourage both to continue using the technology and completing surveys. At the request of patient or partner, we will disengage the portions of PartnerCHESS that connect the two of them. If the partner is willing to continue in the study and act as a support for the patient via technology, we will keep the partner in the study. If the separated partner prefers to not stay involved, we will honor that request. These experiences (if they occur) will help us better understand relationships during recovery and plan PartnerCHESS modifications that account for the level of relationship dissolution or the possibility of repeated break-ups and reconciliations that may occur.

Privacy and Confidentiality:

To mitigate the risk of patient breaches of confidentiality, all subjects will be assigned a code number. A list of subject code numbers will be maintained by the UW project director and stored in a password protected spreadsheet. Participant surveys will be identified by code number only. The UW and SSTAR study coordinators will assist patient subjects in choosing codenames and passwords to use to login to the A-CHESS or Partner-CHESS system. Patients will be instructed not to use their real names as a codename and will be made aware of the potential dangers of divulging confidential information (e.g. real names or telephone numbers).

Prior to gaining access to our data, all students, faculty and staff must provide our Data Security Officer a copy of their certificates of completion of the UW Madison Human Subjects online training and the online HIPAA Privacy Rule training. Furthermore, they are required to complete training on Center security procedures and policies and sign a Center Data Security Policy Certification upon completion of this training.

Hard copy data, such as surveys, will not contain identifying information. They will be stored in a locked file cabinet in the study coordinators private office. Electronic data, such as A-CHESS or PartnerCHESS use data, will be stored on a secure UW-Madison DoIt serverl. Access to this data will be limited by granting individuals access via their UW user log-in. Paper study data, such as surveys and contact information, will be entered into a REDCap system managed by ICTR.

Hard copy data at SSTAR and UW, intake and consent forms, will be stored in a locked file cabinet within the private office of the site coordinator. UMass will not house any data, electronic or paper.

Any data stored on a participant's device are stored in an encrypted file and only accessible by that participant, i.e. participants won't have any other participant data on

their phone. These data are only collected after the participant has signed into their account and are removed when the participant signs out of the A-CHESS/PartnerCHESS application. Any data transferred to and from CHESS servers are done through an encrypted connection.

A list of subject code numbers will be maintained by the UW study coordinator and stored in an electronic spreadsheet. This data will be kept in a secure, limited access, password-protected file on CHESS servers which are located in the department of Systems and Industrial Engineering in the Mechanical Engineering building on the 4th floor.

The study coordinator will be the only person with access to both the coded study data and the subject identifiers.

When all study activities are complete identifiable information will be destroyed. De-identified study data will be stored on the secure CHESS servers for potential future unspecified research for which new IRB submissions will be initiated.

Potential Risks:

Regarding risk of misinterpretation of information: Information and resources on the A-CHESS/PartnerCHESS app will be screened by experts from our recruitment site as well as from our Steering Committee (Dr. Gustafson, Dr. Epstein and Dr. Bailey) for accuracy. Additionally, messages exchanged within A-CHESS/PartnerCHESS will be monitored to make sure the information is accurate and that study participants are using the system for its intended purpose. Inaccurate or harmful statements will be addressed by the CHESS moderator.

Possible breach of confidentiality: All subjects will be assigned a blind code number that will be kept in a locked file in the CHESS office. Data collected from clinic records and smartphone use files will have the name removed and the code number attached by the study coordinator.

Possible break of confidentiality in surveys: Surveys will be conducted by UW staff trained in protecting patient confidentiality. Project staff who have access to the data will not have access to subject names.

Possible breach of confidentiality in smartphone use: There is a risk that information provided on A-CHESS or PartnerCHESS will be used to the detriment of the subjects. Particular sources of risk include A-CHESS or PartnerCHESS messages written within the discussion groups or personal profiles. Patients will select code names and passwords to use on A-CHESS/PartnerCHESS. They will be instructed to not use their real name as a code name and will be warned of the potential dangers of divulging confidential information (e.g. real names or telephone numbers). The smartphone will automatically collect data on how often and for how long a subject uses each of the A-CHESS-PartnerCHESS services.

A-CHESS/PartnerCHESS data will be collected by subjects' codename only and will not be attached to real names or identities. Patients will also be asked to set up a pass code on the phone to protect their information in the event someone else finds the phone.

For the potential psychological stress regarding sensitive issues: Participants do not have to answer any questions that make them uncomfortable. In addition, study participants can change their minds and choose not to participate at any time.

Findings of Depression/Self-harm/Harm to Others: If a patient subject is determined to be in danger of self-harm, suicide or harm to others when on the phone with a participant during a survey or by reviewing a discussion group post on the smartphone, a crisis intervention plan will be implemented. The UW researchers will contact appropriate others to intervene (e.g., the subject's health care team, and/or police). The study team is mandated to report child abuse and will do so if the issue arises during the course of this research.

If they post a message on A-CHESS, we send a message through A-CHESS and will try to call the participant. We will ask them if they feel like they are in danger. And provide them a set of resources in their local community.

The research site will have at least one contact person serve as a contact for reported medical emergencies or for mental health referrals. Mental health referrals will be made when symptoms of major depression, acute anxiety, etc. are indicated in discussion group messages, expert mail, or in the daily or weekly A-CHESS survey. Subjects will be encouraged to call the site contact for further evaluation and referral. If evidence arises that a participant is contemplating suicide, a 4-step protocol will be initiated that includes the following steps: (1) a CHESS staff person will break the code to make identification and emergency intervention possible (e.g., by calling the subject and appropriate authorities); (2) notify the site contact person; (3) initiate crisis intervention to disengage the writer from a suicide method, engage in stabilizing techniques, and connect the subject with appropriate support; (4) document and follow-up as appropriate.

If there is evidence of abuse or of a smartphone user being engaged in criminal activity (e.g., a discussion group being used to sell an illegal drug), we may need to inform an appropriate authority. Hence our consent form will include the following statement: “I understand that subject anonymity and data confidentiality cannot be maintained if A-CHESS or Partner-CHESS finds evidence of abuse, suicidality, or criminal activity.”

Regarding imminent harm to self or others, a specific safety protocol will be in place at the treatment site. If participants experience any crises during the study period, they will be instructed to contact their clinician if currently in treatment or the site researcher if is no clinician is available during working hours. If the risk to self or another is imminent, we will collaborate with staff to ensure that clinical staff evaluate the need for emergency services and triage the participant to receive appropriate services. If participants have crises after hours, they will be instructed to call 911 for imminent risk or go to a local emergency room crisis center. All participants will be provided with a listing of crisis hotline numbers and community resources that participants may access 24/7, such as the National Drug Abuse Hotline (800-662-4357), the National Domestic Violence Hotline (1-800-799-7233), or a Crisis Hotline for any crisis (800-233-4357). For patients in the A-CHESS condition and patients and partners in the Partner-CHESS condition, these numbers will be set up in their safety plan and stored for use with the “panic button” service, which the participant will be trained to use as part of the

intervention.

