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## Testing a Skills Training Course for Use in a Peer-Delivered Mental Health Intervention

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Testing a Skills Training Course for Use in a Peer-Delivered Mental Health Intervention

A Dissertation Presented

by

SAMANTHA L. BERNECKER

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## ABSTRACT

### TESTING A SKILLS TRAINING COURSE FOR USE IN A PEER-DELIVERED MENTAL HEALTH INTERVENTION

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Millions of people who could benefit from mental health services do not receive treatment. If non-professional peers could learn to administer basic psychotherapeutic interventions to each other, taking turns as care provider and care recipient, this unmet need for mental health care could be partially filled. This study sought to test whether non-professionals could learn supportive psychotherapy skills from a massively scalable, free online course. Thirty pairs of individuals who were experiencing psychological distress or who wished to increase their mental well-being were enrolled in the study, and 19 pairs completed the prototype online course. Objective raters assessed participants' skills usage before and after the course by coding ecologically valid video recorded stressor discussions. Participants increased their use of supportive psychotherapy skills as a result of taking the course, and they decreased potentially harmful behaviors. Forty-three percent of those who completed the course met criteria for competency to deliver the intervention. Participants believed that the discussions they had after taking the course were more helpful than those they completed prior to training. Though the course will require refinement, and the effects of the intervention on mental health will need to be tested before it is released to the general public, this study suggests that training non-

professionals to deliver reciprocal peer support interventions via free online courses holds promise as an accessible strategy for alleviating the burden of psychological distress.

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# CHAPTER I

## INTRODUCTION

### A. Overview

The need for mental health care far outpaces available resources. Many of those who suffer from mental illness lack access to evidence-based treatment. Others choose not to seek help because of their attitudes towards treatment. “Disruptive innovations” in the field of mental health care are sorely needed to overcome both structural and attitudinal barriers (Kazdin & Rabbitt, 2013).

One such innovation could be to train non-professional peers to deliver reciprocal support to each other, such that both individuals receive and provide care. If training in such a peer intervention were offered as a free online course, it would be infinitely scalable and could fill some gaps in the mental health care system. In order to be effective, though, non-professionals would need to be able to learn to deliver treatment ingredients with fidelity. The goal of the present study was to assess whether non-professionals can learn supportive psychotherapy skills from an online course.

### **B. Reciprocal Peer-Delivered Intervention as One Solution for the Treatment Gap**

Rates of mental health problems are alarmingly high: approximately half of all Americans will experience a mental illness in their lifetime (Kessler & Wang, 2008), and mental illness is a leading cause of disability in the U.S. and worldwide (World Health Organization, 2008). Even more individuals suffer from impairing subclinical symptoms or chronic stress, which increases risk of future psychological and physical decline (McEwen, 2000; Seeman, McEwen, Rowe, & Singer, 2001) and reduces quality of life

(e.g., Golden-Kreutz et al., 2005; Rusli, Edimansyah, & Naing, 2008). Yet, the majority of affected individuals do not receive care for mental health problems or psychosocial stress. In the National Comorbidity Survey Replication, 67.1% of those with any mental disorder did not obtain treatment (Kessler et al., 2005), and the 2007 National Survey on Drug Use and Health revealed that 55.4% of people with serious psychological distress lacked treatment (Substance Abuse and Mental Health Services Administration [SAMHSA], 2008).

Some barriers to care-seeking are structural, including the cost of treatment, limited provider availability, and lack of providers with relevant specialty training in geographic proximity (Mojtabai, 2005; Mojtabai et al., 2011). Ethnic minorities and rural Americans face these structural barriers at disproportionate rates (President's New Freedom Commission on Mental Health, 2003). Attitudinal barriers are an even greater impediment than structural ones: as many as half of people with a mental disorder indicate that they do not perceive a need for treatment (Mojtabai et al., 2011; Prins, Verhaak, Bensing, & Van der Meer, 2008), and among those who do recognize a need for treatment, many would rather address their problems on their own, perceive treatment as ineffective, or fear stigma (Mojtabai et al., 2011; SAMHSA, 2008).

A reciprocal, peer-delivered intervention has the potential to circumvent all of these barriers. In the program tested in this study, pairs of peers who wish to improve their psychological well-being, henceforth called "partners," complete an online course that teaches evidence-based therapeutic skills. They then apply those skills in weekly meetings. During every meeting, each partner has the opportunity to address his or her own distress for one half of the session by taking the "talker" role, then acts as the care

provider for the other half of the session by taking the “listener” role. The program distributes the responsibility for mental health care provision throughout the non-professional public, or “crowdsources” it, so I call the program “Crowdsourcing Mental Health” (CMH). Because the skills training course is freely available online, CMH eliminates barriers of cost, transportation, and provider availability. It is not marketed as a treatment for mental illness per se, but instead as a method for enhancing psychological wellness, so it does not require acknowledging a need for help and minimizes the risk of stigma. And because no professional is directly involved, and CMH users provide as well as receive care, CMH users can feel empowered and self-reliant. Thus, CMH and similar peer support programs have the potential to avoid the most common treatment barriers, thereby reaching individuals who would not otherwise access mental health care. CMH can benefit both people experiencing mental illness and those who wish to maintain or improve psychological health. The goal is to eventually launch the CMH skills training course as a massive open online course (MOOC) that is freely available to the general public.

There is preliminary evidence that CMH appeals to health care consumers, including those who would not use traditional mental health services. In a survey of more than 500 Internet users, 64% of respondents indicated that they would try CMH, and about one third provided an email address to request more information about the program (Bernecker, Banschback, Santorelli, & Constantino, 2017). Importantly, over 50% of respondents who stated that they would not seek psychotherapy or medication expressed willingness to try CMH. Interest in CMH was fairly high across different demographics (age, gender, race, and SES).

If CMH and peer interventions like it are to have health benefits, though, they must be effective in teaching users the required skills. It remains unknown whether members of the public, particularly those experiencing some level of psychological distress, can learn via an online course to apply psychotherapy skills with fidelity. Indeed, even professionals have trouble learning new treatment skills. For example, in a trial comparing different methods for training clinicians (mostly master's level) in cognitive-behavioral therapy, only about half of participants achieved the authors' benchmark for success (Sholomskas et al., 2005); another trial of dialectical behavior therapy skills training for psychologists, social workers, and counselors concluded that participants "achieved minimal to moderate competency" (Dimeff et al., 2009; though notably, online and instructor-led training achieved comparable outcomes in both studies). Thus, assessment of the efficacy of the CMH course in training non-professionals is an essential first step in achieving the promise of this novel treatment dissemination method.

### **C. Supportive Psychotherapy/Social Support Skills as an Effective Intervention**

The techniques used in CMH should be minimal in number and complexity, so that they can be learned by nearly anyone, while maximal in their efficacy in reducing psychological distress and increasing well-being. Fortunately, there is some evidence that the most basic elements of psychotherapy have a meaningful impact in reducing suffering. When patients are offered "supportive" or "client-centered" therapies, which have tended to be used as control conditions in randomized controlled trials, patients show substantial improvement, with meta-analyses revealing medium effects versus waitlist or no treatment (around  $d = 0.6$ ; Barth et al., 2013; Cuijpers et al., 2012). In fact,

the difference in effect between “active” treatments and these “control” psychotherapies tends to be very small, around  $d = 0.2$ , and there is some indication that this difference is driven partly by publication bias, researcher allegiance to the “active” treatment, or different dosages of treatment and control conditions (Baskin, Tierney, Minami, & Wampold, 2003; Braun, Gregor, & Tran, 2013; Cuijpers et al., 2012; though note that other meta-analyses find no evidence of bias; Cuijpers, van Straten, Andersson, & van Oppen, 2008). In general, this body of research implies that offering simply the so-called “common factor” elements of psychotherapy (or those elements that underlie and cut across most, if not all, different psychotherapy schools and treatment packages) could cause at least some improvement in symptoms or distress. Even if less powerful than multi-component treatment packages, delivery of supportive psychotherapy on a large scale by laypeople could have a substantial public health impact, especially if it reaches those who would not otherwise engage in psychotherapy. Therefore, CMH users will be trained in techniques that will enable them to utilize the most basic and essential components that appear across psychotherapies, and particularly those that are used in supportive psychotherapies.

What are those components? In the majority of psychotherapies, clients disclose about their current concerns on a weekly basis. In supportive psychotherapies, especially those based on Rogers’ (1959) client-centered therapy, the therapist or counselor takes a warm and non-judgmental interpersonal stance and usually employs other techniques that grew out of Rogers’ work, including minimal encouragers, paraphrase/restatement, and open-ended questions. It may be difficult to conceive of such a simple set of ingredients having a meaningful effect on mental health. Consideration of possible mechanisms,

however, shows why it is plausible—and considering these mechanisms has guided the selection of skills to include in CMH.

Setting aside time for discussing one's concerns each week may give individuals the opportunity to engage in self-regulatory processes (Carver & Scheier, 1998). For example, during a session, they may become more aware of the demands and opportunities afforded by their life problems or difficult emotions, talk through possible coping strategies, and then discuss the impact of chosen strategies as they update the therapist in subsequent weeks, allowing them to adjust their behavior if the strategy fails to produce the intended effects. These steps (awareness raising, strategy selection, and feedback monitoring) are considered the basis for successful flexible coping and emotion regulation (Bonanno & Burton, 2013; Cheng, Lau, & Chan, 2014; Gross & Jazaieri, 2014).

These self-directed processes may be facilitated by therapist (or CMH partner) behaviors. Having an attentive audience could encourage more thorough explanations. Paraphrase and summary could help the speaker organize his or her thoughts (after all, people rely on auditory feedback to determine what they themselves have said; Lind, Hall, Breidegard, Balkenius, & Johansson, 2014). Open-ended questions could lead to discussion of aspects of problems or options that one would not otherwise have considered. Beyond enhancement of self-regulatory processes, therapist/partner behaviors may have positive effects on mental health through the provision of interpersonal acceptance—that is, the delivery of positive regard (Rogers, 1957). Non-judgment could foster self-compassion, which is associated with mental health (MacBeth & Gumley, 2012) and psychological and physical adaptation to stressors (Breines et al., 2014): when

people reveal self-relevant information, and feel that their core selves are understood and accepted, they may internalize this acceptance to become more compassionate toward themselves (i.e., through introjection; Benjamin, 2003). Non-judgment could also decrease maladaptive shame-based avoidance. To capitalize on these potential mechanisms, then, the CMH program teaches partners to deliver the supportive psychotherapy ingredients of attentive listening, paraphrase/summary, open-ended questions, and acceptance/non-judgment.

CMH differs from supportive psychotherapy in a consequential way: the above ingredients are delivered by a peer from one's existing social network rather than by a professional with specific training who maintains certain boundaries. Thus, CMH and other peer-delivered interventions must also be viewed as social support interventions and adapted accordingly. As such, CMH may confer a benefit that is not offered by traditional psychotherapy through the strengthening of perceived availability of social support, which shows clear, likely causal, links to mental health (e.g., Cacioppo, Hawkley, & Thisted, 2010; Furher, Stansfeld, Chemali, & Shipley, 1999; Luo, Hawkley, Waite, & Cacioppo, 2012). However, social support also poses the risk of being ineffective or even causing harm. Under some conditions, actual received support (as opposed to perceived availability of support) is associated with negative effects, including increased stress and psychological symptoms (see Nurullah, 2012, for a review). Negative effects may arise because even well-intentioned support attempts can be unresponsive to the support recipient's needs (Coyne, Wortman, & Lehman, 1988; Feeney & Collins, 2015). For example, people who are experiencing stressful life events report that they find it unhelpful when others try to dampen their expression of emotion,

are critical of their emotional response (Dakof & Taylor, 1990; Ingram, Betz, Mindes, Schmitt, & Smith, 2001), or minimize the crisis (e.g., Dakof & Taylor, 1990; Dunkel Schetter, 1984; Wortman & Lehman, 1985). People with low self-esteem tend to regard their friends as less responsive when their friends reframe stressors in a positive light rather than validating their negative feelings (Marigold, Cavallo, Holmes, & Wood, 2014). And unsolicited advice tends to be unwelcome when suggested by a non-professional (Dunkel Schetter, 1984). In an effort to reduce these negative unhelpful behaviors, the CMH course discourages listeners from attempting to influence the talker's coping process by trying to change the talker's emotions or solve the talker's problems. This prohibition of influencing also eliminates direct or implied verbal expressions of judgment, in that the listener will not try to influence the talker by indicating that the talker's current thoughts, feelings, or behaviors are unacceptable.

Received social support could also have a negative impact when it is asymmetrical—that is, the provider gives more to the recipient than vice versa—making the recipient feel indebted or incompetent (Gleason, Iida, Shrout, & Bolger, 2008; Jaeckel, Seiger, Orth, & Weise, 2012; Nurullah, 2012). Because support provision is reciprocal in CMH, it avoids this possible countertherapeutic effect. Indeed, the reciprocal aspect of CMH (which is absent from professional therapy) is expected to augment its power, because acting as a support provider can protect health and improves mood (e.g., Brown, Nesse, Vinokur, & Smith, 2003; Gleason et al., 2008; Reblin & Uchino, 2009). Additionally, reciprocity in self-disclosure increases intimacy (Laurenceau, Barrett, & Pietromonaco, 1998), so dyad members should become closer to each other as a consequence of taking turns disclosing.

#### **D. Need for the Proposed Study**

To summarize, the CMH course teaches users five skills: attentive listening, restatement (paraphrase and summary), open-ended questions, acceptance/non-judgment, and avoiding attempts to influence the talker. Though these skills sound relatively simple, it is far from a foregone conclusion that non-professionals can learn them from an online course. Indeed, these skills overlap heavily with motivational interviewing (MI), and even professionals struggle to develop competence in MI through in-person, instructor-led training (Madson, Loignon, & Lane, 2009; Miller, Yahne, Moyers, Martinez, & Pirritano, 2004). Therefore, before assessing whether the CMH intervention has positive effects on mental health, it is essential to establish that individuals who complete the CMH course can acquire the requisite skills to deliver the intervention. Users must not only gain declarative knowledge of the information included in the course, but also develop the ability to actually perform the skills in interactions with their partners (Fairburn & Cooper, 2011). The present study aims to test whether they can do so by evaluating users' performance in mock CMH sessions. The primary research questions are as follows.

RQ 1. How much does the course change the use of each skill/speech behavior?

By estimating change in the use of individual skills, I can determine which skills were effectively taught and which skills were ineffectively taught, informing revision of the portions of the course teaching those skills.

RQ 2. What effect does the course have on participants' overall competence to deliver the CMH intervention?

The CMH intervention is expected to have its positive mental health effects over time, after partners have completed the course and begun to meet regularly, so the mental health effects of the intervention could not be thoroughly investigated in this study. However, it was feasible to assess participants' perceptions of the immediate impact of using the CMH skills in the laboratory as a proxy measure of whether the CMH skills could have mental health benefits. Therefore, I also investigated the following research question.

RQ 3. Does taking the course increase the perceived helpfulness of discussing a stressor with one's partner?

## **CHAPTER II**

### **METHOD**

#### **A. Participants**

The sample, which included 60 individuals (30 pairs), was composed primarily of full-time undergraduate students either from one large state university (22, 36.7%) or one elite liberal arts college (17, 28.3%) and working adult community members (14, 23.3%). The remainder of participants were studying full-time at other local colleges (3, 5%), working and attending school part-time (2, 3.3%), unemployed (1, 1.7%), or retired (1, 1.7%). The demographic and baseline clinical characteristics of the sample appear in Table 1.

Six of the pairs (20%) were in a romantic relationship with each other (of which two pairs were married), three pairs (10%) were co-workers, three pairs (10%) were roommates, three pairs (10%) were neighbors, and one pair (3.3%) was a mother and daughter. The remainder of the pairs were friends that did not have one of these additional relationships. The partners had known each other for between 5 months and 50 years, with a median of 2.5 years. One third of the pairs had been acquainted for less than a year, and a quarter of the pairs had known each other for more than a decade.

#### **B. Course Prototype**

All course materials were hosted online using Qualtrics Research Suite survey software. The CMH course comprises 10 lessons, five on taking the “talker” role and five on taking the “listener” role. The lessons on “talking skills” were included based on the prediction that some participants may be therapy-naïve and have difficulty directing their

own session without guidance from the listener. The talker lessons, which give instructions on how to explore a stressor, describe emotions, and develop a coping plan, drew their content from the literatures on coping (e.g., Cheng et al., 2014; Chesney, Chambers, Taylor, Johnson, & Folkman, 2003; Rivkin & Taylor, 1999), emotion regulation (e.g., Kross & Ayduk, 2008; Sheppes et al., 2014), and goal-setting (e.g., Gollwitzer, 1999; Kappes, Singmann, & Oettingen, 2012). Because participants' talking performance was not the focus of the current study, I do not discuss these lessons further.

The five listener lessons cover the following topics: focusing one's attention on the talker, taking an accepting and caring attitude, avoiding unhelpful attempts to influence the talker, restating (paraphrase and summary), and asking open-ended questions while minimizing closed-ended ones. The methods for teaching these skills were selected through extensive review of the research on effective techniques for interpersonal skills training and online education. The majority of counseling skills and interpersonal skills training programs, or at least those that have been subjected to research, use some variation of behavior modeling training (BMT), which is based on Bandura's (1977) social learning theory. In BMT, trainees receive a description of each skill to be learned (instruction), view other people performing those skills (modeling), and then have an opportunity to practice the skills, often through role-play, and receive feedback on their performance (practice and feedback; Decker & Nathan, 1985). Meta-analytic reviews of counseling skills and interpersonal skills trainings reveal that BMT is effective in increasing performance of the desired skills in simulated interactions (Baker, Daniels, & Greeley, 1990; Evans, 2010; Klein, 2009; Taylor, Russ-Eft, & Chan, 2005).

To make CMH massively scalable, the BMT steps of instruction, modeling, practice, and feedback needed to be translated into an online format that learners could complete asynchronously (i.e., at their own pace) without interacting with a professional instructor. The CMH course implements the instruction step of BMT in the form of short videos recorded using screencasting software. These videos consist of audio narration accompanied by slideshows of text and illustrations, and the design of the videos follows guidelines from e-learning research (Clark & Mayer, 2011). For the modeling step, volunteer actors of diverse gender, age, and ethnic/racial identity perform each of the skills in videos of scripted interactions (including counterexamples of skill use when appropriate). To promote engagement for the instruction and modeling material, learners are asked to answer thought questions at the beginning of each lesson, which should reduce mind-wandering and thus increase learning (Szpunar, Khan, & Schacter, 2013; Szpunar, Moulton, & Schacter, 2013). They also complete written exercises in which they reconstruct the answers to basic questions about the content of the lesson using an “active recall” or “retrieval practice” technique, which powerfully improves retention and transfer of information relative to passive review (e.g., Butler, 2010; Karpicke, 2012; Karpicke & Blunt, 2011).

Translating practice to an online, asynchronous format poses challenges because interpersonal skills practice typically requires interaction with peers. To implement skill practice, the CMH course takes the approach of simulating interpersonal interactions with increasing degrees of realism, scaffolding learning by guiding learners from simple low-fidelity practice to more complex high-fidelity practice (Brydges, Carnahan, Rose, Rose, & Dubrowski, 2010). In most lessons, learners begin by “interacting” with video

recorded actors, for example, by consciously practicing redirecting their attention to the actor or by typing written responses to the actor's utterances. Learners then progress to practicing over the phone with a trained "mentor" or in person with their partners. The demands of the mentor role were designed to be minimal so that when CMH is publicly launched, any individual who uses CMH can volunteer to be a mentor for a few new learners. In the listener lessons, the two mentor practice exercises include simply listening to the mentor describe a stressor (30 min) and responding to scripted scenarios read by the mentor with restatements (15 min). For this study, undergraduate research assistants served as the telephone mentors. All research assistants completed the CMH course in order to learn the skills and spent approximately three additional hours demonstrating their mentorship skills to me to ensure that they were following directions.

Feedback on the practice is also challenging to implement without the presence of an instructor. Many other MOOCs have relied either on self or peer assessment to generate feedback for complex skills (Kulkarni et al., 2013). Some peer feedback in MOOCs has garnered negative responses from users (e.g., Suen, 2014), who regarded it as useless, confusing, and untrustworthy. Additionally, evaluation by peers may increase anxiety, which can undermine learning (Kluger & DiNisi, 1996). Therefore, CMH requires learners to evaluate their own performance in exercises. After each exercise, learners answer a series of questions about whether they followed each instruction without giving themselves a global evaluation, which provides information on what behaviors to change while minimizing threat to self-esteem (Kluger & DiNisi, 1996; Shute, 2008). Using concrete guidelines to judge one's own performance should also improve feedback accuracy: self-evaluations are more accurate when more specific and

objective tasks are assessed (Zell & Krizan, 2014). When possible, the feedback exercises also include one or more expert responses (e.g., example paraphrases), because research shows that including a “correct” answer increases feedback’s effectiveness (Kluger & DiNisi, 1996; Shute, 2008).

## **C. Measures**

### **1. Demographics and Mental Health Service Use**

Demographic data were collected during the process of screening participants for eligibility. Participants also reported on past, current, and intended use of professional and self-help mental health interventions, and indicated whether they face each of the attitudinal and structural barriers to treatment seeking that were reported in the National Comorbidity Survey Replication (Mojtabai et al., 2011) and the National Survey on Drug Use and Health (SAMHSA, 2008). These study-specific items appear in Appendix A.

### **2. Psychological Distress**

As part of the screening, and at all subsequent laboratory visits, psychological symptoms were evaluated using the Brief Symptom Inventory (BSI; Derogatis, 1993; see Appendix B), a 53-item measure that is a shortened form of the Symptom Checklist-90-Revised (SCL-90-R). Participants rate symptoms experienced within the past week on nine mental illness dimensions (depression, anxiety, obsessive-compulsivity, hostility, somatization, interpersonal sensitivity, paranoid ideation, psychoticism, and phobic anxiety), from which an index of total distress can be calculated. This index has shown high internal consistency (coefficient  $\alpha > .90$ ; Müller, Postert, Beyer, Furniss, &

Achtergarde, 2009) and test-retest reliability (.90 over a two-week interval; Derogatis, 1993). The BSI displays convergent validity with other measures of psychopathology and predictive validity in correctly classifying individuals as patients. Moreover, its scales are correlated ( $r > .90$ ) with the SCL-90-R (Derogatis, 1993; Müller et al., 2009), which is also well validated (Boulet & Boss, 1991). In the present sample, the BSI showed excellent internal consistency (coefficient  $\alpha$  ranging from .95 to .97).

Additionally, participants completed the 10-item Perceived Stress Scale (PSS-10; Cohen & Williamson, 1988; see Appendix C), a widely-used and well-validated measure of subjective stress (Lee, 2012). Though correlated with psychological symptoms, this construct is distinct from mental illness and predicts future symptoms above and beyond current symptom measures (Cohen & Williamson, 1988). PSS scores have repeatedly been shown to predict increased risk for physical and mental illness (for reviews, see Cohen & Janicki-Deverts, 2012; Lee, 2012). In the present sample, internal consistency was acceptable at all time points (coefficient  $\alpha$  ranging from .82 to .88).

### **3. Coding System for Skill Performance**

Participants' performance as a listener in mock CMH sessions was evaluated using a study-specific coding system (see Appendix D for the manual). This system draws inspiration from the psychometrically established Helping Skills Scale (HSS; Hill & O'Brien, 1999), but required modification to capture the specific nature of the listening skills taught in CMH. As with the HSS, conversational turns are segmented into sentence-like grammatical units (Auld & White, 1956), and each unit is coded as falling within a certain category. The system is not intended to capture all possible categories of

verbal utterances, but instead codifies primarily those types that are taught or proscribed in the CMH course and/or that are expected to be important for the intervention's effectiveness (or lack thereof). The coding system includes six *mutually exclusive* categories: "restatement," and "open-ended question" (which are all central CMH skills); "closed-ended question" (which is explicitly discouraged by the course); "self-disclosure" and "sympathy" (which are common response modes that are not proscribed in the course, but are not explicitly proscribed); and "other" (any other non-course- or non-intervention-relevant responses)<sup>1</sup>. All speech units were required to be assigned one of these categories. The system also includes a *non-mutually exclusive* category called "influencing"; any speech unit in which the listener attempts to help the talker solve the problem or change the talker's emotional response (which is proscribed by the course) is coded as influencing, in addition to its classification in one of the six primary categories. The outcome variables for RQ 1 were the total number of units uttered and the proportion of speech units in each category (the six mutually exclusive categories and influencing). Thus, there were eight outcome variables for RQ 1.

Though these proportions provide a detailed profile of how listener behaviors change due to taking the course, they do not reveal whether learners develop adequate competence to participate in the CMH intervention. Therefore, to address RQ2, I created both a continuous and a dichotomous index of competence. Participants were awarded points for engaging in desirable behaviors and docked points for proscribed behaviors to create a composite index of competence with a theoretical range of -50 to 25. This

<sup>1</sup> Brief vocalizations with no substantive content, such as "really?" and "uh-huh," were coded as "minimal encouragers." Because these vocalizations do not convey meaning, they were not included in any analyses and are not discussed further.

scoring system appears in Appendix E. Additionally, participants were classified as “passing” the course and achieving adequate competence to administer the intervention if they met six criteria: uttering fewer than 35 units total, as an indication of silent listening; uttering no more than 20 units/50% self-disclosure, as an indication of focus on the talker; using at least four restatements and having restatements form at least 25% of the session; using fewer than 12 closed-ended questions; using fewer than 10 units/less than 20% influencing; and giving no more than four units of direct advice. All unit counts were per half-hour. There was no requirement for open-ended questions because the course stated that these were optional if the talker did not need prompting in order to elaborate.