Lost or Stolen Smartphone: Participants will be informed that if the phone is in the hands of another person there is the potential that someone might see the information they stored on the phone (personal contacts, text messages). Participants are advised to make their phone password protected to reduce the risk of someone being able to see their information if the phone is lost or stolen.

Phone service for the study phone is terminated at the end of the 6 month study period: The study coordinator will explain this prior to informed consent and will inform the participants well in advance of the service ending so they have time to get their own service if they wish.

To help us further protect participant privacy, we will obtain a Certificate of Confidentiality from the National Institutes of Health.

6.0 MEASUREMENT OF EFFECT

Because this R34 is a planning grant to prepare for an RCT, we will conduct surveys that collect the same information we would collect in an RCT. Questions reflect the information needed to test the primary and secondary outcomes as well as mediation and moderation models. We will measure the time it takes to conduct each survey and assess participant comfort with responding. Table 2 lists items we will ask about in the survey.

Table 2: Measures and scales used in PartnerCHESS study

Measure	*Who*	*Source*	*Reference*	*# Questions*	*Time (month)*
Primary outcomes					
Risky drinking days	Patient	TLFB every 60 days (PhenX)	Collins et al.[75]	1	0, 2,4, 6
Days of abstinence	Patient	TLFB every 60 days (PhenX)	Collins et al.[75]	1	0, 2, 4, 6
Secondary outcomes					
Treatment retention	Patient	Clinic records		0	0, 2, 4, 6
Negative affect	Patient & partner	PANAS	Crawford[60]	10	0, 2, 4, 6
Depression	Patient & partner	PHQ-8		8	0, 2, 4, 6
Sleep quality	Patient & partner	Smartphone data	Sleep Cycle[76]	0	0, 2, 4, 6
Exploratory outcomes					
Days of other drug use	Patient & partner	TLFB every 60 days (PhenX)	Collins et al.[75]	2	0, 2, 4, 6
Health service use	Patient & partner	TLFB every 60 days (PhenX)	McCollister, et al.[77]	8	0, 2, 4, 6
Risky drinking days	Patient & partner	TLFB every 60 days (PhenX)	Collins et al.[75]	2	0, 2, 4, 6
Physical/psychological abuse	Patient & partner	Rev. Conflict Tactics Scale	Straus et al.[78]	8	0, 2, 4, 6
Satisfaction with technology	Patient & partner	Technology Acceptance Model[79]	Szajna[80]	10	0, 2, 4, 6
Mediators					
Intrinsic motivation	Partner	Brief Self Control Scale.	Tangey[81]	12	0, 2, 4, 6
Intrinsic motivation	Patient	Commitment to sobriety scale	Kelly[82]	5	0, 2, 4, 6
Competence	Patient & partner	CCQ and # of skills used.	Schroder[83]	9	0, 2, 4, 6
Relatedness	Patient & partner	Bonding	Kim[84]	5	0, 2, 4, 6
Moderators					
Gender/Sex	Patient & partner	Question (PhenX tier 1)	Collins et al.[75]	1	0
PartnerCHESS use	Patient & partner	Smartphone data	McTavish[85]	0	0, 2, 4, 6
A-CHESS use	Patient	Smartphone data	McTavish[85]	0	0, 2, 4, 6
Covariates					
Age	Patient & partner			1	0
Education	Patient & partner			1	0

Race/ethnicity	Patient & partner			2	0
Relationship status	Patient & partner			1	0, 2, 4, 6
Psychiatric treatment history	Patient & partner	Question (PhenX tier 1)	Collins et al.[75]	1	0
Baseline of outcomes	Patient & partner	See rows above	Collins et al.[75]	11	0
Concurrent Tx services received	Patient	TSR	McLellan et al.[86]	6	0, 2, 4, 6
Addiction severity	Patient	DSM-5	APA[87]	11	0, 2, 4, 6
Addiction treatment level (e.g. IOP)	Patient	Administrative records	Collins et al.[75]	11	0, 2, 4, 6

Items were selected based on the conceptual model (Figure 1). When possible, we will use questions from PhenX toolkit on SUD so that results are comparable to those in other studies.[88] The survey will have 134 questions for partners and 130 for patients. Using the survey in this pilot will help us determine which items can be eliminated or altered to reduce participant burden while obtaining the data necessary to analyze our conceptual model. All measures have been validated in the empirical studies referenced above.

7.0 STUDY PARAMETERS

40 dyads will be recruited, 6 of whom will participate in development and initial testing of PartnerCHESS and the survey instruments. The remaining 34 dyads will be randomized on a 1:1 ratio to either A-CHESS + TAU or PartnerCHESS + TAU. Subjects will be stratified by gender and have access to A-CHESS or PartnerCHESS for 6 months.

Patients will have access to ACHESS and Patients/Partners will have access to Partner CHESS for the 6 months of the study. They will be allowed to keep the phone, so that they could continue to use those interventions if they had other ways to access the two systems. Partners in the A-CHESS group will not have access to either app.

8.0 STATISTICAL CONSIDERATIONS

Outcomes. *Primary outcomes* will be measured by the Time Line Follow Back over the last 60 days.[75] Risky drinking will be >4 drinks for men and >3 drinks for women in 2 hours, the same cutoffs used in our A-CHESS RCT. These questions are also contained in the PhenX tool kit.[88] *Secondary outcomes* are treatment retention (number of weeks from first to last treatment session) using SSTAR data; negative affect (measured by PANAS[60]); and sleep quality. *Exploratory outcomes* are days of other drug use and health service use per McCollister and French[77]; partner risky drinking days; abuse; and satisfaction with technology, assessed with Technology Acceptance Model[80] data on ease of use, safety, acceptability, attitude toward, behavioral intention, and perceived usage.

Mediators and moderators. *Mediators* come from prior A-CHESS studies so we have comparable measures of them. Including partner mediators is new. *Moderators* are gender and use of the technologies.

Demographics and other covariates. Addiction severity will be identified by the DSM-5 categories *moderate* or *severe* based on number of symptoms present.[87] We will use an adaptation of the Treatment Services Review to track concurrent treatments that patients and/or partners are receiving.

Data analysis plan. The analysis will: (1) determine if there is a significant difference between study arms over the 6-month pilot test, and (2) explore the conceptual model (Figure 1)—i.e., the relationships between the primary and secondary outcomes and patient and partner mediators, moderators, the 2 study arms, and covariates. We will report descriptive statistics for all demographic and clinical variables in both arms to ensure that randomization produced demographically and clinically comparable groups; if not, variables with significant differences will be included as covariates in a sensitivity analysis. Analysis of the impact of PartnerCHESS+TAU vs. A-CHESS+TAU will focus on outcomes over time computed from data at pretest, 2, 4, and 6 months, with separate models for the primary outcomes and each secondary outcome. Linear mixed effects models—which account for dependence among successive observations on the same patient and incomplete data—will analyze outcomes longitudinally and at each time point. Initial intercepts will be modeled as random variables to provide variance and covariance estimates of intervention effects at each time point and across and between patients. A generalized linear mixed effects model, based on a multiple regression, will be used for the continuous outcome of risky drinking days.[89] We will conduct specific treatment time contrasts both between and within groups to test time-based effects. Sensitivity analyses (with and without covariate adjustment) will determine the robustness of covariate-related error control.

Modeling mediation and moderation. For both patients and partners, we will test the effect of the interventions on potential mediators (competence, intrinsic motivation, and relatedness) on primary and secondary outcomes, using Barron and Kenny's[90] steps: Step 1, the outcomes (e.g., risky drinking days) will be regressed on the interventions (arm 1 vs. arm 2); Step 2, mediators will be regressed on the interventions; Step 3, the intervention variable and mediator variables will be regressed on the outcomes. Mediator effects are statistically significant if: (a) the beta-weight coefficients in Steps 1 and 2 differ significantly from zero, (b) the Step 3 beta-weight coefficient of the mediators is statistically significant, and, (c) the difference between the beta-weight coefficients of the intervention variable in Steps 1 and 3 is statistically greater than zero. We will test whether patient and partner gender moderates the effect of intervention on outcomes. We will derive interaction terms for the predictor variables, incorporating them into the regression model, and determine whether those terms significantly contribute to the outcome predictions that exist independent of other significant contributors. We will examine moderated mediation because the process may be more complex than can be rendered by treating the factors independently (e.g., a mediator may be stronger for women than men or vice versa). We will develop a moderated mediation structure to determine whether the results are best described by meaningful higher-order interaction terms based on mediator-moderator combinations.

Power. We understand that estimating effect size from pilots can lead to bad estimates. A paper by Leon, Davis, and Kraemer[2] points out that a pilot study can evaluate the. It informs feasibility and identifies modifications needed before a larger hypothesis-testing study. But (they argue) a pilot study does not provide meaningful effect size estimates for planning subsequent studies because of the imprecision inherent small samples. Rather, a hypothesis-testing study should be designed to detect the smallest difference that is generally agreed to be clinically meaningful. Several studies (e.g. Walters et al.)[3] suggest that an effect size of d=.35

is considered clinically meaningful. So we will use d=.35 at a power of .85 to determine sample size needed for the large study.

This particular pilot is not powered to detect any effect on outcomes. Once the R34 analyses are complete, we will develop the R01 proposal based on the previous work mentioned above but also considering what we learn about the feasibility of recruitment, randomization, retention, assessment procedures, and new methods mentioned above.

Missing data. In previous RCTs, we completed about 85% of surveys through 12 months and kept missing data on core survey items to about 2%. We expect these rates in this study. In addiction treatment, data are not likely to be missing at random (i.e., the probability that data are missing relates to what the data would have been had they been observed). For example, a patient may not want to disclose some information in surveys. Because this may lead to biased parameter estimates, we will identify missing data patterns and use pattern-mixture modeling to test the sensitivity of our analysis to missing data assumptions[91-94] and conduct other sensitivity analyses after imputing missing data with a range of plausible values based on assumptions for the missing data (e.g., best-case, worst-case; with and without multiple imputation).[95-97]

Intention-to-treat and subject noncompliance. Standard intention-to-treat (ITT) estimates the average treatment effect by comparing outcomes based on assignment of the treatment, but ignoring use of the treatment. Because ITT effect estimates do not represent treatment efficacy under noncompliance (e.g., a patient is randomized to PartnerCHESS but does not use the system), we will estimate noncompliance by also estimating treatment effects only for compliers using As-treated, Per-Protocol[98] and CACE.[99]

9.0 COI MANAGEMENT PLAN REQUIREMENTS

In accordance with Dr. Gustafson's Conflict of Interest Management Plan Louise Mares, Ph.D will be responsible for acting as an independent reviewer of the analysis. Dr. Mares is a professor in the Department of Communication Arts at the University of Wisconsin and has 30 years of experience working as a PI performing data analysis.

10.0 RECORDS TO BE KEPT

The following records will be kept during the course of the study.

- Subject Intake
- Subject Demographics
- Subject Consent Forms
- HIPAA Authorization Form
- Baseline and follow up survey data
- De-identified A-CHESS and PartnerCHESS use data collected during this study

11.0 DATA SECURITY AND PRIVACY MONITORING PLAN

In accordance with the Health Insurance Portability and Accountability Act (HIPAA) the following Data Security and Privacy Monitoring Plan has been established at the Center.

I. Appointment of Center Data Security Officers.

A. Matthew Wright, Adam Maus and Gina Landucci are the security officers for the Center.

B. Responsibilities of the security officers include:

- Developing information technology (IT) security policies
- Increasing security awareness and providing training for all Center faculty and Team Members
- Providing virus protection for IT resources
- Maintaining security patches on computing equipment
- Developing and implementing back up procedures
- Performing periodic vulnerability scanning on computers
- Reviewing and updating firewall strategies and policies
- Enhancing the physical security of IT resources
- Annual review of staff policies and procedures contained in this document.
- Conduct formal HIPAA Risk Assessment Inventory per requirements of the UW HIPAA Office; last review completed summer 2012.

II. Policy for Orientation and Training

A. All Center students, faculty and staff are required to complete the UW-Madison Human Subjects training on-line at https://my.gradsch.wisc.edu/citi/index.php. You register with your NetID. Select the training for the **UW Social & Behavioral Course.** Please print out your certificate of completion when you have finished, and give it to Judy Ganch. You will need to take a refresher course every three years.

B. Successful completion of the CITI training is required before any Team Member is allowed access to Center data.

C. All Center Team Members are also required to complete an on-line training course on the HIPAA Privacy Rule which is offered through Learn@UW at https://learnuw.wisc.edu/. You will only need to complete the **HIPAA Privacy and Research at UW** course. Contact Judy Ganch if you do not have the HIPAA training on your Learn@UW dashboard. Please print out your certificate of completion when you have finished, and give it to Judy. You will need to retake this course annually.

D. Successful completion of the HIPAA training is required before any Team Member is allowed access to Center data.

E. All Center Team Members are required to complete training with Judy Ganch on Center security procedures and policies.

F. Sign (on the last page) the “Center Data Security Policy and Privacy Monitoring Plan” upon completion of this training and return to Judy Ganch.

III. Workstation Policy

A. All workstations will require login with a unique user name and password.

B. All workstations are required to be joined to the ENGR domain under the control of the College of Engineering. Access to specific folders on the Center network will be approved by the Center Management team or the study Project Director.

C. All workstations are required to use anti-virus software that can be remotely administered from the College of Engineering domain.

D. Users will log-out from or lock workstations when leaving them unattended.

E. Screen savers will be configured to require a password and to activate after ten minutes of workstation inactivity.
F. Users requiring remote access to the Center network will only do so with computers specifically certified by a Center Data Security Officer.
G. Study coordinators or support personnel using desktops in private or public areas must have screens adjusted so that visitors cannot read the screen upon entering the space in case PHI or other confidential information is displayed.
H. Access to the network or center work stations along with any on-line systems will be terminated immediately following an employee's last day of work at the Center.

IV. Password Policy

A. Users will require a password to access any computer connecting to the Center network.
B. Passwords must meet the requirements of the Computer Aided Engineering department (CAE). CAE password construction help can be found here: https://kb.wisc.edu/cae/page.php?id=8143.
C. Ideally the best practice is to re-set your password on a semi-annual basis.
D. Passwords may not be stored in proximity to the workstation and may not be shared by others.