Prior to coding, video recordings of the mock CMH sessions were transcribed and stripped of cues indicative of the time point or condition, allowing coders to remain blind to whether participants had taken the course prior to the session. The coding system was applied by a team of nine undergraduate research assistants and me. The research assistants underwent extensive training in the coding system that included reading the manual, watching instructional videos, and engaging in practice exercises (approximately 10 hours), then meeting for an in-person workshop to discuss the coding system and responses to the practice exercises (4 hours). We then completed several cycles in which we coded transcripts individually, then discussed responses as a group in weekly meetings, focusing on challenging areas and disagreements (approximately 20 hours). The group coded eight transcripts total during this practice period. Only research assistants who consistently showed good interrater reliability with me for these practice

transcripts were employed as coders for the rest of the study material after the training phase.

After training was complete, two research assistants coded each transcript separately, then met to compare their responses and resolve disagreements. Throughout the coding process, weekly meetings continued in which coders discussed and resolved any particularly difficult issues, which had the benefit of reducing coder drift. As additional safeguards against drift, coders were told they would be given reliability checks at unannounced times throughout the coding period, coders were partnered with each other in different combinations each week, and the group re-read and discussed the manual halfway through coding.

Interrater agreement was computed using Cohen's (1960) kappa. For choosing among the six mutually exclusive categories, the average kappa *prior* to resolving disagreements was .82 ( $SD = .11$ ), and the average kappa for deciding whether or not a unit included influencing was .63 ( $SD = .28$ ). To estimate the reliability of the final codes (i.e., the codes after disagreements were resolved), kappa was calculated between the final codes and my own codes for a sample of eight sessions. The mean kappa for these eight sessions was .88 ( $SD = .07$ ) for the six mutually exclusive categories and .79 ( $SD = .34$ ) for influencing. Thus, reliability for the majority of sessions was acceptable. Note that the kappa statistic, which assesses whether raters agree on the categorization of each individual unit, sets a much higher bar for agreement than is necessary for this study. The outcome variables are based on the total number or proportion of units in each category, so it would not matter if coders disagreed on the classification of individual units, as long as they concluded that approximately the same number of units fell in each category.

Given the reasonably high average kappa values, the coding system appears to have been applied with an acceptable level of measurement error.

#### **4. Participants' Perception of Session Helpfulness**

To address RQ 3, participants rated how helpful the mock CMH sessions were to them using the CMH Session Reaction Scale (CSRS, Appendix F), a modified version of the Revised Session Reaction Scale (RSRS; Elliott, 1993), an instrument used for clients to rate psychotherapy sessions. The RSRS is remarkably suited for measuring the impact of a CMH session because its items address the proposed mechanisms of CMH. It covers awareness and insight into oneself, one's feelings, and one's problems; progress toward solving problems; immediate emotional relief; self-acceptance; feeling understood by the helper; feeling socially supported; and feeling closer to the helper. All its subscales showed good internal consistency in the initial measurement study, and they correlated in the expected directions with other indices of session quality from both the therapist's and the client's perspectives (Reeker, Elliott, & Ensing, 1996).

To create the CSRS, four RSRS items that were less relevant to CMH were deleted, the wording of some items was simplified, and the term "therapist" was replaced with "partner." Items were expected to load on two subscales: task reactions (progress towards resolution of the problem through insight, emotional relief, or problem-solving) and relationship reactions (feeling understood by, connected to, and supported by one's partner). The instrument was subjected to confirmatory factor analysis (using data from all visits) using the R package lavaan (Rosseel, 2012). The distributions of responses to negatively-worded (i.e., reverse-scored) items were extremely skewed, such that

endorsement of negative responses to a session was rare, and these items loaded poorly on their scales, so they were dropped from the instrument. One additional item that loaded poorly on the task reactions scale was also removed. The remaining instrument included six items on the task reactions scale and three on the relationship reactions scale, all of which had standardized loadings of at least .5 on their respective scale (with most loadings falling in the range of .7 to .8). This model was an adequate fit to the data ( $\chi^2[26] = 36.95, p = .075, RMSEA = .057, GFI = .996, SRMR = .042, CFI = .998$ ). Internal consistency of each scale was good at all laboratory visits (coefficient  $\alpha$  between .86 and .92 for the task scale, and between .84 and .95 for the relationship scale). The scales were scored by computing the mean of the items, resulting in a theoretical range of 1 to 9 for both.

#### **D. Procedure**

Recruitment followed a multi-step process in which a first participant was recruited and screened, and then that individual recruited a partner. The study was advertised via fliers, classifieds on Facebook and Craigslist, letters to physician's offices and human service organizations, and announcements on listservs and in campus groups. The advertisements presented the program as an opportunity to learn skills to reduce stress and to get closer to another person. Advertisements directed interested individuals to a web page with informational videos on the purpose and structure of the program and a link to an online screening with questions to determine eligibility. To be eligible, respondents were required to agree to (a) take the course during a four-week period over the next few months; (b) have Internet access; (c) be fluent in written and spoken

English; (d) have a *T* score on the BSI of no more than 70 relative to non-patient (general population) norms; (e) respond in the negative to the BSI item on suicidal thoughts; and (f) not currently be in psychotherapy.<sup>2</sup> In the future, CMH will be tested for a variety of mental illnesses with a range of severity, but it was deemed most ethical to limit initial testing of the training to participants with milder problems because no formal, well established treatment was offered.

In the second step of the recruitment process, a researcher contacted those who met inclusion criteria and provided a link to the portion of the course that instructs users in how to select and invite a partner to participate. These instructions discourage users from selecting first-degree relatives, romantic partners/spouses, or individuals with whom they have conflictual relationships (“ambivalent ties”; Fingerman, Hay, & Birditt, 2004), though no potential partner is expressly forbidden. Selecting such individuals as partners may decrease the potency of the intervention: ambivalent ties may actually cause stress and show a documented negative association with health (e.g., Uchino et al., 2012), and immediate relatives and significant others may be too invested in each other’s lives to be able to maintain the non-judgmental stance required in CMH. After learning about the criteria for selecting a good partner, prospective participants completed an exercise in which they brainstormed potential partners and ranked those they would most like to invite. They sent a form email to the top-ranked prospective partner that explained the study, included the link to the recruitment web page, and directed the partner to complete

<sup>2</sup>The original plan was to maintain additional criteria for the first partner in each pair, recruiting only individuals who displayed some elevated distress (BSI or PSS at least one standard deviation above the gender-normed population mean) and who had never been in psychotherapy, in order to ensure that at least one member of each dyad was part of the target population expected to most benefit from CMH—that is, distressed individuals who are less likely to seek professional care. However, during the recruitment process, it became evident that that these additional requirements were too restrictive to accrue subjects at a reasonable rate, so they were dropped.

the screening if interested. If the top-ranked partner was uninterested or ineligible, the first member of the dyad contacted the second person on his or her list, and so on, until an interested and eligible partner was identified.

To assess whether their behavior changed as a result of taking the course, participants' talking and listening behaviors were assessed both prior to and after completing the course, allowing for within-subjects comparisons of skill use. A solely within-subjects design would admit the confound of repeated testing: participants could plausibly increase their skill use over time because they were more comfortable or familiar with each other in the second mock CMH session, rather than as a consequence of training. Therefore, half of the dyads were allocated to a delayed training condition for which they completed two assessments prior to taking the course, enabling a comparison of the magnitude of change between the immediate condition's training period and the delayed condition's waiting period. Dyads were allocated via a balanced, restricted randomization scheme to ensure equal group sizes throughout the study period and to reduce the risk of a chance covariate imbalance (Schulz & Grimes, 2002): out of every six dyads, three were randomly assigned to the immediate training condition and three to the delayed control using an online random number generator. The association of condition assignment with each of the demographic and clinical variables listed in Table 1 was tested using a multilevel model that accounted for the nesting of participants within dyads. Condition differences in categorical variables were tested using chi-square tests of independence. No significant associations were found; however, the associations of condition assignment with baseline BSI raw score (but not *T* score), PSS score, level of education, and previous experience in therapy approached significance. Participants in

the delayed training condition had higher BSI raw scores ( $M = 0.92$ ,  $SD = 0.57$ ; but not  $T$  scores) and higher PSS scores ( $M = 20.1$ ,  $SD = 6.2$ , versus  $M = 17.$ ,  $SD = 5.0$ ,  $p = .093$ ,  $d = 0.51$ ) than participants in the immediate training condition ( $M = 0.67$ ,  $SD = 0.42$ ,  $p = .093$ ,  $d = 0.51$ ), and they were also more likely to have used psychotherapy (43.3% of the delayed condition vs. 20.0% of the immediate condition) in the past,  $\chi^2(1) = 2.77$ ,  $p = .096$ . A marginal association between education and condition assignment ( $\chi^2[4] = 7.97$ ,  $p = .092$ ) was driven by the presence of more individuals with a college degree in the immediate condition (26.6%) versus the delayed condition (3.3%).

After recruitment, each dyad visited the laboratory to complete the first mock CMH session. The experimenter led participants through a careful procedure for selecting a stressor to discuss. Each stressor needed to be novel; that is, participants could not repeat a stressor across sessions. The stressors also needed to be of comparable severity in all laboratory sessions, because the gravity and complexity of the stressor is likely to affect the way it is addressed. If participants were permitted to choose the most serious and salient stressor in all sessions, the stressor in the first session would likely be more severe than in subsequent sessions. Therefore, to increase the probability that the stressors were of comparable magnitude between all sessions, for the first session, participants were instructed to rank their top three current stressors, rate each one's severity on a Likert scale, and then to talk about the second-most stressful one. In subsequent sessions, participants brainstormed and rated three new stressors, then were given their stressor selection worksheet from the first visit and asked to talk about the stressor that was closest to the original stressor in severity.

After stressor selection, the mock session began. In the first session, participants were told to disclose and to listen as they would naturally when discussing a stressor (see Appendix G for full instructions). Each person was given 30 min in the talker role while the partner listened before they switched roles for another 30 min. Talking order was determined by coin flip, and the entire session was video recorded.

After the session, dyads assigned to the immediate training condition were given access information for the course. They were told that they would have 4 weeks to complete the course at locations and on devices of their choosing, though extensions beyond 4 weeks were provided as needed. Dyads in the delayed training condition were instructed not to discuss their stressors with each other more than they ordinarily would during their 4-week waiting period (in order to reduce the risk that they might begin to “practice” with each other if they found the first mock CMH session helpful).

Following the 4-week period, participants returned to the laboratory for a second mock CMH session. Those in the immediate training condition were told to talk and listen using the skills they learned in the course; the instructions specified that they should use the skills “as they would when meeting outside of the lab rather than trying to impress anyone” in order to maximize ecological validity/reduce experimenter demand. Those in the delayed condition were given the same instructions as in the first mock session, then were given course access instructions and completed the course (ideally in a 4-week period) before returning to the laboratory for their final mock CMH session. Thus, the immediate training condition completed two stressor discussions, one pre- and one post-training, and the delayed condition completed three stressor discussions, two pre- and one post-training.

To curtail attrition between data collection points, and to make sure that participants were on track to complete the course, a research assistant contacted all participants weekly via telephone to check on their progress and to give them an opportunity to ask questions and voice concerns. Participants were compensated for their time after each laboratory visit: \$50 for the pre-course visits and \$70 for the post-course visit to promote retention. The payment scheme was explained using language intended to encourage participants to construe payment as compensation for their laboratory visits, not for taking the course.

A flow diagram depicting participants' progress through the study appears in Figure 1. Participants were recruited from October 2015 through May 2016. Ninety-five individuals completed the online screening questionnaire. Twelve did not respond to attempts to contact, 38 were ineligible, six could not find a suitable partner, and nine declined to participate after learning more about the study. Of the 30 initial participants who were enrolled in the study, 29 participated with their first-choice partner and one participated with her second-choice partner. (All other individuals whose first-choice partner was ineligible or uninterested decided not to participate.) Thirty participants (or 15 dyads) were randomly assigned to each condition. Attrition from the study took place pairwise; that is, if one participant wished to exit the study, their partner left as well. (Though the partner was always offered the opportunity to select a new partner, no participant elected to do so.) Nine of the 30 pairs (30%) withdrew, four from the immediate training condition and five from the delayed training condition ( $\chi^2[1] = 0.08, p = .778$ ), all during the process of taking the course. All but one participant completed a follow-up survey.

Because of the “yoked” nature of participation, withdrawal from the study was not perfectly correlated with intention to remain in the study. All participants, regardless of whether they left the study prematurely, were asked to retrospectively rate on a 10-point Likert scale how much they had wanted to withdraw versus remain and complete the course. The difference between withdrawers and completers was only marginally significant ( $p = .086$ ), with withdrawers expressing greater desire to leave the study ( $M = 5.8, SD = 2.1$ ) than completers ( $M = 4.5, SD = 2.1$ ),  $d = 0.60$ . The most-endorsed reasons for attrition were difficulty finding time or motivation to work on the course, stress from the additional workload conferred by the course, and interference from unanticipated life events.

Individuals who withdrew from the study had a marginally significantly greater household income per square root of the number of household members (an index of household wealth that accounts for economies of scale for larger households;  $M = \$69,550, SD = \$51,608$ ) than individuals who completed the study ( $M = \$46,009, SD = \$36,776, p = .063, d = .53$ ). Those who left the study were more likely to have used psychotherapy in the past than individuals who completed the study (66.7% versus 16.7%,  $\chi^2[1] = 12.34, p < .001$ ) and were more likely to be on psychiatric medication (33.3% versus 7.1%,  $\chi^2[1] = 6.78, p = .015$ ). However, there were no differences in baseline symptoms or distress, nor in any of the other demographic characteristics.

### **E. Data Analysis**

Testing the effect of the training, for all outcome variables, requires (1) establishing whether any change in behavior can be attributed to the training (as opposed

to repeated testing, maturation, etc.), and (2) estimating the magnitude of the change. The first question can be addressed by estimating whether the amount of change from the first to the second visit differs between the two conditions. In other words, was change from visit 1 to visit 2 greater in the immediate training condition than in the delayed condition (which received no training between those two visits)? For the second question, the magnitude of change due to the course can be most accurately estimated by aggregating both the immediate and delayed conditions to take advantage of the full sample's data. Consequently, for those analyses, I combined data from the two conditions' pre-training visits (visit 1 for the immediate condition and visit 2 for the delayed condition) and from the two conditions' post-training visits (visit 2 for the immediate condition and visit 3 for the delayed condition).

The nested structure of the data—time points within persons within dyads—demands a data analytic method that accounts for non-independent error, such as multilevel modeling. However, the limited number of data points would make estimation of such models difficult or impossible using maximum likelihood or related methods. Specifically, the presence of only two persons per group (i.e., dyad) and only two time points for the immediate training condition precludes modeling both a random intercept and slope, and makes it difficult to estimate random effects at both the person and dyad level (McMahon, Pouget, & Tortu, 2006). Bayesian data analysis overcomes these problems and confers additional benefits. In a Bayesian analysis, one computes the relative probability of all possible values for each parameter in the model, or a posterior distribution, in light of the observed data (and a distribution representing one's prior beliefs about the parameters). Unlike models in traditional “frequentist” statistical

analyses, Bayesian models are never truly unidentified; the complexity of the model is limited by the amount of data only in that a small number of data points may have minimal influence on the posterior relative to one's prior beliefs. Bayesian modeling is also extremely flexible; for example, one can customize the model for any distribution of outcome variable, including those relevant to this study: proportion (binomial), count (Poisson), binary (Bernoulli), and continuous (Gaussian). Bayesian analysis can produce binary judgments that are analogous to significance tests, but it also provides a richer description of the likely values of a parameter and can quantify evidence in favor of the null hypothesis. Therefore, for all analyses, I used the R package *brms* (Bürkner, in press), which implements Bayesian multilevel models in the programming language Stan (Stan Development Team, 2016).

To investigate whether the magnitude of change between the first two visits was greater in the immediate condition than in the delayed condition, I ran a three-level model with the following form, predicting the value of the outcome variable at visit  $i$  for person  $j$  in dyad  $k$ .

Level 1 (within-person):

$$\text{Outcome}_{ijk} = \beta_{0jk} + \beta_{1jk}(\text{Visit})_{ijk} \quad (1)$$

Level 2 (between-person, within-dyad):

$$\beta_{0jk} = \gamma_{00k} + u_{0jk} \quad (2)$$

$$\beta_{1jk} = \gamma_{10k} + u_{1jk} \quad (3)$$

Level 3 (between-dyad):

$$\gamma_{00k} = \delta_{000} + \delta_{001}(\text{Condition})_k + v_{0k} \quad (4)$$

$$\gamma_{10k} = \delta_{100} + \delta_{101}(\text{Condition})_k + v_{1k} \quad (5)$$

The combined equation, thus, is

$$\begin{aligned} \text{Outcome}_{ijk} = & \delta_{000} + \delta_{001}(\text{Condition})_k + \delta_{100}(\text{Visit})_{ijk} + \delta_{101}(\text{Condition})_k(\text{Visit})_{ijk} + \\ & \nu_{0k} + u_{0jk} + \nu_{1k}(\text{Visit})_{ijk} + u_{1jk}(\text{Visit})_{ijk} \end{aligned} \quad (6)$$

Condition was coded with delayed as 0 and immediate as 1, and visit was coded with the first visit as -1 and the second visit as 0. Thus, the intercept represents the value of the outcome variable for the delayed condition at the second visit; the effect of condition represents the difference between the immediate and delayed conditions at the second visit; the effect of visit represents the change from visit 1 to visit 2 in the delayed group; and the interaction between visit and condition represents the magnitude by which change from visit 1 to visit 2 differed between the two conditions. If there is an effect of the course, but no effect of waiting, one would expect a near-zero coefficient for the effect of visit and positive coefficients for condition and visit-condition interaction if the course increases a variable (or negative coefficients if the course decreases the variable).

I used a simpler version of the above model to estimate the magnitude of change from pre-training to post-training aggregating across both conditions.

Level 1 (within-person):

$$\text{Outcome}_{ijk} = \beta_{0jk} + \beta_{1jk}(\text{Training})_{ijk} \quad (7)$$

Level 2 (between-person, within-dyad):

$$\beta_{0jk} = \gamma_{00k} + u_{0jk} \quad (8)$$

$$\beta_{1jk} = \gamma_{10k} + u_{1jk} \quad (9)$$

Level 3 (between-dyad):

$$\gamma_{00k} = \delta_{000} + \nu_{0k} \quad (10)$$

$$\gamma_{10k} = \delta_{100} + \nu_{1k} \quad (11)$$

Combined:

$$\text{Outcome}_{ijk} = \delta_{000} + v_{0k} + u_{0jk} + \delta_{100}(\text{Training})_{ijk} + v_{1k}(\text{Training})_{ijk} + u_{1jk}(\text{Training})_{ijk} \quad (12)$$

Training was coded as -1 for pre-training and 0 for post-training, so that the intercept can be interpreted as the post-training value of the outcome variable and the effect of training as the amount of change from pre- to post-training.

For each type of outcome variable, the models differed only in the distribution of the outcome variable, the link function, and the scale of the prior distributions. The proportion of units falling in each category was modeled with a binomial distribution and a logistic link function. The probability of passing was modeled with a Bernoulli distribution and a logistic link function. For both, the priors on the fixed-effect parameters were Gaussian distributions with mean 0 and standard deviation 10. The total number of units and the number of competence criteria met were modeled with a Poisson distribution and a log link function, with Gaussian priors on the fixed effects with mean 0 and standard deviation 6 for total units and mean 0 and standard deviation 2 for competence criteria. And the competence score and CSRS scores were modeled with a Gaussian distribution and an identity link function, with Gaussian priors for the fixed effects with mean 0 and standard deviation 50 for competence and standard deviation 9 for the CSRS scales. For all models, I used the default priors from the brms package for the standard deviations of the random effects (half Student-*t* priors with 3 degrees of freedom and standard deviation of 10) and the correlations of the random effects (LKJ-Correlation prior with  $\zeta = 1$ ; Lewandowski, Kurowicka, & Joe, 2009). These priors are minimally-informed; that is, the priors on the fixed effects were chosen to ascribe fairly

equal probability to all values that are within the realm of possibility given the scale of the data. Consequently, the shape of the posterior distribution is influenced primarily by the data. Using minimally-informed priors represents a conservative choice; more informed priors would draw the posterior towards the expected values (e.g., towards zero for the effect of visit in the waitlist group). Stan code for each type of model, as produced by brms, appears in Appendix H.

The Stan language samples the posterior distribution using Hamiltonian Monte Carlo, which converges faster than alternative algorithms (Neal, 2011). For each model, I ran four chains, each with 1,000 steps of warm-up and thinning of 2 (i.e., every other step in the chain was discarded), saving a total of 4,000 sampled values per model. The thinning was increased to 4 and the number of saved steps was increased to 5,000 for the models of continuous outcomes due to autocorrelation in some of the parameters. There was evidence that all models achieved adequate convergence and resembled the target distributions (all  $\hat{R}$  values  $< 1.1$ ; Gelman & Rubin, 1992).

## CHAPTER III

### RESULTS

#### A. Effects of the Course on Skills/Speech Behaviors

If the course was effective in teaching the CMH listening skills, one would expect a decrease in the total number of units uttered by the listener, increases in the proportions of restatements and open-ended questions, and decreases in the proportions of closed-ended questions and attempts to influence the talker. One might also expect the course to decrease the proportion of time the listener engages in speech behaviors that are not prescribed in the course (though not explicitly proscribed), such as self-disclosure, offering sympathy, or other behaviors like off-topic discussion.

The results of the models comparing the two conditions' change from visit 1 to 2 appear in Table 2, and the results of the models aggregating across participants to estimate change appear in Table 3. These tables summarize the posterior distribution for each parameter by listing the mean of the distribution, the standard deviation of the distribution, and the 95% credibility interval. One can interpret the mean as a point estimate of the parameter's value, the standard deviation of the distribution as an index of the uncertainty in the parameter value (analogous to a standard error), and the 95% credibility interval as the range in which one can be 95% certain the population value of the parameter lies (assuming that the model is correct and the priors are reasonable). When the 95% credibility interval excludes zero, one can conclude that it is reasonably likely that an effect exists in the population.

As hypothesized, listeners decreased their overall volume of speech as a result of the course. Prior to taking the course, participants spoke on average 163 units per 30 min

( $SD = 82$ ), and after taking the course, they spoke on average 35 units per 30 min ( $SD = 36$ ). Most credible values for the magnitude of this change fall between -2.21 and -1.54 in log units. This change can be attributed to the course: as shown in Table 2, participants in the two conditions differed at the second visit (i.e., there was an effect of condition), and the change from the first to the second visit was greater in the immediate than the delayed condition (i.e., there was a visit-by-condition interaction).

Participants also increased their frequency of use of restatements. In pre-course sessions, on average only 2.7% ( $SD = 3.9\%$ ) of units were classified as restatement, but after taking the course this mean rose to 25.0% ( $SD = 22.1\%$ ). In the population, the odds of restating after taking the course is most likely to be between 7.9 and 34.8 times higher than before taking the course. Again, there is evidence that this change was caused by the course, because the conditions differed at the second visit, and there was non-zero change in the immediate condition, but not in the delayed condition between the first two visits.

Participants were less likely to attempt to influence the talker after taking the course. At pre-training, on average 34.4% ( $SD = 17.9\%$ ) of statements were classified as influencing, but after taking the course the average was 8.5% ( $SD = 13.8\%$ ). The odds of a unit being influencing was estimated to be between 6.1 and 26.8 times higher at pre-training than at post-training. This change can be attributed to the course, with differences between the two conditions at the second visit, and change between the first two visits in the immediate condition, but not the delayed condition.

Evidence that the course caused an increase in use of open-ended questions was weaker. In the model comparing the two conditions' performance between visits 1 and 2, the two conditions differed in the probability of using open-ended questions at visit 2, but

one cannot confidently conclude that the increase in the use of open-ended questions was greater in the immediate training group than the delayed group. Participants asked open-ended questions for 3.2% of units on average ( $SD = 3.0\%$ ) at pre-training and 9.2% ( $SD = 7.7\%$ ) of units at post-training. In the model aggregating across participants, the odds of asking open-ended questions at post-training was estimated to fall between 2.5 and 5.4 times higher than at pre-training. Thus, the use of open-ended questions increased, but at a relatively small magnitude, and one cannot claim with certainty that change was due to the course.

There was no evidence that participants decreased the proportion of units classified as closed-ended questions ( $M = 13.4\%$ ,  $SD = 8.7\%$  at pre-training;  $M = 15.9\%$ ,  $SD = 11.9\%$  at post-training), with zero falling within the relevant 95% credibility intervals in both models.

With regard to speech behaviors neither prescribed nor proscribed by CMH, it appears that taking the course decreased self-disclosure ( $M = 18.2\%$ ,  $SD = 14.2\%$  at pre-training;  $M = 4.3\%$ ,  $SD = 8.8\%$  at post-training) and speech behaviors in the “other” category ( $M = 48.3\%$ ,  $SD = 15.2\%$  at pre-training;  $M = 33.7\%$ ,  $SD = 18.9\%$  at post-training). In contrast, one cannot conclude that it had an impact on expressions of sympathy ( $M = 14.2\%$ ,  $SD = 10.8\%$  at pre-training;  $M = 11.9\%$ ,  $SD = 12.1\%$  at post-training). The odds of a unit being self-disclosure was estimated to be between 6.3 and 103.5 times higher at pre-training than at post-training, and the odds of a unit being “other” was estimated to be between 1.4 and 2.8 times higher at pre-training than at post-training.

## **B. Effects of the Course on Competence to Deliver CMH**

None of the participants were deemed competent to deliver CMH prior to taking the course, whereas 18 participants (30.0% of the full sample, 42.8% of completers) passed after completing the course. In the model comparing the two conditions, there was evidence that the odds of passing at visit 2 was greater in the immediate than the delayed condition, but there was too much uncertainty in the parameter estimate (i.e., the 95% credibility interval was too wide) to demonstrate that the change in odds was greater in the immediate than the delayed group. In the model aggregating participants in both conditions, 95% of credible values for the *population* odds ratio of passing at post-training relative to pre-training fell between 3,294 and 257 trillion—unsurprisingly large values, given that the odds of passing in the *sample* was infinitely higher at post-training when some people passed than at pre-training when no one passed.

Before taking the course, participants met 1.7 of the 6 passing criteria on average ( $SD = 0.9$ ), and after the course, the average number of criteria increased to 4.9 out of 6 ( $SD = 1.2$ ), a change that can confidently be ascribed to the training based on the model comparing the two conditions. The most common reasons for not passing were uttering more than 35 units per 30 min (35.7% of completers) and not having restatements form at least 25% of the session (35.7% of completers). Several participants (19.0%) also failed to reduce their influencing to an acceptable level. Almost all participants met the criteria of using fewer than 20 units and less than 50% self-disclosure (97.6%), and of giving no more than four units of direct advice (95.2%). Most participants also used fewer than 12 closed-ended questions (88.1%).

The continuous competence score averaged -20.0 at pre-training ( $SD = 7.0$ ) and 2.5 at post-training ( $SD = 10.2$ ). Ninety-five percent of credible population values for this score increase fall between 19.3 and 26.4. There was clear evidence that this improvement was due to the course, with near-zero change during the waiting period, substantial credible differences between the two conditions at visit 2, and greater between-visit change in the immediate condition.

### **C. Effects of the Course on Perceived Session Helpfulness**

Perceived session helpfulness on the CSRS task reactions scale, which measures progress in developing insight and solving problems, increased from a mean of 5.3 ( $SD = 1.5$ ) before the course to a mean of 7.0 ( $SD = 1.6$ ) after the course. The increase from pre- to post-training in the population is most likely to fall between 1.2 and 2.1 points (the bounds of the 95% credibility interval). This improvement appears to be due to the course, with greater change between the first two visits in the immediate than the delayed condition. In contrast, there was no apparent change in the CSRS relationship reactions subscale, which measures feelings of understanding and support between partners, with a mean of 6.7 ( $SD = 1.5$ ) at pre-training and a mean of 7.1 ( $SD = 1.9$ ) at post-training.

### **D. Accounting for Attrition as a Potential Confound**

Thirty percent of participants withdrew from the study prior to completing this time-intensive course. In treatment studies, high attrition raises a concern that any treatment effects are driven by self-selection: patients who would have improved spontaneously may have chosen to remain in the study, whereas others dropped out,

and/or patients who worsened due to the intervention may have withdrawn, leaving only those who had positive outcomes. In the present study, it seems unlikely that participants would have spontaneously worsened or improved in their listening skills; however, it is possible that the course would have been less effective for participants who withdrew.

Consequently, I conducted a post-hoc analysis to investigate whether attrition may have biased the results. As noted, several participants who remained in the study were ambivalent about doing so, while several participants who withdrew wished to complete the study, resulting in only a marginal difference between completers and withdrawers in self-reported desire to finish the study. By controlling for desire to withdraw from the study, one can potentially model the missing data mechanism so that the assumption of missingness at random is met (Leon, Demirtas, & Hedeker, 2007). Therefore, I re-ran the models investigating change from pre- to post-training (shown in equations 7 through 12) while controlling for desire to leave the study and the interaction between desire and time point. The results of these models appear in Table 4.

First, none of the effects of motivation to withdraw excluded zero from their 95% credibility intervals. In other words, one cannot conclude that individuals with higher motivation to withdraw had different values of the outcome variables at the post-training visit, or that they showed more or less change from pre- to post-training. On the other hand, the 95% credibility intervals were generally not narrow enough to conclude that all credible effects of withdrawal motivation were negligible. Though many of the posterior distributions were centered near zero, reflecting that the *most* credible effect size was small to nil, that was not the case for all variables. Examining the most credible value for each parameter (i.e., the mean of the posterior distribution), there was some suggestion

that lower motivation to remain in the study might be associated with a smaller decrease in influencing, a smaller increase in open-ended questions, a smaller decrease in expressions of sympathy, and smaller increases in perceived helpfulness (CSRS task and relationship reactions). However, if these most credible values are accurate, even going from one end of the motivation scale to the other would not wash out the training effect for the variables (when a training effect was present in the first place).

The impact of controlling for these withdrawal motivation covariates on the other variables in the model was generally negligible. Conclusions about whether there is an effect of training on any of the outcome variables remain unchanged, except for the outcome variables of the proportion of expressions of sympathy and the dichotomous designation of passing. When controlling for desire to withdraw from the study, the 95% credibility interval for the effect of training on expressions of sympathy did include zero, such that the training appears to be associated with a decrease in the probability of using this speech behavior. And for the binomial model for passing, including these covariates “washed out” all other effects. Overall, the results of these analyses indicate that it is possible that the effect of the course on some behaviors *could* be weaker in individuals with lower motivation, but not necessarily so, and not enough to substantively change the conclusions of the study. Attrition from this study is unlikely to be a major source of bias in the results.

## CHAPTER IV

### DISCUSSION

#### **A. Evidence for the Efficacy of the CMH Course**

The purpose of this study was to test the efficacy of an online course in teaching supportive psychotherapy skills non-professionals, including non-professionals with elevated psychological symptoms. Through video instruction, video modeling of skills, interactive written and spoken practice exercises, and self-delivered feedback, learners were introduced to skills that would enable them to take the listener role in the Crowdsourcing Mental Health (CMH) intervention. These skills comprised listening attentively, taking a non-judgmental attitude, restating, avoiding possibly harmful attempts to influence the talker, and asking open-ended rather than closed-ended questions.

There was ample evidence that taking the course caused participants to change their listener speech behaviors in the desired directions. After taking the course, participants spoke less during a mock CMH session, and they spent less time talking about themselves, suggesting that they learned to focus their attention on the talker. They increased their use of restatements and decreased their attempts to influence the talker. They also slightly increased their use of open-ended questions, although there was insufficient evidence to demonstrate that this increase was caused by taking the course.

Participants also increased their competence to deliver the CMH intervention, as assessed by a continuous index of competence and a checklist of criteria for passing the course. After taking the course, participants met an average of five out of six of the

criteria for passing. Forty-three percent of those who completed the course met all six criteria, thereby demonstrating adequate competence to deliver the intervention.

Finally, participants reported that they made more progress in problem-solving and developing insight during their stressor discussions after taking the course than before taking the course. This suggests that applying the skills taught in CMH could have a positive impact on mental health.

Overall, these findings provide cause for optimism that non-professionals can learn to deliver psychotherapeutic interventions via massively scalable online courses. Even if such peer-delivered interventions are not as powerful as those delivered by professionals, and even if only a subset of laypeople can learn the skills, disseminating therapeutic ingredients through non-professionals can improve public health by providing treatment under conditions where none was previously possible, and at virtually no cost. This study's demonstration of proof of concept opens up a world of possibilities: one can imagine numerous permutations of peer-delivered interventions for the many settings where need is great and access or willingness to use traditional psychotherapy is low. This study's implication for the CMH program specifically is that it is worthwhile to proceed with developing CMH further and preparing to release it to the general public. One essential step towards that end is to revise the course based on the results of this study in order to maximize its teaching efficacy.

### **B. Problems With the Course and Potential Solutions**

Despite the clear impact of the course on learner behaviors, competence, and perceptions of being helped, this study also suggests that refinements are needed. The

moderately high study attrition (30%) suggests that the course could be improved by modifications to increase motivation or decrease learner burden. When this course is freely available online, users will not encounter the barrier of time pressure that was present in this study, which may improve completion rates, but users will also lack the extrinsic motivation of payment and the encouragement of research assistants who call them each week to check in. Some attrition from MOOCs is inevitable (Clow, 2013), but public health impact will be greatest if retention can be maximized by making the course as easy and as enjoyable as possible. Participants completed a brief feedback form at the end of each lesson, reporting what elements of the lesson they found most and least helpful, and this feedback will be invaluable for refining the course. Anecdotally, participants seemed to find the lessons on talking more onerous than the lessons on listening; the talking lessons took longer and were less interactive. All but one participant who withdrew from the study did so while taking the talker lessons (although this could also be because the talker lessons were administered first). As one strategy for improving retention, I expect that it will be possible to considerably reduce the length and complexity of the talker lessons without affecting their usefulness.

It should be noted, though, that the 30% attrition rate is not as dire a problem as it might initially appear. Its threat to the validity of the study was minimal: post hoc analyses suggested that attrition may have slightly altered parameter estimates, but did not affect overall conclusions. Moreover, individuals who withdrew from the study had significantly higher past use of professional mental health services (psychotherapy and/or medication). These individuals may have had less need and thus less motivation for CMH because professional services were available to them; consequently, their choice to forego

using CMH is less worrisome. Those who were in the target population for CMH, though, tended to complete the study. Thus, that reciprocal peer counseling may be feasible and attractive for those who are not accessing professional services.

The course was also limited in its efficacy in promoting competence to deliver the CMH intervention. Only 43% of those who finished the course met *all* criteria for passing. Most participants missed only one criterion, either failing to restate with enough frequency or failing to reduce the total number of speech units below the specified threshold. The threshold for total units may have been slightly too stringent; the majority of participants showed huge reductions in the amount of time they spent talking as a listener. The failure to meet the criterion of delivering enough restatements is more worrisome. The course encouraged learners to make the *majority* of their responses to the talker restatements, so requiring that at least a quarter of units be restatements is a relatively lenient bar. Although the course clearly increased learners' use of restatements, it did not do so to the degree desired.

Further, though there was an increase in the proportion of open-ended questions, its magnitude was small enough that there was not clear evidence that the increase was greater during the immediate training condition's training period than during the delayed condition's waiting period. The course suggested that if the talker is elaborating thoroughly, not many open-ended questions may be needed, so this small increase in open-ended questions may be adequate. However, there was no evidence for a decrease in the proportion of units classified as closed-ended questions. Some closed-ended questions may always be needed for clarification, but a higher ratio of open-ended to closed-ended questions would be preferable.

The relative rates of restatements and open and closed-ended questions might be improved by altering the self-feedback process. When giving themselves feedback on practice exercises, participants were asked to reflect on whether or not they had used each skill, but not on *how much* they had used each skill. In fact, there was only one exercise, at the culmination of the course, in which learners were free to use all of the skills at times of their choosing in a session with their partners; this was, then, the only exercise in which self-assessment of the proportion of units in each category would have been meaningful. Perhaps if learners were asked to attend to the relative amounts of time they had used restatement, open-ended questions, and closed-ended questions, and then were given a chance to correct any problems in a second practice exercise of the same nature, these ratios would improve. When learning MI, professionals often benefit from receiving feedback on their sessions from a trainer who codes and reports quantities, such as the ratio of open to closed-ended questions (Schwalbe, Oh, & Zweben, 2014). In a course for non-professionals such as CMH, in which it is important to minimize time and effort, it may not be feasible to have participants learn a coding system and painstakingly follow that system to code recorded sessions. Fortunately, recent technical developments suggest that it may be possible to automate the coding of recorded sessions using machine learning (Gibson et al., 2016). In the near future, learners in CMH may be able to make audio recordings of their practice exercises, process the audio file, and receive objective feedback comparable to that of an expert human, making it trivial to deliver information on the relative frequency of use of each skill.

A final concern raised by the results is the absence of clear change in the CSRS relationship reactions scale. Participants reported that they developed more insight and

made more progress in coping during the sessions after they took the course than they did before learning the CMH skills. However, they did not show significant improvement from pre- to post-training in the degree to which they felt supported by, understood by, and close to their partners. This lack of change maybe partially attributable to a ceiling effect, as values of the relationship reactions scale were high both before and after the training, but there was still some variability in scores and room for increase. It may be that perceptions of the social support relationship between two people are simply more stable and will require repeated CMH sessions before change becomes apparent. Some of the participants had long histories with each other, and for all participants, the volume of interaction with their partners outside of the laboratory was certainly greater than a single 45-min session. The brief interaction in the laboratory may not have had much impact on perceptions of the relationship compared to the accumulated effects of previous interactions. An alternative explanation for the lack of improvement in relationship reactions is that some of the behavior change engendered by the course actually limited participants' feelings of closeness. With the decrease in self-disclosure, offering of opinions, and total quantity of speech on the part of the listener, the talker might have felt less aware of the listener's thoughts and consequently experienced less intimacy than in an unstructured interaction (Reis & Shaver, 1988). Nevertheless, scores on this scale did not decrease (and, in fact, the mean increased slightly, though not enough to be confident that such an effect would appear in the population), indicating that the intervention was not harmful. Future iterations of the course can draw on the close relationships and communication literatures to identify additional ways to foster closeness and support. For example, listeners were discouraged from offering opinions because advice-giving can be

detrimental, but there are documented ways to mitigate the risk of advice-giving (Feng, 2009; MacGeorge, Feng, Butler, & Budarz, 2004). These techniques could be incorporated into the instructions so that talkers glean the intimacy benefits of hearing listener opinions with less possibility of harm.

### **C. Methodological Limitations and Future Directions**

In addition the limitations shown in the course itself, this study has some methodological limitations that put bounds on the conclusions that can be drawn. Perhaps the greatest limitation is the use of a highly-educated sample. All participants had attended at least some college, whereas only 59% of adults in the U.S. have attended any college (Ryan & Bauman, 2016). The majority of participants were current college students who may be particularly well-equipped to learn from the course, having high intellectual functioning, familiarity with online course technology, and study skills. The course may be less effective, then, in other samples. CMH could still have a public health impact if deployed only with college students, partially serving to address the rising psychological distress and shortage of mental health services on college campuses (Thielking, 2017). However, it would be ideal to make CMH accessible to as many individuals as possible. Fortunately, this study's sample was ethnoculturally diverse, and one in five participants was born outside the U.S. CMH may be well suited for use across cultures: peers can select partners who share their cultural values, are familiar with their idioms, and have shared experiences, and the skills taught are adaptable to a variety of worldviews and encourage users to discover the ways of coping that work best for them. Participants in this study learned the skills from the course and found them helpful,

suggesting that CMH may be effective for individuals from a variety of cultures, but there were not enough participants from any one cultural group to thoroughly investigate the course's differential efficacy. Future studies will need to clarify whether the course is effective in samples that are more representative of the population, especially in individuals with less education, and the course may need to be tailored to strengthen its performance among those with different backgrounds.

An additional limitation of this study is that few conclusions about the mental health impact of the CMH skills can be drawn. As a proxy for the impact of the intervention, participants rated the perceived helpfulness of their mock CMH sessions, but there is no guarantee that what participants felt was helpful in the short run would have positive effects on psychological symptoms or well-being in the long run. Further, because participants were not blind, the increases in perceived session helpfulness could be driven by a placebo effect or experimenter demand. Studies of the CMH intervention's effect on mental health will need to compare the intervention to a plausible attention placebo or to another active intervention, and those studies will need to assess effects on various indices of mental health over the course of several months.

Additionally, because the CMH course taught participants to change their behaviors in multiple ways, one cannot pinpoint the ingredients that contributed to perceived session helpfulness; some elements may be more important than others. Indeed, the fact that the task reactions scale improved, while the relationship reactions scale did not, implies the possibility that the increase in helpfulness was due to the "talker" lessons rather than the "listener" lessons. (On the other hand, in the follow-up survey, participants more frequently reported using the listening skills than the talking

skills in their everyday lives, suggesting that they did find the listening skills useful.)

Once the CMH course's mental health effects are established, additive and dismantling studies will be needed to determine whether some components can be jettisoned without affecting its potency, or whether new ingredients would enhance CMH. Beyond informing refinements of the intervention, such studies can reveal the mechanisms that are responsible for change—in other words, they can be used to show how psychotherapy “works” (Nock, 2007). Unfortunately, in traditional psychotherapies, such studies are resource-intensive and are rarely fruitful (Bell, Marcus, & Goodlad, 2013); one could conduct infinite studies changing individual ingredients of an intervention and never discover its mechanisms because the effect size of any one ingredient is likely to be small. In contrast, in massive online interventions, ingredients can be manipulated at minimal cost: users can be randomly assigned to different versions of the site, with components of the course augmented, deleted, or modified through A/B testing. And with a large enough user base, sample sizes will be adequate to detect small effects.

Consequently, after CMH is launched, such investigations can be conducted, with the dual aims of continuously revising CMH to be as potent as possible and identifying the mechanisms by which psychosocial interventions cause change.

In this study, the CMH course was fairly effective, but imperfectly so, and its mental health effects have yet to be demonstrated. However, even an imperfect reciprocal peer-delivered intervention has great potential to fill gaps in mental health care. And as CMH is further researched and deployed to the general public, the course's teaching effectiveness and the intervention's mental health effects can be iteratively improved,

both providing insights about therapeutic change processes and strengthening public mental health.

Table 1. Baseline Demographic and Clinical Characteristics

Characteristic	<i>n</i> <sup>a</sup> (%)	<i>M</i> ( <i>SD</i> )	Median
Age	60	24.6 years (12.4)	20.5 years
Gender			
Female	42 (70.0%)		
Male	15 (25.0%)		
Transman	2 (3.3%)		
Genderqueer woman	1 (1.7%)		
Race/ethnicity			
White, non-Hispanic	35 (58.3%)		
East Asian	10 (16.7%)		
White, Hispanic/Latino	5 (8.3%)		
South Asian	4 (6.7%)		
Black	2 (3.3%)		
Native American, Hispanic/Latino	1 (1.7%)		
Multiracial	3 (5.0%)		
Born outside the U.S.	13 (21.7%)		
Non-native English speaker	8 (13.3%)		
Education			
Some college	41 (68.3%)		
Associate's/technical degree	1 (1.7%)		
College degree	9 (15.0%)		
Some graduate/professional school	3 (5.0%)		
Graduate/professional degree	6 (10.0%)		
SAT score, verbal + quantitative sum	42	1293 (147)	1315
Marital status			
Never married	51 (85.0%)		
Married	7 (11.7%)		
Separated/divorced	2 (3.3%)		
Household income	55	\$96K (\$86K)	\$80K
Income per person <sup>1/2</sup>	55	\$54K (\$43K)	\$42K
Visit 1 BSI <i>T</i> score	60	60.8 (9.3)	61.5
Visit 1 PSS	60	18.7 (5.8)	18
Ever in psychotherapy	19 (31.7%)		
Lifetime months in psychotherapy	19	25.8 (31.7)	10
Would consider psychotherapy	52 (86.7%)		
Ever on psychiatric medication	11 (18.3%)		
Lifetime months on medication	11	41.0 (52.4)	18
Currently on medication	9 (15.0%)		
Would consider medication	44 (73.3%)		

*Note.* BSI = Brief Symptom Inventory; PSS = Perceived Stress Scale-10

<sup>a</sup>For continuous variables, *n* represents the number of individuals who provided data.

Table 2. Bayesian Multilevel Models Testing Differences Between Immediate and Delayed Conditions at First Two Laboratory Visits

Parameter	Total units			Restatement			Influencing		
	<i>M est</i>	<i>SD est</i>	95% CI	<i>M est</i>	<i>SD est</i>	95% CI	<i>M est</i>	<i>SD est</i>	95% CI
Fixed									
Intercept	5.11	0.17	4.76, 5.42	-4.52	0.38	-5.29, -3.80	-0.52	0.19	-0.89, -0.15
Visit	0.07	0.17	-0.26, 0.40	-0.62	0.48	-1.60, 0.33	-0.02	0.20	-0.41, 0.38
Condition	-2.15	0.26	-2.67, -1.63	3.06	0.57	1.96, 4.20	-2.46	0.34	-3.16, -1.83
Visit X condition	-1.97	0.25	-2.47, -1.46	3.35	0.70	1.93, 4.78	-2.00	0.36	-2.71, -1.29
Random									
Person intercept SD	0.51	0.09	0.37, 0.72	0.84	0.25	0.42, 1.42	0.75	0.13	0.52, 1.03
Person visit SD	0.49	0.09	0.34, 0.69	1.32	0.30	0.80, 1.97	0.88	0.14	0.64, 1.19
Person intercept-visit correlation	0.43	0.18	0.05, 0.74	0.54	0.21	0.05, 0.86	0.37	0.18	-0.01, 0.67
Dyad intercept SD	0.51	0.15	0.18, 0.81	1.09	0.32	0.39, 1.72	0.37	0.20	0.02, 0.77
Dyad visit SD	0.49	0.15	0.15, 0.78	1.24	0.45	0.24, 2.07	0.35	0.22	0.02, 0.81
Dyad intercept-visit correlation	0.82	0.21	0.25, 0.99	0.69	0.30	-0.25, 0.98	0.01	0.54	-0.94, 0.92

Parameter	Open-ended questions			Closed-ended questions			Self-disclosure		
	<i>M est</i>	<i>SD est</i>	95% CI	<i>M est</i>	<i>SD est</i>	95% CI	<i>M est</i>	<i>SD est</i>	95% CI
Fixed									
Intercept	-3.79	0.26	-4.32, -3.32	-2.26	0.15	-2.57, -1.97	-1.85	0.36	-2.53, -1.14
Visit	0.47	0.28	-0.10, 1.03	0.27	0.17	-0.07, 0.60	-0.07	0.30	-0.66, 0.52
Condition	0.81	0.41	0.02, 1.61	0.25	0.25	-0.23, 0.73	-2.64	0.66	-4.05, -1.47
Visit X condition	0.34	0.43	-0.52, 1.17	-0.46	0.27	-1.01, 0.07	-2.41	0.58	-3.68, -1.37
Random									
Person intercept SD	0.96	0.19	0.62, 1.38	0.66	0.10	0.49, 0.88	1.36	0.29	0.86, 1.99
Person visit SD	0.97	0.22	0.57, 1.44	0.74	0.11	0.55, 0.98	0.96	0.23	0.57, 1.45
Person intercept-visit correlation	0.71	0.15	0.32, 0.92	0.44	0.15	0.10, 0.69	0.61	0.19	0.17, 0.87
Dyad intercept SD	0.44	0.24	0.03, 0.93	0.19	0.13	0.01, 0.49	0.83	0.42	0.07, 1.68
Dyad visit SD	0.35	0.23	0.02, 0.86	0.13	0.10	0.01, 0.38	0.70	0.35	0.07, 1.42
Dyad intercept-visit correlation	0.12	0.56	-0.92, 0.95	0.20	0.58	-0.93, 0.98	0.60	0.43	-0.67, 0.99

Table 2 Continued

Parameter	Sympathy			Other			Pass/fail		
	<i>M est</i>	<i>SD est</i>	95% CI	<i>M est</i>	<i>SD est</i>	95% CI	<i>M est</i>	<i>SD est</i>	95% CI
Fixed									
Intercept	-2.35	0.28	-2.9, -1.78	0.08	0.20	-0.34, 0.45	-19.03	7.36	-36.46, -7.53
Visit	-0.12	0.19	-0.50, 0.26	-0.09	0.18	-0.45, 0.27	13.03	7.66	-1.32, 28.33
Condition	0.42	0.43	-0.41, 1.26	-0.80	0.31	-1.42, -0.19	15.79	6.25	4.69, 29.12
Visit X condition	0.08	0.31	-0.53, 0.67	-0.44	0.29	-1.02, 0.12	10.23	7.83	-5.26, 25.63
Random									
Person intercept SD	0.63	0.14	0.40, 0.98	0.52	0.10	0.36, 0.74	2.30	2.08	0.07, 7.67
Person visit SD	0.55	0.13	0.32, 0.83	0.36	0.11	0.18, 0.62	4.25	3.38	0.17, 12.66
Person intercept-visit correlation	0.17	0.28	-0.43, 0.65	0.26	0.28	-0.34, 0.70	0.08	0.58	-0.94, 0.96
Dyad intercept SD	0.94	0.23	0.55, 1.43	0.62	0.16	0.32, 0.94	8.63	5.23	2.15, 21.71
Dyad visit SD	0.46	0.20	0.06, 0.86	0.58	0.15	0.31, 0.89	5.80	5.01	0.18, 18.56
Dyad intercept-visit correlation	0.64	0.32	-0.33, 0.99	0.79	0.18	0.41, 0.99	0.28	0.56	-0.89, 0.98
Parameter	Competence criteria			Competence score			CSRS task reactions		
	<i>M est</i>	<i>SD est</i>	95% CI	<i>M est</i>	<i>SD est</i>	95% CI	<i>M est</i>	<i>SD est</i>	95% CI
Fixed									
Intercept	0.36	0.16	0.03, 0.66	-22.54	1.71	-25.88, -19.12	5.33	0.30	4.73, 5.92
Visit	-0.30	0.21	-0.71, 0.11	-1.20	1.79	-4.75, 2.40	-0.02	0.32	-0.65, 0.61
Condition	1.26	0.19	0.89, 1.64	27.16	2.53	22.06, 32.07	1.63	0.45	0.75, 2.54
Visit X condition	1.32	0.27	0.8, 1.83	23.60	2.64	18.48, 28.78	1.59	0.47	0.66, 2.53
Random									
Person intercept SD	0.07	0.06	0.00, 0.21	2.52	1.58	0.12, 5.87	1.14	0.24	0.69, 1.65
Person visit SD	0.11	0.09	0.00, 0.31	3.28	2.13	0.18, 7.81	0.53	0.42	0.02, 1.50
Person intercept-visit correlation	0.13	0.58	-0.92, 0.97	0.09	0.53	-0.93, 0.92	0.21	0.47	-0.85, 0.92
Dyad intercept SD	0.08	0.06	0.00, 0.24	4.50	1.44	1.44, 7.37	0.35	0.25	0.01, 0.90
Dyad visit SD	0.11	0.09	0.00, 0.32	2.73	1.75	0.14, 6.50	0.46	0.30	0.01, 1.10
Dyad intercept-visit correlation	0.14	0.59	-0.91, 0.97	0.37	0.48	-0.80, 0.97	0.23	0.56	-0.90, 0.98
Residual SD	-	-	-	5.27	1.07	2.42, 6.98	0.94	0.22	0.35, 1.28