V. Policy for the Use of Email

A. Patient Identifiable, Confidential, or Personnel Data may only be included in an encrypted attachment and should never be sent in the body or subject line of an email message.
B. Team Members who need to send encrypted attachments should contact a Center Data Security Officer to schedule a training session.

VI. Policy for Storage, Retrieval, and Disposal of Protected Information

A. Effective 1/1/14 any new studies must use the REDCap environment for study participant information. Contact Matt for start-up and access information.
B. Any Patient Identifiable, Confidential, or Personnel Data in electronic form will be stored on secure servers only and **may not** be stored on individual workstations, laptops, or any other endpoint devices. Currently, the only place such information can be stored is the R: Drive for studies prior to 1/1/14 or REDCap.
C. Study coordinators will have printers in their office for printing any materials that include PHI and/or names of study participants.
D. All paper-based files will be stored in locked rooms inside locked file cabinets with limited access.
E. Any offices that contain PHI must be locked when leaving a room.
F. Servers containing Patient Identifiable, Confidential or Personnel Data must be located within physically secured server rooms which can only be accessed by authorized personnel.
G. The Center Data Security Officers will be responsible for assigning and restricting access to shared resources on Center servers.
H. Patient Identifiable, Confidential, and Personnel Data as a general rule may not be copied to or stored on the Center's publicly accessible servers at any time. However, in some studies, patient's name, disease state, and physician are stored within Center applications only accessible via a secure connection using a codename/password.

I. Remote access to files on secure Center servers will be provided in a very limited case only through a connection from a certified Center Workstation (see Center Workstation policy above for details).
J. Storage media containing Patient Identifiable, Confidential or Personnel Data will be rendered unusable before disposal.
K. All back up media will be stored in locked rooms with limited access.

VII. Policy for the use of endpoints (e.g. workstation smartphone, laptop, thumb drive, external hard drive, etc.) accessing Patient Identifiable, Confidential, and Personnel Data

A. Staff are not allowed to access or store any PHI data on any endpoint unless the endpoint is provided by a Center Data Security Officer ensuring that the endpoint is protected and secured. In addition, any PHI data residing on an endpoint must also be encrypted with the oversight of a Center Data Security Officer.
B. All endpoints accessing PHI must be owned and provisioned by the Center.
C. Patient Identifiable, Confidential, and Personnel Data files may not be transported from the Center unless the device/medium is monitored for physical security at all times and the data is encrypted on the mobile device.
D. Remote access to any PHI data must be conducted using a secure and encrypted end-to-end connection implementing modern security best practices either over HTTPS or using the WiscVPN connection.

VIII. Policy governing the storage and use of audiovisual materials

A. Audiovisual media containing Patient Identifiable, Confidential, and Personnel Data are governed by the same policies and procedures that apply to handling and use of computerized data, including disposal, storage and access to media.
B. Such audiovisual media may not be transported from the Center unless the material is monitored for physical security at all times.

IX. Policy governing the transmission of information via fax

A. All outgoing correspondence via fax must be stripped of confidential information.
B. Before confidential information is transmitted to the Center via fax, the sender must notify the appropriate Center Team Member to ensure that the recipient is available to pick up the fax document.

X. Field hardware policy

A. Device provided for study participants will require log-in information to access the device.
B. Upon their return, all Center study computers, smartphones, or other devices that have been used in the field will have all data wiped from the hard drive in compliance with DOD standards.
C. Field computers will be stored at the Center in a wiped state.

XI. Study participant information.

A. Center Team Members will not share or talk about confidential information regarding the CHESS study participant with anyone who is not directly involved in the management of the CHESS Project.
B. Confidential or other sensitive information regarding the study participant cannot be left in an unsecured place where others may see it.
C. Copies of written correspondence about the study participants with anyone other than CHESS management cannot be provided, unless specifically authorized to do so by the Project Director.
D. Access to study participant's PHI will be approved by the Project Director in coordination with the PI for the project. As noted in Section VI, studies beginning after 1/1/14 must use REDCap to enter participant information electronically.

XII. User Responsibilities

A. All Center Team Members are responsible for adhering to the Center Data Security and Privacy Monitoring Plan Policies at all times. In addition, all Center Team Members are responsible for adhering to the UW-Madison IT policies detailed at https://it.wisc.edu/about/office-of-the-cio/it-policies/ at all times as well.
B. All Center Team Members will be given a comprehensive briefing session upon hire.
C. Usernames and passwords are not to be shared with others.
D. No equipment may be connected to the Center network without specific prior certification by a Center Security Officer.
E. Specifically, no wireless access points may be deployed or connected to the network under any circumstances.
F. The Center Data Security Officers will maintain records to insure that all Center Team Members have been briefed.
G. The Center Data Security Officers will provide periodic refresher sessions to all Center Team Members.

XIII. Sanctions for non-compliance with Center data security and privacy policies

DEFINITION OF OFFENSE:

Class I offenses:

(1) Accessing information that you do not need to know to do your job;
(2) Sharing your computer access codes (user name & password);
(3) Leaving your computer unattended while you are logged into a PHI program;
(4) Sharing PHI with another employee without authorization;
(5) Copying PHI without authorization;
(6) Changing PHI without authorization;
(7) Discussing confidential information in a public area or in an area where the public could overhear the conversation;
(8) Discussing confidential information with an unauthorized person; or
(9) Failure to cooperate with privacy officer.

Class II offenses:

(1) Second offense of any class I offense (does not have to be the same offense);
(2) Unauthorized use or disclosure of PHI;
(3) Using another person's computer access codes (user name & password); or
(4) Failure to comply with a resolution team resolution or recommendation.

Class III offenses:
(1) Third offense of any class I offense (does not have to be the same offense);
(2) Second offense of any class II offense (does not have to be the same offense);
(3) Obtaining PHI under false pretenses; or
(4) Using and/or disclosing PHI for commercial advantage, personal gain or malicious harm.

SANCTIONS:
Class I offenses shall include, but are not limited to:
(a) Verbal reprimand;
(b) Written reprimand in employee's personnel file;
(c) Retraining on HIPAA Awareness;
(d) Retraining on Center's Privacy and Security Policy and how it impacts the said employee and said employee's department; or
(e) Retraining on the proper use of internal forms and HIPAA required forms.

Class II offenses shall include, but are not limited to:
(a) Written reprimand in employee's personnel file;
(b) Retraining on HIPAA Awareness;
(c) Retraining on Center's Privacy and Security Policy and how it impacts the said employee and said employee's department;
(d) Retraining on the proper use of internal forms and HIPAA required forms; or
(e) Suspension of employee (In reference to suspension period: minimum of one (1) day/ maximum of three (3) days).

Class III offenses shall include, but are not limited to:
(a) Termination of employment;
(b) Civil penalties as provided under HIPAA or other applicable Federal/State/Local law; or
(c) Criminal penalties as provided under HIPAA or other applicable Federal/State/Local law.