Table 2 Continued

Parameter	CSRS relationship reactions		
	<i>M</i> est	<i>SD</i> est	95% CI
Fixed			
Intercept	6.49	0.38	5.76, 7.23
Visit	-0.12	0.30	-0.71, 0.48
Condition	0.66	0.56	-0.45, 1.76
Visit X condition	0.32	0.47	-0.62, 1.25
Random			
Person intercept SD	1.27	0.25	0.81, 1.78
Person visit SD	0.59	0.39	0.03, 1.34
Person intercept-visit correlation	0.34	0.41	-0.78, 0.91
Dyad intercept SD	0.95	0.37	0.14, 1.66
Dyad visit SD	0.74	0.32	0.08, 1.34
Dyad intercept-visit correlation	0.50	0.40	-0.65, 0.97
Residual SD	0.63	0.27	0.03, 1.02

*Note.* 95% CI = 95% credibility interval; CSRS = CMH Session Reaction Scale; *M* est = mean of posterior distribution; *SD* = standard deviation of posterior distribution

Table 3. Bayesian Multilevel Models Estimating Pre- to Post-Training Change

Parameter	Total units			Restatement			Influencing		
	<i>M</i> est	<i>SD</i> est	95% CI	<i>M</i> est	<i>SD</i> est	95% CI	<i>M</i> est	<i>SD</i> est	95% CI
Fixed									
Intercept	3.1	0.17	2.77, 3.43	-1.53	0.27	-2.07, -1.00	-3.21	0.38	-4.08, -2.54
Training	-1.88	0.17	-2.21, -1.54	2.8	0.37	2.07, 3.55	-2.46	0.37	-3.29, -1.81
Random									
Person intercept SD	0.82	0.14	0.58, 1.11	1.02	0.22	0.65, 1.51	1.60	0.36	1.00, 2.41
Person training SD	0.78	0.15	0.52, 1.09	1.75	0.33	1.16, 2.44	1.46	0.34	0.89, 2.22
Person intercept-training correlation	0.83	0.07	0.66, 0.93	0.76	0.13	0.45, 0.94	0.85	0.08	0.66, 0.95
Dyad intercept SD	0.43	0.25	0.02, 0.93	0.85	0.33	0.18, 1.52	0.51	0.35	0.03, 1.36
Dyad training SD	0.47	0.26	0.03, 0.97	0.96	0.53	0.06, 2.05	0.48	0.34	0.03, 1.31
Dyad intercept-training correlation	0.67	0.46	-0.79, 1.00	0.59	0.43	-0.69, 0.99	0.34	0.56	-0.87, 0.98

Parameter	Open-ended questions			Closed-ended questions			Self-disclosure		
	<i>M</i> est	<i>SD</i> est	95% CI	<i>M</i> est	<i>SD</i> est	95% CI	<i>M</i> est	<i>SD</i> est	95% CI
Fixed									
Intercept	-2.52	0.18	-2.89, -2.18	-1.92	0.17	-2.25, -1.61	-4.93	0.71	-6.58, -3.75
Training	1.29	0.20	0.90, 1.69	0.14	0.16	-0.18, 0.44	-3.02	0.71	-4.64, -1.84
Random									
Person intercept SD	0.65	0.16	0.35, 0.98	0.77	0.14	0.51, 1.07	2.42	0.66	1.37, 3.94
Person training SD	0.74	0.21	0.33, 1.16	0.70	0.15	0.43, 1.01	2.20	0.63	1.15, 3.62
Person intercept-training correlation	0.22	0.34	-0.58, 0.73	0.51	0.19	0.07, 0.78	0.87	0.09	0.63, 0.97
Dyad intercept SD	0.38	0.22	0.03, 0.84	0.27	0.19	0.01, 0.71	0.75	0.56	0.03, 2.11
Dyad training SD	0.37	0.24	0.02, 0.88	0.21	0.16	0.01, 0.58	0.93	0.58	0.06, 2.33
Dyad intercept-training correlation	0.09	0.55	-0.93, 0.94	0.32	0.57	-0.89, 0.99	0.40	0.55	-0.86, 0.99

Table 3 Continued

Parameter	Sympathy			Other			Pass/fail		
	<i>M</i> est	<i>SD</i> est	95% CI	<i>M</i> est	<i>SD</i> est	95% CI	<i>M</i> est	<i>SD</i> est	95% CI
Fixed									
Intercept	-2.26	0.23	-2.71, -1.81	-0.74	0.17	-1.1, -0.41	-2.90	3.56	-12.51, 1.75
Training	-0.15	0.19	-0.53, 0.21	-0.68	0.17	-1.02, -0.34	19.40	6.38	8.10, 33.18
Random									
Person intercept SD	0.57	0.22	0.12, 1.02	0.53	0.16	0.26, 0.88	3.85	2.98	0.21, 11.22
Person training SD	0.65	0.18	0.29, 1.01	0.63	0.16	0.34, 0.96	3.88	3.15	0.15, 11.49
Person intercept-training correlation	0.38	0.35	-0.52, 0.83	0.54	0.27	-0.17, 0.87	0.21	0.58	-0.91, 0.98
Dyad intercept SD	0.92	0.23	0.49, 1.42	0.58	0.19	0.16, 0.97	8.49	4.61	2.43, 20.14
Dyad training SD	0.36	0.23	0.02, 0.86	0.50	0.23	0.05, 0.93	5.83	4.83	0.20, 17.88
Dyad intercept-training correlation	0.31	0.48	-0.81, 0.96	0.58	0.37	-0.57, 0.96	0.41	0.54	-0.85, 0.99
Parameter	Competence criteria			Competence score			CSRS task reactions		
	<i>M</i> est	<i>SD</i> est	95% CI	<i>M</i> est	<i>SD</i> est	95% CI	<i>M</i> est	<i>SD</i> est	95% CI
Fixed									
Intercept	1.58	0.07	1.43, 1.72	2.95	1.74	-0.52, 6.44	6.99	0.24	6.51, 7.46
Training	1.09	0.13	0.84, 1.34	22.92	1.81	19.31, 26.43	1.66	0.25	1.17, 2.14
Random									
Person intercept SD	0.06	0.05	0.00, 0.19	6.09	2.76	0.56, 10.92	1.18	0.25	0.71, 1.68
Person training SD	0.12	0.10	0.01, 0.36	5.56	3.23	0.27, 11.46	0.53	0.39	0.02, 1.38
Person intercept-training correlation	0.12	0.58	-0.94, 0.97	0.67	0.39	-0.62, 0.99	0.24	0.47	-0.85, 0.93
Dyad intercept SD	0.07	0.05	0.00, 0.2	4.23	2.22	0.29, 8.65	0.34	0.25	0.01, 0.95
Dyad training SD	0.12	0.09	0.01, 0.34	3.41	2.19	0.16, 8.10	0.39	0.28	0.02, 1.02
Dyad intercept-training correlation	0.12	0.58	-0.93, 0.96	0.49	0.51	-0.82, 0.99	0.28	0.55	-0.88, 0.98
Residual SD	-	-	-	5.64	1.63	1.77, 8.15	0.95	0.20	0.44, 1.29

Table 3 Continued

Parameter	CSRS relationship reactions		
	<i>M</i> est	<i>SD</i> est	95% CI
Fixed			
Intercept	7.19	0.30	6.61, 7.79
Training	0.46	0.28	-0.11, 1.00
Random			
Person intercept SD	1.59	0.28	1.05, 2.14
Person training SD	0.83	0.34	0.14, 1.46
Person intercept-training correlation	0.71	0.24	0.09, 0.98
Dyad intercept SD	0.65	0.40	0.04, 1.49
Dyad training SD	0.95	0.32	0.24, 1.58
Dyad intercept-training correlation	0.25	0.50	-0.86, 0.95
Residual SD	0.57	0.24	0.13, 1.05

*Note.* 95% CI = 95% credibility interval; CSRS = CMH Session Reaction Scale; *M* est = mean of posterior distribution; *SD* = standard deviation of posterior distribution

Table 4. Bayesian Multilevel Models Accounting for Desire to Withdraw from the Study

Parameter	Total units			Restatement			Influencing		
	<i>M est</i>	<i>SD est</i>	95% CI	<i>M est</i>	<i>SD est</i>	95% CI	<i>M est</i>	<i>SD est</i>	95% CI
Fixed									
Intercept	2.90	0.37	2.16, 3.62	-1.28	0.57	-2.41, -0.19	-4.10	0.82	-5.86, -2.67
Training	-2.04	0.37	-2.78, -1.29	2.81	0.83	1.18, 4.41	-3.31	0.78	-4.98, -1.86
Withdrawal motivation	0.05	0.07	-0.09, 0.19	-0.06	0.11	-0.28, 0.16	0.19	0.15	-0.09, 0.51
Training X withdrawal motivation	0.03	0.07	-0.11, 0.18	0.00	0.16	-0.30, 0.31	0.18	0.15	-0.10, 0.48
Random									
Person intercept SD	0.82	0.15	0.57, 1.13	1.06	0.23	0.65, 1.55	1.61	0.34	1.02, 2.36
Person training SD	0.78	0.15	0.52, 1.10	1.79	0.34	1.16, 2.47	1.47	0.32	0.94, 2.19
Person intercept-training correlation	0.85	0.07	0.69, 0.94	0.76	0.12	0.47, 0.93	0.86	0.07	0.68, 0.95
Dyad intercept SD	0.46	0.26	0.03, 0.97	0.80	0.37	0.09, 1.54	0.45	0.33	0.02, 1.24
Dyad training SD	0.51	0.26	0.06, 1.02	0.98	0.55	0.06, 2.13	0.44	0.32	0.02, 1.21
Dyad intercept-training correlation	0.70	0.43	-0.65, 0.99	0.58	0.45	-0.72, 0.99	0.31	0.56	-0.88, 0.98

Parameter	Open-ended questions			Closed-ended questions			Self-disclosure		
	<i>M est</i>	<i>SD est</i>	95% CI	<i>M est</i>	<i>SD est</i>	95% CI	<i>M est</i>	<i>SD est</i>	95% CI
Fixed									
Intercept	-2.21	0.39	-2.99, -1.44	-1.65	0.38	-2.42, -0.91	-5.93	1.46	-9.15, -3.36
Training	1.75	0.44	0.84, 2.60	0.24	0.37	-0.5, 0.96	-3.45	1.44	-6.53, -0.87
Withdrawal motivation	-0.07	0.08	-0.23, 0.08	-0.06	0.07	-0.20, 0.09	0.20	0.26	-0.33, 0.73
Training X withdrawal motivation	-0.10	0.08	-0.26, 0.08	-0.02	0.07	-0.16, 0.12	0.08	0.26	-0.46, 0.61
Random									
Person intercept SD	0.67	0.17	0.37, 1.02	0.79	0.15	0.53, 1.09	2.49	0.69	1.43, 4.05
Person training SD	0.71	0.22	0.28, 1.14	0.72	0.15	0.43, 1.03	2.26	0.66	1.21, 3.77
Person intercept-training correlation	0.16	0.35	-0.65, 0.72	0.53	0.18	0.08, 0.79	0.89	0.08	0.69, 0.98
Dyad intercept SD	0.38	0.22	0.02, 0.86	0.26	0.18	0.01, 0.69	0.70	0.55	0.03, 2.09
Dyad training SD	0.37	0.24	0.02, 0.88	0.21	0.16	0.01, 0.60	0.93	0.58	0.06, 2.34
Dyad intercept-training correlation	0.06	0.55	-0.94, 0.94	0.35	0.55	-0.88, 0.99	0.41	0.54	-0.85, 0.99

Table 4 Continued

Parameter	Sympathy			Other			Pass/fail		
	<i>M</i> est	<i>SD</i> est	95% CI	<i>M</i> est	<i>SD</i> est	95% CI	<i>M</i> est	<i>SD</i> est	95% CI
Fixed									
Intercept	-2.53	0.45	-3.40, -1.66	-0.70	0.35	-1.37, 0.03	0.70	8.40	-17.93, 16.76
Training	-0.83	0.39	-1.62, -0.09	-0.60	0.37	-1.32, 0.14	9.83	8.43	-6.42, 26.77
Withdrawal motivation	0.07	0.08	-0.10, 0.22	-0.01	0.07	-0.15, 0.12	-1.14	1.64	-4.75, 1.82
Training X withdrawal motivation	0.15	0.08	-0.01, 0.29	-0.02	0.07	-0.16, 0.13	14.73	6.89	2.76, 29.48
Random									
Person intercept SD	0.52	0.23	0.08, 0.99	0.53	0.16	0.27, 0.88	8.08	5.22	1.01, 20.81
Person training SD	0.58	0.19	0.19, 0.95	0.62	0.16	0.33, 0.97	6.81	5.95	0.23, 21.98
Person intercept-training correlation	0.26	0.41	-0.74, 0.81	0.53	0.26	-0.12, 0.87	0.12	0.57	-0.93, 0.97
Dyad intercept SD	0.97	0.24	0.53, 1.49	0.61	0.20	0.18, 1.01	13.99	7.72	3.10, 32.52
Dyad training SD	0.41	0.24	0.02, 0.91	0.54	0.23	0.07, 1.00	7.92	6.88	0.28, 26.24
Dyad intercept-training correlation	0.38	0.44	-0.75, 0.96	0.62	0.35	-0.45, 0.97	0.20	0.57	-0.91, 0.98
Parameter	Competence criteria			Competence score			CSRS task reactions		
	<i>M</i> est	<i>SD</i> est	95% CI	<i>M</i> est	<i>SD</i> est	95% CI	<i>M</i> est	<i>SD</i> est	95% CI
Fixed									
Intercept	1.70	0.17	1.36, 2.03	6.09	3.71	-1.42, 13.37	8.02	0.57	6.88, 9.13
Training	1.28	0.31	0.70, 1.87	26.35	3.93	18.43, 33.89	2.18	0.56	1.06, 3.27
Withdrawal motivation	-0.03	0.04	-0.10, 0.04	-0.74	0.75	-2.21, 0.75	-0.22	0.11	-0.45, -0.01
Training X withdrawal motivation	-0.04	0.06	-0.15, 0.08	-0.74	0.79	-2.32, 0.79	-0.12	0.11	-0.34, 0.10
Random									
Person intercept SD	0.07	0.05	0.00, 0.19	6.65	2.56	1.20, 10.96	1.15	0.25	0.68, 1.66
Person training SD	0.13	0.10	0.01, 0.35	6.04	3.07	0.33, 11.37	0.54	0.41	0.02, 1.43
Person intercept-training correlation	0.10	0.58	-0.93, 0.95	0.74	0.32	-0.38, 0.99	0.19	0.48	-0.88, 0.91
Dyad intercept SD	0.07	0.06	0.00, 0.21	3.61	2.21	0.19, 8.15	0.29	0.22	0.01, 0.83
Dyad training SD	0.12	0.09	0.00, 0.35	3.11	2.18	0.13, 8.06	0.37	0.27	0.01, 0.98
Dyad intercept-training correlation	0.11	0.58	-0.93, 0.97	0.45	0.53	-0.85, 0.99	0.25	0.57	-0.91, 0.98
Residual SD	-	-	-	5.39	1.61	1.72, 7.88	0.95	0.21	0.43, 1.29

Table 4 Continued

Parameter	CSRS relationship reactions		
	<i>M</i> est	<i>SD</i> est	95% CI
Fixed			
Intercept	8.22	0.66	6.90, 9.50
Training	1.03	0.60	-0.15, 2.18
Withdrawal motivation	-0.23	0.13	-0.48, 0.02
Training X withdrawal motivation	-0.13	0.12	-0.36, 0.1
Random			
Person intercept SD	1.55	0.27	1.02, 2.09
Person training SD	0.80	0.37	0.08, 1.49
Person intercept-training correlation	0.67	0.26	-0.08, 0.98
Dyad intercept SD	0.52	0.35	0.02, 1.28
Dyad training SD	0.85	0.32	0.14, 1.46
Dyad intercept-training correlation	0.19	0.52	-0.89, 0.95
Residual SD	0.62	0.27	0.05, 1.09

*Note.* 95% CI = 95% credibility interval; CSRS = CMH Session Reaction Scale; *M* est = mean of posterior distribution; *SD* = standard deviation of posterior distribution

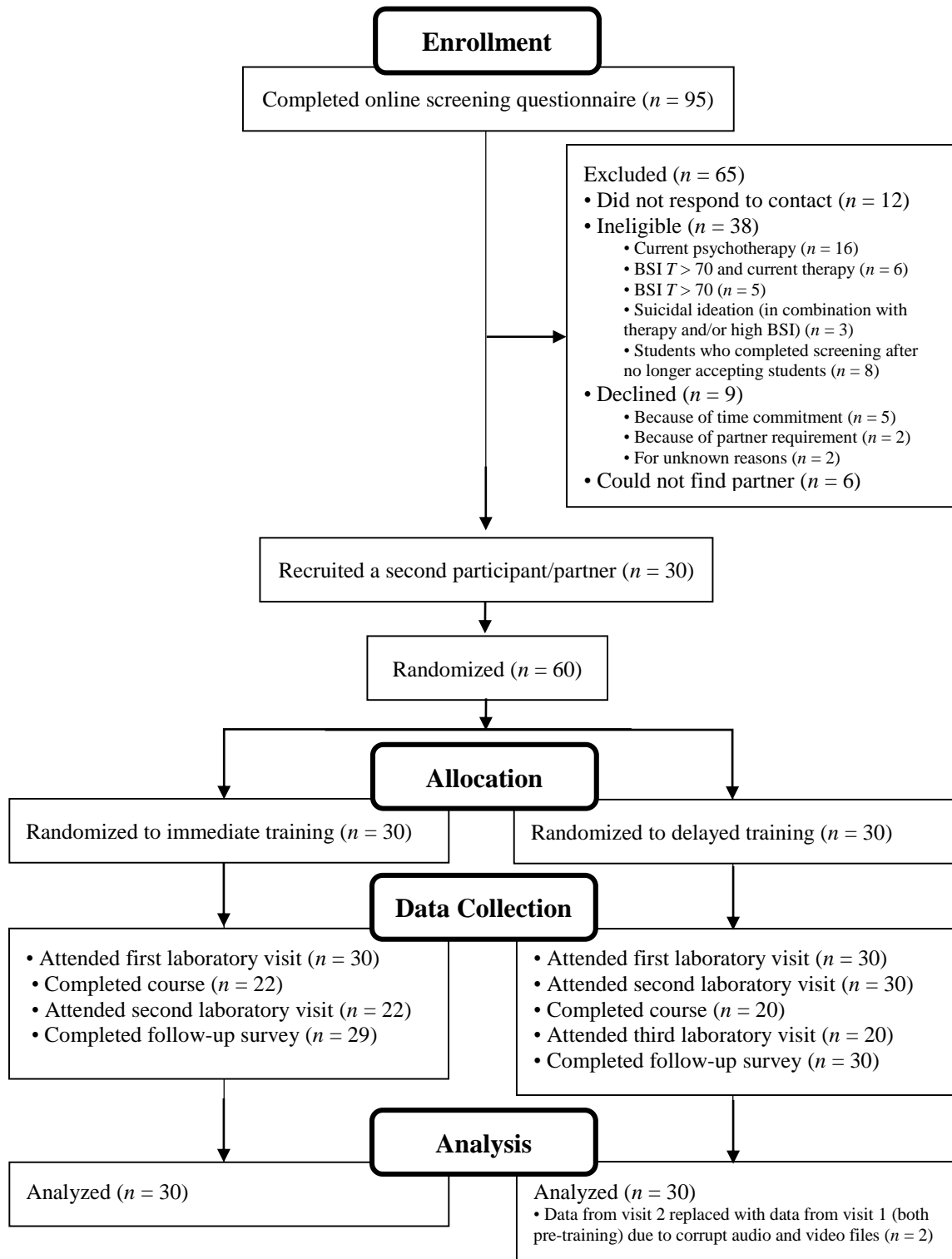


Figure 1. Study flow diagram.  $N$  denotes the number of individuals, not the number of dyads.

**APPENDIX A**

**DEMOGRAPHIC INFORMATION AND MENTAL HEALTH SERVICE USE**

How did you hear about this study?

- I saw a flyer posted (write where you saw the flyer) \_\_\_\_\_
- I read about it online (write where you read about it) \_\_\_\_\_
- A doctor, social worker, pastor or other professional told me about it (write where you saw this person) \_\_\_\_\_
- A friend invited me to participate with them (write friend's name) \_\_\_\_\_
- Other (explain) \_\_\_\_\_

How old are you? \_\_\_\_\_

What is your gender? Mark all that apply.

- Male
- Female
- Transgender
- Other gender [open response] \_\_\_\_\_

What is your race/ethnicity? Mark all that apply.

- Hispanic/Latino(a)
- East Asian
- South Asian
- African American/Black
- Native American
- European American/White
- Middle Eastern/Arab
- Other (please specify) \_\_\_\_\_

What was your first language (that is, the language that you learned as an infant)? Mark all that apply.

- English
- Spanish
- Other [open response] \_\_\_\_\_

Were you born in the U.S.?

- Yes       No

What is your current marital status?

- Never married
- Married/in a domestic partnership
- Separated or divorced
- Widowed

If you are not married, are you currently involved in a romantic relationship?

Yes       No

Please indicate your HOUSEHOLD's annual pre-tax income in U.S. dollars. If you are supported by someone else in any significant way (e.g., your spouse, your parents), this should be that person's and your income combined (e.g., your parent's income plus your own income). \_\_\_\_\_

How many people does this household income support? \_\_\_\_\_

Are you currently a student?

Yes       No

What is your occupation? \_\_\_\_\_

Please indicate your highest COMPLETED level of education and your parents'/guardians' highest level of education.

*If your parents/guardians are/were opposite-sex, list your father/male guardian as "Guardian 1" and your mother/female guardian as "Guardian 2." If your parents/guardians are/were same-sex, you may choose which one to list first. If you were raised by a single parent/guardian, list him/her as Guardian 1 or 2 based on his/her sex.*

- (1) Less than high school
- (2) Completed high school
- (3) Completed associate degree/technical school/other two-year degree
- (4) Some college/university
- (5) Completed college/university (BA, BS, AB)
- (6) Some graduate or professional school
- (7) Completed graduate/professional school (Master's, PhD, MD, JD, etc.)

Your highest level of education \_\_\_\_\_

Guardian 1's highest level of education \_\_\_\_\_

Guardian 2's highest level of education \_\_\_\_\_

Did you ever take any of the following standardized tests? Check off each test that you have taken.

- SAT
- ACT
- GRE
- I have never taken any of these tests

[the following items appear if the corresponding box is checked]

To the best of your memory, what year did you take the SAT? \_\_\_\_\_

Fill in AS MANY of your scores as you remember.

Verbal (critical reading) \_\_\_\_\_  
Math \_\_\_\_\_  
Writing \_\_\_\_\_  
Total \_\_\_\_\_

To the best of your memory, what year did you take the ACT? \_\_\_\_\_

Fill in AS MANY of your scores as you remember.

English \_\_\_\_\_  
Reading \_\_\_\_\_  
Writing \_\_\_\_\_  
Science \_\_\_\_\_  
Math \_\_\_\_\_  
Total \_\_\_\_\_

To the best of your memory, what year did you take the GRE? \_\_\_\_\_

Fill in AS MANY of your scores as you remember.

Verbal \_\_\_\_\_  
Quantitative \_\_\_\_\_  
Writing \_\_\_\_\_  
Total \_\_\_\_\_

Have you ever been in psychotherapy? That is, have you seen a psychologist, social worker, counselor, or other professional to talk about a problem you have had?

Yes \_\_\_\_\_ No \_\_\_\_\_

How many different psychotherapists have you seen? \_\_\_\_\_

How many months total have you been in psychotherapy? \_\_\_\_\_

Are you currently in psychotherapy?

Yes \_\_\_\_\_ No \_\_\_\_\_

Would you consider seeking psychotherapy in the future if you were having a problem?

Yes \_\_\_\_\_ No \_\_\_\_\_

Have you ever seen a psychiatrist or doctor for psychiatric medication? That is, have you ever taken a medication to improve your mental or emotional health? (Do NOT count medication for ADD/ADHD.)

Yes \_\_\_\_\_ No \_\_\_\_\_

How many months total have you taken a psychiatric medication (not counting medication for ADD/ADHD)? \_\_\_\_\_

Are you currently taking psychiatric medication that was prescribed for you by a professional (not counting medication for ADD/ADHD)?

Yes \_\_\_\_\_ No \_\_\_\_\_

Would you consider taking psychiatric medication in the future if you were having a problem?

Yes \_\_\_\_ No \_\_\_\_

Have you EVER used any of the following resources to improve or maintain your mental health?

- Clergy (e.g., minister, imam)
- Formal support group (e.g., Alcoholics Anonymous)
- Self-organized/informal support group
- Self-help book
- Online self-help program
- Other [open response] \_\_\_\_\_

Do you CURRENTLY use any of the following resources to improve or maintain your mental health?

- Clergy (e.g., minister, imam)
- Formal support group (e.g., Alcoholics Anonymous)
- Self-organized/informal support group
- Self-help book
- Online self-help program
- Other [open response] \_\_\_\_\_

Are you CURRENTLY experiencing any mental or emotional distress?

Yes \_\_\_\_ No \_\_\_\_

*[If yes, the following items appear]*

What are your reasons for not seeking professional mental health care at this time? Check all that apply.

- My health insurance would not cover mental health services
- I'm concerned about how much money it would cost
- I'm unsure about where to go or who to see
- I tried, but can't get an appointment
- I have problems with things like transportation, childcare, or scheduling that would make it hard to get to treatment
- It would take too much time or be inconvenient
- I want to handle the problem on my own
- I don't think treatment would work
- I received treatment before and it did not work
- I'm concerned about what others might think if they found out I was in treatment
- I'm scared about being put into a hospital against my will
- I think the problem will get better by itself
- The problem doesn't bother me very much
- I am getting some other kind of help  
(please list source of help) \_\_\_\_\_

Choose your TOP TWO reasons for not seeking professional mental health care at this time.

- My health insurance would not cover mental health services
- I'm concerned about how much money it would cost
- I'm unsure about where to go or who to see
- I tried, but can't get an appointment
- I have problems with things like transportation, childcare, or scheduling that would make it hard to get to treatment
- It would take too much time or be inconvenient
- I want to handle the problem on my own
- I don't think treatment would work
- I received treatment before and it did not work
- I'm concerned about what others might think if they found out I was in treatment
- I'm scared about being put into a hospital against my will
- I think the problem will get better by itself
- The problem doesn't bother me very much
- I am getting some other kind of help

## APPENDIX B

### BRIEF SYMPTOM INVENTORY

*Below is a list of problems and complaints that people sometimes have. Read each one carefully, and select one of the numbered descriptors that best describes HOW MUCH DISCOMFORT THAT PROBLEM CAUSED YOU DURING THE PAST 4 WEEKS INCLUDING TODAY.*

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>Not at all</b>	<b>A little bit</b>	<b>Moderately</b>	<b>Quite a bit</b>	<b>Extremely</b>

*In the past 4 weeks, including today, how much were you distressed by:*

1. Nervousness or shakiness inside
2. Faintness or dizziness
3. The idea that someone else can control your thoughts.
4. Feeling others are to blame for most of your troubles.
5. Trouble remembering things.
6. Feeling easily annoyed or irritated.
7. Pains in the heart or chest.
8. Feeling afraid in open space.
9. Thoughts of ending your life.
10. Feeling that most people cannot be trusted.
11. Poor appetite.
12. Suddenly scared for no reason.
13. Temper outbursts that you could not control.
14. Feeling lonely even when you are with people.
15. Feeling blocked in getting things done.
16. Feeling lonely.
17. Feeling blue.
18. Feeling no interest in things.
19. Feeling fearful.
20. Your feelings being easily hurt.
21. Feeling that people are unfriendly or dislike you.
22. Feeling inferior to others.
23. Nausea or upset stomach.
24. Feeling that you are watched or talked about by others.
25. Trouble falling asleep.
26. Having to check and double check what you do.
27. Difficulty making decisions.
28. Feeling afraid to travel on buses, subways, or trains.

29. Trouble getting your breath.
30. Hot or cold spells.
31. Having to avoid certain things, places or activities because they frighten you.
32. Your mind going blank.
33. Numbness or tingling in parts of your body.
34. The idea that you could be punished for your sins.
35. Feeling hopeless about the future.
36. Trouble concentrating.
37. Feeling weak in parts of your body.
38. Feeling tense or keyed up.
39. Thoughts of death or dying.
40. Having urges to beat, harm or injure someone.
41. Having urges to break or smash something.
42. Feeling very self-conscious with others.
43. Feeling uneasy in crowds.
44. Never feeling close to another person.
45. Spells of terror or panic.
46. Getting into frequent arguments.
47. Feeling nervous when left alone.
48. Others not giving you proper credit for your achievements.
49. Feeling so restless that you can't sit still.
50. Feelings of worthlessness.
51. Feeling that people will take advantage of you if you let them.
52. Feelings of guilt.
53. The idea that something is wrong with you in the mind.

## APPENDIX C

### PERCEIVED STRESS SCALE

*The questions in this scale ask you about your feelings and thoughts during the last month. In each case, please indicate with a check how often you felt or thought a certain way.*

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>Never</b>	<b>Almost Never</b>	<b>Sometimes</b>	<b>Fairly Often</b>	<b>Very Often</b>

1. In the last month, how often have you been upset because of something that happened unexpectedly?
2. In the last month, how often have you felt that you were unable to control the important things in your life?
3. In the last month, how often have you felt nervous and “stressed”?
4. In the last month, how often have you felt confident about your ability to handle your personal problems?
5. In the last month, how often have you felt that things were going your way?
6. In the last month, how often have you found that you could not cope with all the things that you had to do?
7. In the last month, how often have you been able to control irritations in your life?
8. In the last month, how often have you felt that you were on top of things?
9. In the last month, how often have you been angered because of things that were outside of your control?
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

## APPENDIX D

### CODING MANUAL

#### UNITIZING INSTRUCTIONS

(adapted from Hill, 2014, which was adapted from Auld & White, 1956)

A unit can have just (1) an independent or main clause, or it can have (2) an independent clause plus one or more dependent/subordinate clauses.

An independent or main clause is a clause that can stand alone as a sentence. It contains at least a subject and a verb<sup>3</sup>, with or without objects or modifiers. Here are some examples of independent clauses, with the *subject in italics* and the **verb in bold**.

*She* **dances**.

*Ben* **reads** the book.

*Sven's mother, Felicity,* **gave** me a present.

*She* **was listening** to the radio.

*They* **are going to elect** him president tomorrow.

*George III* **hadn't been** to the park.

*George III* **is** the king of England.

A dependent or subordinate clause is a clause that cannot stand alone as a sentence, even though sometimes they might contain a subject and a verb. There are several types of dependent clauses: (a) an adjective clause—acts as an adjective to modify a noun or a pronoun (e.g., the report *that he submitted* was well documented; the mouse *whose eyes pleaded for another cookie* was insatiable)

(b) a noun clause—acts as a noun (e.g., *exercising at night* helped her sleep better; *whoever got in the wicked witch's way* would be sorry.); and

(c) an adverbial clause—acts as an adverb in the sentence, telling why, how, when, or where something occurred, or expressing opposition or contrast (e.g., I was astonished *when I heard the news*; *although she was pretty*, I wasn't interested in a date).

1. When several clauses appear together, dependent clauses are part of the same unit as the independent clause.

2. When two independent clauses are joined together (by coordinating conjunctions or conjunctive adverbs; see below), they are considered separate units because they can stand alone as sentences.

Help with 1 and 2: You may sometimes have trouble distinguishing between independent clauses that should be separated and dependent clauses that have to stick with the rest of the sentence. Independent clauses can be distinguished from dependent clauses as

<sup>3</sup> You can tell a word is a verb if it can be conjugated in different tenses (is was were, singing sang sings, etc.). The subject is the thing doing the verb (is not what the sentence is “about”).

follows. When two independent clauses are connected, the second is introduced by a coordinating conjunction or a conjunctive adverb. Dependent clauses are introduced by subordinating conjunctions or by pronouns such as who, which, or that. You can use the conjunctions as clues. Here are some conjunctions that signal when clauses are independent or dependent.

<p>These words usually signal <b>independent</b> clauses <i>when they join two sentence-like structures (at least a subject and verb)</i>, so you should count the sentences as separate units. The two parts of the sentence should be able to stand alone if separated. Note that sometimes these words can appear between parts of a sentence that are not complete clauses (with a subject and a verb), in which case the sentence should be one unit.</p>	<p>These words usually signal that a clause is <b>dependent</b> and shouldn't be separated from the rest of the sentence.</p>
<p>and, but, or, nor, yet, so, for however, nevertheless, yet, still, thus, accordingly, also, besides, consequently, hence, moreover, otherwise, therefore</p>	<p>although, though, because, if, unless, while, whereas, after, before, as soon as, as long as, since, until, while, when, whenever, rather than, once, than, why</p>
<p>Examples: (I have removed the punctuation because you should not rely on punctuation to make judgments.) <b>SEPARATE UNITS</b> he went to the store and he bought groceries he went to the store thus he bought groceries he went to the store however he forgot to buy groceries <b>NOT SEPARATE UNITS</b> he bought eggs and milk (the conjunction joins two nouns, not two clauses) you can do it however you want ("however you want" can't stand as its own sentence)</p>	<p>Examples: <b>ONE UNIT</b> before he bought groceries he went to the store he bought groceries while he was at the store I'll ask him why he went to the store he bought groceries because he went to the store though he went to the store he forgot to buy groceries</p>

3. There are some exceptions in which an utterance without a subject and/or verb can be a complete unit. These are words or phrases that are intended to stand alone in communicating meaning, sometimes called elliptical sentences.

Examples:

A command: "go," "tell me"

An exclamatory sentence: "good," "agreed"

A question: "what?"

A response to a question: "How are you feeling now?" "The same as before."

4. False starts do not count as separate units. For example, “And Wednesday night, uh, I more or less ... I didn’t high-pressure him” counts as one unit. “And Wednesday night, uh, I more or less ...” is not scored as a separate unit.

5. Utterances lacking some essential feature of a complete sentence because of an interruption by the other speaker or a lapse into silence are considered separate units whenever the general meaning is clear. Example: “And he would ask her to write the...” (the meaning in this sentence is clear even though the last word or two is not spoken). However, when the speaker has not said enough to make his or her meaning clear, we consider the utterance a false start rather than a unit (e.g., “The little girl ...” would not be considered a unit).

6. Phrases such as “you know” and “I guess” are not usually considered separate units. Example: “Some, you know, very serious thing may be, you know, happening,” is all one unit. Similarly, stutters, uhs, ahs, etc. are not separate units. However, the phrase “right?” or “is that right?” at the end of a sentence is considered a separate unit because it asks for confirmation and is typically a separate action.

7. Talker and listener utterances are unitized separately. This avoids having to “separate” complete units due to interruptions from the other person. In other words, when unitizing, talker units are numbered beginning with 1, and listener units are numbered beginning with 1 as well, ignoring the other person’s utterances.

Example:

T: Today, I think I want to talk about, um ...

L: Your girlfriend?

T: my girlfriend. She’s been having a rough time

L: Uh-huh.

T: lately, because Wednesday is the anniversary of her dad’s death.

Talker unit 1 is “Today, I think I want to talk about, um ... my girlfriend”

Talker unit 2 is “She’s been having a rough time lately, because Wednesday is the anniversary of her dad’s death.”

Listener unit 1 is “Your girlfriend?”

Listener unit 2 is “Uh-huh.”

## LISTENER CODING INSTRUCTIONS

### **General principles**

Make sure that you have the coding manual in front of you so that you are using the given definitions for each category. Do *not* assume from the name of the category that you know what it means. For example, your personal definition of a term like “reassurance” may differ from the technical definition used in this coding system.

Many units would not be categorizable if you looked at them in isolation. Therefore, you should use the context of what is being discussed in order to select the appropriate category—that is, use all of the surrounding units and your understanding of their meaning, as well as your knowledge of the whole transcript.

You will generally be making coding decisions based on the speaker’s *intentions*, not based on rigid rules about sentence structure. For example, many kinds of utterances end in question marks, but not all of them are intended to get more information—so “Why don’t you get lost?” is not really a question, so it would not be coded as one.

**Overview of Steps**

Step 1. All units must be placed in categories 1-6 or Other. Start by deciding which of the six main categories a unit belongs to and put a 1 in that box. A unit can be placed in *only one* of these six categories; it cannot fall in more than one. Check whether a unit falls in each of the categories *in order* from 1 through 6—they are listed in this order to limit confusion between categories that overlap. See flowchart for instructions. If a unit does not fit any of the six categories, put a 1 in the Other box.

Step 2. If the main category you chose in for the unit has subcategories, check whether it falls in any of the subcategories, and place a 1 in each appropriate box. A unit might not fit any of the subcategories, in which case leave the subcategory boxes blank. You may only check a subcategory box if the main category is already checked (in other words, for example, don’t check the subcategory Summary within Restatement if the main category isn’t Restatement). Again, the flowchart has more detailed instructions.

Step 3. For every unit, check whether it is also Influencing. If the listener is trying to influence the talker’s thoughts, feelings, or actions in any way, put a 1 in the Influencing box, then place a 1 in the appropriate subcategory. Choose one and only one subcategory. If the unit does not involve Influencing, skip the Influencing box and all of its subcategories, and go to the next unit.

**Category Definitions**

<p>1. Minimal encourager  A brief sound or utterance that <i>does not convey substantive content</i>. A minimal encourager functions only to shows that the listener is attending (and perhaps agreeing/understanding) or to encourage the talker to say more.</p> <p>Minimal encouragers can include</p> <ul style="list-style-type: none"> <li>• An affirmative noise or word, or</li> <li>• a small, natural reaction to what the talker has said, or</li> <li>• repeating one or two words that the talker said as acknowledgment</li> </ul>	<ul style="list-style-type: none"> <li>• uh-huh, yeah, okay, right, mmm, yep, etc.</li> <li>• [laughs], [gasps], wow, huh, really?, ah, oh no! etc.</li> </ul>
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or to encourage further exploration.

A unit is *not* a minimal encourager

- if the listener repeats anything other than the talker's exact words,
- if the listener repeats or sums up a complete idea/sentence (that's a restatement),
- or if the listener is looking for the talker to give a specific piece of information (that's a question).

- T: "I totally freaked out." L: "Freaked out?"  
T: "I haven't been feeling depressed, more just bored." L: "Oh, bored."  
T: "I'm afraid if I tell her what happened she'll think I'm being dramatic about it." L: "Dramatic?"

## 2. Restatement

Restatement involves rephrasing, repeating, or capturing the meaning of something the talker has said. The listener will usually use their own words, but may use some of the talker's words verbatim as well. (The utterance must be more than just an "echo" of a few words, though—a short echo would be a minimal encourager, described above.)

A restatement can be phrased as a statement or it can end in a question mark! The listener may not be sure that the restatement is correct, so the listener might phrase it tentatively by adding a question-inflection or by adding a "tentafying" phrase (e.g., "it seems like ...").

The difference between a restatement-with-a-question-mark and a question (see below) is that in restatement, *the listener is aware that the talker already said something similar to the utterance*. The listener has added the question-inflection not to get more information—that would

"Ah, you hate it when she leaves work early all the time."  
"So you haven't been sleeping well. And you think that's been making it worse."

Restatement with a question mark:

T: "I'm so embarrassed that I spend all day playing video games and just hanging around."

L: "You're feeling bad about the way you're spending your time?"

Restatements with "tentafiers":

"It sounds like you're confused why Chris reacts to you that way"

"Based on what you've said, you're more overwhelmed by the thought of all the work than when you actually start doing it, is that right?"

make it a questions—but just to make sure that the listener captured the talker’s thoughts accurately.

In a restatement, the listener is *intending* to capture the meaning of something the talker has been trying to communicate. A restatement does NOT add the listener’s personal beliefs about of the material.

If a statement sounds like it’s the listener giving their own perspective on the situation, it cannot be a restatement. This is true even if it is something the talker has already said/communicated. If the listener is *agreeing* as if it’s their own opinion rather than just reflecting back what the talker said, it’s not restatement (compare two “brother” examples).

However, a restatement does not need to be a *successful* attempt to capture the talker’s meaning. In other words, the listener could try to restate, and it might not be perfectly accurate; the talker might reply, “That’s not quite what I meant.” As long as the listener is *attempting* to capture the talker’s meaning, it is a restatement.

Restatement:

T: “I’m so pissed that my roommate won’t do the dishes. Yes, she has depression, but can she really not just rinse a freaking plate?”

L: “So you’re mad that she’s not pulling her weight.”

T: [complains about various things brother has done] “Yeah, so he’s really being an ass right now.”

L: “So you feel like your brother is being a jerk because of all of the stuff he’s pulled lately.”

NOT restatement:

T: “I feel so bad that my roommate is depressed right now. I can tell she’s having an episode because she stopped doing the dishes and stays in her room all day. I don’t know what to do to help her.”

L: “I think you’re mad at her for not pulling her weight.”

T: [complains about various things brother has done] “Yeah, so he’s really being an ass right now.”

L: “It sounds like your brother is a being a jerk, yeah.”

Restatement (even though talker disagrees with it!):

T: “I can’t believe he made VP. I should have been promoted by now. Ugh, I just look at his stupid face and I hate him. And at the same time I wish I could be him.”

L: “So what you’re saying is that you’re jealous of his accomplishments?”

T: “Well, I’m not sure I’d say I’m jealous.”

<p>The restatement category also includes any questions or phrase checking in on the accuracy of such a restatement (see the subcategory below for more detail). ONLY code questions as part of restatement if they are clearly checking on the accuracy of a restatement, not if they stand alone (then they are coded in the questions category).</p>	<p>“Is that right?” “Did I capture it?” “Is that what you meant?” “Isn’t it?” etc.</p>
<p>Subcategory: Paraphrase A paraphrase is a straightforward rephrasing of the immediately preceding material. It stays close to the surface meaning, though it does not need to share any of the same words. It will usually capture something that the talker said in the last 20 seconds or so. The listener repeats back the idea in their own words, but does not reorganize the information in any way. Contrast this with summary, described below.</p>	<p>T: “My sister looks up to me. So she feels like it’s hard to talk to me. But I feel that way about my dad because I look up to him.” L: “Right, right, it’s like a chain.”</p> <p>T: “I didn’t talk to him. I totally chickened out. I kept picturing what his face would look like when I told him and imagining him firing me.” L: “You felt too nervous to talk to him.”</p> <p>T: “I just can’t believe that my best friend waited until now to tell me she’s moving out of the country. It feels almost like a betrayal.” L: “You sound so hurt that she kept this from you.”</p> <p>T: “I’ve noticed my grandma’s memory is getting worse. And it really terrifies me. I know some forms of Alzheimer’s are genetic. What if I end up like that?” L: “So you’re worried that you could lose your memory?”</p> <p>T: “I don’t know if I could handle this problem by myself. It feels like it’s too much for me right now.” L: “You feel uncertain of yourself and overwhelmed by this problem.”</p>
<p>Subcategory: Summary A summary is a somewhat more cognitively complex kind of restatement. The main difference between paraphrase</p>	<p>Pulling together repeated ideas/theme: [referring to several different examples the talker gave]</p>

<p>and summary is that the listener adds some more <i>organization</i> to the information the talker said, redigesting it or rearranging it or collecting it into a neat “bouquet.” The listener still does not add new concepts—it is still a reflection of what the talker has already said.</p> <p>One way of telling the difference between paraphrase and summary is by the <i>amount of talker material</i> that it sums up. A paraphrase usually reflects a simple idea, whereas in order for something to be a summary, it needs to involve multiple things the talker has said (otherwise there wouldn’t need to be reorganization or gathering of ideas). It may involve capturing a single theme or idea that a talker has discussed in multiple ways over a longer period of the session. Or it may involve listing multiple themes or ideas.</p>	<p>L: “It’s been really upsetting for you to feel like you’re always second best.”</p> <p>Multiple ideas: [talker speaks for 2 minutes about brother] L: “So it sounds like you’re really concerned about your brother’s drinking. But you’re worried that he wouldn’t listen if you talked to him. And you don’t think it should be your responsibility.”</p> <p>[talker complains about work for 5 minutes] L: “It sounds like your morning of playing phone tag left you frustrated for multiple reasons. You were frustrated that you weren’t as productive as you’d hoped to be and frustrated at this supervisor.”</p>
<p>Subcategory: Check-in A question or phrase checking in on the accuracy of such a restatement. <b>ONLY</b> code questions as part of restatement if their purpose is to check a restatement’s accuracy, not if they stand alone (then they are coded in the questions category).</p>	<p>“Is that right?” “Did I capture it?” “Is that what you meant?” “Isn’t it?” etc. “Is that what’s bothering you?” (only if after a restatement of what’s bothersome, <b>NOT</b> if standing alone)</p>

<p>3. Self-disclosure Any passage in which the listener reveals some information about themselves. It does not have to be deeply personal—it can be totally mundane.</p> <p>Some listener statements that start with “I” or that include other first-person pronouns are not self-disclosures, because the listener is not really sharing something about themselves. To count as self-disclosure, the focus of the unit(s) must be on the listener’s life or personal experience. Similarly, when the listener shares general information, an opinion or</p>	<p>“Oh, my family is the complete opposite of yours when it comes to that.” “One time, I was at the beach, and ...” “I don’t believe in free will, but I do believe that people have to take responsibility for their actions.” “When I’ve been in your situation, I’ve felt angry.” “So, I have ADHD, which makes it extra hard for me to ...” “Call me crazy, but Pierce Brosnan is my favorite Bond.”</p> <p>NOT self-disclosure:</p>
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<p>reaction to the talker's experiences, or a story about someone else, it is not self-disclosure.</p>	<p>"I don't think you're ugly."  "Someone once told me that the way to beat procrastination is ..."  "Oh my gosh, the other day a guy in my class fell asleep and the prof threw an eraser at his head."  "I think you should look into getting a loan."  "I can totally understand that." (not a self-disclosure unless followed by a personal experience that explains why the listener understands; that would be self-disclosure)  "I don't know." (<i>usually</i> not a self-disclosure—may or may not be a self-disclosure depending upon context)</p>
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<p>4. Closed-ended question  In this coding system, sentences that end in question marks are not always coded as questions. Questions are sentences that end in question marks and are intended to get specific information from the talker.</p> <p>Therefore, a question is NOT a minimal encourager (because these are just intended to get the talker to elaborate) and NOT a tentatively-worded restatement or a check-in after a restatement (because the listener already has/understands the information and is just double-checking).</p> <p>A closed-ended question is one that can be answered in a few words. There are three kinds of closed-ended questions:</p> <ul style="list-style-type: none"> <li>• yes/no (questions that can be answered by affirmation or negation),</li> </ul>	<ul style="list-style-type: none"> <li>• "Did you follow your plan?";  "You mean the course you took last semester?"; "Karen is your sister?"; "She came to visit you here?"; "You got angry, didn't you?"; "Have you tried talking to her about it?"</li> </ul>
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- multiple choice (questions that can be answered by selecting from a menu of choices), and
- basic fact (questions that have a simple, factual answer).

Sometimes questions may take the form of statements in which the inquirer leaves out a word, e.g., “Wait, so he came from...?” You can still tell this is a question because it requests more information, and you can identify it as a closed-ended question by thinking about how it would be answered.

In a few cases, questions may not really be directed at finding out more about the talker/the talker’s story, in which case they should not be coded in this category.

Note that whether a question is closed-ended or open-ended depends upon the question itself, not upon how long the talker takes to respond.

- “Do you still live downtown, or did you already move?”; “Are you feeling annoyed at her or did you forgive her, or haven’t you thought about it much?”
- “How long did you talk to Tina?”; “How old are you?”; “What’s your daughter’s name?”; “When did you start your job?”; “Where is that?”

NOT “Did you know I had the exact same experience?” (self-disclosure)  
 NOT “Hold on, do you mind if I blow my nose?” (other)

### 5. Open-ended question

In this coding system, sentences that end in question marks are not always coded as questions. Questions are sentences that end in question marks and are intended to get specific information from the talker.

An open-ended question is a question that cannot be answered in just a few words and thus encourages longer, more complex responses.

- “How do you feel about it now?”
- “What happened during the argument?”
- “When does your feeling of hopelessness come up the most?”
- “Why didn’t you want to go out with her?”
- “What about the situation is worrying you?”
- “How are making sense of it?”
- “When you say she’s a chameleon, what do you mean?”