XIV. In case of a PHI breach, Center Security Officer and/or PI reports incident to UW HIPAA Security Office who is responsible for adhering to breach notification standards.

Definition of Terms

Protected Health Information ("PHI"): Health information or health care payment information, including demographic information collected from an individual, which identifies the individual or can be used to identify the individual.

Confidential Information: Propriety information such as algorithms built into CHESS technology tools, information about a study participant (e.g. name, address, diagnosis) and similar topics.

Personnel Information: Salary rates, disciplinary actions, layoff notices and similar topics about individuals working at the Center or the university.

REFERENCES

1. McKay JR, Van Horn DH, Oslin DW, Lynch KG, Ivey M, Ward K, Drapkin ML, Becher JR, Coviello DM. A randomized trial of extended telephone-based continuing care for alcohol dependence: within-treatment substance use outcomes. Journal of Consulting and Clinical Psychology. 2010;78(6)**:**912-23. PMCID: PMC3082847
2. Maisto SA, Zywiak WH, Connors GJ. Course of functioning 1 year following admission for treatment of alcohol use disorders. Addictive Behaviors. 2006;31(1)**:**69-79.
3. Godley MD, Godley SH, Dennis ML, Funk R, Passetti LL. Preliminary outcomes from the assertive continuing care experiment for adolescents discharged from residential treatment. Journal of Substance Abuse Treatment. 2002;23(1)**:**21-32.
4. Scherr D, Kastner P, Kollmann A, Hallas A, Auer J, Krappinger H, Schuchlenz H, Stark G, Grander W, Jakl G, Schreier G, Fruhwald FM. Effect of home-based telemonitoring using mobile phone technology on the outcome of heart failure patients after an episode of acute decompensation: randomized controlled trial. Journal of Medical Internet Research. 2009;11(3)**:**e34. PMCID: PMC2762855
5. Noh JH, Cho YJ, Nam HW, Kim JH, Kim DJ, Yoo HS, Kwon YW, Woo MH, Cho JW, Hong MH, Yoo JH, Gu MJ, Kim SA, An KE, Jang SM, Kim EK, Yoo HJ. Web-based comprehensive information system for self-management of diabetes mellitus. Diabetes Technology & Therapeutics. 2010;12(5)**:**333-7.
6. Helzer JE, Badger GJ, Rose GL, Mongeon JA, Searles JS. Decline in alcohol consumption during two years of daily reporting. Journal of Studies on Alcohol. 2002;63(5)**:**551-8.
7. Davis JR, Glaros AG. Relapse prevention and smoking cessation. Addictive Behaviors. 1986;11(2)**:**105-14.
8. Larimer ME, Palmer RS. Relapse prevention: An overview of Marlatt's cognitive-behavioral model. Alcohol Research & Health: The Journal of the National Institute on Alcohol Abuse and Alcoholism. 1999;23(2)**:**151-60.
9. Seale JP, Shellenberger S, Velasquez MM, Boltri JM, Okosun I, Guyinn M, Vinson D, Cornelius M, Johnson JA. Impact of vital signs screening & clinician prompting on alcohol and tobacco screening and intervention rates: a pre-post intervention comparison. BMC Family Practice. 2010;11**:**18. PMCID: PMC2844356
10. Sullivan WP, Wolk JL, Hartmann DJ. Case management in alcohol and drug treatment: Improving client outcomes. Families in Society. 1992;73(10):195-204.
11. Dennis M, Scott CK, Funk R. An experimental evaluation of recovery management checkups (RMC) for people with chronic substance use disorders. Evaluation and Program Planning. 2003;26(3)**:**339-52.
12. McLellan AT, Hagan TA, Levine M, Meyers K, Gould F, Bencivengo M, Durell J, Jaffe J. Does clinical case management improve outpatient addiction treatment. Drug and Alcohol Dependence. 1999;55(1)**:**91-103.
13. Lorig KR, Ritter PL, Laurent DD, Fries JF. Long-term randomized controlled trials of tailored-print and small-group arthritis self-management interventions. Medical Care. 2004;42(4)**:**346-54.

14. Rapp RC, Siegal HA, Fisher JH. A strengths-based model of case management/advocacy: adapting a mental health model to practice work with persons who have substance abuse problems. NIDA Research Monograph. 1992;127:79-91.
15. Shaw BR, Jeong Yeob H, Hawkins RP, McTavish FM, Gustafson DH. Communicating about self and others within an online support group for women with breast cancer and subsequent outcomes. Journal of Health Psychology. 2008;13(7):930-9. PMCID: PMC3632281
16. Palermo TM, Wilson AC, Peters M, Lewandowski A, Somhegyi H. Randomized controlled trial of an Internet-delivered family cognitive-behavioral therapy intervention for children and adolescents with chronic pain. Pain. 2009;146(1-2):205-13. PMCID: PMC2760656
17. DuBenske LL, Gustafson DH, Shaw BR, Cleary JF. Web-based cancer communication and decision making systems: connecting patients, caregivers, and clinicians for improved health outcomes. Medical Decision Making : An International Journal of the Society for Medical Decision Making. 2010;30(6):732-44. PMCID: PMC3085247
18. Gustafson D, Wise M, Bhattacharya A, Pulvermacher A, Shanovich K, Phillips B, Lehman E, Chinchilli V, Hawkins R, Kim JS. The effects of combining Web-based eHealth with telephone nurse case management for pediatric asthma control: a randomized controlled trial. Journal of Medical Internet Research. 2012;14(4):e101. PMCID: PMC3409549
19. Substance Abuse and Mental Health Services Administration (SAMHSA). Results from the 2012 National Survey on Drug Use and Health: Summary of National Findings. Rockville, MD: Substance Abuse and Mental Health Services Administration; 2013.
20. Birnbaum HG, White AG, Schiller M, Waldman T, Cleveland JM, Roland CL. Societal costs of prescription opioid abuse, dependence, and misuse in the United States. Pain Medicine (Malden, Mass). 2011;12(4):657-67.
21. Volkow N, Director, National Institute on Drug Abuse (NIDA). America's addiction to opioids: heroin and prescription drug abuse. Senate Caucus on International Narcotics Control. Washington, DC: National Institute on Drug Abuse (NIDA), National Institutes of Health (NIH); 2014.
22. Substance Abuse and Mental Health Services Administration (SAMHSA). Drug Abuse Warning Network, 2007: national estimates of drug-related emergency department visits. Rockville, MD: Substance Abuse and Mental Health Services Administration; 2008.
23. Colvin HM, Mitchell AE, USA Committee on the Prevention and Control of Viral Hepatitis Infections, Institute of Medicine. Hepatitis and liver cancer: a national strategy for prevention and control of hepatitis B and C. National Academies Press; 2010.
24. National Institute on Drug Abuse (NIDA). Drug abuse and HIV. Report No. 12-5760. National Institutes of Health (NIH); 2012, July.
25. Kleber HD. Pharmacologic treatments for opioid dependence: detoxification and maintenance options. Dialogues in Clinical Neuroscience. 2007;9(4):455.

26. Smyth B, Barry J, Keenan E, Ducray K. Lapse and relapse following inpatient treatment of opiate dependence. Irish Medical Journal. 2010;103(6):176-9.
27. Hendershot CS, Witkiewitz K, George WH, Marlatt GA. Relapse prevention for addictive behaviors. Substance Abuse Treatment, Prevention, and Policy. 2011;6:17. PMCID: PMC3163190
28. 2012 National Survey on Drug Use and Health: Detailed Tables - 5.1 to 5.56. SAMHSA, Center for Behavioral Health Statistics and Quality; 2012.
29. Volkow N, Director, National Institute on Drug Abuse (NIDA). Prescription opioid and heroin abuse. House Committee on Energy and Commerce, Subcommittee on Oversight and Investigation. Washington, DC: Department of Health and Human Services (DHHS), National Institutes of Health (NIH); 2014.
30. Center for Substance Abuse Treatment. Medication-assisted treatment for opioid addiction in opioid treatment programs. Rockville, MD: U.S. Department of Health and Human Services (DHHS); 2005.
31. Brady KT, Back SE, Greenfield SF. Women and addiction: a comprehensive handbook: Guilford Press; 2009.
32. Simpson DD, Joe GW, Brown BS. Treatment retention and follow-up outcomes in the Drug Abuse Treatment Outcome Study (DATOS). Psychology of Addictive Behaviors. 1997;11(4):294.
33. Brooks AC, Comer SD, Sullivan MA, Bisaga A, Carpenter KM, Raby WM, Yu E, O'Brien CP, Nunes EV. Long-acting injectable versus oral naltrexone maintenance therapy with psychosocial intervention for heroin dependence: a quasi-experiment. The Journal of Clinical Psychiatry. 2010;71(10):1371-8. PMCID: PMC2974056
34. Fiellin DA, Pantalon MV, Chawarski MC, Moore BA, Sullivan LE, O'Connor PG, Schottenfeld RS. Counseling plus buprenorphine–naloxone maintenance therapy for opioid dependence. New England Journal of Medicine. 2006;355(4):365-74.
35. Witkiewitz K, Marlatt GA. Relapse prevention for alcohol and drug problems: that was Zen, this is Tao. American Psychologist. 2004;59(4):224.
36. McKay JR, Weiss RV. A review of temporal effects and outcome predictors in substance abuse treatment studies with long-term follow-ups preliminary results and methodological issues. Evaluation Review. 2001;25(2):113-61.
37. McLellan A. The outcomes movement in substance abuse treatment: comments, concerns and criticisms. In: Sorenson JL, Rawson RA, Guydish A, Zweben JE, editors. Drug abuse treatment through collaboration: practice and research partnerships that work. American Psychological Association; 2002:119-34.
38. Bradizza CM, Stasiewicz PR, Paas ND. Relapse to alcohol and drug use among individuals diagnosed with co-occurring mental health and substance use disorders: a review. Clinical Psychology Review. 2006;26(2):162-78.
39. Zhang Z, Friedmann PD, Gerstein DR. Does retention matter? Treatment duration and improvement in drug use. Addiction (Abingdon, England). 2003;98(5):673-84.
40. Nicholls L, Bragaw L, Ruetsch C. Opioid dependence treatment and guidelines. Journal of Managed Care Pharmacy : JMCP. 2010;16(1 Suppl B):S14-21.
41. Mauger S, Fraser R, Gill K. Utilizing buprenorphine-naloxone to treat illicit and prescription-opioid dependence. Neuropsychiatric Disease and Treatment. 2014;10:587-98. PMCID: PMC3984058

42. Fiore MC, Jaen CR, Baker TB, Bailey WC, Bennett G, Benowitz NL, Christiansen BA, Connell M, Curry SJ, Dorfman S. A clinical practice guideline for treating tobacco use and dependence: 2008 update. A US Public Health Service report. American Journal of Preventive Medicine. 2008;35(2):158-76. PMCID:PMC4465757
43. Haug NA, Sorensen JL, Gruber VA, Song YS. Relapse prevention for opioid dependence. In: Marlatt GA, Donovan DM, editors. Relapse prevention: maintenance strategies in the treatment of addictive behaviors. 2nd ed. New York, NY: Guilford Press; 2005:151-78.
44. Ledgerwood D, McCaul ME, Petry NM. Psychotherapy and pharmacotherapy in treatment of substance use disorders. In: Kranzler HR, Ciraulo DA, editors. Clinical manual of addiction psychopharmacology. Washington, DC: American Psychiatric Press; 2005:339-63.
45. Nsimba SE. Outpatient treatment programs: A review article on substances of abuse outpatients treatment outcomes in the United States. Addictive Disorders & their Treatment. 2007;6(3):91-9.
46. Giordano TP, Gifford AL, White AC, Jr., Suarez-Almazor ME, Rabeneck L, Hartman C, Backus LI, Mole LA, Morgan RO. Retention in care: a challenge to survival with HIV infection. Clinical Infectious Diseases : An Official Publication of the Infectious Diseases Society of America. 2007;44(11):1493-9.
47. Torian LV, Wiewel EW, Liu KL, Sackoff JE, Frieden TR. Risk factors for delayed initiation of medical care after diagnosis of human immunodeficiency virus. Archives of Internal Medicine. 2008;168(11):1181-7.
48. Fleishman JA, Yehia BR, Moore RD, Korthuis PT, Gebo KA. Establishment, retention, and loss to follow-up in outpatient HIV care. Journal of Acquired Immune Deficiency Syndromes. (1999) 2012;60(3):249-59. PMCID: PMC3383913
49. Schepens T, Morreel S, Florence E, Koole O, Colebunders R. Incidence and risk factors associated with lost to follow-up in a Belgian cohort of HIV-infected patients treated with highly active antiretroviral therapy. International Journal of STD & AIDS. 2010;21(11):765-9.
50. Torian LV, Wiewel EW. Continuity of HIV-related medical care, New York City, 2005-2009: Do patients who initiate care stay in care? AIDS Patient Care and STDs. 2011;25(2):79-88.
51. Westergaard RP, Hess T, Astemborski J, Mehta SH, Kirk GD. Longitudinal changes in engagement in care and viral suppression for HIV-infected injection drug users. AIDS (London, England). 2013;27(16):2559-66. PMCID: PMC3795966
52. Westergaard RP, Ambrose BK, Mehta SH, Kirk GD. Provider and clinic-level correlates of deferring antiretroviral therapy for people who inject drugs: a survey of North American HIV providers. Journal of the International AIDS Society. 2012;15(1):10. PMCID: PMC3306203
53. Yehia BR, Fleishman JA, Metlay JP, Moore RD, Gebo KA. Sustained viral suppression in HIV-infected patients receiving antiretroviral therapy. JAMA : The Journal of the American Medical Association. 2012;308(4):339-42. PMCID: PMC3541503
54. Hanna DB, Buchacz K, Gebo KA, Hessol NA, Horberg MA, Jacobson LP, Kirk GD, Kitahata MM, Korthuis PT, Moore RD, Napravnik S, Patel P, Silverberg MJ,