<p>Sometimes questions may take the form of statements in which the inquirer leaves out a word, e.g., “So you did that because...?”</p> <p>You can still tell this is a question because it requests more information, and you can identify it as an open-ended question by thinking about how it would be answered.</p> <p>Note that whether a question is closed-ended or open-ended depends upon the question itself, not upon how long the talker takes to respond.</p> <p>“Would you describe” or “could you tell me” questions are open-ended questions, in terms of their meaning in everyday speech, even though they are yes/no questions grammatically. It would be absurd for someone to answer “no” to them—they are not intended to be taken literally. They are actually requests for more detailed information; in other words, they are used in everyday speech as open-ended questions and thus should be coded in this category. 98% of grammatical yes/no questions should be coded as closed-ended questions, so only make this exception in rare circumstances!</p>	<p>“Would you tell me more about that?”</p> <p>“Can you give me an example of when you’ve felt that way?”</p>
<p>Subcategory: Why</p> <p>Any question that asks “why” and can (hypothetically) be answered with the word “because.” (There are rare cases that a question may include the word “why” without actually being a “why” question. An easy test is to see if the question can be answered with “because”—if so, it’s a why question.)</p>	<p>“Why do you believe in reincarnation?”</p> <p>“So why didn’t you want to go out with her?”</p> <p>“Why did you think it was a good idea to leave early?”</p> <p>“Why are you getting upset?”</p> <p>NOT “Do you think he knows why you did that?” (can be answered with yes/no, not because)</p> <p>NOT “Why don’t you try waking up earlier?” (a rhetorical question, not intended to be answered with “because”—this “question” is actually a suggestion)</p> <p>NOT “Why don’t you go screw yourself?” (again, a rhetorical question that is</p>

	actually an insult, not intended to be answered with “because”)
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<p>6. Miscellaneous sympathy  This category is a sort of “grab bag” of ways for the listener to express understanding, sympathy, or empathy that do NOT fall into one of the previous categories. In other words, all of the previous categories can be used to express these things, and if the listener does so, the unit should go in one of those categories. This category is ONLY for ways of doing so that do not fall into other categories!</p> <p>Do NOT code this category if the listener is contradicting something the talker said. This category is only for ways of showing that the listener understands and follows what the talker is thinking or feeling. (Contradictions will usually be Other and might also go in New understanding or Reassurance within the Influencing category.)</p> <p>Some examples of ways of the listener might show understanding/sympathy/empathy are</p> <ul style="list-style-type: none"> <li>• finishing a talker’s sentence or idea</li>   <li>• expressing a sympathetic emotion that the talker did NOT already discuss (if the talker already covered the emotion in some way,</li> </ul>	<p>T: “He’s like, ‘You gotta tell me you’re getting upset when it’s happening.’ And I’m like you need to pay attention”  L: “and be sensitive.”</p> <p>T: “So I’m wondering, ‘What’s she thinking? Why is she looking at me?’”  L: “‘Does she think I’m cute or do I have something on my face?’”</p> <p>“That sounds so sad.”  “You must have been pissed!”</p>
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<p>even using a different vocab word, it counts as restatement)</p> <ul style="list-style-type: none"> <li>• adding a thought that the listener could reasonably assume is congruent with the talker's experience, but which the talker has NOT already said at some point (again, if the talker already said it at some point, it would be a restatement)</li> <li>• validating/expressing agreement or a sympathetic opinion ("I'm on your side")</li> <li>• explicitly stating that the listener understands/empathizes.</li> </ul> <p>You may discover other ways as well, which is fine. Before assuming that they fall in this category, though, make extra-sure that they aren't in one of the other categories!</p>	<p>T: "My mom would talk to my brother and say, 'Oh well when [talker] does this it reminds me of his biological father.' And I get so irked by that."  L: "Yeah, because you don't really know what she means." [assuming that the talker did not already explain why it's irksome]</p> <p>T: "I don't think it's too much for me to ask."  L: "No, it's totally not too much for you to ask!"</p> <p>T: "He comes and goes from the house as he pleases. And he never asks if he can contribute."  L: "Forgive me for saying so, but he's acting like an entitled child."</p> <p>"Yeah, it makes sense that you'd feel that way."  "I totally understand where you're coming from."  "I know exactly how you feel."</p>
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<p><b>Influencing</b>  An utterance that is an attempt to influence the talker's beliefs, thoughts, feelings, or actions. It's usually, but not always, intended to help the talker solve the problem or feel better about the situation.</p> <p>To be Influencing, the listener needs to be adding something new. That means that</p>	
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<p>minimal encouragers and restatements are never Influencing.</p> <p>If you mark the Influencing category, you must also choose one <i>and only one</i> subcategory.</p>	
<p>Subcategory: Advice 1 Direct instructions, urging, or persuasion to deal with the problem in a certain way. The listener seems confident that the talker should pursue a certain solution or coping method.</p>	<p>“I think you should call him.” “Tell your boss about what happened.” “Shouldn’t you always pay your credit cards on time?”</p>
<p>Subcategory: Advice 2 A suggestion of a solution or coping method, but without instruction or persuasion. A more tentative way of giving advice. People often suggest solutions indirectly by asking questions or by telling what has worked for them or for other people.</p>	<p>“It might help if you set an alarm to remind yourself.” “You could always wait to decide until you find out about the internship.” “Maybe you could try treating yourself once in a while.” “What if you asked the doctor for a referral?” “Have you tried making a to-do list?” “Why don’t you get a babysitter on those nights?” “What about going to bed earlier?” “When that happened to me, I just talked to my professor about it. It worked pretty well for me.” “My sister started taking fish oil and it really helped.”</p>
<p>Subcategory: New understanding A statement or question that attempts to lead the talker to a new understanding or interpretation of the situation.</p>	<p>“Maybe it’s not that she’s bored with you. Maybe she’s just busy with school.” “It seems to me that the organization is taking advantage of you.” “It could be that your boss is picking on you because you’re a woman.” or “Could your boss be discriminating against you?” “It was probably just an accident.”</p>
<p>Subcategory: Emotion instruction An explicit instruction to the talker to change their emotional response or to feel a certain way.</p>	<p>“Don’t worry about it.” “Relax.” “Cheer up.” “Aw, don’t be sad.”</p>
<p>Subcategory: Reassurance</p>	

<p>Reassurance is when a listener provides a comforting opinion about the state of reality. Usually this means <i>contradicting</i> what the talker believes or is concerned about.</p> <p>It can be</p> <ul style="list-style-type: none"> <li>• a denial of something negative (telling the talker that something negative isn't true or isn't so bad), or</li> <li>• a positive prognostication or belief about the situation.</li> </ul> <p>Not everything reassuring is reassurance! Don't get confused by the name of the category. The listener has to be doing one of the things above to count as reassurance.</p>	<ul style="list-style-type: none"> <li>• “No, you’re not a bad writer.” “It’s not your fault.” “It’s not so bad.” “She can’t stay sick forever.”</li> <li>• “I’m sure you’ll get a chance to try again.” “When it happened to me, I got through it.” “I don’t think he really hates you.” “I believe in you.” “You’ll feel better with the passage of time.”</li> </ul>
<p>Subcategory: Positive reframe Pointing out a good aspect or a bright side to something negative. A positive reframe does not deny the existence of the negative situation, but tries to shift attention to a positive element of it.</p> <p>Again, don’t get confused by the name of the category. There are many ways of giving a positive perspective on something. To go in this category, the statement or question must point out a “silver lining” to the problem without denying that the problem exists.</p>	<p>“Do you think dealing with this problem has made you into a stronger person?” “I know you’re upset that your son got a D in his history class. But now he’ll learn the importance of keeping track of deadlines.” “Your boss isn’t scheduling you for as many hours as you want at work? Well, maybe that’s a good thing. You weren’t feeling very engaged at work anyway.” (code second and third units as positive reframe; first is paraphrase) “Even if you’re not very athletic, you have a lot of other talents, like singing.”</p>
<p>Subcategory: Downward comparison Pointing out a way the situation could be worse. Like positive reframe, downward comparison does not deny the reality of</p>	<p>“It sucks that you broke your left hand. But it could have been your right one. And then where would you have been?”</p>

<p>the situation, but instead compares it to a different, worse situation—one that could have happened, that happened in the past, or that happened to someone else.</p>	<p>(code second and third unit as downward comparison)          “I heard someone broke in and stole your TV. But at least it’s not like the robbery at Mr. Weiss’s house where the burglar killed his dog.” (code second unit as downward comparison)          “I hear that you’re disappointed in yourself. But you used to struggle with this so much more than you do now.” (code second unit as downward comparison)</p>
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## APPENDIX E

### COMPETENCE SCORING SYSTEM

Total number of units per 30 minutes (excluding minimal encouragers):

- 10-25 units: +5 points
- 5-9 units or 25-30 units: +3 points
- < 5 or 31-39 units: 0 points
- $\geq 40$  units: -4 points

Number of restatement units per 30 minutes:

- $\geq 10$  units: +5 points
- 5-9 units: +3 points
- < 5 units: 0 points

Percentage of units classified as restatement:

- $\geq 50\%$ : +5 points
- $\geq 35\%$  and  $< 50\%$ : +3 points
- $< 35\%$ : 0 points

Number of open-ended question units per 30 minutes:

- 3-8 units: +4 points
- 9-15 units: +2 points
- 1-2 units: 0 points
- $> 15$  units: -1 point

Number of closed-ended question units per 30 minutes:

- < 5 units: +3 points
- 5-10 units: +1 point
- 10-15 units: 0 points
- $> 15$  units: -3 points

Units classified as self-disclosure:

- $> 20$  units per 30 minutes but less than 50%: -3 points
- $\geq 50\%$  of units: -5 points

Number of units classified as direct advice:

- 0 units: 0 points
- 1-2 units: -2 points
- 3-4 units: -3 points
- $> 4$  units:  $-3.5 - 30 \times \text{proportion of units}$ , with maximum of penalty of -15 points

Units classified as influencing:

- 0 units: 0 points
- 1-5 units: -1 point
- $> 5$  units: -3 points
- $> 10\%$  of units:  $-25 \times \text{proportion of units}$ , with maximum of penalty of -20 points, in addition to penalty based on number of units

*Note:* The direct advice and influencing penalties stack with each other.

**APPENDIX F**

**CMH SESSION REACTION SCALE**

*Think back over the session you have just completed, both as the talker and as the listener.*

Write a brief summary of what you and your partner talked about when you were the *talker*. Just write a sentence or two.

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Write a brief summary of what you and your partner talked about when you were the *listener*. Just write a sentence or two.

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**Now rate the extent to which you have experienced each of the following reactions to the session. Think of the experience as a whole, that is, both segments of the session. Select the appropriate number for each item.**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>Not at all</b>		<b>Slightly</b>		<b>Somewhat</b>		<b>Pretty Much</b>		<b>Very Much</b>

*[Items were administered in a random order. Items marked with a strikethrough were excluded when scoring the scale. The final version of the task reactions subscale includes items 2, 4, 12, 13, 16, and 18. The final version of the relationship reactions subscale includes items 6, 9, and 10.]*

~~1. As a result of this session, I feel too much pressure is being put on me to confront something or to change; or I feel controlled or manipulated by my partner, or pushed to do something I don't want to do.~~

2. As a result of this session, I have realized or become clearer about what I need or want to work on, or what my problems or goals are.

~~3. As a result of this session, I now feel disappointed or left alone by my partner; I feel my partner is ignoring or not properly attending to my needs; or I experience my partner as bored, insensitive, or uncaring.~~

4. As a result of this session, I have come to understand myself, or my feelings, or my actions better.

~~5. As a result of this session, I am less willing to feel certain feelings; or I am now pushing away or stopping myself from experiencing particular thoughts or feelings.~~

6. As a result of this session, I now feel more supported by my partner.
- ~~7. As a result of this session, I now feel better emotionally. Feeling better might mean feeling less negative, depressed, guilty, anxious, or hurt, or feeling positive, relieved, unburdened, safe, relaxed, or confident. (This refers to a positive change in your emotional state, not necessarily in your view of yourself.)~~
- ~~8. As a result of this session, I now feel stuck, blocked, or hopeless about making progress; or I feel like this program will not be able to help me.~~
9. As a result of this session, I feel closer to my partner; I have come to experience my partner as a person or fellow human being; or I feel less alone because of my relationship with my partner.
10. As a result of this session, I now feel understood by my partner; or I am glad that my partner really understood what I was thinking, feeling, or trying to say.
- ~~11. As a result of this session, I now feel put down, rejected, attacked, or judged by my partner; or I feel my partner has been critical or judgmental of me.~~
12. As a result of this session, I have become more aware of things about my situation or about other people in my life (not counting my partner); or I am facing the reality of a situation.
13. As a result of this session, I am now more in touch with my feelings or thoughts; I have realized something about myself; or I have become clearer about things in myself that I had been avoiding or having trouble putting into words.
- ~~14. As a result of this session, I now feel upset or uncomfortable (for example, scared, overwhelmed, sad, or embarrassed); I feel worse than when I started the session today; or I am more bothered by unpleasant thoughts or feelings.~~
- ~~15. As a result of this session, I now feel that my partner does not understand me as a person, or misunderstands something about me; or I feel my partner is saying things which just don't fit me as a person or my situation or problems.~~
16. As a result of this session, I am more accepting of who I am; or I have come to see myself or specific things about me more positively or less negatively.
- ~~17. As a result of this session, I now feel more confused about my problems or issues.~~
18. As a result of this session, I have figured out how to go about resolving a specific problem or how to achieve a specific goal; or I decided what to do about my problems or situation.

## APPENDIX G

### MOCK CMH SESSION INSTRUCTIONS

#### **Pre-training stressor discussion (visit 1 for both conditions and visit 2 for delayed condition)**

*Note: The delayed condition's second stressor discussion differed in the procedure for selecting a stressor; it used the post-training stressor selection method, which appears below.*

“When people are stressed, they often tell someone who is close to them about what’s going on, and that person usually tries to respond in a supportive way. Our research team wants to learn about how people naturally talk about stress. I’m going to ask the two of you to take turns talking about something that has been on your mind and listening and being supportive. First, one of you will tell about something that has been stressing you out for 30 minutes and the other will be supportive. Then you’ll have a five-minute break to clear your mind, use the restroom, or get a drink. Then you’ll switch, and the second person will tell about what’s been stressing them out for 30 minutes, while the other is supportive.”

“I’ll give you more instructions about how to talk about the stressor in a moment. First, though, I’m going to help both of you decide what kind of stressor or problem to talk about.”

- Hand participants worksheets

“Please write your name on top of this worksheet. This worksheet lists the guidelines for choosing a stressor at the top, but I’ll also tell you the guidelines out loud. It can be any issue from any area of your life—something that’s going on at home, with family or friends, at work, at school, or with the way you think or feel. It can be something new or something that’s been going on for a while, as long as it’s something that still causing you stress or problems. Try not to avoid topics that are upsetting or embarrassing—those often cause us the most stress. It should also be something you haven’t talked about much before, especially with each other. It’s okay if you’ve mentioned it in passing, but we don’t want you to talk about something today that you’ve already discussed in depth. You should basically be telling each other about the stressor from the beginning. Do you have any questions so far?”

“Now, please take a minute to think about what has been stressing you out lately. Write the top three things that have been stressing you out on this worksheet, following the guidelines I just gave. Then follow the rest of the instructions on the worksheet. Make sure that you list your stressors in order from most stressful to least stressful.”

- Allow them to write

“Were you able to come up with three stressors that met the guidelines? I’d like you both to talk about the number two stressor on your list today. That should be the second-most stressful one. Is that right?”

- If there is any indication of error (e.g., the participant talked about their #2 stressor with their partner before, they listed the stressors out of order, etc.), fix the error by having the participant talk about and circle an appropriate stressor. Appropriate stressor = not the very most stressful thing in the person’s life, not discussed with partner before, not discussed for more than 20 minutes or so with anyone else.

“Okay, go ahead and circle the stressor you’re going to talk about today. Here are the instructions for the activity. When it’s your turn to talk, you should just tell your partner about this stressor, in the way you normally would when telling someone who’s close to you about something that’s been on your mind. Please try to talk in detail about the stressor and your thoughts and feelings about it. When your partner is telling you about their stressor, you should do what you would naturally do to be supportive. There are no specific instructions; just behave normally. What questions do you have so far?”

“Please try to fill the full 30 minutes talking about your stressor without changing the subject. You can always talk in more detail about the stressor to fill the time. After 30 minutes, you’ll have a break, then switch roles and do it again. Your conversation will be video recorded. We’ll use the recordings to study what people naturally say and do when talking about stressors. I’m also going to use this audio recorder as backup in case the video recording malfunctions. Do you have any more questions? Okay, please silence your cell phones and get comfortable. I’ll go start the recording and then we’ll decide who goes first.”

- Start the audio recorder
- Start the video recorder in the A/V room
- Flip a coin to decide who talks first

[to the first talker] “You’re going to talk about your stressor first. So that we know who you are when we go back and look at the video, please hold up this whiteboard in front of you and say your name, your ID, and ‘I’m going to talk about my stressor.’”

- Allow P to repeat the phrase

“Okay, now please talk about your stressor number 2 in the way you normally would when telling someone who’s close to you about something that’s been on your mind, and try to fill the full 30 minutes. [Other person’s name]’ do what you would naturally do to be supportive. I’ll leave you alone to talk. After 30 minutes is up, I’ll knock on the door and let you know it’s time to stop and take a break. If you need anything, I’ll be in the room I showed you down the hall. Go ahead.”

- Set an alarm or timer to go off in 30 minutes

- Work in room 141 until the timer is up
- When the timer goes off, knock on the door and give them a 5-minute break; do not stop the recording devices during this period

[to the second talker] “Now it’s your turn to talk about your stressor. Please hold up this whiteboard in front of you and say your name, your ID, and ‘I’m going to talk about my stressor.’”

- Allow P to repeat the phrase

[to the second talker] “Now please talk about stressor number 2 in the way you normally would when telling someone who’s close to you about something that’s been on your mind, and try to fill the full 30 minutes.” [to the second listener]. “You do what you would naturally do to be supportive. I’ll leave you alone to talk. After 30 minutes is up, I’ll knock on the door and let you know you’re done.”

- Set an alarm or timer to go off in 30 minutes
- Work in room 141 until the timer is up
- When the timer goes off, go to the A/V room and stop the video recorder; wait until the light is green and remove the USB flash drive
- Knock on the door and stop the audio recorder
- Clean out the room and bring all materials to 141 with the participants
- Make sure participant names are on the worksheets; add IDs, date, and visit number

**Post-training stressor discussion (visit 2 for immediate condition and visit 3 for delayed condition)**

“Now that you’ve completed the course, I’d like you to have your first real session here in the lab. In other words, I’d like you to take turns talking and listening about stressors in the way you learned in the course. Ordinarily, when people finish the course, they’ll start to meet in a private place like one of their houses, but in this study, you’ll do your first session here in the lab so that we can video record it and understand how people use the skills from the course.”

“I’ll give you all the materials you would have in front of you for an ordinary session. The only difference between this and an ordinary session is that I will help you choose a stressor instead of you choosing your own. What questions do you have so far?”

- Hand participants worksheets

“Please write your name on top of this worksheet. Now, look at the top of the page where the instructions are. I want you to brainstorm three stressors that fit the guidelines for choosing a stressor that you learned in the course. You should also make sure that you didn’t talk any of these stressors all the way through for practice during the course. It’s okay to choose a stressor that you wrote about briefly in the beginning of the course, but

it should not be something that you covered fully or talked about to each other. The reason for choosing a new-ish stressor is because today I'm going to ask you to start from the beginning of the exploring a stressor process. So you should try to come up with stressors that you didn't talk through before. Do you have any questions about that?"

"Now, please take a minute to think about what has been stressing you out lately. Write the three biggest stressors that follow the guidelines I just gave. Then follow the rest of the instructions on the worksheet. Make sure that you list your stressors in order from most to least stressful."

- Allow them to write
- If they're having trouble coming up with three, you can remind them that a decision to make or an unmet goal can be stressors

"Okay, now I'm going to give you your worksheets from the last time you were in the lab. Look at the stressor you talked about last time, which should be the second stressor on the list."

- Hand them worksheets from Visit 1

"Compare that stressor you talked about last time to the ones on your new list. Which stressor on the new list is closest to the stressor you talked about last time, in terms of how stressful and complicated it is? You can use the ratings you made of the stressors to help you decide. Take a minute to think about it, and then circle your choice. If there's not one that's perfectly equal, just pick the one that is closest. Any questions about that?"

- Make sure that they both circle an appropriate stressor on the new worksheet

"Okay, I want you to talk about the stressor that you circled."

"Here are the instructions for the activity. Pretend you are doing a session just like you learned in the course. Here is a sheet that shows what you would have in front of you during a session. Take a minute and look it over."

- Place "Session Page" handouts in front of participants
- Wait a minute or two while they read it

"I will give you a few minutes to do your preparation before each person's turn. Then you'll have 45 minutes to talk and listen. Please try to fill the full 45 minutes talking about your stressor without changing the subject. You can always talk in more detail about the stressor to fill the time.

After 45 minutes, you'll have a break, then switch roles and do it again. Your conversation will be video recorded. We'll use the recordings to study how people use the skills from the course. I'm also going to use this audio recorder as backup in case the video recording malfunctions."

“Here’s an important thing to remember: You should use the skills from the course however you really would use them when meeting outside of the lab, rather than trying to impress anyone. We are trying to understand how people really use these skills, so relax and do what you learned in the way that works best for you. Do you have any more questions? Okay, please silence your cell phones and get comfortable. I’ll go start the recording and then we’ll decide who goes first.”

- Start the audio recorder
- Start the video recorder in the A/V room
- Flip a coin to decide who talks first

[to the first talker] “You’re going to talk about your stressor first. So that we know who you are when we go back and look at the video, please hold up this whiteboard in front of you and say your name, your ID, and ‘I’m going to talk about my stressor.’”

- Allow P to repeat the phrase

“Now I will leave you alone for a few minutes to prepare silently for your roles, just like you learned.”

- Leave the room
- Set an alarm or timer for 3 minutes
- Knock on the door when 3 minutes is up

“Okay, you can go ahead and start talking and listening. After 45 minutes is up, I’ll knock on the door and let you know it’s time to stop and take a break. If you need anything, I’ll be in the room I showed you down the hall.”

- Set an alarm or timer to go off in 45 minutes
- Work in room 141 until the timer is up
- When the timer goes off, knock on the door and give them a 5-minute break; do not stop the recording devices during this period

“Okay, now it’s time to switch roles.” [to the second talker] “Please hold up this whiteboard in front of you and say your name, your ID, and ‘I’m going to talk about my stressor.’”

- Allow P to repeat the phrase

“Again, I’ll leave you alone for a few minutes to prepare for your roles.”

- Leave the room
- Set an alarm or timer for 3 minutes
- Knock on the door when 3 minutes is up

“Okay, you can go ahead and start talking and listening. After 45 minutes is up, I’ll knock on the door and let you know you’re done.”

- Set an alarm or timer to go off in 45 minutes
- Work in room 141 until the timer is up
- When the timer goes off, go to the A/V room and stop the video recorder; wait until the light is green and remove the USB flash drive
- Knock on the door and stop the audio recorder
- Clean out the room and bring all materials to 141 with the participants
- Make sure participant names are on the worksheets; add IDs, date, and visit number

## APPENDIX H

### STAN CODE

#### Proportion outcome variable (binomial) models

##### *Visit/condition differences model*

```
// generated with brms 1.5.1
functions {
}
data {
  int<lower=1> N; // total number of observations
  int Y[N]; // response variable
  int<lower=1> K; // number of population-level effects
  matrix[N, K] X; // population-level design matrix
  // data for group-level effects of ID 1
  int<lower=1> J_1[N];
  int<lower=1> N_1;
  int<lower=1> M_1;
  vector[N] Z_1_1;
  vector[N] Z_1_2;
  int<lower=1> NC_1;
  // data for group-level effects of ID 2
  int<lower=1> J_2[N];
  int<lower=1> N_2;
  int<lower=1> M_2;
  vector[N] Z_2_1;
  vector[N] Z_2_2;
  int<lower=1> NC_2;
  int trials[N]; // number of trials
  int prior_only; // should the likelihood be ignored?
}
transformed data {
  int Kc;
  matrix[N, K - 1] Xc; // centered version of X
  vector[K - 1] means_X; // column means of X before centering
  Kc = K - 1; // the intercept is removed from the design matrix
  for (i in 2:K) {
    means_X[i - 1] = mean(X[, i]);
    Xc[, i - 1] = X[, i] - means_X[i - 1];
  }
}
parameters {
  vector[Kc] b; // population-level effects
  real temp_Intercept; // temporary intercept
  vector<lower=0>[M_1] sd_1; // group-level standard deviations
  matrix[M_1, N_1] z_1; // unscaled group-level effects
  // cholesky factor of correlation matrix
  cholesky_factor_corr[M_1] L_1;
  vector<lower=0>[M_2] sd_2; // group-level standard deviations
  matrix[M_2, N_2] z_2; // unscaled group-level effects
  // cholesky factor of correlation matrix
  cholesky_factor_corr[M_2] L_2;
}
transformed parameters {
```

```

// group-level effects
matrix[N_1, M_1] r_1;
vector[N_1] r_1_1;
vector[N_1] r_1_2;
// group-level effects
matrix[N_2, M_2] r_2;
vector[N_2] r_2_1;
vector[N_2] r_2_2;
r_1 = (diag_pre_multiply(sd_1, L_1) * z_1)';
r_1_1 = r_1[, 1];
r_1_2 = r_1[, 2];
r_2 = (diag_pre_multiply(sd_2, L_2) * z_2)';
r_2_1 = r_2[, 1];
r_2_2 = r_2[, 2];
}
model {
  vector[N] mu;
  mu = Xc * b + temp_Intercept;
  for (n in 1:N) {
    mu[n] = mu[n] + (r_1_1[J_1[n]]) * Z_1_1[n] + (r_1_2[J_1[n]]) *
Z_1_2[n] + (r_2_1[J_2[n]]) * Z_2_1[n] + (r_2_2[J_2[n]]) * Z_2_2[n];
  }
  // prior specifications
  b ~ normal(0, 10);
  sd_1 ~ student_t(3, 0, 10);
  L_1 ~ lkj_corr_cholesky(1);
  to_vector(z_1) ~ normal(0, 1);
  sd_2 ~ student_t(3, 0, 10);
  L_2 ~ lkj_corr_cholesky(1);
  to_vector(z_2) ~ normal(0, 1);
  // likelihood contribution
  if (!prior_only) {
    Y ~ binomial_logit(trials, mu);
  }
}
generated quantities {
  real b_Intercept; // population-level intercept
  corr_matrix[M_1] Cor_1;
  vector<lower=-1,upper=1>[NC_1] cor_1;
  corr_matrix[M_2] Cor_2;
  vector<lower=-1,upper=1>[NC_2] cor_2;
  b_Intercept = temp_Intercept - dot_product(means_X, b);
  // take only relevant parts of correlation matrix
  Cor_1 = multiply_lower_tri_self_transpose(L_1);
  cor_1[1] = Cor_1[1,2];
  // take only relevant parts of correlation matrix
  Cor_2 = multiply_lower_tri_self_transpose(L_2);
  cor_2[1] = Cor_2[1,2];
}

```

### ***Pre-post change model***

```

// generated with brms 1.5.1
functions {
}
data {
  int<lower=1> N; // total number of observations

```

```

int Y[N]; // response variable
int<lower=1> K; // number of population-level effects
matrix[N, K] X; // population-level design matrix
// data for group-level effects of ID 1
int<lower=1> J_1[N];
int<lower=1> N_1;
int<lower=1> M_1;
vector[N] Z_1_1;
vector[N] Z_1_2;
int<lower=1> NC_1;
// data for group-level effects of ID 2
int<lower=1> J_2[N];
int<lower=1> N_2;
int<lower=1> M_2;
vector[N] Z_2_1;
vector[N] Z_2_2;
int<lower=1> NC_2;
int trials[N]; // number of trials
int prior_only; // should the likelihood be ignored?
}
transformed data {
  int Kc;
  matrix[N, K - 1] Xc; // centered version of X
  vector[K - 1] means_X; // column means of X before centering
  Kc = K - 1; // the intercept is removed from the design matrix
  for (i in 2:K) {
    means_X[i - 1] = mean(X[, i]);
    Xc[, i - 1] = X[, i] - means_X[i - 1];
  }
}
parameters {
  vector[Kc] b; // population-level effects
  real temp_Intercept; // temporary intercept
  vector<lower=0>[M_1] sd_1; // group-level standard deviations
  matrix[M_1, N_1] z_1; // unscaled group-level effects
  // cholesky factor of correlation matrix
  cholesky_factor_corr[M_1] L_1;
  vector<lower=0>[M_2] sd_2; // group-level standard deviations
  matrix[M_2, N_2] z_2; // unscaled group-level effects
  // cholesky factor of correlation matrix
  cholesky_factor_corr[M_2] L_2;
}
transformed parameters {
  // group-level effects
  matrix[N_1, M_1] r_1;
  vector[N_1] r_1_1;
  vector[N_1] r_1_2;
  // group-level effects
  matrix[N_2, M_2] r_2;
  vector[N_2] r_2_1;
  vector[N_2] r_2_2;
  r_1 = (diag_pre_multiply(sd_1, L_1) * z_1)';
  r_1_1 = r_1[, 1];
  r_1_2 = r_1[, 2];
  r_2 = (diag_pre_multiply(sd_2, L_2) * z_2)';
  r_2_1 = r_2[, 1];
  r_2_2 = r_2[, 2];
}