Sterling TR, Willig JH, Lau B, Althoff KN, Crane HM, Collier AC, Samji H, Thorne JE, Gill MJ, Klein MB, Martin JN, Rodriguez B, Rourke SB, Gange SJ. Trends and disparities in antiretroviral therapy initiation and virologic suppression among newly treatment-eligible HIV-infected individuals in North America, 2001-2009. Clinical Infectious Diseases : An Official Publication of the Infectious Diseases Society of America. 2013;56(8):1174-82. PMCID: PMC3657490
55. Armstrong GL, Wasley A, Simard EP, McQuillan GM, Kuhnert WL, Alter MJ. The prevalence of hepatitis C virus infection in the United States, 1999 through 2002. Annals of Internal Medicine. 2006;144(10):705-14.
56. Weinbaum C, Lyerla R, Margolis H. Prevention and control of infections with hepatitis viruses in correctional setting. MMWR. Recommendations and Reports: Morbidity and Mortality Weekly Report. Recommendations and Reports/Centers for Disease Control. 2003;52(10):205-14.
57. Amon JJ, Garfein RS, Ahdieh-Grant L, Armstrong GL, Ouellet LJ, Latka MH, Vlahov D, Strathdee SA, Hudson SM, Kerndt P. Prevalence of hepatitis C virus infection among injection drug users in the United States, 1994–2004. Clinical Infectious Diseases. 2008;46(12):1852-8.
58. Hagan H, Pouget ER, Des Jarlais DC, Lelutiu-Weinberger C. Meta-regression of hepatitis C virus infection in relation to time since onset of illicit drug injection: the influence of time and place. American Journal of Epidemiology. 2008;168(10):1099-109. PMCID: PMC2727245
59. Wise M, Gustafson DH, Sorkness CA, Molfenter T, Staresinic A, Meis T, Hawkins RP, Shanovich KK, Walker NP. Internet telehealth for pediatric asthma case management: integrating computerized and case manager features for tailoring a Web-based asthma education program. Health Promotion Practice. 2007;8(3):282-91. PMCID: PMC2366971
60. Mayer DK, Ratichek S, Berhe H, Stewart S, McTavish F, Gustafson D, Parsons SK. Development of a health-related website for parents of children receiving hematopoietic stem cell transplant: HSCT-CHESS. Journal of Cancer Survivorship : Research and Practice. 2010;4(1):67-73. PMCID: PMC3049177
61. Gustafson DH, Taylor JO, Thompson S, Chesney P. Assessing the needs of breast cancer patients and their families. Quality Management in Health Care. 1993;2(1):6-17.
62. McCarty D, Gustafson DH, Wisdom JP, Ford J, Choi D, Molfenter T, Capoccia V, Cotter F. The Network for the Improvement of Addiction Treatment (NIATx): enhancing access and retention. Drug and Alcohol Dependence. 2007;88(2-3):138-45. PMCID: PMC1896099
63. DuBenske LL, Wen KY, Gustafson DH, Guarnaccia CA, Cleary JF, Dinauer SK, McTavish FM. Caregivers' differing needs across key experiences of the advanced cancer disease trajectory. Palliative & Supportive Care. 2008;6(3):265-72. PMCID: PMC3590014
64. Gustafson DH, Hawkins R, Pingree S, McTavish F, Arora NK, Mendenhall J, Cella DF, Serlin RC, Apantaku FM, Stewart J, Salner A. Effect of computer support on younger women with breast cancer. Journal of General Internal Medicine. 2001;16(7):435-45. PMCID: PMC1495237

65. Gustafson DH, Hawkins R, McTavish F, Pingree S, Chen WC, Volrathongchai K, Stengle W, Stewart JA, Serlin RC. Internet-based interactive support for cancer patients: are integrated systems better? The Journal of Communication. 2008;58(2):238-57. PMCID: PMC3144782
66. Gustafson DH, Hawkins R, Boberg E, Pingree S, Serlin RE, Graziano F, Chan CL. Impact of a patient-centered, computer-based health information/support system. American Journal of Preventive Medicine. 1999;16(1):1-9.
67. Gustafson DH, DuBenske LL, Namkoong K, Hawkins R, Chih MY, Atwood AK, Johnson R, Bhattacharya A, Carmack CL, Traynor AM, Campbell TC, Buss MK, Govindan R, Schiller JH, Cleary JF. An eHealth system supporting palliative care for patients with non-small cell lung cancer: a randomized trial. Cancer. 2013;119(9):1744-51. PMCID: PMC3684251
68. Gustafson DH, McTavish FM, Chih MY, Atwood AK, Johnson RA, Boyle MG, Levy MS, Driscoll H, Chisholm SM, Dillenburg L, Isham A, Shah D. A smartphone application to support recovery from alcoholism: a randomized clinical trial. JAMA Psychiatry. 2014;71(5):566-72. PMCID: PMC4016167
69. Johnson KA, Richards S, Chih MY, Moon TJ, Curtis H, Gustafson DH. If we build it, will they come? a pilot test of a mobile app for drug court participants. Submitted to Journal of Experimental Criminology; 2014.
70. Linas BS, Latkin C, Westergaard RP, Chang LW, Bollinger RC, Genz A, Kirk GD. Capturing illicit drug use where and when it happens: an ecological momentary assessment of the social, physical and activity environment of using versus craving illicit drugs. Addiction (Abingdon, England) 2014. PMCID: PMC4447335
71. Barocas JA, Brennan MB, Hull SJ, Stokes S, Fangman JJ, Westergaard RP. Barriers and facilitators of hepatitis C screening among people who inject drugs: a multi-city, mixed-methods study. Harm Reduction Journal. 2014;11:1. PMCID: PMC3896714
72. Dennis TA, O'Toole LJ. Mental health on the go: effects of a gamified attention-bias modification mobile application in trait-anxious adults. Clinical Psychological Science. 2014;2(5):576-90. PMCID: PMC4447237
73. Grossman P, Niemann L, Schmidt S, Walach H. Mindfulness-based stress reduction and health benefits: a meta-analysis. Journal of Psychosomatic Research. 2004;57(1):35-43.
74. Nelson KG, Young K, Chapman H. Examining the performance of the brief addiction monitor. Journal of Substance Abuse Treatment. 2014;46(4):472-81.
75. Voogt C, Kuntsche E, Kleinjan M, Poelen E, Engels R. Using ecological momentary assessment to test the effectiveness of a web-based brief alcohol intervention over time among heavy-drinking students: randomized controlled trial. Journal of Medical Internet Research. 2014;16(1):e5. PMCID: PMC3906701
76. Krishna S, Boren SA, Balas EA. Healthcare via cell phones: a systematic review. Telemedicine Journal and e-Health : The Official Journal of the American Telemedicine Association. 2009;15(3):231-40.
77. Baker TB, Gustafson DH, Shaw B, Hawkins R, Pingree S, Roberts L, Strecher V. Relevance of CONSORT reporting criteria for research on eHealth interventions. Patient Education and Counseling. 2010;81 Suppl:S77-86. PMCID: PMC2993846