```

```

}
model {
  vector[N] mu;
  mu = Xc * b + temp_Intercept;
  for (n in 1:N) {
    mu[n] = mu[n] + (r_1_1[J_1[n]]) * Z_1_1[n] + (r_1_2[J_1[n]]) *
Z_1_2[n] + (r_2_1[J_2[n]]) * Z_2_1[n] + (r_2_2[J_2[n]]) * Z_2_2[n];
  }
  // prior specifications
  b ~ normal(0, 10);
  sd_1 ~ student_t(3, 0, 10);
  L_1 ~ lkj_corr_cholesky(1);
  to_vector(z_1) ~ normal(0, 1);
  sd_2 ~ student_t(3, 0, 10);
  L_2 ~ lkj_corr_cholesky(1);
  to_vector(z_2) ~ normal(0, 1);
  // likelihood contribution
  if (!prior_only) {
    Y ~ binomial_logit(trials, mu);
  }
}
generated quantities {
  real b_Intercept; // population-level intercept
  corr_matrix[M_1] Cor_1;
  vector<lower=-1,upper=1>[NC_1] cor_1;
  corr_matrix[M_2] Cor_2;
  vector<lower=-1,upper=1>[NC_2] cor_2;
  b_Intercept = temp_Intercept - dot_product(means_X, b);
  // take only relevant parts of correlation matrix
  Cor_1 = multiply_lower_tri_self_transpose(L_1);
  cor_1[1] = Cor_1[1,2];
  // take only relevant parts of correlation matrix
  Cor_2 = multiply_lower_tri_self_transpose(L_2);
  cor_2[1] = Cor_2[1,2];
}

```

## Dichotomous outcome variable (Bernoulli) models

### *Visit/condition differences model*

```

// generated with brms 1.5.1
functions {
}
data {
  int<lower=1> N; // total number of observations
  int Y[N]; // response variable
  int<lower=1> K; // number of population-level effects
  matrix[N, K] X; // population-level design matrix
  // data for group-level effects of ID 1
  int<lower=1> J_1[N];
  int<lower=1> N_1;
  int<lower=1> M_1;
  vector[N] Z_1_1;
  vector[N] Z_1_2;
  int<lower=1> NC_1;
  // data for group-level effects of ID 2
  int<lower=1> J_2[N];
}

```

```

int<lower=1> N_2;
int<lower=1> M_2;
vector[N] Z_2_1;
vector[N] Z_2_2;
int<lower=1> NC_2;
int prior_only; // should the likelihood be ignored?
}
transformed data {
  int Kc;
  matrix[N, K - 1] Xc; // centered version of X
  vector[K - 1] means_X; // column means of X before centering
  Kc = K - 1; // the intercept is removed from the design matrix
  for (i in 2:K) {
    means_X[i - 1] = mean(X[, i]);
    Xc[, i - 1] = X[, i] - means_X[i - 1];
  }
}
parameters {
  vector[Kc] b; // population-level effects
  real temp_Intercept; // temporary intercept
  vector<lower=0>[M_1] sd_1; // group-level standard deviations
  matrix[M_1, N_1] z_1; // unscaled group-level effects
  // cholesky factor of correlation matrix
  cholesky_factor_corr[M_1] L_1;
  vector<lower=0>[M_2] sd_2; // group-level standard deviations
  matrix[M_2, N_2] z_2; // unscaled group-level effects
  // cholesky factor of correlation matrix
  cholesky_factor_corr[M_2] L_2;
}
transformed parameters {
  // group-level effects
  matrix[N_1, M_1] r_1;
  vector[N_1] r_1_1;
  vector[N_1] r_1_2;
  // group-level effects
  matrix[N_2, M_2] r_2;
  vector[N_2] r_2_1;
  vector[N_2] r_2_2;
  r_1 = (diag_pre_multiply(sd_1, L_1) * z_1)';
  r_1_1 = r_1[, 1];
  r_1_2 = r_1[, 2];
  r_2 = (diag_pre_multiply(sd_2, L_2) * z_2)';
  r_2_1 = r_2[, 1];
  r_2_2 = r_2[, 2];
}
model {
  vector[N] mu;
  mu = Xc * b + temp_Intercept;
  for (n in 1:N) {
    mu[n] = mu[n] + (r_1_1[J_1[n]]) * Z_1_1[n] + (r_1_2[J_1[n]]) *
Z_1_2[n] + (r_2_1[J_2[n]]) * Z_2_1[n] + (r_2_2[J_2[n]]) * Z_2_2[n];
  }
  // prior specifications
  b ~ normal(0, 6);
  sd_1 ~ student_t(3, 0, 10);
  L_1 ~ lkj_corr_cholesky(1);
  to_vector(z_1) ~ normal(0, 1);
}

```

```

sd_2 ~ student_t(3, 0, 10);
L_2 ~ lkj_corr_cholesky(1);
to_vector(z_2) ~ normal(0, 1);
// likelihood contribution
if (!prior_only) {
  Y ~ poisson_log(mu);
}
}
generated quantities {
  real b_Intercept; // population-level intercept
  corr_matrix[M_1] Cor_1;
  vector<lower=-1,upper=1>[NC_1] cor_1;
  corr_matrix[M_2] Cor_2;
  vector<lower=-1,upper=1>[NC_2] cor_2;
  b_Intercept = temp_Intercept - dot_product(means_X, b);
  // take only relevant parts of correlation matrix
  Cor_1 = multiply_lower_tri_self_transpose(L_1);
  cor_1[1] = Cor_1[1,2];
  // take only relevant parts of correlation matrix
  Cor_2 = multiply_lower_tri_self_transpose(L_2);
  cor_2[1] = Cor_2[1,2];
}

```

### ***Pre-post change model***

```

// generated with brms 1.5.1
functions {
}
data {
  int<lower=1> N; // total number of observations
  int Y[N]; // response variable
  int<lower=1> K; // number of population-level effects
  matrix[N, K] X; // population-level design matrix
  // data for group-level effects of ID 1
  int<lower=1> J_1[N];
  int<lower=1> N_1;
  int<lower=1> M_1;
  vector[N] Z_1_1;
  vector[N] Z_1_2;
  int<lower=1> NC_1;
  // data for group-level effects of ID 2
  int<lower=1> J_2[N];
  int<lower=1> N_2;
  int<lower=1> M_2;
  vector[N] Z_2_1;
  vector[N] Z_2_2;
  int<lower=1> NC_2;
  int prior_only; // should the likelihood be ignored?
}
transformed data {
  int Kc;
  matrix[N, K - 1] Xc; // centered version of X
  vector[K - 1] means_X; // column means of X before centering
  Kc = K - 1; // the intercept is removed from the design matrix
  for (i in 2:K) {
    means_X[i - 1] = mean(X[, i]);
    Xc[, i - 1] = X[, i] - means_X[i - 1];
  }
}

```

```

    }
  }
  parameters {
    vector[Kc] b; // population-level effects
    real temp_Intercept; // temporary intercept
    vector<lower=0>[M_1] sd_1; // group-level standard deviations
    matrix[M_1, N_1] z_1; // unscaled group-level effects
    // cholesky factor of correlation matrix
    cholesky_factor_corr[M_1] L_1;
    vector<lower=0>[M_2] sd_2; // group-level standard deviations
    matrix[M_2, N_2] z_2; // unscaled group-level effects
    // cholesky factor of correlation matrix
    cholesky_factor_corr[M_2] L_2;
  }
  transformed parameters {
    // group-level effects
    matrix[N_1, M_1] r_1;
    vector[N_1] r_1_1;
    vector[N_1] r_1_2;
    // group-level effects
    matrix[N_2, M_2] r_2;
    vector[N_2] r_2_1;
    vector[N_2] r_2_2;
    r_1 = (diag_pre_multiply(sd_1, L_1) * z_1)';
    r_1_1 = r_1[, 1];
    r_1_2 = r_1[, 2];
    r_2 = (diag_pre_multiply(sd_2, L_2) * z_2)';
    r_2_1 = r_2[, 1];
    r_2_2 = r_2[, 2];
  }
  model {
    vector[N] mu;
    mu = Xc * b + temp_Intercept;
    for (n in 1:N) {
      mu[n] = mu[n] + (r_1_1[J_1[n]]) * Z_1_1[n] + (r_1_2[J_1[n]]) *
Z_1_2[n] + (r_2_1[J_2[n]]) * Z_2_1[n] + (r_2_2[J_2[n]]) * Z_2_2[n];
    }
    // prior specifications
    b ~ normal(0, 6);
    sd_1 ~ student_t(3, 0, 10);
    L_1 ~ lkj_corr_cholesky(1);
    to_vector(z_1) ~ normal(0, 1);
    sd_2 ~ student_t(3, 0, 10);
    L_2 ~ lkj_corr_cholesky(1);
    to_vector(z_2) ~ normal(0, 1);
    // likelihood contribution
    if (!prior_only) {
      Y ~ poisson_log(mu);
    }
  }
  generated quantities {
    real b_Intercept; // population-level intercept
    corr_matrix[M_1] Cor_1;
    vector<lower=-1,upper=1>[NC_1] cor_1;
    corr_matrix[M_2] Cor_2;
    vector<lower=-1,upper=1>[NC_2] cor_2;
    b_Intercept = temp_Intercept - dot_product(means_X, b);
  }

```

```

// take only relevant parts of correlation matrix
Cor_1 = multiply_lower_tri_self_transpose(L_1);
cor_1[1] = Cor_1[1,2];
// take only relevant parts of correlation matrix
Cor_2 = multiply_lower_tri_self_transpose(L_2);
cor_2[1] = Cor_2[1,2];
}

```

## Count outcome variable (Poisson) models

### *Visit/condition differences model*

```

// generated with brms 1.5.1
functions {
}
data {
  int<lower=1> N; // total number of observations
  int Y[N]; // response variable
  int<lower=1> K; // number of population-level effects
  matrix[N, K] X; // population-level design matrix
  // data for group-level effects of ID 1
  int<lower=1> J_1[N];
  int<lower=1> N_1;
  int<lower=1> M_1;
  vector[N] Z_1_1;
  vector[N] Z_1_2;
  int<lower=1> NC_1;
  // data for group-level effects of ID 2
  int<lower=1> J_2[N];
  int<lower=1> N_2;
  int<lower=1> M_2;
  vector[N] Z_2_1;
  vector[N] Z_2_2;
  int<lower=1> NC_2;
  int prior_only; // should the likelihood be ignored?
}
transformed data {
  int Kc;
  matrix[N, K - 1] Xc; // centered version of X
  vector[K - 1] means_X; // column means of X before centering
  Kc = K - 1; // the intercept is removed from the design matrix
  for (i in 2:K) {
    means_X[i - 1] = mean(X[, i]);
    Xc[, i - 1] = X[, i] - means_X[i - 1];
  }
}
parameters {
  vector[Kc] b; // population-level effects
  real temp_Intercept; // temporary intercept
  vector<lower=0>[M_1] sd_1; // group-level standard deviations
  matrix[M_1, N_1] z_1; // unscaled group-level effects
  // cholesky factor of correlation matrix
  cholesky_factor_corr[M_1] L_1;
  vector<lower=0>[M_2] sd_2; // group-level standard deviations
  matrix[M_2, N_2] z_2; // unscaled group-level effects
  // cholesky factor of correlation matrix
  cholesky_factor_corr[M_2] L_2;
}

```

```

transformed parameters {
  // group-level effects
  matrix[N_1, M_1] r_1;
  vector[N_1] r_1_1;
  vector[N_1] r_1_2;
  // group-level effects
  matrix[N_2, M_2] r_2;
  vector[N_2] r_2_1;
  vector[N_2] r_2_2;
  r_1 = (diag_pre_multiply(sd_1, L_1) * z_1)';
  r_1_1 = r_1[, 1];
  r_1_2 = r_1[, 2];
  r_2 = (diag_pre_multiply(sd_2, L_2) * z_2)';
  r_2_1 = r_2[, 1];
  r_2_2 = r_2[, 2];
}
model {
  vector[N] mu;
  mu = Xc * b + temp_Intercept;
  for (n in 1:N) {
    mu[n] = mu[n] + (r_1_1[J_1[n]]) * Z_1_1[n] + (r_1_2[J_1[n]]) *
Z_1_2[n] + (r_2_1[J_2[n]]) * Z_2_1[n] + (r_2_2[J_2[n]]) * Z_2_2[n];
  }
  // prior specifications
  b ~ normal(0, 6);
  sd_1 ~ student_t(3, 0, 10);
  L_1 ~ lkj_corr_cholesky(1);
  to_vector(z_1) ~ normal(0, 1);
  sd_2 ~ student_t(3, 0, 10);
  L_2 ~ lkj_corr_cholesky(1);
  to_vector(z_2) ~ normal(0, 1);
  // likelihood contribution
  if (!prior_only) {
    Y ~ poisson_log(mu);
  }
}
generated quantities {
  real b_Intercept; // population-level intercept
  corr_matrix[M_1] Cor_1;
  vector<lower=-1,upper=1>[NC_1] cor_1;
  corr_matrix[M_2] Cor_2;
  vector<lower=-1,upper=1>[NC_2] cor_2;
  b_Intercept = temp_Intercept - dot_product(means_X, b);
  // take only relevant parts of correlation matrix
  Cor_1 = multiply_lower_tri_self_transpose(L_1);
  cor_1[1] = Cor_1[1,2];
  // take only relevant parts of correlation matrix
  Cor_2 = multiply_lower_tri_self_transpose(L_2);
  cor_2[1] = Cor_2[1,2];
}

Pre-post change model
// generated with brms 1.5.1
functions {
}
data {

```

```

int<lower=1> N; // total number of observations
int Y[N]; // response variable
int<lower=1> K; // number of population-level effects
matrix[N, K] X; // population-level design matrix
// data for group-level effects of ID 1
int<lower=1> J_1[N];
int<lower=1> N_1;
int<lower=1> M_1;
vector[N] Z_1_1;
vector[N] Z_1_2;
int<lower=1> NC_1;
// data for group-level effects of ID 2
int<lower=1> J_2[N];
int<lower=1> N_2;
int<lower=1> M_2;
vector[N] Z_2_1;
vector[N] Z_2_2;
int<lower=1> NC_2;
int prior_only; // should the likelihood be ignored?
}
transformed data {
int Kc;
matrix[N, K - 1] Xc; // centered version of X
vector[K - 1] means_X; // column means of X before centering
Kc = K - 1; // the intercept is removed from the design matrix
for (i in 2:K) {
means_X[i - 1] = mean(X[, i]);
Xc[, i - 1] = X[, i] - means_X[i - 1];
}
}
parameters {
vector[Kc] b; // population-level effects
real temp_Intercept; // temporary intercept
vector<lower=0>[M_1] sd_1; // group-level standard deviations
matrix[M_1, N_1] z_1; // unscaled group-level effects
// cholesky factor of correlation matrix
cholesky_factor_corr[M_1] L_1;
vector<lower=0>[M_2] sd_2; // group-level standard deviations
matrix[M_2, N_2] z_2; // unscaled group-level effects
// cholesky factor of correlation matrix
cholesky_factor_corr[M_2] L_2;
}
transformed parameters {
// group-level effects
matrix[N_1, M_1] r_1;
vector[N_1] r_1_1;
vector[N_1] r_1_2;
// group-level effects
matrix[N_2, M_2] r_2;
vector[N_2] r_2_1;
vector[N_2] r_2_2;
r_1 = (diag_pre_multiply(sd_1, L_1) * z_1)';
r_1_1 = r_1[, 1];
r_1_2 = r_1[, 2];
r_2 = (diag_pre_multiply(sd_2, L_2) * z_2)';
r_2_1 = r_2[, 1];
r_2_2 = r_2[, 2];
}

```

```

}
model {
  vector[N] mu;
  mu = Xc * b + temp_Intercept;
  for (n in 1:N) {
    mu[n] = mu[n] + (r_1_1[J_1[n]]) * Z_1_1[n] + (r_1_2[J_1[n]]) *
Z_1_2[n] + (r_2_1[J_2[n]]) * Z_2_1[n] + (r_2_2[J_2[n]]) * Z_2_2[n];
  }
  // prior specifications
  b ~ normal(0, 6);
  sd_1 ~ student_t(3, 0, 10);
  L_1 ~ lkj_corr_cholesky(1);
  to_vector(z_1) ~ normal(0, 1);
  sd_2 ~ student_t(3, 0, 10);
  L_2 ~ lkj_corr_cholesky(1);
  to_vector(z_2) ~ normal(0, 1);
  // likelihood contribution
  if (!prior_only) {
    Y ~ poisson_log(mu);
  }
}
}
generated quantities {
  real b_Intercept; // population-level intercept
  corr_matrix[M_1] Cor_1;
  vector<lower=-1,upper=1>[NC_1] cor_1;
  corr_matrix[M_2] Cor_2;
  vector<lower=-1,upper=1>[NC_2] cor_2;
  b_Intercept = temp_Intercept - dot_product(means_X, b);
  // take only relevant parts of correlation matrix
  Cor_1 = multiply_lower_tri_self_transpose(L_1);
  cor_1[1] = Cor_1[1,2];
  // take only relevant parts of correlation matrix
  Cor_2 = multiply_lower_tri_self_transpose(L_2);
  cor_2[1] = Cor_2[1,2];
}
}

```

## Continuous outcome variable (Gaussian) models

### *Visit/condition differences model*

```

// generated with brms 1.5.1
functions {
}
data {
  int<lower=1> N; // total number of observations
  vector[N] Y; // response variable
  int<lower=1> K; // number of population-level effects
  matrix[N, K] X; // population-level design matrix
  // data for group-level effects of ID 1
  int<lower=1> J_1[N];
  int<lower=1> N_1;
  int<lower=1> M_1;
  vector[N] Z_1_1;
  vector[N] Z_1_2;
  int<lower=1> NC_1;
  // data for group-level effects of ID 2
  int<lower=1> J_2[N];
  int<lower=1> N_2;
}

```

```

    int<lower=1> M_2;
    vector[N] Z_2_1;
    vector[N] Z_2_2;
    int<lower=1> NC_2;
    int prior_only; // should the likelihood be ignored?
}
transformed data {
    int Kc;
    matrix[N, K - 1] Xc; // centered version of X
    vector[K - 1] means_X; // column means of X before centering
    Kc = K - 1; // the intercept is removed from the design matrix
    for (i in 2:K) {
        means_X[i - 1] = mean(X[, i]);
        Xc[, i - 1] = X[, i] - means_X[i - 1];
    }
}
parameters {
    vector[Kc] b; // population-level effects
    real temp_Intercept; // temporary intercept
    real<lower=0> sigma; // residual SD
    vector<lower=0>[M_1] sd_1; // group-level standard deviations
    matrix[M_1, N_1] z_1; // unscaled group-level effects
    // cholesky factor of correlation matrix
    cholesky_factor_corr[M_1] L_1;
    vector<lower=0>[M_2] sd_2; // group-level standard deviations
    matrix[M_2, N_2] z_2; // unscaled group-level effects
    // cholesky factor of correlation matrix
    cholesky_factor_corr[M_2] L_2;
}
transformed parameters {
    // group-level effects
    matrix[N_1, M_1] r_1;
    vector[N_1] r_1_1;
    vector[N_1] r_1_2;
    // group-level effects
    matrix[N_2, M_2] r_2;
    vector[N_2] r_2_1;
    vector[N_2] r_2_2;
    r_1 = (diag_pre_multiply(sd_1, L_1) * z_1)';
    r_1_1 = r_1[, 1];
    r_1_2 = r_1[, 2];
    r_2 = (diag_pre_multiply(sd_2, L_2) * z_2)';
    r_2_1 = r_2[, 1];
    r_2_2 = r_2[, 2];
}
model {
    vector[N] mu;
    mu = Xc * b + temp_Intercept;
    for (n in 1:N) {
        mu[n] = mu[n] + (r_1_1[J_1[n]]) * Z_1_1[n] + (r_1_2[J_1[n]]) *
Z_1_2[n] + (r_2_1[J_2[n]]) * Z_2_1[n] + (r_2_2[J_2[n]]) * Z_2_2[n];
    }
    // prior specifications
    b ~ normal(0, 9);
    sigma ~ student_t(3, 0, 10);
    sd_1 ~ student_t(3, 0, 10);
    L_1 ~ lkj_corr_cholesky(1);
}

```

```

to_vector(z_1) ~ normal(0, 1);
sd_2 ~ student_t(3, 0, 10);
L_2 ~ lkj_corr_cholesky(1);
to_vector(z_2) ~ normal(0, 1);
// likelihood contribution
if (!prior_only) {
  Y ~ normal(mu, sigma);
}
}
generated quantities {
  real b_Intercept; // population-level intercept
  corr_matrix[M_1] Cor_1;
  vector<lower=-1,upper=1>[NC_1] cor_1;
  corr_matrix[M_2] Cor_2;
  vector<lower=-1,upper=1>[NC_2] cor_2;
  b_Intercept = temp_Intercept - dot_product(means_X, b);
  // take only relevant parts of correlation matrix
  Cor_1 = multiply_lower_tri_self_transpose(L_1);
  cor_1[1] = Cor_1[1,2];
  // take only relevant parts of correlation matrix
  Cor_2 = multiply_lower_tri_self_transpose(L_2);
  cor_2[1] = Cor_2[1,2];
}

```

### ***Pre-post change model***

```

// generated with brms 1.5.1
functions {
}
data {
  int<lower=1> N; // total number of observations
  vector[N] Y; // response variable
  int<lower=1> K; // number of population-level effects
  matrix[N, K] X; // population-level design matrix
  // data for group-level effects of ID 1
  int<lower=1> J_1[N];
  int<lower=1> N_1;
  int<lower=1> M_1;
  vector[N] Z_1_1;
  vector[N] Z_1_2;
  int<lower=1> NC_1;
  // data for group-level effects of ID 2
  int<lower=1> J_2[N];
  int<lower=1> N_2;
  int<lower=1> M_2;
  vector[N] Z_2_1;
  vector[N] Z_2_2;
  int<lower=1> NC_2;
  int prior_only; // should the likelihood be ignored?
}
transformed data {
  int Kc;
  matrix[N, K - 1] Xc; // centered version of X
  vector[K - 1] means_X; // column means of X before centering
  Kc = K - 1; // the intercept is removed from the design matrix
  for (i in 2:K) {
    means_X[i - 1] = mean(X[, i]);
  }
}

```

```

    Xc[, i - 1] = X[, i] - means_X[i - 1];
  }
}
parameters {
  vector[Kc] b; // population-level effects
  real temp_Intercept; // temporary intercept
  real<lower=0> sigma; // residual SD
  vector<lower=0>[M_1] sd_1; // group-level standard deviations
  matrix[M_1, N_1] z_1; // unscaled group-level effects
  // cholesky factor of correlation matrix
  cholesky_factor_corr[M_1] L_1;
  vector<lower=0>[M_2] sd_2; // group-level standard deviations
  matrix[M_2, N_2] z_2; // unscaled group-level effects
  // cholesky factor of correlation matrix
  cholesky_factor_corr[M_2] L_2;
}
transformed parameters {
  // group-level effects
  matrix[N_1, M_1] r_1;
  vector[N_1] r_1_1;
  vector[N_1] r_1_2;
  // group-level effects
  matrix[N_2, M_2] r_2;
  vector[N_2] r_2_1;
  vector[N_2] r_2_2;
  r_1 = (diag_pre_multiply(sd_1, L_1) * z_1)';
  r_1_1 = r_1[, 1];
  r_1_2 = r_1[, 2];
  r_2 = (diag_pre_multiply(sd_2, L_2) * z_2)';
  r_2_1 = r_2[, 1];
  r_2_2 = r_2[, 2];
}
model {
  vector[N] mu;
  mu = Xc * b + temp_Intercept;
  for (n in 1:N) {
    mu[n] = mu[n] + (r_1_1[J_1[n]]) * Z_1_1[n] + (r_1_2[J_1[n]]) *
Z_1_2[n] + (r_2_1[J_2[n]]) * Z_2_1[n] + (r_2_2[J_2[n]]) * Z_2_2[n];
  }
  // prior specifications
  b ~ normal(0, 9);
  sigma ~ student_t(3, 0, 10);
  sd_1 ~ student_t(3, 0, 10);
  L_1 ~ lkj_corr_cholesky(1);
  to_vector(z_1) ~ normal(0, 1);
  sd_2 ~ student_t(3, 0, 10);
  L_2 ~ lkj_corr_cholesky(1);
  to_vector(z_2) ~ normal(0, 1);
  // likelihood contribution
  if (!prior_only) {
    Y ~ normal(mu, sigma);
  }
}
generated quantities {
  real b_Intercept; // population-level intercept
  corr_matrix[M_1] Cor_1;
  vector<lower=-1,upper=1>[NC_1] cor_1;
}

```

```
corr_matrix[M_2] Cor_2;  
vector<lower=-1,upper=1>[NC_2] cor_2;  
b_Intercept = temp_Intercept - dot_product(means_X, b);  
// take only relevant parts of correlation matrix  
Cor_1 = multiply_lower_tri_self_transpose(L_1);  
cor_1[1] = Cor_1[1,2];  
// take only relevant parts of correlation matrix  
Cor_2 = multiply_lower_tri_self_transpose(L_2);  
cor_2[1] = Cor_2[1,2];  
}
```