78. Hays RD, Bjorner JB, Revicki DA, Spritzer KL, Cella D. Development of physical and mental health summary scores from the patient-reported outcomes measurement information system (PROMIS) global items. Quality of Life Research : An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation. 2009;18(7):873-80. PMCID: PMC2724630
79. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)--a metadata-driven methodology and workflow process for providing translational research informatics support. Journal of Biomedical Informatics. 2009;42(2):377-81. PMCID: PMC2700030
80. Gossop M, Darke S, Griffiths P, Hando J, Powis B, Hall W, Strang J. The Severity of Dependence Scale (SDS): psychometric properties of the SDS in English and Australian samples of heroin, cocaine and amphetamine users. Addiction (Abingdon, England). 1995;90(5):607-14.
81. Sobell LC, Maisto SA, Sobell MB, Cooper AM. Reliability of alcohol abusers' self-reports of drinking behavior. Behaviour Research and Therapy. 1979;17(2):157-60.
82. Cacciola JS, Alterman AI, Dephilippis D, Drapkin ML, Valadez C, Jr., Fala NC, Oslin D, McKay JR. Development and initial evaluation of the Brief Addiction Monitor (BAM). Journal of Substance Abuse Treatment. 2013;44(3):256-63. PMCID: PMC3602977
83. Ferreira-Valente MA, Pais-Ribeiro JL, Jensen MP. Validity of four pain intensity rating scales. Pain. 2011;152(10):2399-404.
84. Darke S, Hall W, Heather N, Ward J, Wodak A. The reliability and validity of a scale to measure HIV risk-taking behaviour among intravenous drug users. AIDS (London, England). 1991;5(2):181-6.
85. Sklar SM, Annis HM, Turner NE. Development and validation of the Drug-Taking Confidence Questionnaire: A measure of coping self-efficacy. Addictive Behaviors. 1997;22(5):655-70.
86. Clifford P, Longabaugh R. Manual for the administration of the Important People and Activities Instrument. Providence, RI: Brown University; 1991.
87. Williams GC, Cox EM, Kouides R, Deci EL. Presenting the facts about smoking to adolescents: effects of an autonomy-supportive style. Archives of Pediatrics & Adolescent Medicine. 1999;153(9):959-64.
88. Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: the PANAS scales. Journal of Personality and Social Psychology. 1988;54(6):1063.
89. Measelle JR, Stice E, Springer DW. A prospective test of the negative affect model of substance abuse: moderating effects of social support. Psychology of Addictive Behaviors. 2006;20(3):225.
90. Carter RE, Haynes LF, Back SE, Herrin AE, Brady KT, Leimberger JD, Sonne SC, Hubbard RL, Liepman MR. Improving the transition from residential to outpatient addiction treatment: gender differences in response to supportive telephone calls. The American Journal of Drug and Alcohol Abuse. 2008;34(1):47-59. PMCID: PMC2633717
91. McLellan AT, Alterman AI, Cacciola J, Metzger D, O'Brien CP. A new measure of substance abuse treatment initial studies of the treatment services review. The Journal of Nervous and Mental Disease. 1992;180(2):101-10.

92. McCollister KE, French MT. The relative contribution of outcome domains in the total economic benefit of addiction interventions: a review of first findings. Addiction (Abingdon, England). 2003;98(12):1647-59.
93. Hu FB, Goldberg J, Hedeker D, Flay BR, Pentz MA. Comparison of population-averaged and subject-specific approaches for analyzing repeated binary outcomes. American Journal of Epidemiology. 1998;147(7):694-703.
94. Hedeker D, Gibbons RD, Waternaux C. Sample size estimation for longitudinal designs with attrition: comparing time-related contrasts between two groups. Journal of Educational and Behavioral Statistics. 1999;24(1):70-93.
95. Cohen J. Statistical power analysis for the behavioral sciences. 2nd ed. Hillsdale, NJ: Lawrence Erlbaum Associates; 1988.
96. McKay JR, Lynch KG, Shepard DS, Ratichek S, Morrison R, Koppenhaver J, Pettinati HM. The effectiveness of telephone-based continuing care in the clinical management of alcohol and cocaine use disorders: 12-month outcomes. Journal of Consulting and Clinical Psychology. 2004;72(6):967-79.
97. Hintze J. PASS 11. Kaysville: NCSS; 2011.
98. Satorra A, Saris WE. Power of the likelihood ratio test in covariance structure analysis. Psychometrika. 1985;50(1):83-90.
99. Shaw BR, Hawkins R, McTavish F, Pingree S, Gustafson DH. Effects of insightful disclosure within computer mediated support groups on women with breast cancer. Health Communication. 2006;19(2):133-42.
100. Shim M, Cappella JN, Han JY. How does insightful and emotional disclosure bring potential health benefits? Study based on online support groups for women with breast cancer. Journal of Communication. 2011;61(3):432-54. PMCID: PMC4283796
101. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behavior Research Methods. 2007;39(2):175-91.
102. Diggle P, Kenward MG. Informative drop-out in longitudinal data analysis. Applied Statistics. 1994:49-93.
103. Hedeker D, Gibbons RD. Application of random-effects pattern-mixture models for missing data in longitudinal studies. Psychological Methods. 1997;2(1):64.
104. Hedeker D, Gibbons RD. Longitudinal data analysis. Hoboken, NJ: John Wiley & Sons; 2006.
105. Enders CK. Missing not at random models for latent growth curve analyses. Psychological Methods. 2011;16(1):1-16.
106. White IR, Horton NJ, Carpenter J, Pocock SJ. Strategy for intention to treat analysis in randomised trials with missing outcome data. British Medical Journal (Clinical Research Ed.). 2011;342:d40. PMCID: PMC3230114
107. Hedeker D, Mermelstein RJ, Demirtas H. Analysis of binary outcomes with missing data: missing = smoking, last observation carried forward, and a little multiple imputation. Addiction (Abingdon, England). 2007;102(10):1564-73.
108. Thabane L, Mbuagbaw L, Zhang S, Samaan Z, Marcucci M, Ye C, Thabane M, Giangregorio L, Dennis B, Kosa D, Borg Debono V, Dillenburg R, Fruci V, Bawor M, Lee J, Wells G, Goldsmith CH. A tutorial on sensitivity analyses in clinical trials:

the what, why, when and how. BMC Medical Research Methodology. 2013;13:92. PMCID: PMC3720188
109. Little RJ, Yau LHY. Statistical techniques for analyzing data from prevention trials: treatment of no-shows using Rubin's causal model. Psychological Methods 1998;3(2):147.
110. Jo B. Statistical power in randomized intervention studies with noncompliance. Psychological Methods 2002;7(2):178.
111. Keen J. Case studies. In: Pope C, Mays N, eds. Qualitative Research in Healthcare: John Wiley & Sons; 2008:112-20.
112. Yin RK. Case study research: Design and methods: Sage publications; 2014.
113. Baker GR. The contribution of case study research to knowledge of how to improve quality of care. BMJ Quality & Safety 2011;20 Suppl 1:i30-5. PMCID: PMC3066793
114. Krippendorff K. Content analysis: an introduction to its methodology: Sage; 2012.
115. Berelson B. Content analysis in communication research. New York, NY: Free Press; 1952.