## REFERENCES

- Auld, F., & White, A. M. (1956). Rules for dividing interviews into sentences. *Journal of Psychology*, *42*, 273–281. doi:10.1080/00223980.1956.9713040
- Baker, S. B., Daniels, T. G., & Greeley, A. T. (1990). Systematic training of graduate-level counselors: Narrative and meta-analytic reviews of three major programs. *The Counseling Psychologist*, *18*(3), 355–421. doi:10.1177/0011000090183001
- Bandura, A. J. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.
- Barth, J., Munder, T., Gerger, H., Nüesch, E., Trelle, S., Znoj, H., ... Cuijpers, P. (2013). Comparative efficacy of seven psychotherapeutic interventions for patients with depression: A network meta-analysis. *PLOS Medicine*, *10*(5), e1001454. doi:10.1371/journal.pmed.1001454
- Baskin, T. W., Tierney, S. C., Minami, T., & Wampold, B. E. (2003). Establishing specificity in psychotherapy: A meta-analysis of structural equivalence of placebo controls. *Journal of Consulting and Clinical Psychology*, *71*(6), 973–979. doi:10.1037/0022-006X.71.6.973
- Bell, E. C., Marcus, D. K., & Goodlad, J. K. (2013). Are the parts as good as the whole? A meta-analysis of component treatment studies. *Journal of Consulting and Clinical Psychology*, *81*(4), 722–736. doi:10.1037/a0033004
- Benjamin, L. S. (2003). *Interpersonal Reconstructive Therapy (IRT): An integrative personality-based treatment for complex cases*. New York, NY: Guilford.
- Bernecker, S. L., Banschback, K., Santorelli, G. D., & Constantino, M. J. (2017). A Web-disseminated self-help and peer support program could fill gaps in mental health care: Lessons from a consumer survey. *JMIR Mental Health*, *4*(1), e5. doi:10.2196/mental.4751
- Bonanno, G. A., & Burton, C. L. (2013). Regulatory flexibility: An individual differences perspective on coping and emotion regulation. *Perspectives on Psychological Science*, *8*(6), 591–612. doi:10.1177/1745691613504116
- Boulet, J., & Boss, M. W. (1991). Reliability and validity of the Brief Symptom Inventory. *Psychological Assessment: A Journal of Consulting and Clinical Psychology*, *3*, 433–437. doi:10.1037/1040-3590.3.3.433
- Braun, S. R., Gregor, B., & Tran, U. S. (2013). Comparing bona fide psychotherapies of depression in adults with two meta-analytical approaches. *PLOS ONE*, *8*(6), e68135. doi:10.1371/journal.pone.0068135

- Breines, J. G., Thoma, M. V., Gianferante, D., Hanlin, L., Chen, X., & Rohleder, N. (2014). Self-compassion as a predictor of interleukin-6 response to acute psychosocial stress. *Brain, Behavior, and Immunity*, *37*, 109–114. doi:10.1016/j.bbi.2013.11.006
- Brown, S. L., Nesse, R. M., Vinokur, A. D., & Smith, D. M. (2003). Providing social support may be more beneficial than receiving it: Results from a prospective study of mortality. *Psychological Science*, *14*(4), 320–327. doi:10.1111/1467-9280.14461
- Brydges, R., Carnahan, H., Rose, D., Rose, L., & Dubrowski, A. (2010). Coordinating progressive levels of simulation fidelity to maximize educational benefit. *Academic Medicine*, *85*(5), 806–812. doi:10.1097/ACM.0b013e3181d7aabd
- Bürkner, P.-C. (in press). brms: An R package for Bayesian multilevel models using Stan. *Journal of Statistical Software*.
- Butler, A. C. (2010). Repeated testing produces superior transfer of learning relative to repeated studying. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *36*(5), 1118–1133. doi:10.1037/a0019902
- Cacioppo, J. T., Hawkey, L. C., & Thisted, R. A. (2010). Perceived social isolation makes me sad: 5-year cross-lagged analyses of loneliness and depressive symptomatology in the Chicago Health, Aging, and Social Relations Study. *Psychology and Aging*, *25*(2), 453–463. doi:10.1037/a0017216
- Carver, C. S., & Scheier, M. F. (1998). *On the self-regulation of behavior*. New York, NY: Cambridge University Press.
- Cheng, C., Lau, H. B., & Chan, M. S. (2014). Coping flexibility and psychological adjustment to stressful life changes: A meta-analytic review. *Psychological Bulletin*, *140*(6), 1582–1607. doi:10.1037/a0037913
- Chesney, M. A., Chambers, D. B., Taylor, J. M., Johnson, L. M., & Folkman, S. (2003). Coping effectiveness training for men living with HIV: Results from a randomized clinical trial testing a group-based intervention. *Psychosomatic Medicine*, *65*(6), 1038–1046. doi:10.1097/01.PSY.0000097344.78697.ED
- Clark, R. C., & Mayer, R. E. (2011). *E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning*. San Francisco, CA: Pfeiffer.
- Clow, D. (2013). MOOCs and the funnel of participation. In E. Duval, X. Ochoa, D. Suthers, & K. Verbert (Eds.), *Proceedings of the Third International Conference on Learning Analytics and Knowledge* (pp. 185–189). Retrieved from <http://hcibib.org/LAK13>

- Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, 20(1), 37–46.
- Cohen, S., & Janicki-Deverts, D. (2012). Who's stressed? Distributions of psychological stress in the United States in probability samples from 1983, 2006, and 2009. *Journal of Applied Social Psychology*, 42(6), 1320–1334. doi:10.1111/j.1559-1816.2012.00900.x
- Cohen, S., & Williamson, G. (1988). Perceived stress in a probability sample of the United States. In S. Spacapan & S. Oskamp (Eds.), *The social psychology of health: Claremont Symposium on applied social psychology*. Newbury Park, CA: Sage.
- Coyne, J. C., Wortman, C. B., & Lehman, D. R. (1988). The other side of support: Emotional overinvolvement and miscarried helping. In Gottlieb, B. H. (Ed.), *Marshaling social support: Formats, processes, and effects* (pp. 305-330). Thousand Oaks, CA: Sage.
- Cuijpers, P., Driessen, E., Hollon, S. D., van Oppen, P., Barth, J., & Andersson, G. (2012). The efficacy of non-directive supportive therapy for adult depression: A meta-analysis. *Clinical Psychology Review*, 32(4), 280–291. doi:10.1016/j.cpr.2012.01.003
- Cuijpers, P., van Straten, A., Andersson, G., & van Oppen, P. (2008). Psychotherapy for depression in adults: A meta-analysis of comparative outcome studies. *Journal of Consulting and Clinical Psychology*, 76(6), 909–22. doi:10.1037/a0013075
- Dakof, G. A., & Taylor, S. E. (1990). Victims' perceptions of social support: What is helpful from whom? *Journal of Personality and Social Psychology*, 58(1), 80–89. doi:10.1037/0022-3514.58.1.80
- Decker, P. J., & Nathan, B. R. (1985). *Behavior modeling training: Principles and applications*. New York, NY: Praeger.
- Derogatis, L. R. (1993). *BSI: Brief Symptom Inventory: Administration, scoring, and procedures manual*. Bloomington, MN: PsychCorp.
- Dimeff, L. A., Koerner, K., Woodcock, E. A., Beadnell, B., Brown, M. Z., Skutch, J. M., ... & Harned, M. S. (2009). Which training method works best? A randomized controlled trial comparing three methods of training clinicians in dialectical behavior therapy skills. *Behaviour Research and Therapy*, 47(11), 921-930. doi:10.1016/j.brat.2009.07.011

- Dunkel Schetter, C. (1984). Social support and cancer: Findings based on patient interviews and their implications. *Journal of Social Issues, 40*, 77–98. doi:10.1111/j.1540-4560.1984.tb01108.x
- Elliott, R. (1993). *The Revised Session Reaction Scale*. Toledo, OH: University of Toledo.
- Elliott, R., Hill, C. E., Stiles, W. B., Friedlander, M. L., Mahrer, A. R., & Margison, F. R. (1987). Primary therapist response modes: Comparison of six rating systems. *Journal of Consulting and Clinical Psychology, 55*, 218–223. doi:10.1037/0022-006X.55.2.218
- Evans, A. L. (2010). *A meta-analysis of pre-practicum counselor training in helping skills* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (UMI No. 3424048)
- Fairburn, C. G., & Cooper, Z. (2011). Therapist competence, therapy quality, and therapist training. *Behaviour Research and Therapy, 49*(6), 373-378. doi:10.1016/j.brat.2011.03.005
- Feeney, B. C., & Collins, N. L. (2015). A new look at social support: A theoretical perspective on thriving through relationships. *Personality and Social Psychology Review, 19*(2), 113-147. doi:10.1177/1088868314544222
- Feng, B. (2009). Testing an integrated model of advice giving in supportive interactions. *Human Communication Research, 35*(1), 115-129. doi:10.1111/j.1468-2958.2008.01340.x
- Fingerman, K. L., Hay, E. L., & Birditt, K. S. (2004). The best of ties, the worst of ties: Close, problematic, and ambivalent social relationships. *Journal of Marriage and Family, 66*, 792–808. doi:10.1111/j.0022-2445.2004.00053.x
- Fuhrer, R., Stansfeld, S. A., Chemali, J., & Shipley, M. J. (1999). Gender, social relations and mental health: Prospective findings from an occupational cohort (Whitehall II study). *Social Science & Medicine, 48*(1), 77–87. doi:10.1016/S0277-9536(98)00290-1
- Gelman, A., & Rubin, D. B. (1992). Inference from iterative simulation using multiple sequences. *Statistical Science, 7*(4), 457-472. doi:10.1214/ss/1177011136
- Gibson, J., Gray, G., Hirsch, T., Imel, Z. E., Narayanan, S., & Atkins, D. (2016, May). *Developing an automated report card for addictions counseling: The Counselor Observer Ratings Expert for MI (CORE-MI)*. Poster presented at the Computing and Mental Health symposium of the annual ACM CHI Conference on Human Factors in Computing Systems, San Jose, CA.

- Gleason, M. E. J., Iida, M., Shrout, P. E., & Bolger, N. (2008). Receiving support as a mixed blessing: Evidence for dual effects of support on psychological outcomes. *Journal of Personality and Social Psychology, 94*(5), 824–838. doi:10.1037/0022-3514.94.5.824
- Golden-Kreutz, D. M., Thornton, L. M., Wells-Di Gregorio, S., Frierson, G. M., Jim, H. S., Carpenter, K. M., ... Andersen, B. L. (2005). Traumatic stress, perceived global stress, and life events: Prospectively predicting quality of life in breast cancer patients. *Health Psychology, 24*(3), 288–296. doi:10.1037/0278-6133.24.3.288
- Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist, 54*(7), 493–503. doi:10.1037/0003-066X.54.7.493
- Gross, J. J., & Jazaieri, H. (2014). Emotion, emotion regulation, and psychopathology: An affective science perspective. *Clinical Psychological Science, 2*(4), 387–401. doi:10.1177/2167702614536164
- Hess, S. A., Knox, S., & Hill, C. E. (2006). Teaching graduate trainees how to manage client anger: A comparison of three types of training. *Psychotherapy Research, 16*(3), 282–292. doi:10.1080/10503300500264838
- Hill, C. E., & O'Brien, K. M. (1999). *Helping skills: Facilitating, exploration, insight, and action*. Washington, DC: American Psychological Association.
- Ingram, K. M., Betz, N. E., Mindes, E. J., Schmitt, M. M., & Smith, N. G. (2001). Unsupportive responses from others concerning a stressful live event: Development of the Unsupportive Social Interactions Inventory. *Journal of Social and Clinical Psychology, 20*(2), 173–207. doi:10.1521/jscp.20.2.173.22265
- Jaeckel, D., Seiger, C. P., Orth, U., & Wiese, B. S. (2012). Social support reciprocity and occupational self-efficacy beliefs during mothers' organizational re-entry. *Journal of Vocational Behavior, 80*(2), 390-399. doi:10.1016/j.jvb.2011.12.001
- Kappes, A., Singmann, H., & Oettingen, G. (2012). Mental contrasting instigates goal pursuit by linking obstacles of reality with instrumental behavior. *Journal of Experimental Social Psychology, 48*(4), 811–818. doi:10.1016/j.jesp.2012.02.002
- Karpicke, J. D. (2012). Retrieval-based learning: Active retrieval promotes meaningful learning. *Current Directions in Psychological Science, 21*(3), 157–163. doi:10.1177/0963721412443552
- Karpicke, J. D., & Blunt, J. R. (2011). Retrieval practice produces more learning than elaborative studying with concept mapping. *Science, 331*(6018), 772–775. doi:10.1126/science.1199327

- Kazdin, A. E., & Rabbitt, S. M. (2013). Novel models for delivering mental health services and reducing the burdens of mental illness. *Clinical Psychological Science, 1*(2), 170-191. doi:10.1177/2167702612463566
- Kessler, R. C., Demler, O., Frank, R. G., Olfson, M., Pincus, H. A., Walters, E. E., ... Zaslavsky, A. M. (2005). Prevalence and treatment of mental disorders, 1990 to 2003. *New England Journal of Medicine, 352*(24), 2515–2523. doi:10.1056/NEJMsa043266
- Kessler, R. C., & Wang, P. S. (2008). The descriptive epidemiology of commonly occurring mental disorders in the United States. *Annual Review of Public Health, 29*, 115–129. doi:10.1146/annurev.publhealth.29.020907.090847
- Klein, C. R. (2009). *What do we know about interpersonal skills? A meta-analytic examination of antecedents, outcomes, and the efficacy of training* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (UMI No. 3357877)
- Kluger, A. N., & DeNisi, A. (1996). The effects of feedback interventions on performance: A historical review, a meta-analysis, and a preliminary feedback intervention theory. *Psychological Bulletin, 119*(2), 254–284. doi:10.1037/0033-2909.119.2.254
- Kross, E., & Ayduk, O. (2008). Facilitating adaptive emotional analysis: Distinguishing distanced-analysis of depressive experiences from immersed-analysis and distraction. *Personality & Social Psychology Bulletin, 34*(7), 924–938. doi:10.1177/0146167208315938
- Kulkarni, C., Wei, K. P., Le, H., Chia, D., Papadopoulos, K., Cheng, J., ... Klemmer, S. R. (2013). Peer and self assessment in massive online classes. *ACM Transactions on Computer-Human Interaction, 9*(4). doi:10.1145/2505057
- Laurenceau, J.-P., Barrett, L. F., & Pietromonaco, P. R. (1998). Intimacy as an interpersonal process: The importance of self-disclosure, partner disclosure, and perceived partner responsiveness in interpersonal exchanges. *Journal of Personality and Social Psychology, 74*(5), 1238–1251. doi:10.1037/0022-3514.74.5.1238
- Lee, E.-H. (2012). Review of the psychometric evidence of the perceived stress scale. *Asian Nursing Research, 6*(4), 121–127. doi:10.1016/j.anr.2012.08.004
- Leon, A. C., Demirtas, H., & Hedeker, D. (2007). Bias reduction with an adjustment for participants' intent to drop out of a randomized controlled clinical trial. *Clinical Trials 4*(5), 540-547. doi:10.1177/1740774507083871

- Lewandowski, D., Kurowicka, D., & Joe, H. (2009). Generating random correlation matrices based on vines and extended onion method. *Journal of Multivariate Analysis*, *100*(9), 1989-2001. doi:10.1016/j.jmva.2009.04.008
- Lind, A., Hall, L., Breidegard, B., Balkenius, C., & Johansson, P. (2014). Speakers' acceptance of real-time speech exchange indicates that we use auditory feedback to specify the meaning of what we say. *Psychological Science*, *25*(6), 1198–1205. doi:10.1177/0956797614529797
- Luo, Y., Hawkey, L. C., Waite, L. J., & Cacioppo, J. T. (2012). Loneliness, health, and mortality in old age: A national longitudinal study. *Social Science & Medicine*, *74*(6), 907-914. doi:10.1016/j.socscimed.2011.11.028
- MacBeth, A., & Gumley, A. (2012). Exploring compassion: A meta-analysis of the association between self-compassion and psychopathology. *Clinical Psychology Review*, *32*(6), 545–552. doi:10.1016/j.cpr.2012.06.003
- MacGeorge, E. L., Feng, B., Butler, G. L., & Budarz, S. K. (2004). Understanding advice in supportive interactions: Beyond the facework and message evaluation paradigm. *Human Communication Research*, *30*(1), 42-70. doi:10.1111/j.1468-2958.2004.tb00724.x/
- Madson, M. B., Loignon, A. C., & Lane, C. (2009). Training in motivational interviewing: A systematic review. *Journal of Substance Abuse Treatment*, *36*(1), 101-109. doi:10.1016/j.jsat.2008.05.005
- Marigold, D. C., Cavallo, J. V, Holmes, J. G., & Wood, J. V. (2014). You can't always give what you want: The challenge of providing social support to low self-esteem individuals. *Journal of Personality and Social Psychology*, *107*(1), 56–80. doi:10.1037/a0036554
- McEwen, B. S. (2000). Allostasis and allostatic load: Implications for neuropsychopharmacology. *Neuropsychopharmacology*, *22*, 108–124. doi:10.1016/S0893-133X(99)00129-3
- McMahon, J. M., Pouget, E. R., & Tortu, S. (2006). A guide for multilevel modeling of dyadic data with binary outcomes using SAS PROC NLMIXED. *Computational Statistics & Data Analysis*, *50*(12), 3663–3680. doi:10.1016/j.csda.2005.08.008
- Miller, W. R., Yahne, C. E., Moyers, T. B., Martinez, J., & Pirritano, M. (2004). A randomized trial of methods to help clinicians learn motivational interviewing. *Journal of Consulting and Clinical Psychology*, *72*(6), 1050-1062. doi:10.1037/0022-006X.72.6.1050

- Mojtabai, R. (2005). Trends in contacts with mental health professionals and cost barriers to mental health care among adults with significant psychological distress in the United States: 1997–2002. *American Journal of Public Health, 95*, 2009–2014. doi:10.2105/AJPH.2003.037630
- Mojtabai, R., Olfson, M., Sampson, N. A., Jin, R., Druss, B., Wang, P. S., ... Kessler, R. C. (2011). Barriers to mental health treatment: Results from the National Comorbidity Survey Replication. *Psychological Medicine, 41*(8), 1751–1761. doi:10.1017/S0033291710002291
- Müller, J. M., Postert, C., Beyer, T., Furniss, T., & Achtergarde, S. (2009). Comparison of eleven short versions of the Symptom Checklist 90-Revised (SCL-90-R) for use in the assessment of general psychopathology. *Journal of Psychopathology and Behavioral Assessment, 32*, 246–254. doi: 10.1007/s10862-009-9141-5
- Neal, R. M. (2011). MCMC using Hamiltonian dynamics. In Brooks, S., Gelman, A., Jones, G., & Meng, X.-L. (Eds.), *Handbook of Markov Chain Monte Carlo* (pp. 113-162). Boca Raton, FL: CRC Press/Chapman & Hall.
- Nock, M. K. (2007). Conceptual and design essentials for evaluating mechanisms of change. *Alcoholism: Clinical and Experimental Research, 31*(S3), 4s-12s. doi:10.1111/j.1530-0277.2007.00488.x
- Nurullah, A. S. (2012). Received and provided social support: a review of current evidence and future directions. *American Journal of Health Studies, 27*(3), 173-188.
- President's New Freedom Commission on Mental Health. (2003). *Achieving the promise: Transforming mental health care in America*. Final report (DHHS Publication No. SMA 03-3832). Washington, DC: U.S. Government Printing Office.
- Prins, M. A., Verhaak, P. F. M., Bensing, J. M., & Van der Meer, K. (2008). Health beliefs and perceived need for mental health care of anxiety and depression—the patients' perspective explored. *Clinical Psychology Review, 28*(6), 1038–1058. doi:10.1016/j.cpr.2008.02.009
- Reblin, M., & Uchino, B. N. (2009). Social and emotional support and its implication for health. *Current Opinion in Psychiatry, 21*(2), 201–205. doi:10.1097/YCO.0b013e3282f3ad89
- Reeker, J., Elliott, R., & Ensing, D. (1996, June). *Measuring session effects in process-experiential and cognitive-behavioral therapies of PTSD: The Revised Session Reaction Scale*. Paper presented at the meeting of the Society for Psychotherapy Research, Amelia Island, FL. Retrieved from <http://www.experiential-researchers.org/instruments/elliott/rsrspaper.html>

- Reis, H. T., & Shaver, P. R. (1988). Intimacy as an interpersonal process. In S. Duck (Ed.), *Handbook of personal relationships: Theory, research and interventions* (pp. 367–389). Chichester, England: Wiley.
- Rivkin, I. D., & Taylor, S. E. (1999). The effects of mental simulation on coping with controllable stressful events. *Personality and Social Psychology Bulletin*, 25(12), 1451–1462. doi:10.1177/01461672992510002
- Rogers, C. R. (1957). The necessary and sufficient conditions of therapeutic personality change. *Journal of Consulting Psychology*, 21(2), 95–103. doi:10.1037/h0045357
- Rogers, C. R. (1959). A theory of therapy, personality, and interpersonal relationships, as developed in the client-centered framework. In S. Koch (Ed.), *Psychology: A study of a science: Vol. 3* (pp. 184-256). New York, NY: McGraw Hill.
- Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, 48(2), 1-36. Retrieved from <http://www.jstatsoft.org/v48/i02/>.
- Rusli, B. N., Edimansyah, B. A., & Naing, L. (2008). Working conditions, self-perceived stress, anxiety, depression and quality of life: A structural equation modelling approach. *BMC Public Health*, 8, 48. doi:10.1186/1471-2458-8-48
- Ryan, C. L., & Bauman, K. (2016). *Educational Attainment in the United States: 2015*. U.S. Census Bureau. Retrieved from <https://www.census.gov/content/dam/Census/library/publications/2016/demo/p20-578.pdf>
- Schulz, K. F., & Grimes, D. A. (2002). Generation of allocation sequences in randomised trials: Chance, not choice. *The Lancet*, 359(9354), 515–519. doi:10.1016/S0140-6736(02)07683-3
- Schwalbe, C. S., Oh, H., Y., & Zweben, A. (2014). Sustaining motivational interviewing: A meta-analysis of training studies. *Addiction*, 109, 1287-1294. doi:10.1111/add.12558
- Seeman, T. E., McEwen, B. S., Rowe, J. W., & Singer, B. H. (2001). Allostatic load as a marker of cumulative biological risk: MacArthur studies of successful aging. *Proceedings of the National Academy of Sciences of the United States of America*, 98(8), 4770–4775. doi:10.1073/pnas.081072698
- Sheppes, G., Scheibe, S., Suri, G., Radu, P., Blechert, J., & Gross, J. J. (2014). Emotion regulation choice: A conceptual framework and supporting evidence. *Journal of Experimental Psychology: General*, 143(1), 163–181. doi:10.1037/a0030831

- Sholomskas, D. E., Syracuse-Siewert, G., Rounsaville, B. J., Ball, S. A., Nuro, K. F., & Carroll, K. M. (2005). We don't train in vain: A dissemination trial of three strategies of training clinicians in cognitive-behavioral therapy. *Journal of Consulting and Clinical Psychology, 73*(1), 106–115. doi:10.1037/0022-006X.73.1.106
- Shute, V. J. (2008). Focus on formative feedback. *Review of Educational Research, 78*(1), 153–189. doi:10.3102/0034654307313795
- Stan Development Team. (2016). The Stan C++ Library, Version 2.14.0 [Computer Software]. Retrieved from <http://mc-stan.org>
- Substance Abuse and Mental Health Services Administration. (2008). *Results from the 2007 National Survey on Drug Use and Health: National Findings* (Office of Applied Studies, NSDUH Series H-34, DHHS Publication No. SMA 08-4343). Rockville, MD: Author.
- Suen, H. K. (2014). Peer assessment for massive open online courses (MOOCs). *International Review of Research in Open and Distributed Learning, 15*(3). Retrieved from <http://www.irrodl.org/index.php/irrodl/article/view/1680/2904>
- Szpunar, K. K., Khan, N. Y., & Schacter, D. L. (2013). Interpolated memory tests reduce mind wandering and improve learning of online lectures. *Proceedings of the National Academy of Sciences of the United States of America, 110*(16), 6313–6317. doi:10.1073/pnas.1221764110
- Szpunar, K. K., Moulton, S. T., & Schacter, D. L. (2013). Mind wandering and education: From the classroom to online learning. *Frontiers in Psychology, 4*, 495. doi:10.3389/fpsyg.2013.00495
- Taylor, P. J., Russ-Eft, D. F., & Chan, D. W. L. (2005). A meta-analytic review of behavior modeling training. *Journal of Applied Psychology, 90*(4), 692–709. doi:10.1037/0021-9010.90.4.692
- Thielking, M. (2017, February 6). A dangerous wait: Colleges can't meet soaring student needs for mental health care. *STAT*. Retrieved from <https://www.statnews.com/>
- Uchino, B. N., Cawthon, R. M., Smith, T. W., Light, K. C., McKenzie, J., Carlisle, M., ... Bowen, K. (2012). Social relationships and health: Is feeling positive, negative, or both (ambivalent) about your social ties related to telomeres? *Health Psychology, 31*(6), 789–796. doi:10.1037/a0026836
- World Health Organization. (2008). *The global burden of disease: 2004 update*. Retrieved from [http://www.who.int/healthinfo/global\\_burden\\_disease/2004\\_report\\_update/en/](http://www.who.int/healthinfo/global_burden_disease/2004_report_update/en/)

Wortman, C. B., & Lehman, D. R. (1985). Reactions to victims of life crises: Support attempts that fail. In I. G. Sarason & B. R. Sarason (Eds.), *Social support: Theory, research, and applications* (pp. 463–489). Dordrecht, the Netherlands: Martinus Nijhoff.

Zell, E., & Krizan, Z. (2014). Do people have insight into their abilities? A metasynthesis. *Perspectives on Psychological Science*, 9(2), 111–125.  
doi:10.1177/1745691613518075